

From Portland to Billings and Back: Challenges and Opportunities for Small HVAC RTU Service Innovations

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ABSTRACT

In 2001, the Northwest Energy Efficiency Alliance initiated a pilot program to research, design, and test an O&M service to increase the operating efficiency of small (< 10 ton) rooftop Heating, Ventilating and Air Conditioning Units (RTUs). The long-term goals of this initiative were to:

- Capture regional energy savings and peak demand reductions.
- Design a program to benefit business owners operating small RTUs.
- Create a business opportunity for HVAC service contractors.
- Offer a program for utilities for an underserved customer base.

In 2002, the first phase of the pilot was conducted in 5 markets throughout the Northwest.

Energy Market Innovations, Inc. was contracted to provide “real time evaluation” services for the pilot project. By integrating market research and traditional evaluation tasks, working closely with the implementation team, providing feedback in real time, and identifying issues and obstacles that challenge the potential of the service as a viable program in the marketplace, our efforts provided a good example of how evaluators can play a key role in the program development *process*.

The first phase of development focused on market research and the technical research and development of a workable service protocol. Our evaluation findings addressed the following topics:

- Market potential –Is there likely to be long-term interest within the market for this service?
- Market barriers – What are the significant barriers that might impede market acceptance?
- Critical success factors – What are the important considerations for program design that will enhance the potential for long-term success of the program?

Introduction

In 2001, the Northwest Energy Efficiency Alliance (Alliance) initiated a pilot program to research, design, and test a new technical service protocol that would increase the operating efficiency of small (< 10 ton) rooftop Heating Ventilating and Air Conditioning units (RTUs). In the summer and fall of 2002, the first phase of the pilot service was conducted in 65 field tests in 5 markets throughout the Northwest.

Energy Market Innovations, Inc. (eMI) was contracted by the Alliance to provide “real time evaluation” services for the first phase of the pilot project. Our evaluation was intended to provide current feedback to program managers and identify issues and obstacles that would challenge the potential of the RTU protocol as a viable program offering in the marketplace. Real time evaluation represents a conscious attempt to soften the lines between project planning, operations, and evaluation. As such, our scope of work sought to integrate market research and traditional evaluation efforts to provide current information to the program implementation team. Our efforts provide a very good example of how evaluators can play a key role in the program development *process* by conducting specific research and working closely with the implementation team and providing feedback in real time.

This paper provides an overview of the Pilot project, reviews the evaluation goals and methodology, highlights key findings from this research, and discusses how these results were used to define the future scope and direction of the Pilot project.

Project Overview

As an overview, we provide background information on the project, a description of the technical services offered through the program, and the overall program plan.

Background

It is estimated that, throughout the Pacific Northwest, there are 700,000 RTUs on small and medium sized commercial buildings. These units are ubiquitous and yet they are also widely neglected. Traditional service contracts that are offered by commercial HVAC contractors are not specifically designed to address the energy efficient operation, or improve the operating life, of individual units.

In 2001, Portland Energy Conservation, Inc. (PECI) submitted a proposal to the Alliance to develop and implement a full-scale program targeting small RTUs in the commercial market. From the perspective of the Alliance, there were a number of reasons why this program concept was compelling. As noted above, small RTU's are common throughout the region, and initial research indicated that there was the potential for significant energy savings estimates. Many Alliance member utilities expressed a need for energy efficiency program options that would serve their small commercial customers.

Recognizing the collective energy savings potential and the need for an efficiency program that could benefit the small commercial market, the Alliance began a collaborative effort with PECI to research, design, and conduct a pilot test of a new technical service protocol that was designed to increase the operating efficiency of 3 – 10 ton RTUs.

The Players

- Northwest Energy Efficiency Alliance: Contracting and Funding Agency
- Portland Energy Conservation, Inc.: Program Design and Implementation Contractor
- Participating HVAC service contractors: Administering agents. Service Technicians were trained to conduct service protocol. HVAC contractors then delivered the service to their customers.
- Energy Market Innovations, Inc.: Evaluation contractor

Pilot Program Plan

Rather than committing funding to a wholesale program implementation which the PECI proposal had requested, the Alliance took a more cautious approach, choosing to conduct research and field testing to determine if the program would, in fact, have long term viability as a market transformation tool. The long-term goals of this initiative were to:

- Capture significant regional energy savings and peak demand reductions.
- Design a program that could provide significant benefits to business owners operating small RTUs.
- Create a new business opportunity for HVAC Service contractors.
- Offer a program for utilities to provide to an underserved customer base.

Once the basic concept of the program was clarified, the Alliance embarked upon a three-phase development process:

- Phase I Technical Research and Development – this phase emphasized the technical research and development of a workable service protocol, including the recruitment of six HVAC contractors to test the protocol in 65 units. Additional market research and initial energy savings measurements were also included in this phase. Phase I was conducted during 2002.
- Phase II Market Test -- Building on the experiences and findings of Phase I, Phase II involves more substantial market research, a broader market test involving 20 HVAC contractors and 250 RTUs. This work will be conducted in 10 different utility service areas, and extensive metering will be conducted to verify energy savings and demand reductions. Phase II commenced in early 2003.
- Phase III Full Scale Implementation -- If Phase II provides favorable results, Program managers would initiate Phase 3 that would initiate a full-scale program launch in 2004.

Description of Technical Services

The RTU service addresses several areas of inefficiency in operations that have an adverse effect on energy use. These include (1) the vapor compression cycle, (2) air-flow and thermostat settings, and (3) the functional integrity of system economizers. Each of these areas was found to offer opportunities for increased energy efficiency, and protocols were therefore developed to address them.

The service protocol included:

- testing and adjusting refrigerant charge,
- checking and adjusting airflow,
- assessing economizer function and controls,
- inspecting for air leakage on exposed ducting located on the roof, and
- verifying control settings and function.

Evaluation Goals

Since this was the first phase of a pilot program, the Alliance recognized very early that evaluation had a critical role in informing their internal decision-making process. As such, the evaluation team was brought into the process as the pilot was being designed so that an evaluation plan could be developed that would meet these internal needs and provide real-time feedback that would maximize the chances for the success of the program.

There were two broad areas of interest from an evaluation perspective: (1) evaluation of the level of energy savings resulting from the program service, and (2) the long-term market potential for the program service. PECCI was responsible for documenting and validating the energy savings as part of their program development contract with the Alliance. Our evaluation plan for Phase I was designed to focus primarily upon the long-term market potential for the service. As such, the following broad evaluation goals were defined:

- Review progress in achieving project goals and progress indicators.
- Provide ongoing “real-time” feedback, and corrective and constructive guidance regarding the program implementation.
- Assess the perspectives of HVAC contractors, customers and utilities regarding the program and their interest or willingness to participate.
- Make recommendations regarding the market transformation potential of a full-scale program.

Because metering and verification of energy savings were not part of our focus, an emphasis was placed upon providing the program managers with an accurate market assessment and identification of specific issues that would need to be addressed for the program to have potential as a market transformation tool.

Specific evaluation tasks were developed around the following critical research questions:

- *What is the in-field viability of the service protocols being developed?*
- *What is the long-term market for the intended service?*
- *Is the new service compatible with existing HVAC business practices?*
- *What are the needs of local and regional utilities and how can they support the program?*

Methodology

Beginning in the Spring of 2002, and continuing through the Fall of 2002, we conducted market research and evaluation activities to address these questions. The following section defines the specific activities undertaken to provide the continuous feedback that project managers needed to ensure the Pilot would have greatest chance of success.

In order for us to provide program planners with a clear picture of the issues, obstacles and successes of the Pilot as well as the potential of the program, our evaluation research activities needed to focus on the program implementation team, the participating HVAC contractors, small business owners and property managers, and utility representatives. We then designed and conducted the following research tasks:

- *Market Research* – In-depth interviews with small business owners and property or facility managers.
- *Field Observations* -- Field observations of the technicians and engineers conducting the service.
- *Contractor Interviews* -- Regular interviews with participating contractors (sales and service managers).
- *Utility feedback* -- In-depth interviews with regional utility program managers and implementation personnel.

Market Research

While PECEI was conducting research and technical design tasks necessary to develop the protocol, we designed a market research project that involved in-depth interviews with business owners and property or facility managers (n=59). This group constituted an effective representation of the demographic that the program was designed to serve. The overall goal of this research was to better understand decision-makers by business size, classification and building type and to collect information that would help inform the development of marketing strategies and promotional materials for the program. We also sought to develop some understanding of who is responsible for decisions and to obtain an understanding of attitudes and awareness of these decision makers regarding HVAC system maintenance.

Our interviews explored (1) overall awareness and interest in energy efficiency, (2) importance of HVAC systems to their business, (3) nature and value of relationships with HVAC contractors, (4) attitudes toward HVAC RTU maintenance, (5) willingness to invest in HVAC maintenance.

The information gained through this early research served two purposes: (1) it helped to inform the initial program design and identify initial marketing messages, and (2) served as a foundation for interpreting subsequent evaluation research in light of the realities of the consumer market.

Field Observations

In the spring of 2002, PECEI recruited six HVAC contractors to participate in the training and field tests of the protocol. The selected HVAC contractors were well-established and had expressed interest in learning more about a new RTU service that might distinguish their company in the marketplace. Participating firms were located in Tacoma, WA, Tri-Cities, WA, Boise, ID, Billings, MT, Missoula, MT and Portland, OR. Collectively, the group represented a mix of firms that a broad-scale

program might involve during full-scale implementation. Throughout the summer, we conducted a series of observations of, and interviews with, the PECI engineers responsible for training and the service technicians who were learning the protocol. The goals of these observations and interviews were to look closely at the implementation of the service to: (1) assess the time it took to complete a service call, (2) identify issues and challenges relating to scope and sequence of the protocol and the paperwork required to document the service, and 3) discuss obstacles and opportunities (if any) that the new service would pose to technicians when they were working independently in the field.

The information gained in these interviews provided valuable feedback for the design of a workable in-field protocol, and informed our assessment of the market potential for including this program within the range of services currently offered by contractors.

Contractor Interviews

Our next step was to follow up the field observations with more specific, in-depth interviews with the service technicians, the Service Managers and Sales Managers who would have to support and sell an on-going program.

Through our interviews with the service technicians we sought to: critique the effectiveness of the training process, discuss the value they perceived the service might provide to their customers, and identify specific concerns they had with implementing the service. Through our interviews with the Service Managers we sought to: gain insight into the day to day operations of managing service technicians in the field, understand their existing RTU service contracts and how the new service might complement or conflict with them, discuss their concerns about managing technicians who are learning a new service and its possible impact on work load, and explore issues related to billable hours and other management issues. And finally, through our interviews with Sales Managers we sought to: understand the contractor/client relationship, identify the challenges they perceive in trying to sell the new service, and discuss the training and marketing support they would need in order to be able to successfully promote a new service offering to their customers.

The information gained during these interviews helped to inform our understanding of the potential fit between the program design and the various business models of the contracting firms.

Utility Feedback

The Alliance and PECI anticipated that utilities would need to play a significant role in the Phase 2 pilot. Utilities had expressed interest in adopting a program to serve their small commercial customers and our market research with small commercial customers indicated that utility sponsorship and/or branding of a new service would be important in legitimizing the program to them. We therefore designed this task to conduct in-depth interviews with 15 regional utility representatives to determine the appropriate and preferred role that the utilities might play in Phase II of the pilot in 2003.

Through our interviews, we sought to (1) determine how the individual utility (currently) serves small commercial customers, (2) determine if the utility perceives this new service to be valuable to their customers, (3) assess the utility's willingness to participate in Phase II, (4) ask how this new program could best be integrated into their existing operations, and (5) explore potential models for collaboration.

Our analysis and reporting of these interviews helped establish the framework for collaboration between PECI and participating utilities during the Phase 11 Market Test.

While conducting all our evaluation tasks we were in close communication with the Alliance and PECI and were able to share information, data and analysis in real time. This proved to be extremely valuable in informing the pilot design and implementation. The next section provides insight into the findings and why they were important to the Pilot project and plans for future implementation.

Key Findings

Throughout the pilot, findings were reported as they were identified and a summary of these findings was prepared at the conclusion of the project. These findings can be organized roughly into the following broad categories:

- *Market Potential* – Findings related to whether or not there is likely to be long-term interest within the market for this service.
- *Market Barriers* – Significant barriers that will need to be addressed to achieve market acceptance.
- *Critical Success Factors* – Important considerations for program design that are likely to enhance the potential for the long-term success of the program.

Market Potential

Each evaluation task we conducted underscored the fact that there is significant potential for the RTU service in the marketplace. Highlights of our findings in support of this argument are organized as follows:

- *RTUs are widely neglected* – As highlighted in our market research, most business owners have an “out of sight, out of mind” attitude toward their RTUs. Moreover, most standard service contracts provided by HVAC contractors provide a simple service that is more akin to an oil change in an automobile than a comprehensive system tune-up. These service contracts are not designed to facilitate energy efficiency or improved air-flow. In the field, service technicians conducting the service regularly discovered unexpected repair and service issues that reflected unit neglect.
- *HVAC contractors support the program concept* -- Each contractor that participated in the pilot project was interested in developing their business and adopting practices or expertise that could distinguish them in the market. They viewed this new service as a tool to help them improve service with existing customers and as a means to solicit new ones.
- *Potentially significant energy savings* -- The service protocol was developed, tested and refined in the field. Initial savings calculations are in line with pre-pilot projections* and a number of service technicians were trained to successfully complete the service.
*Outside the scope of this evaluation.
- *Utilities support the program concept* -- There was widespread agreement among utility representatives that the program would have real value as both a conservation tool and as a customer service opportunity. While the utilities have varying perspectives on the needs of their small commercial customers and they have different needs with regard to energy efficiency programs for these customers, they view the service as a potentially positive offering for their underserved small commercial customers and are therefore interested in exploring ways of adopting and delivering the service.

Market Barriers

Each task we completed provided the program design team insights into specific market barriers that will need to be addressed for the HVAC service to establish itself in the market and succeed as a market transformation tool. The cumulative weight of these issues and obstacles is formidable and may be categorized as follows:

- *Low market awareness* -- The key players in this market transformation program are business owners and HVAC contractors. Currently, business owners are largely unaware of the specific efficiency opportunities that exist with their RTUs and uninformed about the specific benefits the

new service can provide them. Since customers are not aware of this type of service, the HVAC contractors have not developed the service to provide on their own.

- *Ambitious technical scope* -- The initial service protocol was complex and represented a significant departure from the current standard practice of most service providers. Early in the field tests, service technicians required considerable time to complete the service (sometimes 4+ hours). Subsequent modifications have been made to the protocol that are expected to enable technicians to complete the service within a two to three hour time window.
- *Opportunity costs for HVAC contractors* -- Because standard service calls are usually 1-2 hours and service contracts are not high profit areas of business, service managers have a “time is money” mentality that may inhibit support of the training demands of the new service. To be successful, HVAC service managers will need to accept the fact that mastery of the protocol will involve a learning curve that will likely involve a significant commitment of often un-billable staff time. Further, the HVAC contractor must believe that the new service will be good for their business or they will not market it aggressively.
- *Cost of service* -- From both the customer and HVAC contractor vantage point, these time and cost issues represent significant obstacles to program success. Once trained, service technicians are expected to be able to complete the service in 2-3 hours. With average HVAC billing rates in the range of \$65-75 per hour, this will dictate a price-point of \$150-200 for the basic service. On top of this, the final cost to the customer may include additional parts and labor associated with additional and unanticipated repair issues that may be identified in the process. Asking customers to pay more for a diagnostic service they are currently unfamiliar with, and do not perceive a need for, is viewed as being a tough sell, particularly in light of current economic conditions.

Critical Success Factors

Through our interviews, we were able to identify key issues that would shape guidelines for working with HVAC contractors and inform the development of an initial marketing strategy. The following highlights the findings we provided the program managers concerning our understanding of the market and the decision-making considerations of small business owners.

- *Importance of understanding local market conditions* -- The implementation team must understand the local markets in which they are to operate. Awareness of the needs and interests of the key players (i.e. commercial business, HVAC contractors, property managers) is essential. Because this is a new service with no existing market demand, program managers will need an accurate characterization of the market in general. They must then take care to select reputable HVAC contractors, and work with them to target businesses that are most likely to benefit by the new service.
- *Importance of leveraging established relationships* -- More than 70% of business owners surveyed expressed an interest in hearing more about a new program that would lower their utility costs and improve system performance from their service provider. Initial marketing efforts should work with HVAC contractors to target customers with whom they have established relationships.
- *Targeting franchise and corporate customers* -- Although such recruitment takes substantial focus and effort, once these customers are sold on the program benefits at the higher level, they provide a broad base of work for the participating contractors. By definition, these are not the small commercial customers that utilities are interested in providing energy efficiency services to. Yet by focusing on a small number of decision makers who control a large number of properties and work with specific service providers, the program will be able to develop a ‘foothold’ with HVAC contractors. This approach will ensure broad geographic participation and training of service providers across all four states.

- *Target property manager* -- Property managers have decision-making roles, or at least significant influence, in multiple properties and will be able to guide HVAC contractors to the most attractive candidates. In most markets, a small number of reputable property managers control a substantial percentage of the commercial market.
- *Importance of understanding HVAC contractors' business models*: The HVAC contractors will be the essential player in the delivery of the service. Each of these contractors has developed, over time, a business model that works well for them. As such, any deviations from these business models are viewed with a “show me” perspective. Program success will be most easily achieved if the service is designed such that it can be integrated relatively easily into these existing business models.

Summary

The research and analysis conducted during this evaluation provided useful information, on a real-time basis, that was used by program managers during the Phase I pilot implementation period. From the outset, the design team faced significant challenges. First, the team was confronted with significant technical challenges associated with developing a streamlined protocol that would define the service and provide savings sufficient to warrant support from the Alliance and member utilities. Second, it was also clear from the evaluation research that the proposed program would face significant challenges in the marketplace because there was no existing market demand for this service.

As “real time” evaluators, we conducted research tasks that focused on these market potential issues and influenced the evolution of the program. Moreover, this work was influential in helping planners define the 2003 Phase II pilot implementation strategy. As noted earlier, Phase II includes a much more expansive market test, with an estimated 20 contractors participating and 250 RTUs receiving the service. During this Phase II implementation, we will continue to provide real-time input to the program. In order to avoid perceived compromises in objectivity, the Phase II evaluation efforts will be more structured in nature. These efforts will continue, however, to place an emphasis on regular and timely data collection with participating customers and contractors. A final set of research tasks will also be conducted at the conclusion of the evaluation to provide, in a summative sense, a final evaluation of the overall market potential for the program.