Final Project Report

Demonstrating a Small Utility Approach to Demand-Side Program Implementation

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Burlington Electric Department
Burlington, Vermont

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Final Report

Executive Summary

The US Department of Energy awarded a grant of \$125,000 to the Burlington Electric Department (B.E.D.) in September of 1989. The purpose of this grant was to help B.E.D. test a demand-side management (DSM) demonstration program designed to quickly save a significant amount of power with little disruption to the utility's customers or its normal operations. B.E.D. is a small municipal utility located in northern Vermont, with a lengthy history of successful D.S.M. involvement.

In our grant application, we proposed to develop a replicable program and approach to DSM that might be useful to other small utilities and to write a report to enable such replication. We believe that this DSM program and/or individual program components are replicable. This report is designed to allow other utilities interested in DSM to replicate this program or specific program design features to meet their DSM goals.

We also wanted to use the opportunity of this grant to test the waters of residential heating fuel-switching. We hoped to test the application of one fuel-switching technology, and to benefit from the lessons learned in developing a full-scale DSM program for this end-use. To this end the pilot effort has been very successful.

In the pilot program we installed direct-vent gas fired space heaters sized as supplemental heating units in 44 residences heated solely by electric resistance heat. We installed the gas space heating units at no cost to the owners or residents. The installations included connection of radio control switches on the electric heating equipment in each home, allowing us to shut off all or most electric heat during peak hours. In this way, the coincident contribution to peak from electric space heating in those homes was virtually eliminated. The design phase of the project began in December of 1989, and we completed the last of the installations in March of 1991. We surveyed participating customers. The results of those surveys are included in this report and preliminary estimates of winter peak capacity load reductions are also noted in this report.

B.E.D.'s application for federal funds sought to test the potential for designing and operating a DSM program which addressed concerns we thought might inhibit small utilities from investing in such programs. These concerns include: lost revenues; maintenance of the established utility-customer relationship; the need for predictable, reliable and significant savings; the perception that DSM programs cannot be operated quickly; and the need for minimal impact on utility staff. We hoped through this pilot effort to determine which were the real concerns and to what extent were they problems.

B.E.D. tried to address most of these concerns through initial program design. To the extent that the program could work precisely as designed, the problems related to these issues would be minimized. By using supplemental fuel switching (units not sized to replace a residence's total heating load) and by limiting the utility control to costly peak hours, lost revenues are lessened. We ensured reliability by turning off all or almost all remaining electric heat during peak times. By designing a project time line that limited the installation phase to six months, the utility quickly realized program savings. Since electric heat's coincident contribution to peak averaged 3.5 KW per home before the program, controlling this load created significant peak load reduction.

We did not ask participants to pay for the installations, in this pilot phase, eliminating a significant barrier to their participating. Since participants still had to pay their heating bills and since the program would reduce electric costs for both participants in the short run and non-participants in the long run, we believed it would help us maintain our excellent relationship with all of our customers.

An important question at the outset of the program was whether customers would participate in this program. Would customers accept supplemental heating units that might not fully meet their heating load, especially during the coldest days of the winter? Would customers allow their electric heat to be controlled by their utility during peak hours? Could this program be operated successfully with minimal liability to the utility and without damaging its relationship with its customers?

To increase the likelihood that these questions would be answered positively, we adopted three standards for evaluating each program component before its inclusion in the final program design:

- 1) Few or no customer complaints,
- 2) A desirable program with easy participation, and
- 3) No disruption of utility operations.

Our goal of producing quick, reliable and significant savings and these three standards guided program design and operation decisions. The program produced the following results:

- an effective penetration rate of 66% of the target audience;
- only two minor customer complaints in the program's 16 month operation;
- building owners, contractors and B.E.D. personnel had high praise for the program;
- an average of four site visits by contractors and B.E.D. staff per participant;
- a total of 30 person days of B.E.D. staff time in a 9 month period were required in the actual marketing and installation in 44 residences; and,
- an estimated reduction of 154 KW of winter peak demand.

The total cost for the installation of 48 heating units and the load control switches in 44 residences was \$97,814.65. The average cost of the entire project per residence was \$2223. The program reached 20 single family and 24 multi-family units. Assuming an average peak KW savings per residence of 3.5 KW, the cost per peak KW saved was \$635.

Lawrence Berkeley Laboratory is currently planning an evaluation of energy savings achieved by the project. This study will examine the program's overall impact on energy consumption the extent to which customers shifted their off-peak consumption to gas, and the relationship of energy and cost savings to the efficiency of the heating equipment and the manner in which it is used.

Using lessons learned and assumptions tested in this pilot program, in April of 1991, B.E.D. initiated a full-scale electric heat conversion program. Designed to reach about 1500 customers over 5 years, the program, called Heat Exchange, is planned to achieve a reduction of 5 megawatts and 12 million kilowatt hours annually.

While built substantially on the foundation of the pilot program, it differs in very significant ways. The pilot program was designed to achieve immediate capacity savings through rapid and high penetration levels. The results of the program substantiated that this program design can achieve these results. B.E.D. faces very different needs at this time, however. Due to a capacity surplus, we do not need immediate capacity savings. Due to current economic conditions and the overall effectiveness of our energy conservation program efforts we do not need to implement the program rapidly. We feel this provides us the opportunity to test whether we can reach similar penetration levels over a longer period of time with a smaller subsidy. Therefore, the design of Heat Exchange includes the following differences from the pilot:

- we will require that customers repay a portion of their predicted energy savings to the utility, still maintaining an overall positive cash flow;

- program financing will offer the choice of a low-interest loan or a rebate;
- customers will have the option of installing central heating systems, and our contribution will be the same as towards the space heating option; and,
- the customer will be free to choose whatever heating fuel they wish.

How to Use This Report

B.E.D. has prepared this report for small utilities that are considering investing in demand side management (DSM). This project tested a specific DSM program for a small utility in Vermont, a severe heating climate. The specific technology tested may or may not be applicable to other utilities. However, it proved the viability of program design features that could be included in programs dealing with a wide range of DSM technologies. We believe that this DSM program and each demonstrated program design feature are replicable by other utilities.

This report has been designed to be used in different ways. The main body of this report presents a thorough explanation of what we did and why we took the specific actions we did. Careful reading of this Final Report and the Appendices should allow interested persons to replicate this program and achieve results comparable to those we achieved. Each tool designed to implement this program appears in these Appendices. Persons who are solely interested in investigating specific program design features may wish to begin by examining the appropriate appendices. If any of these program design features are of interest, the contents page will allow readers to locate the explanation of how and why we used each specific tool.

Note: Documents presented in these appendices reflect the state to which they were developed for B.E.D.'s particular situation at the time of this demonstration program. We strongly recommend that utilities wishing to adopt these documents seek competent legal assistance in tailoring them to their own situation.

The section entitled "Program Design" provides a capsule summary of key program design parameters.

Some readers may wish to read this report and then consult with specific individuals whose effort enabled this demonstration to succeed. The section entitled "Project Staffing and Acknowledgements" along with the list in Appendix C. will enable readers to contact individuals who made contributions to this project and who have indicated a willingness to be contacted.

Finally, Appendix S. presents a brief description of the full-scale DSM program which was subsequently developed from this pilot effort. The description of modifications which we made in developing our current full-scale program will help interested readers further interpret our experience and refine their own plans.

Project Staffing and Acknowledgments

Robert Young, the outgoing General Manager of B.E.D., managed B.E.D. during the duration of this project. James Lauzon, the former Manager of Power Supply and Resources, was responsible for all DSM and other supply issues at B.E.D. during this project. Thomas Buckley, B.E.D.'s Director of Energy Services, served as principal investigator for the D.O.E. grant and was directly responsible for all aspects of this project. Chris Burns, B.E.D.'s residential energy specialist, was the program's field specialist and implemented all training programs discussed in this report. B.E.D.'s Energy Services Administrative team of Michelle Adams and Mary Austin devoted considerable time and effort to the program and this report. A variety of B.E.D. personnel, including key persons in Resource Planning, Consumer Relations, M.I.S. and Finance areas also contributed to the success of the project.

Paul A. Cillo and Harlan Lachman of The Energy Efficiency Institute (EEI) developed the idea for bringing this plan to D.O.E. They were involved with the program design and development of many of the tools included in the Appendices. They designed and helped implement the training programs described in this report. EEI is also responsible for much of the work on this final report.

Richard C. Diamond and the team at Lawrence Berkeley Laboratory was responsible for the design of the random sample procedure used to select program participants, design of the evaluation tools and evaluation procedures. He also provided the initial version of the post-program customer survey instrument.

Dr. Roberta Walsh of the University of Vermont planned and facilitated a focus group meeting used to test program design features, her report appears as Appendix C. In addition, she assisted in refining the post-program customer survey instrument.

Dr. Susan French, of Human and Environmental Resource Studies, designed and completed the customer survey analysis that appears as Appendix S.

This project was a joint effort of many parties. A key role was played by members of the program advisory committee who provided many of the key program design attributes. Their role is described in more detail in the section entitled "Community Input", and their names and organizations are listed in Appendix B.

Finally, we'd like to thank those who were the real key to the success of this project---the customers of B.E.D. Their patience during our learning phase and the excitement of experimentation which they gladly shared with us drove the entire process to success.

Background

An overview of the Burlington Electric Department and the city of Burlington may help readers to understand the development of this project and the inclusion of specific program design features.

B.E.D. is a municipal electric utility servicing 14,130 residential and 3550 commercial customers in the City of Burlington which has a population of 38,752. We have a long history of developing and implementing demand-side management programs (see Appendix A.):

- B.E.D. was the first Vermont utility to use high-pressure sodium in new street lighting installations beginning in 1977;
- B.E.D., in the late 70's, pioneered energy-efficient construction techniques, still rare at the time, leading up to the 1983 development of a city-wide energy efficiency ordinance, one of the first of its kind;
- in 1981, B.E.D. funded energy efficiency and load management initiatives with a \$2 million revenue bond issue. These included a Wrap-Up/Seal-Up hot water heater wrap and weatherization program in 1982 - 83;
- in 1984, B.E.D. invested in demand-side management programs for the city schools;
- B.E.D. installed a System Control And Data Acquisition system (SCADA) for load control completed in 1986; and,
- During this time, B.E.D. offered a wide variety of other energy-saving programs targeting both residential and commercial customers.

B.E.D. maintains a small but well-trained and committed staff in its Energy Services area. These individuals have been responsible for developing and implementing the on-going DSM program initiatives at B.E.D.

Vermont has a harsh climate with a design winter temperature of -12°F in the Burlington area. This is colder than Juneau, Alaska; Reykjavik (Iceland) and Moscow (USSR). In this climate, space heating accounts for the largest component of annual building energy consumption. While fuel oil has long been the mainstay of space heating fuels in Vermont, the oil crisis of the early seventies led to a conversion from oil heating to electric heating as a way to reduce vulnerability to oil price hikes and supply shortages. In 1989, approximately 22% of B.E.D.'s residential customers heated solely with electric heat. Vermont's climate and the increased use of electric space heating have been major contributors to historical winter peaks among Vermont's electric utilities.

Many owners of multi-family rental housing converted from oil to electric space heating in the 1970's. They did so largely to avoid the untenable position of paying for their tenants' heating costs while having little control over the lifestyles that contributed to those costs. Building owners converted to individual apartment metering, shifting the cost of heating to their tenants. Since building owners no longer paid for heating costs, they had little incentive to finance changes to the heating systems in their buildings as long as the units remained marketable. Without this incentive, building owners have often been reluctant to invest in energy efficiency. Since tenants do not own their residences, they too have been reluctant. This reluctance has lead to difficult penetration of utility energy efficient building retrofit programs in the multi-family housing sector.

The political climate in Burlington has also affected the design of this project. For the past ten years, Burlington has had progressive mayors with strong social agendas. Equity issues, especially those issues affecting low income and elderly persons, play a major role in decisions in Burlington. Since many low income and elderly persons live in Burlington's rental housing, it was imperative that any residential DSM program effectively serve the multi-family housing sector.

Project Description

Given our winter peak demand, the prevalence of electric heating, and concerns about revenue erosion from a successful and significant DSM effort, we decided to investigate the feasibility of a program to control residential electric heating during peak hours, supplementing the existing electric heat with gas space heaters. We selected gas because Burlington is the home of Vermont's only major supplier of inexpensive natural gas and of many LP gas dealers. The program could thus eliminate much of the contribution to peak load from electric space heating while maintaining some portion of off-peak kwh sales. We designed this project to test the feasibility of this retrofit.

We acknowledged from the beginning, however, that since natural gas averages less than 1/3rd the cost of on-peak electricity as a heating fuel, consumers would choose to use gas for much of their off-peak heating as well. One objective of program evaluation will be to determine to what extent they do so.

We applied to DOE on January 12, 1989 for a grant to help demonstrate this program in a way that would be replicable by other, particularly small, utilities. DOE funded this grant in September of 1989 and we began work on the program's design in December.

On the surface the project was simple. We would install one or more gas fired space heaters in electric heated homes at no charge to the customer, providing the owner allowed us to control the electric heat during peak hours. Since it was a pilot program with limited funds, only a randomly selected group would receive this offer.

In the original program design, customers who preferred to convert to a central heating system were to be offered the opportunity to do so. In these cases, we would pay for a percentage of the conversion equal to the amount we would have spent for the supplemental space heating unit(s). However, because B.E.D. was planning to expand this pilot effort into a program that partially subsidizes central heating conversions, called Heat Exchange, we dropped this option from the pilot program. We offered customers who desired a central heating system the opportunity to be put on a waiting list for the Heat Exchange program. This program is described in more detail in the last section of this report, entitled: "The Heat Exchange Program."

Program Design

One of the first major decisions made about the program was how much of the cost we would pay. We decided to test a full-cost program. A full-cost program is one in which all program costs including installation costs are absorbed by the utility. Why?

A full-cost program would provide several benefits. Since the utility was paying the full cost; we presumed:

- customers would more willingly test novel supplemental heating systems;
- customers might more easily accept certain program features such as:
 - 1) using one of a limited number of space heater models which were bulky and required vent holes to be drilled in their walls;
 - 2) using a contractor they did not know well; and
 - 3) allowing electric heat to be shut off during our peak hours, possibly causing some rooms to be cooler than those to which they were accustomed,
- we could test customer acceptance of the heating system and program mechanisms per se, without needing to sift through the impact of customer economic considerations; and,
- we could overcome the traditional difficulties in reaching rental customers.

The project also tested three assumptions about DSM program design. The first assumption was that when people are confused, they tend not to act. We decided that any confusion created by the program might be a disincentive to participate and thus limit program participation. Therefore, every program design feature was held up to the standard: "Is it simple?"

Our second assumption was that any complaints could damage the relationship the utility had built with its customers. Many utilities have legitimately seen DSM as potentially harmful to customer relations. Such questions as, "How will non-participants feel? What if something goes wrong? What if customers participate and there are no savings?," are legitimate concerns. The survival of small utilities depends on a trusting and healthy relationship with their customers. We adopted "zero complaints" as a program goal.

Our third assumption was that a utility cannot afford distractions that might disrupt its normal operations. We evaluated all program design decisions for their impact on our staff and operations. We designed the program to minimize this impact.

When formulating their DSM program design, other utilities may or may not make these same assumptions. If they do, they can simply run this program as designed, adapt the basic mechanisms to other appropriate technologies, or adopt as many program components as seem appropriate. However, even if a utility faces different circumstances and needs to base its program decisions on different assumptions, many program design features will be applicable.

Key design elements included at the outset of the program included the following:

- 1) Customers were asked to pay nothing. Since we were offering free installation of gas space heaters to program participants, we felt free to try out a heating system which we initially believed might be unpopular with some customers. We felt at first that this system design might have resulted in some questions and complaints in a DSM rebate program. In fact, we found this to be so insignificant a problem that we have adopted the technology to a loan/rebate version for our Heat Exchange program (see "The Heat Exchange Program" at the end of this report).
- 2) Program options were minimized. We offered ten models of direct-vent space heaters to program participants. This made the decision for the customer very simple. Either the models offered were acceptable to the customer, or they did not participate. This program decision also simplified matters for our staff. The program staff did not have to research the safety and reliability of many different units requested by customers. They also did not have to respond to equity issues raised by customers who resented receiving one model when someone else received another. This resulted in only a few different installation types to inspect, reducing the training time for the field staff and increasing the likelihood of accurate inspections.
- 3) The contract signed by the customer was simple while affording adequate protection for us and our customers. Lengthy and complicated contract documents can appear frightening. Even an agreement that appears to be complicated could waste staff time if the field specialist must explain such an agreement to each customer or alleviate fears about what some customers might consider "legalese."

A major accomplishment of this project was the use of the "agency relationship" to define the role of B.E.D. with its participating customers for the purposes of this DSM program. Customers signed an agreement authorizing us to act as their agent with a contractor. The agreement establishing this relationship between us and the building owner was short, simple and easy to read (see Appendix D.).

As the customer's agent, we introduced the contractor to the job and monitored his/her work. The contractor was held liable for the system design, the equipment and the quality of his/her installation. The description of essential program features and all the usual legal clauses that protected the parties involved appeared in a lengthy contract with the contractor, signed by B.E.D. acting on the customer's behalf. This did not appear to present an impediment to contractors participating in the program, since they were accustomed to contractual relationships, and since direct dealings with B.E.D. insured prompt and full payment for acceptable installations.

- 4) Contractors were pre-screened by the utility. There are several ways to work with contractors in a DSM program that involves contractor installations. A common method is to maintain a list of contractors who agree to work according to program guidelines. The customer selects a contractor and the utility is somewhat exempt from liability because the customer makes the selection and the contractor has agreed to meet the program standards.

We decided that using this method might cause some customers not to participate in the program. Customers would have to invest their time obtaining bids, choose a stranger to work in their home, and assume liability for the job. Additionally, while B.E.D.'s legal liability might be lessened using this method, we probably would have rectified any problems for our customers anyway, out of our commitment to strong customer relations. In other words, this approach might have created problems while offering few benefits.

We chose to pre-select a limited number of contractors to develop proposals for this project, while the customer retained the right of choosing another contractor if so desired. The utility used a system that initially opened the process to all area heating contractors and gave them an equal opportunity to participate. A public notice was issued announcing the offer and an informational meeting was held for all interested contractors. We selected seven contractors for interviews and chose three to work in the pilot program.

By retaining a few contractors, we also simplified the program. Dealing with fewer, pre-selected contractors who could be carefully trained and who had committed to program goals would reduce the time requirements for staff and customers. It would also allow us to more closely control customer/contractor interactions. It is telling that not one customer chose a non-program contractor to handle their installation.

- 5) Contractors were trained and given responsibility for the system design in each home. We held a training session for potential program contractors to explain how the program worked and what we expected from participating contractors. The training emphasized the difference between participating in this program and the usual requirement to market the job and their services. By the time the contractor entered the home, we had successfully marketed the job and the contractor had already been selected to make a proposal; not the usual relationship that a contractor has when first meeting a customer.

Once a building owner expressed interest in participating, a pre-selected contractor went with our field staff person on the initial visit to the home. While the field specialist explained the details of the program and the agreement to the owner, the contractor surveyed the home and decided on the size, number, placement and cost of the heaters we would offer to install. The field staffer also explained to customers the option of using their own contractor if so desired. He then reviewed and approved the plan prior to installation.

Putting the onus of design and system selection on the professional reduced our liability, simplified the specialist's job and put the field specialist in an advocacy relationship with our customers.

- 6) Program mechanics were designed to mesh with existing utility operations. We paid contractors using normal accounts payable procedures. Installation of the SCADA control equipment in each building used installation procedures similar to now familiar hot water heater load controls and conventionally available relay enclosures. These were installed by electrical contractors. City building inspectors inspected the heating systems as they do any such system.
- 7) Telemarketing of randomly selected residential electric heat customers was designed to be done quickly by in-house personnel. Though we could have used contractors for telemarketing, we decided to use our own personnel. They were already familiar with us and regularly represented us on the phone and in-person with customers.

We selected B.E.D. staff and offered them an opportunity to work for a few evenings on this project for overtime pay. Then, we carefully trained them. Trainers gave them a prepared script and answers to typical questions, had them role-play potential conversations, and monitored and critiqued their first few conversations. The telemarketing was designed to be brief and to the point. The

telemarketer gave the owner a simple explanation of the program and asked whether the owner was interested. Telemarketing staff were specifically instructed not to try to sell owners on the program.

The total time spent by the telemarketing staff for this pilot project was 22 person hours.

- 8) B.E.D. decided to control all space heating but not to leave a customer with an uncomfortable house. Before the beginning of the installation phase, we considered controlling only a portion of the electric heating in participating customers' homes. This would have eliminated any concern about a customer being uncomfortable when the electric heat was controlled. By doing this, we would have lost the certainty of eliminating the entire heating load and program savings projections would be less reliable.

The solution chosen was to control all or almost all of the electric heat. If a customer complained about being uncomfortable, we were prepared to remedy the situation -- even if it meant disconnecting all the controls. This solution maintained a program design that assured savings. It did not allow the design to be determined by concerns that did not materialize.

Community Input

Once we resolved some initial design issues, we believed it was important to review the program plan with professionals in the DSM community and with potential program participants in the Burlington community.

Advisory Committee

Included in the grant application and initiated early in the design process was the formation of a program Advisory Committee. Individuals selected to serve on the Advisory Committee included people with a variety of backgrounds and perspectives on DSM programs. Included among the members of the Advisory Committee were a marketing specialist, an area contractor, a DSM program evaluation expert from the Hood River Project run by Bonneville Power Administration in Oregon, a former utility regulator, a staff person from the American Council for an Energy Efficient Economy (ACEEE), a DSM program design consultant and members of B.E.D.'s staff. Program design consultants from the Energy Efficiency Institute, Inc. staffed the meetings (see Appendix B. for a list of the members of the committee).

The committee met twice to minimize project expense and the members' time commitments while ensuring a useful role. We held the first meeting of the committee on January 22, 1990 during the design phase of the program after some preliminary design work had been completed. We sought comments from these professionals before completing the final program design.

We held the second meeting of the committee on October 12, 1990. At that point, the installation phase of the program was well underway. The committee was briefed on the status of the project, visited a completed installation and was asked to discuss methods of evaluation and analysis. They were also asked what form of final report would be most useful to other utilities interested in replicating this project.

These discussions with the Advisory Committee produced many useful program operation and evaluation ideas. We incorporated most of those ideas into the program design. Some of these design features include:

- using an agreement form for tenants to ensure they were notified of the program before installations took place in their homes,
- marketing the program based on the societal benefit as well as the personal benefit to participants,

- checking with the Attorney General's office to see whether complaints have been filed against a contractor who applied to work in the program,
- using measurable contractor selection criteria to avoid complaints about the process,
- specifying in the contract that arbitration will provide the final resolution in any program dispute to minimize the potential for lengthy legal proceedings,
- soliciting bids for typical units as the cost basis for selecting contractors,
- providing a contractor training session; and,
- using photos of typical units for customers to see during the home visit to help them to decide whether and how to participate.

Another idea that arose from the initial Advisory Committee meeting was to conduct a focus group of potential program participants before beginning the program. The purpose of the focus group was to look for any unanticipated barriers to participation and to test the program design by presenting it to typical electric heat customers. In the spring of 1990, work began to assemble a focus group for this purpose.

Focus Group

B.E.D. contracted with Roberta Walsh, PhD. from the Department of Consumer Studies at the University of Vermont to conduct a focus group meeting and to report to us on its results. We randomly selected focus group participants from the list of customers identified as having electric heating.

On the evening of May 3, 1990 the focus group meeting was held in the B.E.D. auditorium. 12 people had been invited by telephone, 9 attended the meeting. We videotaped the entire focus group meeting. Refreshments were available for the focus group participants throughout the evening.

Participants received a written agenda for the evening. The meeting opened with an explanation of how the program would work. Participants were encouraged to make comments or ask questions whenever they wanted during the two hour meeting. B.E.D. staff were present only as observers. A report on the results of the focus group appears in Appendix C.

The focus group served to both true up the program design and to raise some new issues. Some of the participants' questions had already been raised and discussed by B.E.D. and its consultants before the focus group meeting. It was extremely helpful, however, to have the issues confirmed by potential participants. The new issues raised were also helpful in preparing a final program design. For example, two of these issues were: homeowners' concerns about

the safety of a gas installation and the location of LP gas tanks or bottles as aesthetic issues. These two issues, in fact, turned out to be two of the primary ones which program implementers needed to address. Raising these issues at the focus group meeting helped to prepare our staff for dealing with them when they arose during the marketing and installation phases of the program.

Staff Selection and Training

Staff Selection

We decided to use skilled field staff to ensure that we properly served our customers. We knew that the program was more likely to achieve the desired results if the utility had control over the program's operation to the greatest extent possible. We selected staff and chose contractors based on their skills and commitment to do the job.

The positions that were key to the success of this project were the telemarketers, field specialists and the contractors. We used a strict selection process to ensure that the individuals chosen for these roles understood program goals and had the background and ability to do the jobs.

For telemarketers, we selected skilled staffers who were familiar with B.E.D., its programs and its commitment to its customers. They were also experienced in communicating professionally on the telephone and understood how to work as part of a team.

Our field specialist had three years of actual field experience in residential weatherization programs. He was knowledgeable about options for solving home energy problems and knew how to work with building owners and occupants to accomplish energy efficiency retrofits. He also had experience working with building owners and tenants in this field and was familiar with the special issues that arise in multi-family housing situations.

Each contractor was experienced with the installation of residential energy efficiency retrofits and specifically with the installation of high efficiency direct-vent gas space heaters such as those installed as part of this program.

Training

Selecting people with the commitment and skills to do the required job is important to the success of a program, but it is not enough. Even the individuals most suited for a job must be properly trained to perform their specific duties.

Training in this pilot project ensured that all program staff including contractors understood their specific responsibilities and how their role related to the overall intention and direction of the project. Therefore, all training began with an overview of the project goals.

Many utilities benefit from the on-the-job approach to training individuals who already have appropriate skills and background as DSM staff. For many traditional DSM efforts, such as residential energy auditing, this approach has proved more than adequate, as the policy issues are limited and most technical problems are easily resolved.

A pilot program such as this encompasses many steps and decisions. New program designs invariably need fine tuning once in the field. Decisions based on a staff member's prior experience may or may not be in alignment with the overall program goals. Such day-to-day decisions can reshape program policy, and once made, are difficult to undo.

This pilot demonstrated that a carefully orchestrated training program prior to field implementation can surface many of the issues requiring program design adjustments and address them consistent with the program goals.

- 1) Training of telemarketers ensured that customers received a brief and friendly invitation to participate and were not badgered by employees trying to meet quotas.
- 2) The field specialist training eliminated confusion from the series of contacts with the homeowner, contractors, gas utility representatives and the city building inspectors. The goal of the training was an ordered program that did not inconvenience building owners or occupants.
- 3) Contractors were trained so that once they began to interact with customers, very little was left to chance.

The training began with an explanation of the program goals and the trainee's duties. The trainer set up sessions designed to demonstrate potential problems and to offer the trainee the opportunity to respond to the problems they were likely to encounter. The trainer provided a critique to ensure that the trainees knew how to respond to problems in a way that was consistent with the program goals.

Implementation

Contracts

Once an eligible customer decided to participate in the program, he/she signed a contract with us establishing an agency relationship. The agency relationship established us as the agent for the owner for the installation of the equipment paid for by us. This agreement is a simple, contract written in easy to read language (see copy in Appendix D.). This was the only contract the customer had to sign. It contains none of the clauses about what the contractor is responsible for doing or the consequences for not performing. It simply states that the contractor is responsible for the work. As the customer's agent, we acted on their behalf to ensure compliance by the contractor with the terms of a detailed contract the contractor was required to sign with us.

The detailed contract with participating contractors provides us and our customers with maximum protection by placing all liability and responsibility for installation with the contractor (see copy in Appendix E.). One contract was signed for each project. No "blanket" contract between B.E.D. and the contractor existed which detailed the relationship. This allowed us a review of the contractor's quality control from contract to contract, with the option of discontinuing the working relationship at any time we needed to. The contractor's incentive to sign was that it assured she/he would be introduced to work without any marketing expense. In addition, we made a commitment to contractors to expedite payment upon successful completion of each project. We were able to pay them within 1 week at all times, as we made this a top administrative priority. We gave each contractor a copy of this contract before she/he agreed to participate in the program. She/he had plenty of time to review the contract with their lawyers or to discuss it with us. When the contractor entered the first customer's home, she/he understood the agreement and knew that it would be used for each project.

Coordination with Gas Utilities (LP & Natural gas)

Since B.E.D. was arranging for the installation of gas heating to supplement electric heating already in place, coordinating with the gas suppliers was imperative. Before finalizing the program design, our staff met with representatives of Vermont Gas, Inc. (Burlington-based

supplier of natural gas) to discuss the logistics of getting participating B.E.D. customers who were near Vermont Gas supply lines hooked on to the system as quickly and simply as possible.

Vermont Gas provided maps of the city that showed where gas lines existed and where they were planned. B.E.D. and Vermont Gas agreed to a hook-up schedule, a method of customer referral and a system for dealing with customer complaints. Multi-family buildings often presented fairly complex gas piping problems which required joint problem-solving.

Some B.E.D. customers selected to participate in the pilot program were not in areas of the city supplied with natural gas. If the owner wanted to participate and receive a system designed for LP gas she/he then selected a supplier. We gave each customer a questionnaire to use in interviewing potential L.P. suppliers (see Appendix F.).

Contractor Selection

We placed a public announcement in two area newspapers for a 14 day period (see copy of announcement in Appendix G.). We invited contractors who responded to this announcement to a public information and training meeting held in the Burlington City Hall conference room (see the agenda in Appendix H.). Twelve contractors attended this meeting. At the meeting, we explained the program, outlined program goals, detailed the role of the contractor, and answered questions. We emphasized that while contractors operated independently of B.E.D., their work reflected on us and affected our relationship with our customers. Contractors were told that any action by a contractor that harmed our relationship with any customer would create a serious problem.

We invited those contractors interested in participating to submit a bid on two typical installations specified by B.E.D. (see copy in Appendix I.) with a description of their business, including their qualifications and experience with gas installations. Seven contractors submitted applications. We interviewed all seven contractors and evaluated them based on criteria established before the interviews (see Appendix J.). As is evident from the list of criteria, our major concerns were each contractor's ability to safely install gas systems, their willingness to adopt the program goals as their own, and their commitment to customer satisfaction. We checked references, checked with the Attorney General's office and selected three contractors.

Marketing

B.E.D. used a fairly simple algorithm to segregate a listing of its customers most likely to

have all-electric heating (see Appendix K.). No stratification scheme was developed given the small size of the sample. Based on experience, we queried our data base for customers whose winter to summer energy consumption differential and gross annual consumption matched that of known electric heating customers. While neither exhaustive nor foolproof, this list proved to be almost 90% accurate when used as the basis for random selection of customers for program marketing.

Telemarketing was the sole marketing method used for the pilot program. As described earlier in this report, an offer went out to employees at B.E.D. to make extra money by working a few evenings. We selected two employees as telemarketers from those who expressed interest. The individuals selected had strong communication skills, were familiar with our programs and had loyalties to us.

The first element of the marketing training program was a clear explanation of the program. The trainer ensured that they understood the program goals and agreed to do what they could to meet them.

We prepared a sample script for personnel to use during phoning to show the telemarketers how to market the program (see Appendix L.). The trainer explained that they did not have to follow the script exactly, but should at least follow the order of the sample conversation.

B.E.D.'s policy was to limit the number of attempts to contact a customer. If, after two attempts on two different evenings, the telemarketer could not reach the person who could make a decision for that location, the next person on the random list was contacted. Telemarketers were instructed not to leave a message on answering machines. We did not want to burden our daytime customer service personnel with people returning calls.

For 2-3 hours on the first evening, the trainers met with the telemarketing personnel to outline how the telemarketing would work. They instructed the telemarketing personnel to begin making telephone calls from the random list of customers. They then critiqued these calls for style, the accuracy of answers to customers' questions, and the clarity of the invitation extended to each customer. During the critiques the trainers emphasized that the telemarketers should not try to convince the customer to take the offer, but to ensure that the customer understood the offer, received answers to his/her questions, and made a decision. If a customer expressed interest, the telemarketer noted the name on a telephone contact form (see copy in Appendix M.) and told the customer that a specialist would call to schedule a site visit within 10 days. If a customer was not interested, the telemarketer thanked him/her for listening to the offer and asked "for our records" why she/he was not interested. The telemarketer recorded this information on the contact form.

Before the second evening of phoning, we prepared a list of appropriate responses to specific questions that the telemarketers had received from customers during the first evening. This information resolved most of the issues to which the telemarketers had to respond.

The telemarketers called between the hours of 6:00 and 8:00 o'clock in the evening on Mondays, Tuesdays and Wednesdays. These days were thought to cause the minimum of disruption to customers. It took the two telemarketers a total of 22 person hours of telephoning to arrange for 48 installations. Their effort produced a program penetration rate of 66% of those contacted saying they were interested or would wait for our Heat Exchange program so they could install a central system. This excludes those contacted who had already converted to gas.

Multi-family buildings could have presented special difficulties, as it is often difficult to locate the key decision makers. We made a simplifying, if somewhat risky decision. We simply called customers at random, and after a brief introduction, asked them their housing type. If they were tenants of a multi-family structure of less than 5 units, we asked them how to reach their building owner. All subsequent contacts were then made with the building owner.

The results of the telemarketing effort were:

79 households were contacted

- 12 households reported that they had already converted to oil or gas
- 38 households accepted the offer
- 6 households wanted a central heating system without further information
- 35 households either rejected or did not want to discuss the offer

Reasons given for rejecting the offer included:

- owner was elderly and didn't want to make any changes
- electric heating bills were not a problem
- owner was planning to sell in the near future

Scheduling

Once the telemarketer made the initial contact with the customer and the customer decided that they wanted to participate, the field specialist made a follow-up phone call. In this telephone call, the field specialist briefly reviewed the program with the customer, made certain the customer understood the program, and verified the customer's interest. If the customer still wanted to participate, the field specialist scheduled a visit to the home. These

phone calls averaged 5-10 minutes in length. The specialist then mailed detailed program information to be discussed at the home (see Appendix N.).

The field specialist asked the selected contractors which days of the week they would be available to schedule home visits. The field specialist scheduled visits on those days.

Site Visits

The initial site visit was an essential part of the program. This was the first time the B.E.D. field specialist met with the building owner. The contractor also met the customer for the first time during this visit. In addition to meeting both the field specialist and the contractor, the customer was also asked to review the contract.

In the case of multi-family housing, all visits were scheduled with the building owner. We encouraged that tenants be present whenever possible, to enhance their understanding of the program and to obtain their commitment. In general, however, we left most of the responsibility in the hands of the owner, who was free to treat this conversion much like any other home improvement.

Much care and training went into preparing for these meetings. The role of the field specialist in the home was to oversee all the interactions with the owner and coordinate between the owner and the contractor. The field specialist explained the program mechanics and reviewed the contract with the owner. It was also the field specialist's job to oversee the contractor's activities in the home and to recommend any additional energy saving ideas. The contractor took responsibility for taking all necessary measurements in the home and for recommending to the field specialist the best location(s) for safe and efficient installation of the space heaters. The contractor also noted where gas piping would run and other issues which might affect the installation price.

Generally, the specialist introduced both himself and the contractor to the owner at the door when they arrived and then sat with the owner to discuss the program and the contract while the contractor looked over the layout of the home and any constraints to a standard installation. See Appendix O. for organization of site visit contained in the specialist's field manual. The Executive Summary of the Field Manual is included as Appendix P. During this time the contractor developed a proposal for the space heater installation. The contractor reviewed this proposal with the field specialist and the customer to arrive at an agreed-upon number of units to be installed and their location(s).

The field specialist offered the owner a contract. Since price was not a part of the contract between us and the owner, the contract creating the agency relationship with us could be signed immediately even though the contractor had not yet developed a price for the installation. At this time the homeowner was informed of the option to bring in an additional contractor if so desired. This helped to establish the "agency" relationship and gave the owner some responsibility for the choice of contractors. If the owner wanted more time to think about the program, to review the contract or obtain bids she/he was given two weeks to decide whether or not to participate in the program. After two weeks, she/he would no longer be eligible. This short time line eliminated procrastination, simplified contractor scheduling of work, and minimized the number of cases in which our field specialist had to track the status of prospective participants.

After leaving the home the contractor developed a price for the installation and gave it to us. We had the right to reject the contractor's proposal if it did not seem reasonable or if it was not in line with the prices submitted with the contractor's original program application package. If we rejected the proposal price for a given installation, our field specialist could call on another contractor to get a price.

Thirteen of the building owners signed the agreement before the specialist left the home. Seven owners dropped out of the program or were disqualified after the home visit. Either the heating system was not perceived as adequate, or in two cases, did not fit into the interior design of the home. On average, owners who chose not to sign the contract during the site visit took seven working days to return the signed contract.

Multi-family housing presented a special case. Although the agreement signed by the owner was identical, we asked that the owner obtain a tenant fuel record release (see Appendix Q.). This backed up the requirement in the contract that participants provide us survey information after the retrofit for a period of up to three years. This release served the dual purpose of obtaining permission to analyze tenants' fuel consumption, and also of insuring that tenants were aware of the planned heating system conversion. In general, tenants were very enthusiastic about the retrofit.

Installations

All installations in this program involved the use of direct vent, sealed combustion gas space heaters which are relatively inexpensive to install. The existing electric resistance heaters remained in place and could be used as much as desired during off-peak hours. They provided owners with the assurance that there would be adequate heating capacity in their homes since the supplemental space heaters were not usually adequately sized or able to distribute enough heat evenly to handle the entire space heating load. The space heater installations generally involved one to four days in the customer's home depending upon the complexity of the installation. An additional visit to the home by the electrical contractor was required to install the load control switches.

Multi-family buildings presented a variety of challenges. Typically we would leave scheduling issues in the hands of the owner or property manager. Generally they were willing to handle this. In some cases, the owners would ask that our contractors do the scheduling, and provide a tenant contact list. Although we cooperated when requested, this was the more time-consuming method and was discouraged.

As mentioned earlier, gas piping in multi-family buildings often became more complex than in single-family, and therefore required a larger effort and more careful coordination with the gas company. These additional expenses were very often offset by the economy of scale which these buildings provided.

Installing load control switches was more difficult in multi-family residences, since the incentive of a new heating system no longer motivated the building owner to coordinate installation scheduling.

The main limitation of the direct vent space heaters was in heat distribution. If at any time during the conversation with the owner, the telemarketers or the field specialist sensed that the owner would only be satisfied with a central system, they referred the owner to B.E.D.'s Heat Exchange program. Four owners who received home visits opted to wait for the Heat Exchange program.

To ensure maximum comfort with the space heaters, the field specialist and the contractor determined which rooms were most often occupied or required heat during peak hours. Whenever possible, a space heater was located in these rooms. In ten of the installations, ducts were used to distribute heat from a heater installed in an adjacent room. This was

almost never needed in multi-family housing. Tenants very often were already accustomed to zoning, and the smaller areas were often easily heated from a single source without a distribution system.

Additionally, the installation of these units had to meet safety clearance requirements for proximity to windows, roof overhangs, any building surface, and to the ground as itemized in the 1987 BOCA building code.

Aesthetics also affected the location or feasibility of space heater installations. The appearance of some interior wall surfaces was so important to customers that they did not want space heaters affixed to them. For other owners, the appearance of the installed heaters themselves was an important consideration. This was seldom a consideration in rental housing. Owners did have some choices regarding space heater models. The specific models of space heaters offered in the program are described in Appendix R.

Inspections

The city building inspectors performed a safety inspection of the space heater installations just as they do for any other permanent heating installation in the city. Their visit was arranged by the contractor.

Once the city building inspector had completed the inspection and approved the installation's compliance with applicable codes, she/he sent a certificate of inspection to us. This certificate was our notice that the project was complete and payment could be processed. The inspection by the city building inspector ensured safety for customers.

Initially we designed the project so that it was not necessary for the B.E.D. specialist to make final inspections. Since the owner had already agreed to the installation location and heater size, the contractor had a built-in accountability to the owner for doing the work as agreed upon without further B.E.D. intervention. In reality, however, customers, field specialists, and B.E.D.'s Accounts Payable staff were more comfortable when our staff provided the final inspection. As a result, we adopted this inspection in all cases by the program's end.

Call backs by customers are costly to contractors, homeowners and utilities. Another program objective was to minimize problems requiring call backs. Use of selected contractors, having only one contractor propose a retrofit in each home, having the owner and the specialist present during the initial contractor visit, and the heavy emphasis on training contractors and the field specialist to anticipate problems were features designed to eliminate call backs. In two cases we required the contractor to re-visit the home and make changes to the installation.

Analysis & Results

The results of this pilot project can be evaluated from several perspectives. We have contracted with outside individuals to assist with evaluation. A consumer response evaluation report was completed in June 1991 based on a survey of program participants and interviews with contractors. This report appears as Appendix S. Some highlights of the findings include:

- before the project, 60% of customers had rooms too cold to heat, afterwards, only 20%;
- 78% of the participants said their comfort expectations were met, and 70% said they were more comfortable than before participating;
- 46% said they "never" use their baseboard electric heat since the conversion, 42% said they use it sometimes;
- 70% of participants felt their expectations for cost savings were met. An additional 24% who did not know whether or not these were met were multi-family owners;
- all multi-family owners felt the heaters added to the value of their building, as well as 82% of single-family owners;
- noise from the heaters was the biggest technical problem for 50% of the participants; and,
- 97% of participants felt the program should continue.

Additionally, DOE has arranged with the Lawrence Berkeley Laboratory (LBL) to provide an evaluation of actual energy savings and benefit to the utility from the operation of this program. Program funding did not allow for installation of sophisticated monitoring equipment able to monitor energy savings. Lawrence Berkeley Laboratory has devised procedures for a simple analysis that will provide limited estimates for energy savings. We will use LBL's procedures to complete this analysis after the 1991-92 heating season.

That evaluation will be completed in 1992 after full-year consumption data becomes available. The objective of this study will be to determine, as well as possible,

- To what extent did gas space heaters displace on-peak consumption? off-peak consumption?
- Was there any net reduction or increase in overall energy consumption?
- What impact did the program have on individuals' energy costs?

From information that is readily available, we know the following resulted from the operation of this pilot program:

- 1) The status quo at B.E.D. was not interrupted. B.E.D. fulfilled its commitment to minimally disrupt its on-going operations. We required no permanent new staff or staff re-organization. We hired one field specialist, under contract, for the program duration. Our staff did the telemarketing, the field specialist performed all site visits, and B.E.D.'s Director of Energy Services provided program management. No additional liability insurance was required to cover the program activities.
- 2) Few customer complaints. This program did not jeopardize customer relations and according to survey information they were probably improved. There were only two customer complaints from beginning to end of the program's one year duration. These were resolved by the field specialist to the customers' satisfaction. The complaints that B.E.D. expected from non-participants, about contractors, or about scheduling rarely occurred.
- 3) Savings for B.E.D. are certain to occur. B.E.D. is certain to realize winter peak load reduction. As with our water heater control program, when we require load management, we will use the SCADA system to cycle any electric resistance heaters not already displaced by the gas heaters in the 44 homes.

The Heat Exchange Program

As has been noted throughout this report, one objective of this pilot effort was to test the mechanism for a full-scale electric heat conversion program. This program, Heat Exchange, was launched in April of 1991. It is targeted to reach 1,500 housing units and save almost 5 megawatts and 12 million kilowatt-hours of electricity annually by 1998.

Through the pilot program, we hoped to find out which of our assumptions about customer concerns were accurate, to refine the technology and to test the program design.

For the most part, our assumptions were verified. The simple (to the customer) pilot program design did bring customers to action quickly. Paying the full cost for the program did lead to high participation levels and easily satisfied participants. The program led to little or no disruption of our normal operations.

The technology did prove out very well. The range of space heaters chosen allowed an adequate choice for each situation encountered. The heaters themselves operated flawlessly with only two exceptions. Problems were quickly remedied by both contractors and suppliers. The ingenuity of our contractors in adapting their designs to interior layouts and supplementing the heaters with strategically placed vents and ductwork enhanced their performance.

The program design itself we found almost wholly adaptable to a full-scale effort. The basic relationships with contractors and building owners has not changed, the home visit is nearly identical, and administering the program is similar from B.E.D.'s standpoint. A description which is given to interested customers is included as Appendix T. Still, a number of the assumptions tested in the pilot are not those driving the current program. A different set of issues came up in operating the pilot program which we addressed in the Heat Exchange program design. These can be summarized as customer equity, cost to the utility for implementation, speed of implementation and the resulting impact on revenues; the importance of customer choice, and the need to address a wider range of customer energy issues within the context of program delivery.

Therefore, a number of important changes were made which distinguish Heat Exchange from the pilot program. These are described below, and the reasons for each change are given:

- 1) Customers will pay a significant portion of installation costs. Although the notion of a free installation is quite attractive to the participant, we are not sure that it necessary in order to achieve a high degree of program penetration over time, and it did cause concern for some non-participants.

Each Heat Exchange installation must pass a screening which determines that the energy saved is less expensive than competitive utility generation supply sources. This ensures that B.E.D. could pay the entire cost and not overpay for D.S.M., assuming additional winter peak capacity is needed. However, paying full price means that program participants receive a "windfall" paid for by other customers. By collecting a large portion of the installation cost out of the customer's energy savings, this problem is alleviated.

Customer co-payment is sure to have an impact on the overall penetration of the program. It will also slow down the pace of implementation below that of a full-cost program. This was borne out in the results of our post-program customer survey, (Appendix S.). We have not attempted to quantify the impact on penetration, and instead we are holding up the pilot results as an ultimate goal for the full-scale program.

The regional power supply picture has shifted, as well. What were once expected to be large shortages of power are now projected as excess, at least in the short term.

Stretching out the implementation over a longer period of time will soften the impact on utility revenues; helping to avoid disruption of normal utility operations.

- 2) We offer two forms of co-payment, a loan or a cash rebate. While this is somewhat more complex to explain, and even more complex to administer, we have prepared for these complexities, developed appropriate communication tools, and have budgeted for them. Training developed for the pilot program proved its worth in helping us develop clear customer communication pieces for Heat Exchange.

Customers are more likely to get competitive bids for installations, since a portion of their funds are involved. This, again, can slow down the process, but in the end helps to ensure that prices remain competitive. It also guarantees "ownership" on the part of the customer, helping to secure long-term commitment to the program.

- 3) Customers will have the option of installing central heating systems. Customers like to have their choice among options. Each customer receives essentially the same home visit as that designed in the pilot program. While in the home, our contractor will design a space heating option for that home. The customer, however, may wish to choose a central heating system instead. In that instance, we will provide the same level of rebate as we would have provided for the space heating option which we designed.

The homeowners will often ask our contractor for a bid on that system, so his effort is not wasted. In this case, the rebate is the only option available.

- 4) Customers are free to choose whichever heating fuel they wish. Partly because they are paying a large portion of the cost, and partly because customers' needs and preferences vary, we are making funding available for any heating system which is automatically fueled, permanently vented, and thermostatically controlled. This eliminates wood stoves, and other portable spot heaters which we might not be able to rely on to displace electric heat. However, this does allow choice among a wide variety of systems and fuels. Our financial subsidy is based upon the least expensive fuel available to the customer.
- 5) Customers can choose their own contractors and manage their own projects. The rebate is available for customers who wish to proceed with their own financing and their own contractors, and will be provided to them when the project is successfully completed. This helps to expand the range of options available to the customer, and expands the reach of the program to a different type of customer. It is particularly useful for large building owners who have their own maintenance operations and access to capital.
- 6) We are requiring cost-effective weatherization in the program package in some cases. Even though the buildings are being converted to heat with another fuel, we wanted to ensure that some level of weatherization was assured, and that we weren't simply passing along a heat loss problem to a new fuel supplier.

Because we are not the ultimate fuel vendor, we are not pursuing all cost-effective weatherization. We are requiring a base line typical of average electric-heated residences (see Appendix U.). The local gas company who will be the vendor in many cases, is currently considering DSM options and is actively involved in a program design process. To date, they have made no firm commitments to a weatherization program. If they were co-participants, we would hope to act cooperatively with them and perhaps jointly raise the levels of weatherization which we require.

Overall, weatherization is not a large cost component of the program. Since electrically-heated buildings have been expensive to operate for a long time, many of them have already been quite well weatherized over time. We estimate weatherization measures will be needed in fewer than 20% of the conversion cases at an average cost

of around \$300. Since building owners are repaying a significant portion of the retrofit cost, most of these expenses will be recovered.

- 7) We have undertaken no promotion of this program to date. Several announcements of program activity have resulted in over 1000 units of housing pre-subscribed to the program. This is almost four years of work at our presently planned pace, and represents 2/3rds of our total target. We haven't felt it necessary to advertise or otherwise package the program yet. The energy specialists and in-house administration staff handle all customer communications.

Over time, as the program matures, we hope to be able to assemble case studies and develop momentum to encourage some of the harder-to-reach market niches in multi-family housing to participate. This will be the final 1/3rd of our target.

It is still too early to tell how these changes will impact the success of the Heat Exchange program. We are off to a very aggressive start, having served over 60 units in our first four months of program operation.

APPENDICES

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- B. Advisory Committee and Agendas
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- E. Contract with Contractor
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- G. Public Notice to Solicit Contractors
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- K. Sample Selection Process--LBL
- L. Script Used by Telemarketers
- M. Telephone Contact Form
- N. Model Letters to Customers
- O. On-site Visit Flow Description
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- T. Heat Exchange Program Description
- U. Weatherization Requirements

***Demonstrating a Small Utility Approach
to Demand-Side Program Implementation***

Appendices

Burlington Electric Department
Burlington, Vermont

APPENDICES

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Appendix A.

BURLINGTON

DEPARTMENT

585 Pine Street • Burlington, VT 05401-4891
802/658-0300 (TDD/Voice) • FAX: 802/658-0300 Ext. 517

Energy Efficiency Programs in Burlington, Vermont

Smartlight

Begun in 1989, this program delivers compact fluorescent energy-saving light bulbs to consumers for only .20 each per month. A variety of bulbs and hardware are on-hand to fit most residential lighting applications. Bulbs are available by mail or directly from the Burlington Electric Department. In fifteen months, we have distributed almost 25,000 bulbs to over five thousand residential consumers.

Neighbor\$ave

Begun in 1990, this program brings energy saving devices, including our SMARTLIGHTS, into residents' homes. Trained student employees install energy and water saving measures at no cost. In addition, they review household energy usage and provide information on other energy-saving opportunities. In the first year we have served over 40% of our residential consumers.

Heat Exchange

Begun in 1990 with the assistance of a grant from the U.S. Department of Energy, Burlington Electric Department offers assistance and financial subsidies to consumers to convert from costly electric heating to other energy sources. To date we have facilitated almost 500 such conversions. We currently plan to provide this service to about 1500 customers over the next 5 years. This will save the city almost 5 megawatts of electrical demand, and 12 million kilowatt hours annually.

Top 10

Begun in 1991, this program brings a customized menu of energy-saving measures to our city's largest electrical consumers. Burlington Electric Department will work closely with company management to provide "positive cash flow" financing of demand-side management measures. Though directed to a small group of customers, this program is planned to save from 5 to 7 megawatts of electrical demand, and about 25 million kilowatt hours annually.

Energy Advantage

Begun in 1991, this program is designed to install energy efficiency lighting measures in our commercial consumers' places of business. This program offers direct installation and "positive cash flow" financing for a wide range of lighting measures, customized for each business. This service will expand to encompass new construction based on Energy Efficiency Guidelines currently being adopted. When delivered to 2500 commercial customers, this program is planned to save over 3 megawatts of electrical demand and about 11 million kilowatt hours of power annually.

Appendix B.

DOE I Advisory Committee

Susan French
Human & Environmental Resource Studies
2824 Sweet Road
Pompey, NY 13138

Ron York
Bates & Murray, Inc.
P.O. Box 668
Barre, VT 05641

Roberta Walsh
Professor of Consumer Studies
208 Terrill Hall
University of Vermont
Burlington, VT 05405

Steve Nadel
American Council for an Energy-Efficient Economy
1001 Connecticut Avenue, NW
Suite 535
Washington, D.C. 20036

Gerald Tarrant
Diamond & Associates
P.O. Drawer D
Montpelier, VT 05602

Rebecca Vories
Infinite Energy
P.O. Box 17945
Denver, CO 80217

Harlan Lachman
Energy Efficiency Institute
23 Goodsell Point Road
Colchester, VT 05446

Paul Cillo
Energy Efficiency Institute
RR1, Box 932
Hardwick, VT 05843

AGENDA

Advisory Committee Meeting Burlington Room Radisson Hotel January 22, 1990

Burlington Electric Department
Pilot Full-Cost DSM Program

Morning

- 9:00 OPENING REMARKS James Lauzon
- 9:15 INTRODUCTIONS
"WHY WE'RE HERE..." Thomas Buckley
- 9:30 PROGRAM PHILOSOPHY AND DESCRIPTION
Paul Cillo, Facilitator
- 10:00 GENERAL DISCUSSION AND ISSUES IDENTIFICATION
Paul Cillo, Facilitator
- 10:30 ----- Break -----
- 10:45 COMMITTEE DISCUSSION OF ISSUES
Paul Cillo, Facilitator
- Noon ----- Lunch -----

Afternoon

- 1:00 "THIS IS BURLINGTON"
(Slide presentation) Thomas Buckley
- 1:30 COMMITTEE DISCUSSION OF ISSUES
Paul Cillo, Facilitator
- 4:00 THE NEXT STEP Paul Cillo, Facilitator
- 4:30 CLOSING REMARKS Thomas Buckley

AGENDA

Advisory Committee Meeting

Radisson Hotel
October 12, 1990

Burlington Electric Department
Pilot Full-Cost DSM Program

10:45	Opening Remarks	Jim Lauzon
11:00	Summary Report	Tom Buckley
	"How did we address the Committee's recommendations?"	
11:15	Progress Report & Discussion	Chris Burns
Paul Cillo
	"How Have We Addressed Each Major Area of Program Design and Implementation?"	
12:30	Lunch - Village Green	
1:00	Focus Discussion on Three Questions	Paul Cillo, Moderator
	- What don't you know that you want to know? - What do you recommend for evaluation purposes? - What do we need for transferability in the final report?	
Optional		
3:00	Visit to a Participant's Home	

Appendix C.

Burlington Electric Department
Pilot Full-Cost (DOE) DSM Program

Robert W. Walsh, Ph.D.

I. Introduction

The primary purpose of this report is to summarize questions, comments and concerns raised by a group of nine residential customers of Burlington Electric Department (BED) during a focus group session held at the company's headquarters conference room on May 3, 1990, 7:00-9:00 p.m., concerning implementation of the above-referenced program. The summary is preceded by a background discussion of the underlying rationale of the focus group, and is followed by an analysis of and the program recommendations based on the customer's input, in the context of the program's objectives.

II. Background

The decision to hold a focus group was made following the suggestion of several members of the project's Advisory Committee during a meeting held on January 22, 1990. Although these and other members had prior experience with consumer aspects of a wide range of residential energy efficiency programs, it was pointed out that customer reaction to an untried program such as this one is not easily predicted.

The purpose of holding the focus group was to see the program as consumers see it. This perspective adds at least three important elements to implementation of this program by

- (1) reinforcing what has already been identified by program planners as its positive features,
- (2) adding new benefits not previously identified, and
- (3) serving as an "early warning system" for addressing previously unidentified issues of concern to prospective program participants.

As focus group facilitator, I represented a party who was familiar with the program's objectives and design, yet whose role has been external to the program planning process. This position enables a facilitator to maintain a degree of detachment from the program, assuring sufficient objectivity to plan the focus group and elicit the information it is intended to generate. The following material provided the necessary background and content:

FOCUS GROUP SUMMARY REPORT

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- (1) BED RFP to DOE, pages 1-16 and Abstract.
- (2) Personal notes from Advisory Committee meeting.
- (3) Draft Program Outline by The Energy Efficiency Institute (EEI), Inc., February 12, 1990.
- (4) Memo to Tom Buckley from EEI re "Focus Group Issues," March 26, 1990.
- (5) Memo to Tom Buckley and Harlan Lachman from Rick Diamond (Lawrence Berkeley Laboratory) re "Revised Sample Selection Guidelines," February 21, 1990. This was followed up for further information by a telephone call on April 18, 1990.

Finally, focus group logistics were discussed and planned at a meeting at BED on April 9, 1990. Participants were to be solicited by telephone from a random list of BED residential electric heat customers and building owners, using a "script" designed to screen out disinterested or uncooperative persons and obtain selected other data about the household. A follow-up letter and telephone call was to be used to confirm participation, allowing for "no-shows."

III. Summary

A. Participants. Nine individuals representing eight households were present. The group included one married couple, one tenant, and one elderly female household head. No absentee or resident landlords were among the group. In general, all were very interested in learning about the program. Without exception, they were attentive, reflecting a positive attitude about the program's objectives. They looked favorably upon BED as a utility that is genuinely concerned about customer needs. They could be described as middle- to upper-middle income, responsive, energy-conscious and sophisticated in their understanding of the program.

Besides the facilitator, other attendees who joined in the discussion as needed were Chris Burns and Steve Shelley (intern) representing BED, and Paul Cillo of EEI.

B. Questions, Comments and Concerns. The following topic areas represent the essence of input from the participants, based on the general explanation they received about the background and purpose of the program, in addition to how it is proposed to be implemented.¹¹

(See Q & A handout, appended to this report.)

1. Making the decision about cost-effectiveness and proper installation of supplemental gas heat.

Participants were concerned at first that the decision about whether gas would indeed represent a savings for them would be entirely their own. When advised that BED would be providing cost-effectiveness information, their concerns were abated on this point.

They were also relieved that BED would assume responsibility for obtaining a competent installer to perform the work. An important aspect was that BED would mediate any problems or complaints.

2. Aesthetics.

Some concerns were expressed about the appearance and location of propane gas tanks, for those customers who cannot connect to natural gas. These concerns were dissipated by explanations about how tanks can be "hidden" by a covering structure or even buried underground.

Interestingly, circulation of photographs of three types of gas heater units did not generate any negative response. One participant asked whether the installation would be permanent if gas did not produce the desired savings (all things, such as thermostat settings and occupant behavior, being equal). She was assured (by Chris) that the unit would be removed and the area returned in appearance to its before-installation condition.

3. Price and availability of gas.

A considerable amount of questioning focused on whether the current situation pertaining to high cost of electricity would not, at some future time, apply to gas. Several participants felt they were victims of the "all electric" promotion of new homes in the past when today's high costs were not predicted, and wondered whether the cheapest type of fuel is not a cyclical phenomenon.

¹¹It should be noted that just before the focus group was held, BED made a tentative decision to eliminate the option within the program to install a central gas system with removal of electric heat.

Other questions addressed the nature of gas supplies ("Where does it come from, anyway?") and the propane shortage that plagued the area in December, 1989. Although explanations were offered, lingering doubt seemed to remain in the minds of some. An additional issue in this category was whether limits imposed on the number of (natural) gas installations would cause problems for those who chose to participate.

4. Comfort and convenience.

Some comments dealt with "getting used to" gas--i.e., how would it be different from electricity? Areas of concern included humidity levels and one's health status, especially as related to allergies. Lack of familiarity with cleaning and maintenance requirements was cited as problematic.

5. Safety.

Although this point emerged last, it was obviously not low on the priority list of concerns. One participant noted that she did not have a well developed sense of smell to readily detect leaks.

C. Conclusion. As a concluding exercise, participants were asked to rate on a 1 to 10 scale whether they would be "not at all" or "very" interested in the program, respectively.

Five placed themselves at the high end, citing the reasons as saving on their heating bill, allowing income to be allocated for other household expenditures. This group represented four households but points to the fact that husband and wife were in agreement. One at the moderately high end cited safety as the only drawback. One felt that her home design would not be suitable (i.e., cost effective) for a supplementary installation and in fact, is planning on converting to natural gas. Another (the older female who lives alone) stated at the very end of the session that she would not want a gas heater in her home under any circumstances, saying she is "scared to death of fire."

IV. Analysis and Recommendations

Analysis of the focus group participants on at least two levels is in order before specific program recommendations can be offered. The first is whether the group is representative of participants in the pilot program. To this end, the screening process via telephone contact for focus group participants may be regarded as approximating the initial program solicitation by letter. The degree of sophistication of the group (as described above) may well be characteristic of those BED customers who respond favorably to the program announcement letter. BED may wish to consider how this kind of self-selection bias may be averted in order to attract participants who better reflect the diversity of its service area.

FOCUS GROUP SUMMARY REPORT

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A second factor is the lack of building owner participants in the focus group. Although initially it was expected that some would be in attendance, upon reflection, it seems that their concerns might differ considerably from those of homeowners and tenants (inasmuch as "saving money" was the major motivating force). Accordingly, it may be advisable for BED to obtain their input through either another focus group or a telephone survey.

The remainder of this section is organized around a framework consisting of five dimensions that have been identified by researchers as leading to positive experiences with a company's products or services.²² They form the basis for recommendations to BED about program implementation, emerging from the focus group.

- (1) Reliability: the ability to provide what was promised, dependably and accurately.

Consumers regard saving money as the "promise" in this program. This suggests reliability in the determination about cost-effectiveness of gas heat supplement for the individual homeowner or tenant situation. BED needs to establish procedures so that marginal cost effectiveness situations are avoided.

- (2) Assurance: the knowledge and courtesy of employees, and their ability to convey trust and confidence.

BED enjoys a high confidence level among its residential customers. Accordingly, written and oral assurances concerning all aspects of the program, as enumerated in III-B above, should be delivered as authoritatively as possible by personnel who come in contact with customers. This is probably most important in connection with safety considerations in the use of gas. Individual instruction on operation and maintenance of the unit will be required to supplement use and care manuals.

- (3) Tangibles: the physical facilities and equipment, and the appearance of personnel.

As pertains to this program, this dimension can best be associated with the aesthetics of the gas unit. It may also be conveyed by the phrase, "Neatness counts." Although no focus group members raised this issue directly, it is probably fair to state that they assumed no problems would occur with cleanup and

²²Parasurmaan, A., V. A. Zeithami, and L. L. Berry (1984). "A Conceptual Model of Service Quality and Its Implications for Future Research." Report 84-108. Marketing and Sciences Institute, Cambridge, MA.

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appropriate discarding of materials association with the installation.

- (4) Empathy: the degree of caring and individual attention provided to customers.

As evidenced by some comments, there are numerous and varied concerns that may arise on a one-to-one basis with customers. While they often appear trivial or ill-founded to some, to the consumer, they are very real. Concerns about allergies, gas availability and price, safety and maintenance all fall into this category. Attention to staff training in this regard will be an important element in the program.

- (5) Responsiveness: the willingness to help customers and provide prompt service.

This is a dimension where customers enter into an agreement with the trust and confidence that their questions and problems will be responded to when such matters arise. Accordingly, BED should have in place a "quick response" and "troubleshooting" strategy to deal expeditiously with customers' needs.

It should be noted that the above dimensions will be applicable to the process as the program begins making its first customer contacts, and is not limited exclusively to final program participants. Instilling sensitivity to these dimensions will, of course, apply to contractors as well as BED staff.

Appendix D.

BED Pilot Program Owner's Agreement

This constitutes the Agreement dated _____, 199__, between _____, ("Owner") who resides at _____, and Burlington Electric Department ("BED"), a public utility, referred to in this Agreement as the Agent.

BASIS OF AGREEMENT

WHEREAS, Owner, desires to reduce its electric space heating bills by installing gas space heaters to replace existing electric heat, and,

WHEREAS, BED, as part of its conservation program, desires to implement methods to reduce peak electrical demand to lower costs to all rate payers;

NOW THEREFORE, in consideration of the mutual promises contained in this Agreement, BED and the Owner agree as follows:

SECTION ONE APPOINTMENT OF AGENT

- 1.1 In consideration of BED's agreement to provide payment for the gas space heating system installation, as is described in the Owner-Contractor Agreement, Owner appoints Burlington Electric Department ("BED") as its exclusive Agent to coordinate and facilitate the installation of the gas space heating system.

SECTION TWO DUTIES OF OWNER

- 2.1 Owner will permit BED to install load switches to control Owner's existing electric heaters. These switches will prevent operation of existing electric baseboard heat during BED's peak hours.
- 2.2 Following the installation of heaters, for the purpose of evaluating program effectiveness, Owner agrees to participate in up to a maximum of three (3) BED follow-up surveys and to authorize the release of up to three (3) years of fuel records to BED or BED's agent.
- 2.3 Owner agrees that as long as the premises is served by BED, it will not utilize any additional electric space heaters for any reason, including but not limited to instances where supplemental heating is required due to increased heating requirements, as a result of additions to or modifications of premises.
- 2.4 If Owner has tenants and gas heaters are installed in tenant apartments, Owner agrees as a condition to this agreement to enter into a separate agreement with tenant which provides for tenant's obligation to participate in BED surveys and for tenant's release of fuel records as set forth in Section 2.2 above.

SECTION THREE DUTIES OF AGENT

- 3.1 BED agrees to solicit bids for the design and installation of gas space heating systems.
- 3.2 BED agrees that it will monitor the progress of the work and assist the Owner in the selection of qualified contractors. Contractor will have general liability insurance and will offer Owner a one (1) year parts and labor warranty.

BED Pilot Program
Owner's Agreement

- 3.3 BED is authorized to enter into an Agreement on behalf of the Owner, for the purpose of installing gas space heating systems in Owner's premises. A sample Agreement between Owner and Contractor is attached.
- 3.4 BED is authorized to make payment to the Contractor on behalf of the Owner, for work performed pursuant to the Owner-Contractor Agreement.

SECTION FOUR
OWNER-CONTRACTOR RELATIONSHIP

- 4.1 Owner understands that an Independent Contractor-Owner relationship has been created by virtue of the Owner-Contractor Agreement and that the Contractor is not an Employee or Agent of BED. BED will not be liable for personal injury or property damage caused by Contractor or Contractor's agents or employees.

SECTION FIVE
PAYMENT FOR INSTALLATION

- 5.1 BED agrees that it will provide payment for the installation of the gas space heating system described in the Owner-Contractor Agreement.
- 5.2 BED will retain the funds for the payment of the system on behalf of the Owner.
- 5.3 Pursuant to the terms of the Owner-Contractor Agreement, BED will issue checks to the Contractor representing payment for the work, signed by BED, as agent for the Owner.

SECTION SIX
DURATION

- 6.1 This Agreement shall remain in full force and effect until either termination or sale of property by Owner.

SECTION SEVEN
TERMINATION

- 7.1 This Agreement may be terminated by either party on seven (7) days written notice to the other party.
- 7.2 If Owner terminates this Agreement within three (3) years from the date of the Agreement, it may opt to have BED remove the gas heating equipment at BED's expense. Any equipment so removed by BED will become the property of BED. If Owner removes the equipment at its own expense, equipment will remain the property of the Owner.
- 7.3 If Owner terminates this Agreement subsequent to three (3) years from the date of the Agreement, Owner will remove the gas heating equipment at its own expense. Any equipment so removed will remain the property of the Owner.
- 7.4 If BED terminates the Agreement, it will pay for the removal of the gas space heating equipment upon Owner's request.
- 7.5 In the event of termination, by either party, BED will remove load controlling switches on electric baseboard heat.

SECTION EIGHT
BREACH

- 8.1 In the event that Owner breaches the terms of the Agreement, Owner will be liable to BED for this documented cost of the materials and installation of the system.

BED Pilot Program
Owner's Agreement

- 8.2 Breach includes, but is not limited to, use of supplemental electric heating while this Agreement is in effect.

SECTION NINE
MISCELLANEOUS PROVISIONS

- 9.1 No waiver, alteration or modification of any of the provisions of this Agreement shall be binding unless in writing and signed by a duly authorized representative of both parties to this Agreement.
- 9.2 Notice from one party to the other under this Agreement shall be deemed to have been properly delivered if forwarded by United States Postal Service, First Class Mail, as set forth below:

For the BED: General Manager
c/o Burlington Electric Department
585 Pine Street
Burlington, VT 05401

For the Owner:

Witness

Burlington Electric Department

Witness

Owner

Appendix E.

BED Pilot Program Contractor's Agreement

Agreement made this ____ day of _____, 1990, by and between the City of Burlington, a Vermont municipal corporation, acting by and through the Burlington Electric Department ("BED"), a public utility of 585 Pine Street, Burlington, Vermont, acting as the Agent and on behalf of ("Owner") of _____ and _____ ("Contractor") doing business as (a corporation) or (a partnership), or (an individual) with a place of business located at _____.

WITNESSETH:

- WHEREAS, Owner desires to install gas space heating units at _____ and
- WHEREAS, Contractor is engaged in the business of installing gas space heating systems; and
- WHEREAS, Owner has agreed that BED will act as its Agent for the purpose of facilitating said installation; and
- WHEREAS, Contractor agrees to install said gas space heaters according to the terms and conditions of this Agreement,

NOW THEREFORE, in consideration of the mutual promises set forth herein, the parties agree as follows:

SECTION ONE SCOPE OF SERVICES

- 1.1 Contractor shall provide for the installation and design of the gas space heating system by _____, as described in the work order attached as Exhibit "A" to this Agreement.
- 1.2 The Contractor will be solely responsible for determining the size and best locations of the heaters to be installed.

SECTION TWO PAYMENT

- 2.1 Owner, acting by and through its Agent, BED, will pay the Contractor the total sum of _____ Dollars (\$_____) for the performance of work under this Agreement.
- 2.2 Contractor will receive fifty percent (50%) of the total sum upon signing this contract. The balance will be paid upon completion of the work in full satisfaction of the work order specified in Exhibit A.
- 2.3 In lieu of the payment provision set forth in Section 2.2 above, and in lieu of the bonding provision set forth in Section 14.1, Contractor has the option of receiving one hundred percent (100% payment upon completion of the work, in full satisfaction of the work order specified in Exhibit A.
- 2.4 Work shall be considered complete and satisfactory when Agent receives a Certificate of Inspection from the City of Burlington's Inspection Division and has authorized final payment on behalf of the Owner.
- 2.5 In the event work is not carried out in full compliance with the work order, Contractor shall make the corrections noted by Agent. In the event that Contractor disputes the corrections to be made, Contractor agrees to participate in conciliation as set forth in Section Eight, Disputes.

SECTION THREE RELATIONSHIP OF PARTIES

- 3.1 The parties intend that an **Independent contractor/agent** relationship will be created by this Agreement between Owner and Contractor. Contractor will be solely and entirely responsible for his acts and for the acts of contractor's agents, employees, servants and subcontractors during the performance of this Agreement. Owner is only interested in the

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results to be achieved, and the conduct and control of the work will lie solely with the contractor. Contractor is not to be considered an agent or employee of Owner for any purpose.

SECTION FOUR CONTRACTORS DUTIES

- 4.1 Contractor shall have sole control of the manner and means of performing this Agreement, and shall complete it according to its own means and methods of work. Contractor shall direct the performance of all workers and subcontractors, and ensure that subcontractors are competent and qualified.
- 4.2 Contractor will be responsible for and will superintend the execution of all works covered by this Agreement, either personally or through a representative. If contractor uses a representative, Contractor agrees that the representative shall be competent and qualified, shall give personal attention to the work hereunder at all times, and shall represent contractor with full power to act in all matters pertaining to this Agreement.
- 4.3 Contractor shall furnish, at Contractor's own expense, all labor, materials, equipment, and other items necessary to carry out the terms of this Agreement.
- 4.4 Contractor shall furnish qualified and experienced artisans, workers, foremen and supervisors to carry out the work to be performed under the Agreement. Persons hired by Contractor shall be and remain Contractor's employees.
- 4.5 Contractor shall perform work during normal business hours, Monday to Friday, 8 a.m. to 5 p.m., unless otherwise agreed to by Owner and Contractor. In the event work is performed at times other than normal business hours, Contractor shall make arrangements for returning to the site to enable appropriate inspections by Agent and/or others during normal business hours.

SECTION FIVE WARRANTIES

- 5.1 Contractor warrants to owner that all materials and equipment furnished under this Agreement will be new, and that all work will be of good quality, free from faults and defects.
- 5.2 Contractor will guarantee its workmanship (including all parts and labor) for a period of one year from date of final payment and acceptance of the work.
- 5.3 Contractor warrants that the supplemental space heating system design will provide adequate heat for Owner's premises. In designing the system, the Contractor agrees to take into consideration the effect of BED's installation of load control switches on all existing electrical heat. Said switches will turn off electric heat during BED's peak hours and during system emergencies. Contractor agrees to contact BED directly for additional information Contractor may require concerning the load control switches.
- 5.4 Contractor extends to Owner all manufacturer's warranties for material and equipment installed. Contractor agrees to provide copies of all warranty information to Owner should such information exist. Said warranties will not in any way limit Contractor's obligations as set forth in Section 5.2.

SECTION SIX PERMITS, FEES AND NOTICES

- 6.1 Contractor will secure and pay for all permits, governmental fees, licenses and inspections necessary for the proper execution and completion of the work.
- 6.2 Contractor shall give all notices and comply with all laws, ordinances, rules and orders of any public authority bearing on the performance of the work.
- 6.3 Contractor is obligated to make certain that its work conforms with all applicable federal, state and local laws, statutes, building codes and regulations.

SECTION SEVEN INSPECTION AND SUPERVISION

- 7.1 In the performance of the work herein contemplated, Contractor is an Independent Contractor with the authority to control and direct the performance of the details of the work, Owner being only interested in the results obtained. However, the work contemplated herein must meet the approval of the Agent and shall be subject to the Agent's general right of inspection and evaluation to secure the satisfactory completion thereof in accordance with the work order.
- 7.2 Contractor is obligated to make certain that its work is performed in a professional and workmanlike manner and Contractor shall enforce strict discipline and maintain good order over its employees at all times.

SECTION EIGHT DISPUTES

- 8.1 In the event of a dispute the parties agree to participate in binding arbitration as set forth in Exhibit "B" attached hereto.
- 8.2 Prior to participation in binding arbitration, the parties agree to attend at least one (1) conciliation conference, to be held at either's request and at no additional charge to either party.

SECTION NINE INDEMNIFICATION

- 9.1 Contractor shall assume all liability and indemnify Owner and Agent individually against all liability or loss, and against all claims or actions based upon or arising out of damage or injury (including death) to persons or property caused by or sustained in connection with the performance of the Agreement or by conditions created thereby, or based upon any violation of any statute, ordinance, building code or regulation, and the defense of any such claims or actions.

SECTION TEN TERMINATION

- 10.1 This contract may be terminated by mutual agreement by either party on seven (7) days written notice to the other party.
- 10.2 In the event of termination, Contractor will be paid for labor and materials incorporated to date of termination.

SECTION ELEVEN INSURANCE

- 11.1 Contractor shall provide coverage for not less than the following amounts and greater where required by Laws and Regulations:

- (1) Worker's Compensation
- (2) Automobile Liability Insurance
- (3) Comprehensive General Liability Insurance, (including completed operations and products liability) as set forth below:

Bodily Injury	
1,000,000	Each Occurrence
1,000,000	Annual Aggregate
Property Damage	
1,000,000	Each Occurrence
1,000,000	Annual Aggregate

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- 11.2 Contractor shall purchase and maintain such comprehensive general liability and other insurance as set forth above which will provide protection from claims arising from the result of Contractor's performance of this Agreement.
- 11.3 Contractor shall provide BED a certificate of insurance and name BED an additional insured for coverages set forth above which will provide that such insurance shall not be subject to cancellation without at least thirty (30) days advance written notice to B.E.D.. Such evidence of insurance shall be received at BED within ten (10) working days after being designated a Contractor for this program or prior to commencing work, whichever is sooner, and shall maintain such insurance throughout the duration of this Agreement.
- 11.4 Any property damage or bodily injury claims in excess of limits set forth above or which are not covered by comprehensive liability, worker's compensation, or automobile liability insurance are the responsibility of the Contractor.

SECTION TWELVE
CHANGES IN WORK

- 12.1 Contractor shall not make changes to the work which either increase or decrease the contract price, without the written approval of the Agent acting on behalf of the Owner. Said changes include but are not limited to substitutions or alterations of specified materials or equipment, relocations and replacements.
- 12.2 The cost or credit resulting from such change shall be determined as follows:
 - a. by lump sum, mutually agreed to by the Agent and Contractor and supported by substantiating data; or if parties are unable to agree,
 - b. by time and material costs as verified by the Agent.

SECTION THIRTEEN
UNANTICIPATED CONDITIONS

- 13.1 The Contractor shall notify the Owner or its Agent, if it uncovers latent physical conditions at the site differing materially from that anticipated.
- 13.2 Agent shall investigate and if it finds that such conditions materially differ, provide for an adjustment in Agreement price as set forth in SECTION TWELVE, CHANGES IN WORK.

SECTION FOURTEEN
BONDING

- 14.1 To guarantee satisfactory completion of the work Contractor will supply either a Performance Bond or a two (2) year irrevocable Letter of Credit. The bonding agent must be registered in the state of Vermont.
- 14.2 The Letter of Credit shall be supplied to BED in the amount of Ten Thousand Dollars (\$10,000.00). The Letter of Credit will be drawn upon in the event the Contractor breaches the terms of this Agreement.
- 14.3 In lieu of supplying a Bond or Letter of Credit, Contractor has the option of performing work and receiving full payment upon satisfactory completion as set forth in Section 2.3.

SECTION FIFTEEN
DEBRIS

- 15.1 Contractor is responsible to maintain the premises free of waste materials or rubbish generated in the performance of the work, on a daily basis. Contractor shall remove and properly dispose of all debris, and shall leave the premises vacuum clean at the end of each work day.

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SECTION SIXTEEN
RELEASE

- 16.1 Contractor's acceptance of payment in the full Agreement amount, shall operate as a full release to both the Owner and BED from any and all claims under the terms of this Agreement.

SECTION SEVENTEEN
MISCELLANEOUS PROVISIONS

- 17.1 No waiver, alteration, or modification of any of the provisions of this Agreement shall be binding unless in writing and signed by a duly authorized representative of both parties to this Agreement.
- 17.2 This contract may not be assigned nor any of the rights and duties hereunder without the prior written consent of the Owner.
- 17.3 Notice from one party to the other under this Agreement shall be deemed to have been properly delivered if forwarded by United States Postal Service, First Class Mail, as set forth below:

For the Owner: General Manager
c/o Burlington Electric Department
585 Pine Street
Burlington, VT 05401

For the Contractor:

IN WITNESS WHEREOF, the parties have caused these presents to be executed by themselves or by their representative officer or representative thereto duly authorized the day and year first above written.

Witness

BY: _____

Burlington Electric Dept.
as Agent for Owner

Witness

BY: _____

Contractor

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Exhibit B

ACKNOWLEDGEMENT OF ARBITRATION

I understand that this Agreement contains an agreement to arbitrate. After signing this document, I understand that I will not be able to bring a lawsuit concerning any dispute that may arise which is covered by the arbitration agreement, unless it involves a question of constitutional or civil rights. Instead, I agree to submit any such dispute to an impartial arbitrator.

Date

Signature

Date

Signature

Appendix F.

INFORMATION GATHERING SHEET FOR PRICING PROPANE GAS SERVICE

NAME OF VENDOR: _____
 TELEPHONE #: _____
 CONTACT PERSON: _____

- (1) PRICE TO INSTALL 100 GALLON CYLINDER AND REGULATOR: _____
- (2) PRICE TO INSTALL 250 GALLON CYLINDER AND REGULATOR (IF POSSIBLE AND APPROPRIATE) _____
- (3) RENTAL CHARGES FOR TANK AND REGULATOR: _____
- (4) OTHER CHARGES: _____
- (5) PRICE PER GALLON OF PROPANE: _____

NOTES: _____

NAME OF VENDOR: _____
 TELEPHONE #: _____
 CONTACT PERSON: _____

- (1) PRICE TO INSTALL 100 GALLON CYLINDER AND REGULATOR: _____
- (2) PRICE TO INSTALL 250 GALLON CYLINDER AND REGULATOR (IF POSSIBLE AND APPROPRIATE) _____
- (3) RENTAL CHARGES FOR TANK AND REGULATOR: _____
- (4) OTHER CHARGES: _____
- (5) PRICE PER GALLON OF PROPANE: _____

NOTES: _____

NAME OF VENDOR: _____
 TELEPHONE #: _____
 CONTACT PERSON: _____

- (1) PRICE TO INSTALL 100 GALLON CYLINDER AND REGULATOR: _____
- (2) PRICE TO INSTALL 250 GALLON CYLINDER AND REGULATOR (IF POSSIBLE AND APPROPRIATE) _____
- (3) RENTAL CHARGES FOR TANK AND REGULATOR: _____
- (4) OTHER CHARGES: _____
- (5) PRICE PER GALLON OF PROPANE: _____

NOTES: _____

Appendix G.

REQUEST FOR PROPOSAL

The Burlington Electric Department (B.E.D.), a municipal electric utility serving approximately 18,000 customers, seeks contractors to install new non-electric heating systems in approximately fifty (50) electrically heated Burlington homes. Up to three contractors will be retained by B.E.D. to install heating equipment according to B.E.D. specifications and using accepted installation practices. Selected contractors will be paid by B.E.D. on a per-job basis.

Applicants must provide a letter of credit and appropriate insurance. Interviews will be conducted. B.E.D. reserves the right to reject any and all applicants. Any interested firm is encouraged to apply. Please contact:

**Chris Burns, Residential Energy Specialist
Burlington Electric Department
585 Pine St. Burlington, VT 05401 658-0300**

**All inquiries must be made no later than 4:30
p.m., May 10, 1990.**

Appendix H.

Burlington Electric Department

PILOT FULL-COST DEMAND-SIDE MANAGEMENT PROGRAM

Contractor Orientation

Burlington City Hall
Tuesday, June 5, 1990
9:30 AM

Agenda

- 9:15 Registration and Coffee
- 9:30 Opening Remarks
 James Lauzon, Manager of Power Resources
- 9:40 Review Agenda
- 9:45 Program Overview and Contractor Selection Process
 Chris Burns, Energy Services Specialist
- 10:00 Program Organizational Structure & Contractors' Role
 Paul Cillo, Program Consultant
- 10:10 The Customer -- A Different Relationship
 Paul Cillo
- 10:20 Inspections, Payment, Warranty, Callbacks
 Paul Cillo
- 10:30 Questions
- 11:00 Closing Remarks and The Next Step
 Chris Burns

Appendix I.

BED/DOE PILOT FULL-COST PROGRAM
Contractors Bid Prices

For
Installation Of Gas Direct Vent Space Heaters

In filling out this sheet we ask that contractor consider that B.E.D will be saving contractor the cost of a sales visit, B.E.D will assist contractor in customer relations and that there will be at least fifteen (15) of these installations.

The use of specific products in the sample bids below is not an endorsement of these products. The make and manufacturer of units to be installed will be left to the discretion of each retained contractor. However, assume you were able to purchase these specific units for the same contractor's discount that you will be receiving for the actual units you will be installing.

1. Sample bid to install one (1) DYNAWALL Model DWW 40E with blower and wall thermostat. The DWW 40E's specifications are: HEIGHT (inches) 77 3/8 WIDTH (inches) 14 1/8 DEPTH (inches) 11 1/2 SHIPPING WEIGHT (lbs.) 131 VENT OPENING- Inside Wall Surface 8" Dia. Outside Wall Surface 8" Dia.

House Specifics: Three story seventy year old apartment house with four units. Electric service panel is in the basement. The walls are 2 x 6 construction. The exterior siding is clapboard and the interior walls are plaster and lathe, and the plaster is very weak. All exterior walls are filled with cellulose insulation. The apartment is on the third floor but ladders can be easily placed against all exterior walls. No other obstacles prevent installation.

2. Sample bid to install two (2) EMPIRE DV-235-3SG's, one with a blower package and both with wall thermostats. The DV-235-3SG specifications are: HEIGHT (inches) 27 3/4 (includes 4" floor clearance) WIDTH (inches) 34 DEPTH (inches) 9 3/8 SHIPPING WEIGHT (lbs.) 80 VENT OPENING- Inside Wall Surface 7 1/2" DIA. Outside Wall Surface 7 1/2" Dia.

House Specifics: 1970 split level ranch. The exterior siding is aluminum and the interior walls are sheetrock covered with wallpaper. All exterior walls are 2 X 4 construction and filled with fiberglass insulation batts. The unit without the blower will be located in the kitchen/dining area. No ladder will be required for exterior work on this unit and there are no other obstructions. The second unit, with a blower, will be located downstairs in the family room at the opposite end of the house. In addition, there is not an outlet available for the blower. An outlet will have to be installed near the unit. The electric service panel is located in the utility room next to the family room. The owner has granted permission to use service raceway i.e. wiremold which will run 25 feet. Wiring will be to code. There are no other obstructions.

DRAFT-DOE

3. Sample bid to install one (1) EMPIRE DV-210-7SG with wall thermostat and one (1) DV-60-3CIP with a wall thermostat and an eight foot duct extension to an adjoining room. Any joints on the duct work will be sealed. The duct work will be left exposed. There are no doors on either room so that there is adequate cold air return flow. The DV-210-7SG specifications are: HEIGHT (inches) 21 3/8 WIDTH (inches) 16 1/4 DEPTH (inches) 9 3/8 SHIPPING WEIGHT (lbs.) 43

Vent Opening For: Inside Wall Surface Min. 6 1/4 Dia. Outside Wall Surface Min. 6 1/4 Dia.

The DV-60-3CIP specifications are: HEIGHT (inches) 82 3/8 WIDTH (inches) 16 DEPTH (inches) 11 1/2 SHIPPING WEIGHT (lbs.) 140

Vent opening for: Inside wall surface Min. 7" Dia. Outside Wall Surface Min. 7" Dia.

House Specifics: 1985 two story home with an unfinished basement. The exterior siding is vinyl. All exterior walls are 2 x 6 construction with two inch rigid foam board insulation on the outside of the wall and fiberglass insulation batts. All interior walls are sheetrock that is painted. The DV-215 will be installed in the second floor study. A twenty foot ladder will be needed to install the exhaust vent. The other unit will be installed in the family room and the duct extension will supply the kitchen area. There is a non load bearing wall between the two rooms. There are no other obstructions to the installations.

EXHIBIT C

**DOE/BED PILOT FULL-COST PROGRAM
PERFORMANCE SPECIFICATIONS FOR THE INSTALLATION OF
GAS DIRECT VENT SPACE HEATERS**

Introduction

These performance specifications are meant to be in addition to applicable existing codes and federal regulations. In any case where a Federal, State, or local code or regulation exceeds the requirements herein, that code or regulation shall apply. If the Federal, State or local code or regulation does not exceed the requirement herein, then the requirements contained in this specification shall apply.

1. All units installed shall be gas fired direct vent space heaters with sealed combustion and electronic ignition.
2. All units installed shall be design certified and labeled by the American Gas Association Laboratories as a Direct Vent Wall Furnace.
3. All units and accessories shall be installed according to manufacturer's specifications and instructions. A copy of the manufacturer's instructions shall be left with the unit to ensure ease of inspection.
4. A City permit will be needed for all heating system installations. All installations shall be done in accordance with City of Burlington codes. In the absence of City codes, the installation shall conform with American National Standard (National Fuel Gas Code) known as NFPA 54 and ANSI Z223.1, 1984 available from the American National Standards Institute, Inc., or from the National Fire Protection Association.
5. Actual location(s) of unit(s) will be according to the Work Order prepared for the specific home. Contractor shall size and help determine the best location(s) of the heater(s) to be installed. Due to high temperatures the appliance should be located out of traffic and away from furniture and draperies.
6. Care will be taken during the installation so that the installation of the space heater will not mar the appearance of the home. The appearance of the unit, removal and replacement of siding, wiring, controls, duct work and vent will be neat and all penetrations into the structure will completely sealed against air infiltration and water leakage, and insect infestation.
7. On completion of the installation, the Contractor shall test the operation of the space heater, controls and accessories and assure their proper functioning. Contractor will submit a B.E.D Completion Certificate, with bill, that certifies that the unit is operating correctly. Instructions on unit(s) operation and maintenance shall be provided to the appropriate occupant. In rental units, additional copies will be provided to the owner or to B.E.D to deliver to the owner.
8. Contractor shall provide the following safety information and instructions to occupants:
 - If you smell gas: open windows, do not touch electrical switches, extinguish any open flames, and immediately call your gas supplier.
 - Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.
 - This is a heating appliance. Do not operate this appliance without the front panel installed
 - Children and adults should be alerted to the hazard of high surface temperature and should be kept away to avoid burns or clothing ignition.
 - Young children should be carefully supervised when they are in the same room with the appliance.
 - Do not place clothing or other flammable material on or near appliance.
 - Installation, servicing and repair should be done only by a qualified service person.
 - The appliance should be inspected at least annually by a professional service person. More frequent cleaning may be required due to excessive lint from carpeting, bedding material, etc. It is imperative that control compartments, burners, and circulating air passageways of the appliance be kept clean.

I HEREBY SUBMIT THAT I HAVE READ AND UNDERSTAND THESE SPECIFICATIONS

Contractor's Name _____

Signature

Date

Appendix J.

CONTRACTOR SELECTION PROCESS FOR THE DOE PILOT PROJECT

The selection of the three contractors was based on the following eight criteria with their associated point values.

1. Attendance, and participation, at the contractors informational meeting. 5 points
2. Prices submitted along with the bid package (including the response to the company information requested and quality of bid information). 20 points
3. Experience working with LP and Nat.Gas. 20 points
4. Experience installing direct-vent gas space heaters. 25 points
5. Customer references. 20 points
6. Call to Consumer Affairs Division of the Vermont Attorney General's office. 10 points
7. Call to the Director of the City Inspection Division. 5 points
8. Responses to the interview questions (see attached copy of questions). 15 points

Total Possible Points- 120

Seven firms submitted bid packages and all seven were interviewed.

CONTRACTORS INTERVIEW QUESTIONS

1. How long has your company been in business?
2. Could you please briefly describe your organizations structure or who does what?
3. Who will be responsible for the installations?
- 3.5 How do you select and train your employees?
4. How much experience has your organization, and the individuals who will be doing the work, had working with natural gas and liquid propane? Where did they receive their training?
5. How much experience has your company, and the individuals who will be doing the actual work, had installing direct-vent gas space heaters? Where did they receive their training? What brands did you work with?
6. Are you affiliated with any trade associations?
7. Does your organization subscribe to any technical or trade journals, newsletters or magazines?
8. Do you or your staff attend any technical conferences or trade shows?
9. How do you ensure that all needed members of your organization are fully aware of code regulations and changes to the code?
10. Could you please describe a couple of situations where you had a disagreement with a customer and how you resolved it?
11. As you know we have designed the program so that you will go to the home with a B.E.D. representative who will lead and organize the visit. Do you see yourself, or your employee, having a problem with this arrangement?
12. What do you think of this program?
13. How patient are you? This is a pilot program that has never been tried before by a utility.
14. What do you consider to be a professional and quality installation? Please describe this.
15. What can you contribute to this program?

Appendix K.

Lawrence Berkeley Laboratory

Building 90, Room 3074, Berkeley, CA 94720

Applied Science Division

(415) 486-4459 • FTS 451-4459

February 21, 1990

M E M O

TO: Tom Buckley, Harlan Lachman
FROM: Rick Diamond
RE: Revised Sample Selection Guidelines

Based on discussions with Harlan Lachman (2/14/90) and Tom Buckley (2/21/90) we have revised the original sample selection guidelines (memo 2/8/90). These notes represent our current thinking on the subject. Please feel free to call if we need to discuss this further.

Sample Selection

The purpose of selecting the sample is to a) generalize the performance of the sample to the population of interest, and b) determine the energy savings of the proposed retrofit. The target sample is to be representative of the approximately 2000 electric-heating customers, is to reflect the relative proportion of single-family and multifamily households, and is to exclude wood and kerosene users. The desired experimental sample size is between 50 and 80 households, 20-30 single family customers and 30-50 multifamily units (8-10 multifamily buildings).

Because the utility does not have a record of which customers are solely electric heating, the approach is to select 1000 households at random (e.g., select every 10th customer) and compare winter and summer electricity use. The first choice for comparison, based solely on weather, would be to compare January and June consumption. (June should be relatively free of air-conditioning; December is irregular due to the holidays.) Because a large part of the multifamily population may be students, who are away in January, and out of school in June, February and May would be the next choice for comparison, but the schedule for the local schools should be consulted. (If the selected month is found to have had uncharacteristic weather, the selection ratio defined in the next paragraph may need to be adjusted accordingly.)

Those households that used more than 2-3 times their summer electricity consumption in winter would be presumed to have electric space heating. (The selection of the exact ratio will depend on the month selected and the desired mix of single and multifamily houses.) The upper bound of three was based on a rough estimate that the typical single-family house in Burlington uses 24,000 kWh per year, 12,000 kWh for space heating. Assuming a 6-month heating season, a winter bill would be roughly 3,000 kWh compared to a summer month of 1,000 kWh, thus the factor of 3 to 1. Based on the

February 21, 1990

expected frequency of electric-heat customers in the population, we would expect between 200-300 of the 1000 households to be in this category.

Once this sample is identified, the utility records will be used to split the households into single-family and multifamily. The households will then be assigned a random order from which individuals will be contacted for screening for the study. Non-contacted households will be used as both controls and as a pool of additional candidate households to be added at later times. This pool can also be used for selecting representative households for the focus groups.

One limitation of this method of selecting electric-heating households is the bias against low-winter/high-summer electricity-using households (for example, a well-insulated house that uses little heating in winter, but has high air-conditioning use in summer). Another artifact of the selection process is that households that are away during the summer may also turn up in the 3-to-1 ratio, and perhaps a minimum summer consumption will need to be established.

Following the identification of the 200-300 potential homes would be a phone survey that would have a short screening criteria. The criteria would be questions to determine:

- 1) **Whether electricity is the only source of heat (i.e., no wood, kerosene, or gas).** You will need to set some level of acceptable auxiliary fuel use, e.g., use of fireplace for holidays, ceremonial uses. Will auxiliary fuel users be excluded? What happens in the full program, will such households be included?
- 2) **Is the household single-family or multifamily?** (If multifamily, obtain name and phone number of landlord, number of units in building).
- 3) **Has the household been at that address for the previous 12 months.** This may pose a problem in multifamily (high student-turnover) and in rental single-family as well. Ideally, the twelve-month period will be used to determine the pre-retrofit energy consumption. We will need to identify such households, but we expect that they will be kept in the sample.
- 4) **Is the household interested in the program?** If the household has been identified as electric heating (question 1), then the program can be briefly described. The household would then be told that information will be mailed to them and that they will be called in the next week to answer any further questions. (They should be asked what would be a good time to be reached.)

Appendix L.

Burlington Electric Department
Pilot Full-Cost DSM Program

Telephone Interview

Hello, my name is _____. I'm calling from the
Burlington Electric Department on Pine Street here in
Burlington. Is _____ home?

If no, When would be a good time for me to call back?
Note the date_____ and time_____.

IF YES:

May I speak with him/her please?

Hello, my name is _____. I'm calling from the
Burlington Electric Department on Pine Street here in
Burlington. I'm calling to talk with you about the free
electric heat to gas conversion program being offered by BED.
Do you have a few minutes to talk now?

IF NO:

When would be a good time to call you back?
Note the date_____ and time_____.
Thank you very much, I'll call you then.

IF YES:

That's great. Have you heard about this program or read about
it in our newsletter? (Wait for response?)

IF YES:

Ask them about what they have heard and then fill in with the
explanation below.

IF NO:

Begin explanation below.

You may already know that electric heat is currently the most expensive way to heat your home. It is also expensive for Burlington Electric to purchase electricity at certain times of the day when you need heat. We have come up with a way to save our electric heat customers money on their electric bills and reduce the department's cost of purchasing power at the same time. We can do this by converting a portion of your home to gas heat. Right now, we have federal funds to make this offer at no charge to only about 50 of our electric heat customers at part of a pilot program. About _____ (30) of our customers have already opted to take advantage of this free offer. Do you think you would be interested? (Wait for response.)

IF YES:

That's great! This is how the program works. We will schedule a time to come to your home with one of our heating system contractors. First, we'll determine the size and number of gas units that need to be installed. Then the contractor and I, with your help, will determine the best locations for the heaters. After that is done, I'll explain how the heating system installation will be done and I'll ask you to review and sign an agreement with BED. There will be no cost to you for the conversion. The agreement explains what BED will do and verifies that you want this work to occur in your home. The contract includes 2 additional requirements: First, that you allow BED to install a load management device that will be used on weekdays between 9:00 and 11:00 AM and 5:00 to 8:00PM to turn off selected electric baseboard heaters. We will determine which electric baseboards can be controlled without sacrificing your comfort when we come visit you. Finally, the contract gives BED the right to monitor your gas consumption for 3 years to help us determine how successful the pilot project has been.

I realize this is a lot of information to take in all at

once. Do you have any questions about what I've said?
(Address the questions)

The first step is to schedule an appointment for me and one of our heating contractors to met with you in your home. We would prefer to meet between 8:00 AM and 4:00 PM Monday thru Friday. We should allow up to 1 1/2 hours for the visil. What is possible for you?

IF NO:

That's fine. To complete our files for the Department of Energy, can you tell me why you are not interested? Record response. Thank you very much for your time. Good-bye.

STREETS THAT VGS WILL NEVER SERVICE:

- DERWAY RD
- MORRILL DR
- RIVERMOUNT DR
- SUNSET CLIFF PAST CURTIS
- PROSPECT PARKWAY
- VAN PATTON PARKWAY

10/31/90 (telephn2.wp)

Appendix M.

Burlington Electric Department
Pilot Full-Cost DSM Program

Telephone Interview Form

Customer Name _____

Address _____

Customer No. _____

1st Contact By _____ Date _____ Time _____

Interested ____ Very interested ____ Not interested ____

Follow-up call scheduled on _____

Wants appt., call from field specialist expected by _____

Comments

2nd Contact By _____ Date _____ Time _____

Interested ____ Very interested ____ Not interested ____

Follow-up call scheduled on _____

Wants appt., call from field specialist expected by _____

Comments

3rd Contact By _____ Date _____ Time _____

Interested ____ Very interested ____ Not interested ____

Follow-up call scheduled on _____

Wants appt., call from field specialist expected by _____

Comments

BED PILOT FULL-COST DSM PROGRAM
Customer Data Sheet

Customer #: _____ Meter #: _____

Customer's Name: _____

Address: _____

Phone #: (Hm) _____
(Wk) _____

Owner _____ Tenant _____

If tenant:

Owner's Name: _____

Address: _____

City, State, Zip _____

Phone: (Hm) _____
(Wk) _____

Directions to home: _____

scheduled initial visit (date & time): _____

Notes: _____

Type of dwelling:

_____ Single family detached	_____ Condo
_____ Apt. in duplex	_____ Apt. in
Multi-family	

Estimated annual space heating cost (from BED Calc.):

Electric _____ Nat. Gas _____ LP Gas _____

Appendix N.

Field Manual

F-3.1

Burlington Electric Department
Pilot Full-Cost DSM Program

POST INITIAL VISIT
SAMPLE LETTER

Date

Mr. Name
His Address
Burlington, VT 05401

Dear Mr. Name:

I enjoyed visiting with you today and working out a plan for installing new gas space heaters in your home. As we discussed during our talk, (Contractor's name) proposes to install (number) space heaters in your home as described in the work order form I left with you.

Burlington Electric Department will pay the full cost of the installation providing you accept this offer by (date). To accept the offer, you must sign the agreement form I left with you and return it to me postmarked no later than the date noted above. If you decide to go forward with the installation, the contractor will begin work within four weeks. The work will take a day or two in your home.

Thank you for your interest in this program. Please feel free to call me at 658-0300 (Extension 369) if you have any questions. We look forward to hearing from you.

Sincerely,

Field Specialist
BED

7/24/90

Field Manual

F-3.2

Burlington Electric Department
Pilot Full-Cost DSM Program

CHANGE ORDER
SAMPLE LETTER

Date

Ms. Name
Her Address
Burlington, VT 05401

Dear Ms. Name:

As we discussed, (describe problem that has become apparent).

In an effort to resolve this problem, the contractor has proposed (describe solution).

Therefore, Burlington Electric Department is authorizing a change order on your behalf to allow the contractor to go forward with the project and ensure your comfort and safety.

(Either) The Burlington Electric Department will pay the full cost of this changed work since it simply a different way of accomplishing the installation which the contractor believes will work better for you.

(Or) Since this work relates to an existing deficiency in your home, you will have to pay the cost of this additional work. The cost will be \$_____ as quoted by the contractor. BED will, of course, pay for the installation itself as originally agreed upon once this deficiency is corrected.

If this change is agreeable to you, please sign the attached Change Order and return the (color) copy to me as soon as possible. The contractor cannot continue work at your home without your approval of this change.

Please feel free to call me at 658-0300 (Extension 369) if you have any questions.

Sincerely,

Field Specialist
BED

7/24/90

BURLINGTON ELECTRIC DEPARTMENT
Pilot Full-Cost DSM Program

Post Marketing
Information Letter

Dear

Thank you for your interest in the Burlington Electric Department's free electric to gas space heating conversion program. Enclosed is the additional information you requested and an explanation of the program.

B.E.D. is making the offer of installing free space heaters for a very limited time this year. I will call you back next week after you have had some time to think about our offer. If you are interested in the program a visit will be scheduled with a heating contractor.

If you have any questions feel free to contact me at 658-0300 ext. 369. Thanks again for your interest.

Sincerely,
BURLINGTON ELECTRIC DEPARTMENT

Chris Burns
Energy Services Specialist

Appendix O.

BED PILOT FULL-COST DSM PROGRAM**Home Visit Flow -- 1 - 2 hours****At the door...**

Say hello. Introduce yourself and the contractor. Go inside and let homeowner know that you would like to sit and talk for a few minutes.

Sitting somewhere....

Contractor should stay with you until you indicate to owner that contractor will look around the home.

- Explain... the program briefly
 - ... why contractor is with you
 - ... how the process in the home will flow
- Ask owner if he/she wants to go forward with the gas conversion.
- If yes, ask occupant to show you around the house while you ask questions.

Walking around the home with occupant and contractor...

- Ask occupant interview questions
- Ask owner interview questions (if appropriate)
- Let occupant know that contractor needs to take some measurements. Ask if that is OK.

Talk with occupant about NeighborSave, etc...

- Insulate water heater, if appropriate
- Install Smartlights
- Showerheads

Sit down again....

- Write audit report
- Discuss contractor's recommendations with owner and work out any differences.
- Once owner agrees with proposal, have contractor write up a work order.
- Review owner agreement with owner and ask whether he/she wants to sign.
- If signed, explain that contractor will call to schedule visit within two weeks.

Leave....

- If not signed, leave agreement and work order with owner.
- Leave.

Appendix P.

Burlington Electric Department

BED PILOT FULL-COST DSM PROGRAM

FIELD MANUAL

Executive Summary

The field specialists were provided with a Field Manual that included information thought to be useful during the on-site visit and during follow-up communications with the owner and contractors. The manual is divided into two sections: one relating to dealings with the owner and the other relating to dealings with the BED selected contractors. A brief description of each component of the manual is provided below. If, after reading this, you would like a copy of the entire manual, you may contact BED to get one.

SECTION I -- OWNER

This section of the manual was set-up to provide the field specialist with information useful in dealing with the building owner and/or tenant.

A. On-Site Information

1. Home Visit Flow

This one-page piece provides the field specialist with a method for organizing the home visit. Since the visit includes conversations with both the owner and the contractor, the potential for confusion is great. A copy of this page of the manual is included in Appendix K of this report.

2. Customer Data Sheet

This form was filled out by the field specialist during the phone call to the owner when the visit was scheduled. The information collected was the minimum required to allow the specialist to get to the home and have some idea of the situation there. It includes the owner's name and address, directions to the home, name of the tenant (if applicable), date and time of the scheduled visit, type of dwelling and estimated annual space heating costs.

3. Owner and Occupant Interview

Basic information acquired during the on-site interview with the owner and/or occupant was recorded on this form. It also provided a prompt for the field specialist to bring up issues relating to the operation of the home. This information was necessary in order to correctly size and place the space heaters for maximum comfort.

4. Audit Report

Burlington Electric Department

The audit report form was used by the specialist and left in the home after the on-site visit. It provided the owner and/or tenant with the specialist's observations about potential energy saving measures other than the planned conversion. This simple form provided a vehicle for the specialist to convey these observations in writing.

5. Inspection Checklist

The inspection checklist was filled out only when the field specialist actually did a final inspection. Final inspections by the field specialist were done randomly. The city building inspector inspected every installation.

B. Space Heaters

1. Photographs of Typical Installations

One of the recommendations of the focus group that participated in this project was that the field specialist should have photographs of the heaters being proposed for the owner to see. Aesthetics was a major consideration to owners, so the photos gave the owner a visual idea of what the unit might look like in his/her home. These can be either photographs taken by the utility or manufacturer's photo brochures.

2. Estimated Savings in Typical Homes

Included in the manual is a calculation of the energy and dollar savings likely to occur based on three different assumed residences in Burlington. This was provided in a spreadsheet format with all of the assumptions clearly documented. The specialist could use this information to provide the owner with an estimate of the savings (s)he was likely to see. Specialists were cautioned to explicitly tell the owners that all estimates were approximate and that actual savings would depend on the way the new heaters were used.

3. System Installation Description

This one and one-half page document explained how the installation would be done. It was designed to either prompt the specialist in explaining the procedure to the owner verbally or simply to be given to the owner for him/her to read.

4. Use and Care of System

Once the system was installed and inspected, this one page document was provided to the owner and/or tenant as a reference document. It describes the best way to use the system, reminds the owner to read the Owner' Manual supplied by the manufacturer, describes the system warranty and invites the owner to call BED

Burlington Electric Department

with problems.

C. Contractors

This portion of the manual provides the field specialist with information about the selected contractors. It was included so that the specialist would have information to give to the owner about the contractor that was going to be working in his/her home. It includes:

- Contractors' names, addresses, phone numbers
- Resumes
- References from other building owners

D. Program Description

This is a one and one-half page document that explains the pilot program and how it works. It was available to be given to the owner if the owner wanted to read about the program before making a decision whether or not to participate.

E. Other Programs

Also included in the manual were brief descriptions of other programs that the owner or tenant might be eligible for. Programs offered by BED as well as other local service agencies were included. This allowed the field specialist to knowledgeably refer an individual to another program that might be useful to that person.

F. Forms

Forms that the field specialist used in the course of dealings with owners were included in the manual for ready access. Included were:

- Contract
- Change Order
- Model Letters
 - Post Initial Visit
 - Change Order Cover Letter
 - Post Final Inspection

SECTION II -- CONTRACTOR

This section of the manual includes information useful to the field specialist in his/her work with the selected contractors.

Burlington Electric Department

A. Price Sheets for Typical Installations for Each Contractor

Each contractor was required to provide bids for typical installations at the time that they applied for inclusion in the program. If the field specialist found that the contractor's bid on a particular job was out of line with his/her earlier bid, the specialist could get another of the selected contractors to bid on that job. These bids or price sheets are included in the manual so that the field specialist has them easily available.

B. Equipment and Installation Specifications

Since many of the decisions about equipment and installation were made during the on-site visit, specifications relating to the proper selection and installation of a specific heater were useful to have near at hand.

C. Contractor Contract

This is the contract that the contractor signs with the owner with BED acting as the owner's agent. The provisions of this contract are lengthy and ready access was important to both the contractors and the specialist in the event of confusion or disagreement on an issue. Having this contract on-site allowed the specialist to review it with the owner if requested.

Appendix Q.

Burlington Electric Department

585 Pine St. 658-0300

Electric to Gas Space Heating Pilot Program

Fuel Records Release Agreement

I, _____, (hereinafter called "Tenant"), located
at _____,

(Address and Apt. Number)

hereby consent to and agree to participate in up to three
Burlington Electric Department follow-up surveys and give
permission to Vermont Gas Systems or other fuel supplier to release
up to three years of fuel records to the Burlington Electric
Department or its agent in order to evaluate the effectiveness of
the heating system program.

The Burlington Electric Department will not reveal the names of
any program participants.

Dated ____ / ____ / ____, 19__ at _____

(month and day) (Year)

(Address)

(Tenant Signature)

(Owner Signature)

Appendix R.

DOE PILOT PROJECT
HEATING UNITS INSTALLED
7/2/91

MODEL NAME	BTU OUTPUT	A.F.U.E.
EMPIRE DV-55	42,900	74%
EMPIRE DV-235	24,500	64%
EMPIRE DV-225	17,500	63%
EMPIRE DV-215	10,500	61%
EMPIRE DV-210	7,000	59%
SUBURBAN HV-50	35,000	80%
COZY CDV-225	22,400	64%
COZY CDV-155	9,300	61%
COZY CDV-335	21,120	64%
SUBURBAN DWW55P	44,000	76%
MONITOR MPI22	20,400	78%
ARCOAIRE 100K	80,000	80%

Appendix S.

BURLINGTON ELECTRIC DEPARTMENT

FUEL-SWITCHING PILOT SURVEY REPORT

Prepared for:

Burlington Electric Department

Prepared by:

Susan French

Human & Environmental Resource Studies

2824 Sweet Road • Pompey, NY 13138 • Tel. 315/677-3998

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BED Fuel-Switching Pilot Survey Report -- Page 1

I. Introduction

This report summarizes results from the Burlington Electric Department's Fuel Switching Pilot Survey. The telephone survey was conducted by Burlington Electric (BED) in May 1991 at the completion of a year long pilot program. This report presents a quantitative summary of the survey results, and a discussion of any trends indicated by the pattern of survey responses.

Program Description

The Burlington Electric Department's Fuel Switching Pilot Program was initiated in 1990. The program was a preliminary test of the effectiveness of fuel conversion as a strategy to reduce Burlington Electric Department's electric heating load. In partnership with the United States Department of Energy, BED installed natural gas or propane space heaters in dwellings at no cost to the customer. Electric baseboard heaters were radio-controlled to limit their use during hours of peak demand.

Fifty program participants were randomly selected from a list of BED customers who use electricity to heat their homes. Contractors and BED field personnel visited the customer's home to perform an energy audit. The appropriate gas/propane heating unit and heater location was determined during this joint visit. Program contractors installed the space heating unit(s) and completed a satisfaction survey with the customer at the time of installation. A Burlington city inspector performed an installation inspection and BED staff ensured continued program quality with follow-up phone calls to all customers.

This survey was administered to collect additional information from customers about their response to the pilot program. An analysis of actual customer energy savings is being conducted by the Lawrence Berkeley Laboratory to determine the quantitative impact of the program.

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Survey Administration and Response Rates

Forty-four dwellings were treated as part of this fuel-switching program. In multifamily buildings, both the tenants and building owner were surveyed, resulting in a potential survey sample of 56 program participants. The actual sample size is 51 people when vacancies are taken into account.¹ Of the 51 program participants included in the survey, 37 responded to the survey for an overall response rate of 73%.

Eighteen of the 37 respondents own single family homes, 13 live in multifamily dwellings, and six respondents own multifamily buildings. Single-family owners are most completely represented, with 18 out of 20 participants responding for a 90% response rate. Thirteen out of a potential of 18 multifamily tenants were reached for a 72% response rate, and 55% of the 11 multifamily building owners responded to the survey.² Of the 14 non-respondents, five multifamily tenants, five multifamily building owners, and four single-family home owners could not be reached by survey administrators.

II. Analysis of Demographic Data

Number of People in Household

Sixty-one percent (61%) of the dwellings treated by the pilot program have one or two residents. Sixteen percent (16%) of the homes have three residents, and 23% have four residents. Seventy-one percent (71%) of multifamily dwellings have one or two residents, compared to 53% of single-family homes (Figure 1).

¹ Of the 56 potential respondents, one multi family building owner had sold his property, one apartment was unoccupied at the time of the retrofit, and three tenants had moved out of their apartments, resulting in an actual survey population of 51 people.

² Because only six multi family building owners were surveyed, each individual represents approximately 17% of the group. This means that "33% of multi family owners" represents two people, and "50% of multi family owners" represents three people.

BED Fuel-Switching Pilot Survey Report -- Page 3**Household Income**

Most of the survey respondents (51%) report annual household incomes of between \$20,000 and \$35,000 (24%) or between \$35,000 and \$50,000 (27%). Nineteen percent (19%) of respondents say they have annual incomes of \$20,000 or less, and 8% of the respondents report incomes over \$50,000. Eight people did not answer this question (Figure 2).

People at Home During Day

Seventy-one percent (71%) of the survey respondents report that no one is typically home during the day on a weekday. Twenty-six percent (26%) of respondents report that there typically is someone at home during the day, while three percent have other arrangements. Fewer multifamily tenants (64%) are usually not at home during the day than single family residents (77%) (Figure 3).

Residents With Special Needs

Sixteen percent (16%) of the households surveyed have at least one resident with special needs (i.e., elderly, invalid, small child). More respondents who live in multifamily residences (21%) have people with special needs than those who live in single family homes (12%) (Figure 4).

Single Family Residents

Of the respondents who live in single family homes, 65% have lived in their homes more than 10 years (Figure 5). Seventy-seven percent (77%) of the single-family homeowners surveyed report that their home was built after 1960, and 24% live in homes built before 1960 (Figure 6). In general, the single family housing stock of the pilot program participants is relatively new.

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Figure 1
Number of People in Household

Figure 2
Household Income

Figure 3
Someone Home During Weekday

Figure 4
Residents With Special Needs?

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Almost half of the single-family residents (47%) say they have 1500 or more square feet of heated living space, and an additional 29% do not know the square footage of their heated living space. The remainder of the single-family participants (24%) have homes with less than 1500 square feet (Figure 7). Most of the single-family homeowners (82%) have three or more bedrooms in their homes, while 18% have one or two bedrooms (Figure 8).

Multifamily Residents

Most of the participants who live in multifamily buildings (79%) report that they have lived in their dwellings between one and 10 years (Figure 5). All multifamily residents have either one or two bedrooms in their home. Eighty-six percent (86%) of multifamily tenants have two bedrooms in their dwellings, while 14% have one bedroom (Figure 8).

Multifamily Building Owners

Forty percent (40%) of multifamily building owners report they have owned their building between one and 10 years, while 60% have owned their building for more than 10 years. Half of the multifamily building owners (50%) report that their buildings were constructed prior to 1920, while the other half say their buildings have been constructed since 1960 (Figure 6).

One-third (33%) of the multifamily building owners say they have heated areas of 1500 sq. ft. or less in their building, and an additional 33% say their buildings have more than 2000 sq. ft. of heated living area. The remaining 33% of building owners do not know the square footage of their building (Figure 7).

III. Comparison of Heat Use Before and After Program

Overall, 32% of all survey respondents report that they heated all of the rooms in their home during the winter before the BED pilot program (Figure 9). More multifamily tenants (36%) said they kept all rooms heated than single-family homeowners (29%).

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Figure 5
Length of Time in Home

Figure 6
Year Home Built

Figure 7
Heated Area

Figure 8
Number of Bedrooms

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Rooms Too Cold to Use

Sixty percent (60%) of the program participants report that some rooms were too cold to use in the winter before the pilot program. After the installation of gas or propane heaters in their homes, only 20% of the participants surveyed report that some rooms are still too cold to use in the winter (Figures 10-11).

Single-family homeowners report a greater drop in the number of cold rooms; 65% of the sample had rooms too cold to use before the program, and only 24% said they had rooms too cold to use after the program (Figure 10). Multifamily tenants also noticed a substantial difference, from 57% with rooms too cold to use in winter before the pilot program to only 25% with rooms too cold to use after the program (Figure 11).

Figure 9
All Rooms Heated in Winter?
(Before Program)

Figure 10
Any Rooms Too Cold?
Single Family

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Figure 11

**Any Rooms Too Cold?
Multi Family Tenants**

Figure 12

Baseboard Use After Program **Use of Baseboard Heaters**

Forty-six percent (46%) of the program participants report that they "never" use their baseboard heaters since the retrofit, while 42% report using baseboard heaters "sometimes." More multifamily residents (50%) report that they "never" use their baseboard heat than single-family residents (41%) (Figure 12). This makes sense intuitively, since overall, multifamily dwellings are smaller in size, allowing for maximum benefit and distribution of heat from gas space heaters.

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IV. Comfort

Customer Expectations About Comfort

Participants were asked what benefits they expected to receive as a result of gas heaters. Three choices were provided: lower heating bills, more comfortable home, and "other." Fifty-one percent (51%) of the survey respondents said they expected a more comfortable home as a result of installing gas heaters (Figure 13).

Seventy-eight percent (78%) of survey respondents report that their expectations about increased comfort have been met by the installation of gas heaters. All of the multifamily residents (100%) report that their expectation for increased comfort were met "completely," compared to 81% of single-family home owners (Figure 14).

One third (33%) of the multifamily building owners report that their expectations for increased comfort were met, while the remaining building owners said they do not know if their comfort expectations have been met (Figure 14).

Figure 13
Expected Program Benefits

Figure 14
Degree to Which Comfort Expectations Were Met

BED Fuel-Switching Pilot Survey Report -- Page 10**Comfort Since the Program**

Seventy percent (70%) of the survey respondents overall report that compared to before the pilot program, they are more comfortable in their homes after the pilot program. One hundred percent (100%) of the multifamily residents report that they are more comfortable now, compared to 65% of single-family homeowners (Figure 15).

Out of 50 comments about what customers liked most about the program, two described warmth as a strong benefit. Of the 44 comments about what customers liked least about the program, three mentioned blasting heat in the living room as a detriment to comfort.

V. Cost of Energy**Customer Expectations About Cost Savings**

A majority of the survey respondents (95%)³ said they expected lower heating bills as a result of having gas or propane heaters installed in their home. Slightly more multifamily residents (93%) than single-family residents (89%) expected this benefit (Figure 13).

Sixty-four percent (64%) of the survey respondents said their expectations for lower heating bills were "met completely" by the program while 6% reported their expectations were "met somewhat" and 6% said their expectations were "not met."⁴ Twenty-four percent (24%) of the survey respondents (primarily multifamily building owners) do not know whether their expectations for lower heating costs have been met (Figure 17).

Single-family home owners and multifamily tenants are very similar in their response to this question. When multifamily building owners and people who do not know if their

³ Thirty-five out of 37 respondents

⁴ In this case, 6% is equal to two respondents.

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expectations were met are excluded from the sample, only two people feel the program did not meet their expectations for reduced energy costs.

Heating Costs Since the Program

Sixty-one percent (61%) of the survey respondents report that they have lower energy costs (gas/propane and electricity combined) now than they did before the program. In general, multifamily tenants fared better, with 80% reporting lower energy costs, compared to 65% of the single-family residents (Figure 16).

Out of the 50 comments about what customers liked most about the program, 11 comments pointed to the benefit of lower energy bills and energy savings.

Figure 15

Comfort After Program

Figure 16

Energy Bills After Program

BED Fuel-Switching Pilot Survey Report -- Page 12**VI. Additional Customer Responses to Gas Heaters**

In addition to questions about comfort and heating costs, customers were asked if they believed the gas heaters add to the value of their home or building, and whether the noise from the heaters presents a problem.

Increased Value of Home/Building

All of the multifamily building owners surveyed believe that the installation of gas heaters adds to the value of their building. However, none of the building owners reported any plans to increase rent as a result of the installation of gas heaters. While it is possible that building owners would not increase tenants' rent after receiving free program services, this is unlikely to be the case if building owners pay for part of the cost of conversion.

Eighty-two percent (82%) of single-family homeowners report that the gas heater adds value to their home (Figure 18).

Noise

The most tentative customer response to the pilot program overall concerns noise caused by the gas heaters. When asked if noise is a problem, 50% of the survey respondents said it is, while 44% said it is not. In general, fewer building owners (33%) report that noise is a problem compared to single-family homeowners (59%) and multifamily tenants (46%) (Figure 19).

Of the 44 customer comments about what participants liked least about the program, 10 mentioned the noise created by the heating unit, while one person said the noise was only a problem "at first."

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Figure 17
Degree to Which Lower Energy Cost Expectations Were Met

Figure 18
Does Space Heater Add Value to Home or Building?

Figure 19
Is Noise A Problem?

Figure 20
Reason For Participation

BED Fuel-Switching Pilot Survey Report -- Page 14**VII. Elements of Program Participation****Reasons For Participation**

Respondents were asked which of the following reasons contributed to their participation in the program: high energy bills, because the program was free, or because they prefer gas heat. Each respondent was asked to select as many reasons as applied.

Eighty-two percent (82%) of the single family residents said they participated in the program because of their high energy bills, while 71% said they participated because the program was free. Twenty-nine percent (29%) of the single-family residents said they participated in the program because they like gas heat (Figure 20).

More multifamily building owners (83%) said they participated in the program because it was free, although 67% percent also report being concerned about high energy bills. Fifty percent (50%) of multifamily building owners said they participated because they like gas heat (Figure 20).

These reasons also stood out for a number of respondents as the thing they liked most about the program. Out of 50 comments about what customers liked most about the program, 11 comments referred to the fact that it was free and five comments noted the desirability of gas heat over electric heat.

Free Riders

Participants were asked if they had been planning on converting to gas before they were asked to participate in the program. Almost half of the single family residents (47%) and half of the multifamily building owners (50%) said they had been planning to convert to gas heat prior to their involvement in the program (Figure 21).

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From a "free-rider" perspective, this would indicate that approximately half of the program participants would have converted to gas heat on their own, in the absence of this program. This result should be taken with a grain of salt. While it is possible that almost half of the participants would actually have changed to gas heat on their own, it is more likely that they have been thinking about a fuel conversion, or would generally prefer to use gas to heat their home. It is less likely that half of the participants would actually have carried out a fuel conversion.

Constraints of Cost in Participation

The cost of energy seems to have been a strong factor in motivating people to participate and in shaping people's expectation of the benefits of gas heaters (i.e., lower heating bills). In the same way, cost seems to have a strong effect on customers' willingness to participate in such a program.

As noted above, at least 71% of single-family homeowners and multifamily building owners said they participated in the program because it was free. Respondents were asked if they would have participated in the program if they had been required to pay one-quarter or one-half of the total cost.

Eighty-two percent (82%) of single family residents report that they would have participate in the program if it had cost them \$250, while 53% say they would have participated if the program cost was \$500 (Figure 22).

Because building owners receive less direct benefit from the program, they are even more sensitive to cost. Half of the multifamily building owners (50%) said they would have participated in the program if it cost them \$400, while only one third (33%) said they would have participated if the program cost them \$800 (Figure 23).

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Figure 21
Already Planning to
Convert to Gas Heat?

Figure 22
Participation with Program Cost
Single Family

Figure 23
Participation with Program Cost
Multi Family Owners

Figure 24
Were You Well Informed
About the Program?

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Overall, it is probable that these percentages are optimistic. In general, people are more likely to indicate they would pay for a product after they have had a positive experience with the product. Ordinarily, customers would have to make the decision to participate by factoring in risk, uncertainty and cost. In this case, because the cost variable was removed, and the utility was sharing much of the risk, normal barriers to participation were removed.

VIII. Participant Evaluation of the Program**Well Informed About Program?**

Most of the survey respondents said they were well informed about the program. Ninety-four percent (94%) of single-family residents and 84% of multifamily building owners said they were well informed about the program. Fewer multifamily residents (57%) report being well informed (Figure 24).

Of the 44 comments about what people liked least about the program, in only two instances did customers indicate they were not adequately informed. Both of these customers are tenants in multifamily dwellings. It is possible that some tenants did not read the program material provided by BED or did not have any contact with the installation contractor. As a result, tenants had fewer opportunities to receive information about the program. This tendency is probably compounded by the fact that multifamily building owners, not tenants, made the choice to participate in the program.

Should the Program Continue?

Fully 97% of all survey respondents said the program should be continued. One hundred percent (100%) of multifamily building owners and tenants feel the program should be continued, compared to 94% of single-family residents. Once again, a total of 36 people out of 37 (97%) said the program should be continued, and one participant did not answer the question. No participants said the program should not be continued (Figure 25).

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These results were supported by general customer comments like, "thought it was great," "good deal - tenants happy," "I love this program and would like to help others participate," and "this should have been done a long time ago."

Figure 25
Should Program Be Continued?

IX. Customer Comments

Recommended Changes

Almost half of the respondents (44%) believe that the program should continue to be administered with no changes, while 33% of respondents suggested the program continue with "minor changes." The remaining 17% say they don't know what changes should be made to the program for future customers.

More multifamily tenants (64%) felt some changes should be made for future customers than single-family homeowners (47%) and multifamily building owners (33%).

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Suggestions for program change include four comments about the need for additional (or different) ducting to get heat to remote areas like the kitchen or bedroom, four comments requesting a smaller heater design, different style or different fans, and one comment suggesting that more thought and time could be put into heater placement.

Noise was mentioned by six people as something to change, while two people (tenants) mentioned a need to receive more information about the program, and two others suggested that contractors use a cardboard foldout to demonstrate the size and shape of the heater in the customers home.

What Customers Liked Best

Program participants were asked what they liked best about the program. Customers offered a total of 50 comments about what they liked best. The majority of comments (11) related to the fact that the program was free or "a good deal." Eleven customers commented that lower bills and energy savings were their favorite thing about the program, while five others said having gas heat instead of electricity was their favorite thing.

Twelve customers said they liked best the caliber of various personnel associated with the program. In general, people liked the professionalism of the energy audit, they felt the people were "nice" and "very good," and the installers were described as courteous, clean, prompt, thorough and polite. Two participants liked best the fact that all their questions were answered clearly. Other participants said they liked: learning a lot, making their tenants happy, adding to the value of their home, and having a safer, contained heating unit.

What Customers Liked Least

Program participants were also asked what they liked least about the program. It is notable that out of 44 comments, 12 people could think of nothing they liked "least." The aspect of the program mentioned by the largest number of people as liked least is the noise

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produced by the gas space heaters. Ten people said they liked the noise least, and one person said they disliked only "the noise at first."

Another type of comment concerned comfort. Three customers dislike the blasting heat in their living room, while one customer noted that there was insufficient heat in another room. Several other comments concerned the use of gas/propane heat itself. People noted things like more dust, adjusting to heater cycles, a vibrating floor, and the looks of the unit (at first). Many of these characteristics represent a learning curve for customers as they adjust to a heating technology that operates differently from the one they are used to.

Some customers are concerned about maintaining their units. Two customers said they don't feel adequately informed about how to use and maintain their heater. At least two other customers mentioned the large gas deposit as the thing they liked least, and at least one customer delayed connecting the gas service because of the deposit. One customer felt the program should be offered to "those who need it" first.

Finally, three customers said the thing they liked least was the inconvenience of the installation, while one customer did not like the fact that contractors do not work after normal business hours.

X. Contractor Perspectives

The three contractors who worked on the fuel-switching pilot program were interviewed as part of the program evaluation. The purpose of interviewing contractors was twofold. First, it was important to discover what changes, if any, contractors felt should be made to improve the program. Second, contractors were asked to describe what specific elements of the program should be replicated to insure that similar programs will be successful. This allows for maximum transferability of the program to other utilities and provides program planners with an "inside" view from the contractor's perspective.

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Overall, contractors have very positive feelings about the program. The elements which are usually sources of frustration for contractors were eliminated by the program design. Examples of this include a well thought out contractor selection process which ensured high quality contractors, random distribution of jobs based on submitted estimates rather than bids, a 72-hour turnaround on payment of contractor invoices after inspection,⁵ and effective communication and teamwork between contractors and BED staff. Contractors offered their thoughts on what BED did to make the program work as well as it did.

Skill Sets

All three contractors pointed out that it is useful to select contractors with both heating & plumbing, and electrical abilities. When one contractor has all these skills, communication is simplified between the utility and the contractor, and there are fewer intrusions into the customer's home. In addition contractors mentioned gas heat experience, weatherization skills and knowledge, remodelling experience and some masonry (for going through brick walls or stone foundations) as useful resources.

BED asked contractors to provide estimates for three different types of installations as a baseline for their installation costs. All three contractors felt this method was a useful part of the selection process. However, the contractors pointed out that such details as the location of the electrical box, the location of the gas meter, and the length of the thermostats should be included in the scenario. When these were not included, contractors factored materials and time for the worst case scenarios into their estimates.

The contractors all feel that it is essential to be thorough in contractor selection. Tough standards and references are important. One contractor pointed out that customers

⁵ A utility staff person noted that, while this is an important contractor benefit, a large internal coordination effort is necessary to facilitate such rapid payment of invoices. Anyone wishing to provide this benefit should be prepared to put some time and effort into creating "rapid processing" channels inside the company.

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will view the contractor as a utility employee, while another pointed out that a contractor who cannot work in a team or get along well with a city inspector can "mess up the program."

Utility Coordination

The contractors each pointed out the exceptionally high quality of the program's field staff. They described the staff as excellent for the job, well trained, always professional, and effective at fostering an atmosphere of respect and teamwork. Contractors offered comments like "BED did good front work," the program was "well planned, well thought out," "there was excellent communication by Chris and Ron," and that "no one was ever in the dark -- BED kept the customer and the contractor informed."

The relationship between the utility and the contractors involved a lot of give and take, with the shared knowledge that the utility was "the boss." For example, while BED reduced hassle by providing contractors with random assignments, contractors knew that their proposals were being compared to their initial estimates to maintain steady costs.

The field staff's training in energy efficiency was also crucial to the success of the program. One contractor concern about this program's transferability is that it will be a challenge for other utilities to find people with the energy level, interest, and commitment to make the program work. The specific skill sets mentioned by contractors for a utility field staff position include: energy efficiency background, ability to perform energy audits, a working knowledge of the construction trades, good communication skills, ability to work as a team, and some knowledge of gas heating technology. BED's field staff person added to this list the need for utility experience and the ability to manage contractors.

All three contractors feel that the visit to the customer's home by a contractor-BED field staff team is a "big plus" for the program. This visit makes the customer feel well attended to and creates customer trust in the contractor's ability to do the work. While the

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field staff person performs an energy audit with the customer, the contractor begins to determine what type of unit would work best for the home, where it could be placed, and what ducting arrangements are possible. This plan is then discussed with the homeowner.

All three contractors pointed out the importance of professionalism during this visit. The BED field person is the "lead man" and the contractor serves in a supporting role as the "technical gas heater expert." Both people can use one another to answer questions based on each person's expertise. If there is a difference of opinion about heating systems or installations, this should not be aired in front of the customer. The objective of this visit is to present a professional, well informed, unified front to the customer.

Installation & Heating Systems

Installation times ranged from one-half day for a small apartment, to between four and five days for a large central system or a home with ducting and thermostat installations. There seems to be a tension between BED's preference for space heaters (primarily driven by cost-effectiveness requirements) and the contractor's desire to insure maximum flow of warm air through the home. Two contractors pointed out that there is not very much difference between the cost of three space heaters and a central heating system.

When a central heating system is possible, several of the challenges of a space heater installation are avoided. For instance, there is no need to cut holes through rooms, walls, or closets, customers do not have to contend with unsightly units or fan noise, and heat is evenly distributed throughout the dwelling. Most contractors predict that, as program participants become paying customers, there may be a movement toward installing more central systems.

Two contractors noted that liquid propane installations should be done with an eye toward future conversion. Using a pipe material and size that is compatible with natural gas costs a little more on the front end, but it saves hundreds of dollars when a customer

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converts to natural gas. One contractor noted that, if a program does gas heat installations during the summer months, some arrangement has to be made for a visit to the customer's home to light the pilot in the fall.

Equipment

Some differences between the perspective of the utility staff person and that of the heating contractor emerge in the heat unit sizing process. It seems that contractors view BED staff as wanting to take a space heater to the limit of its capacity to heat a given space. Contractors want to make sure the unit provides adequate heat for the customer's needs. Some BED staff believe, on the other hand, that heat systems have been traditionally oversized. This allows for a creative tension which hopefully results in an installation plan that meets everyone's needs. As the program continues, it will be important for both contractors and program staff to keep abreast of new gas heating technology and to share this information. In this way, the most cost-effective and comfortable installations will be possible.

As in every product market, some gas heaters are "better" than others in areas such as noise, appearance, and durability. These benefits are traded off against the cost of the "better" units. Contractors and field staff should have a clear and shared understanding of when to select what brand of heater. Both cost-effectiveness and customer preferences should be factored into this decision.

Customer Service

Some contractors noted that multifamily tenants were not as well informed as other program participants. Contractors pointed out that, while building owners loved getting something for nothing, tenants often had no choice about participating, were uninformed about the program, and were not present during the installation. BED program staff share this concern. One of the major challenges of the pilot program was to provide the necessary information for multifamily tenants while maintaining the building owner as the primary

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customer. Program staff are planning to send a separate letter to inform the tenant about the program in the future.

One contractor suggested the need to make sure the customer is informed "right off the bat" in order to avoid "nasty surprises." One example concerns gas heater unit size and noise. Contractors feel customers should be fully informed of the noise level before it is installed. Customers should also be told they have the option of unplugging the fan.

Both the contractors and BED field staff members noted that the gas company deposit was an unpleasant surprise and a barrier to immediate participation for some customers. Steps are being taken to address this issue.

Some of the contractors feel that this program should focus on customers with the greatest need. One person noted that selecting participants by usage level (though beneficial for reducing electric load) can create a bias toward people with larger incomes. Likewise, one contractor suggested that fuel assistance candidates should be a top priority for the fuel conversion program. This would allow the same number of assistance dollars to pay for four times more gas heat than it could purchase in electric heat.

XI. Conclusions

In general, the results of both the customer survey and the interviews with program contractors indicate a strong positive response to the program. Participants hoped to lower their heating costs and be more comfortable in the winter. These results show that the program fulfilled these expectations for a majority of the program participants.

In general, single-family homes have more space to heat, more bedrooms, more residents, and higher heating costs. A substantial proportion of single-family homeowners experienced greater comfort, lower energy bills, used more rooms than they could before,

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and used baseboard heaters less often than they had in the past. However, fewer single-family residents had total success with the program compared to multifamily tenants. Single-family homes often received a large space heater, and these tend to make more noise. Also, while 82% of single-family homeowners participated in the program because of high bills, only 65% reported lower heating costs as a result of the program.

Multifamily tenants were the recipients of some of the most successful program elements on the one hand, and one of the program's communication challenges on the other. Multifamily participants report receiving very substantial positive results from the program. One hundred percent (100%) report that they are more comfortable now, and 80% say they have lower heating costs. This may be because multifamily dwellings tend to be smaller and more compact.

Fewer multifamily tenants than single-family homeowners report that noise is a problem, and 50% report that they "never" use their baseboard heaters since the installation of gas space heaters.⁶ However, tenants were also in a unique role as participants. They did not choose to participate, and they didn't have any formal contact with the utility. As a result, fewer tenants felt well informed about the program. Nevertheless, 100% of the tenants who participated in the program believe the program should be continued.

Multifamily building owners liked most the fact that the program was free. They see this program as increasing the value of their building and making their tenants happy. Overall, building owners did not seem very well informed about how well tenants like the new heaters, any changes in tenants comfort, or their energy costs.

Many participants were driven by economic influences in their decision to participate in the program. The high cost of electric heat and the fact that the program was free

⁶ While this is positive, it is unknown how many tenants used their baseboards before the program.

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combined to make this a worthwhile proposition. The active role played by Burlington Electric Department in selecting contractors and attending the first visit helped remove typical customer concerns.

It is unknown how much participation levels will be affected when customers must pay for program services. However, it is telling that close to 50% of single-family participants surveyed would not participate if the program cost them \$400. In addition, the role of the customer will change when the homeowner is "purchasing" this program and the gas heating equipment. Utilities who are interested in a fuel-conversion program which involves a customer payment would do well to follow the learnings of Burlington Electric Department as the free pilot program transitions to a paid program. It is possible that this one change in program design will have significant ramifications for the program as a whole.

Burlington Electric Department should consider additional approaches to multifamily customers. The first challenge is to make sure the tenant is included in the process and receives all the necessary program and equipment maintenance information. One approach might involve building meetings (for larger buildings) where the program is explained by the BED representative and the building owner. BED staff might also consider how to better inform the building owner about the results of his or her participation in the program (i.e., changes in tenants' energy use or comfort). In addition to creating positive feedback, this information could be used to market the program or provide information to other building owners who would like to participate in the program.

The problems created by noise should be more carefully explored, and program staff should be on the lookout for new and quieter technologies. It seems that the noise problem is more troublesome in single-family homes, and the connection to larger Empire units should be explored.

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It is also interesting that only 65% of single-family homeowners reported a reduction in energy costs. This result should be carefully explored, perhaps through the impact analysis of the program, and any necessary changes in the program design should be made. This may tie into the technical issue of appropriate sizing for gas heaters.

In addition to the program report, BED staff should be prepared to describe this program to the utility and energy efficiency communities at national conferences. Key elements of the program, including program design, marketing and customer relations, contractor-staff teamwork, organizational streamlining, staff training, and contractor selection, in addition to any new learnings as a result of the impact evaluation, should be presented.

Appendix T.

HEAT EXCHANGE...

An energy-efficiency program for residential customers with electric heat

You could be enjoying tremendous savings on your heating costs. How? By switching to another heating fuel through Burlington Electric's Heat Exchange program. We'll guide you every step of the way--it'll be a lot easier than you think!

Why are we offering this program?

You don't need us to tell you that electric heat is a very expensive way to heat your home. You've experienced the strain it puts on your budget especially during one of our very cold winters. Well, it's also more costly for us when we need to find other power sources to meet the city's demand for electricity. Usually, we can *save* energy for less than it costs to buy new sources. So Heat Exchange gives us both a break.

How does the program work?

A contractor and a B.E.D. energy services specialist will visit your home to give you a free energy audit. The contractor will design a heating system using direct-vent wall-mounted space heaters. We'll determine if weatherization improvements are needed. After the audit, you'll receive a report which describes:

- o details of the proposed heating system and its price, including the projected annual savings;
- o details of weatherization work (if needed);
- o other recommended energy-saving measures (such as SMARTLIGHTS and water-saving measures);
- o financial options available through B.E.D. based on the contractor's proposal.

How does the financing work?

There are two forms of financing available--a loan or a cash rebate.

Loan

With the loan, the contractor-proposed heating system and weatherization improvements will be paid for up front. We'll compare your current heating costs with your projected heating costs after the conversion (including your new fuel costs). You'll keep 40% of the calculated savings. Sixty percent will be used to pay back the loan. The loan term will be a maximum of five years. Any balance remaining after five years will be paid by B.E.D.

Rebate

If you decide to complete the work on your own or install a more expensive heating system, the rebate is available. You'll pay for the installation and any weatherization work. After you complete and pay for the needed installations you'll receive the rebate.

Here's how the financing works:

You own a well-insulated 2-story home. No weatherization is needed. A heating contractor proposes to install two natural gas space heaters. Cost: \$1,689.

Current electric heating bill:	\$658 per year
New estimated gas bill:	<u>\$234</u> per year
Expected savings in first year:	\$424

Under the loan, you'll repay \$254 (60% of your expected savings of \$424) for five years. That's a savings of \$170 per year for the first five years! After five years, B.E.D. will contribute any remaining balance (including program costs)--all of the savings of \$424 per year will be yours to keep!

If you choose the rebate, you'll receive \$686 (about 40% of the installation cost in this example) after completing the project.

This is only an example. Increased electric rates and gas costs have not been included in the expected savings. Your loan and rebate amounts will be different. We'll calculate them for you at the time of your energy audit.

How does the work get done?

Once you receive our written report, you may go ahead with the proposal. Or, if you'd like, you may contract the work on your own. Once you're satisfied with the arrangement, we'll sign an agreement with you and the work will begin. You'll control the process at all times. All work that's going to be done (and the costs) will be given to you in writing before any work begins.

If you choose to finance the work with the loan, we'll oversee the work. The contractor will be paid and your loan repayment will begin after the work is completed.

If you choose to finance the project yourself and get the rebate, you'll make all arrangements for the work and pay the contractors directly. We'll issue you the rebate after the heating installation and any needed weatherization has been successfully completed.

Who can I call for more information?

For more information on Heat Exchange or any other energy-efficiency programs that we offer, call: Chris Burns, B.E.D. Energy Services Specialist, at 658-0300, ext.369.

Appendix U.

Weatherization Requirements for the Burlington Electric Department (B.E.D) Heat Exchange Program

In all cases, the need for compliance with these guidelines is subject to final determination by B.E.D. These guidelines shall apply to any space which is directly heated by a heating system installed through the Heat Exchange program. If the simple payback ratio of any measure below, based on more than one documented bid price, exceeds 5 years, the installation of that measure will not be mandatory.

1. Attics

A. If existing accessible attic insulation is R-15 or less:

- attic insulation shall be added to bring the total insulation to the R-38 level;
- insulation shall be added to any horizontal access panels or doors to the R-19 level; and
- insulation shall be added to any vertical access panels or doors to the R-5 level.

B. If existing attic insulation is equal to or greater than R-15, no additional insulation is required.

2. Box Sills, Sidewalls and Floors

A. If insulation material of an R-Value less than or equal to 2.5 is present:

- insulation shall be added to accessible box sills to bring the total insulation level to R-11 in spaces kept at an average temperature of 60°F or above throughout the winter season;
- insulation shall be added to accessible sidewalls to bring the total insulation level to R-11; and,
- insulation shall be added to accessible floors over spaces kept at an average winter season temperature of 50°F or lower to bring the total insulation level to R-19.

B. If insulation material of an R-Value greater than 2.5 but less than or equal to R-10 is present:

- R-11 insulation shall be added to accessible box sills in spaces kept at an average temperature of 60°F or above throughout the winter season;
- no additional insulation shall be required in sidewalls; and,
- R-11 insulation shall be added to floors over spaces kept at an average winter season temperature of less than 50°F.

C. If insulation material of an R-Value greater than R-10 is present, no additional insulation shall be required.

3. Energy delivery systems

A. All accessible heating supply and return ducts located in vented spaces, crawlspaces with insulated ceilings and basements with insulated ceilings shall have a minimum of R-5 insulation.

B. All accessible non-circulating hot water pipes connected to the water heater shall be insulated with at least R-2 insulation for the first six feet or equipped with a thermal trap.

4. *Infiltration*--A building shall have a tested air leakage rate of less than 1500 cubic feet per minute under a pressure differential of 50 Pascals.

5. *Equipment*--All water heaters which are in uninsulated basements, crawlspaces or storage areas shall be equipped with insulation jackets of at least R-5 unless they are stamped as meeting ASHRAE standard 90-75, 90-77 or 90A-80.

END

**DATE
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01/102/92