FINAL REPORT

Building Tune-Up and Operations Program Evaluation

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Executive Summary

Energy Trust of Oregon's (Energy Trust) Building Tune-Up and Operations Program (BTO) has three primary services: 1) boiler tune-ups, 2) building tune-ups, and 3) retrocommissioning (RCx).[1] Boiler tune-up activities for the program are mostly complete, but building tune-up and retrocommissioning activities are still underway. This report describes the evaluation progress, results, and insights from program initiation in Summer 2005 through mid December 2006.

The overall goal of the BTO evaluation is to provide Energy Trust feedback on how the program is progressing towards achieving its goals and to offer actionable recommendations that will help improve current or future program structure and delivery. To achieve this goal, the evaluation collected and reviewed program documentation, conducted interviews with program staff, boiler contractors, retrocommissioning service providers and boiler tune-up participants, and joined boiler technicians on two ride-alongs to observe the boiler tune-up process. The evaluation results for building tune-up and retrocommissioning activities are preliminary. A final evaluation memorandum in Summer 2007 will add the results of these continuing activities.

Program Theory, Background, and Delivery

Program staff believe substantial energy savings can be achieved through improved operation and maintenance (O&M) in commercial buildings. The boiler tune-up portion of BTO provides a simple tune-up service that is expected to save approximately 2-5% of total annual boiler gas consumption. This contrasts with the other elements of BTO that are intended to take a more comprehensive look at savings opportunities from O&M improvements throughout the building.

The building tune-up and RCx services of the program presume that O&M services provided in the market place are not well defined or coordinated. To address this fundamental problem of defining and coordinating services, BTO markets a set of service definitions and a step-by-step approach that service providers can use to help deliver building O&M services. Energy Trust staff viewed BTO as a pilot program to help prove if cost-effective energy savings can be delivered through building operation improvements.

In 2005, Energy Trust hired Portland Energy Conservation Inc. as the Program Management Contractor (the PMC) to develop and manage the BTO. PMC staff report that the boiler tune-up portion of the program is a traditional design that draws on the experience of similar programs throughout the country. Boiler contractors drove boiler tune-ups, contacting customers, bringing in projects, conducting the tune-up, and filling out the paperwork.

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[1] Originally, building tune-ups and retrocommissioning were combined into one service, but they are currently being delivered and reported on separately. The program also provides grants for Building Operator Certification, but this component is not considered in this evaluation.

The building tune-up element uses the Building Performance Services (BPS) approach, which had already been developed by the Northwest Energy Efficiency Alliance (NEEA). NEEA leads building tune-up projects through initial contact, information gathering, scoping, and diagnostics. Once a project gets to the implementation phase they coordinate with Energy Trust to provide incentives for implementing improvements and for measures that will help savings persist over time.

The RCx track was added to the program in February 2006 to help the program meet its performance goals as projected building tune-up projects would not deliver the savings needed. The PMC leads the initial steps of a RCx project, recruiting the participants and conducting enhanced screening to determine if sufficient opportunities exist for RCx. Once a project passes the enhanced screening phase, the client selects a service provider. The PMC develops the scope and a budget and the service provider conducts the building investigation to identify opportunities for improving building performance. The owner reviews the recommendations, selects measures to implement, and chooses who will implement the measures. The final step in the process is to implement a persistence strategy to help maintain the energy savings.

Summary of Findings

- While BTO had a slow start, the PMC and Energy Trust worked well together to adjust the program and move forward. This included working with NEEA to define goals and roles for delivering building tune-ups, adding the RCx track, adding budget to the boiler tune-up program to accommodate more projects, notifying boiler contractors the program would not be continued due to low savings, and creating a way to continue modest building tune-up and RCx efforts.

- The boiler contractors recruited enough participants to fill the boiler queue and the initial tune-ups were completed and incentives paid well before the end of the BTO program. Participants were very satisfied with the boiler tune-up program. However, the boiler tune-ups results were disappointing. The boiler contractors had significant difficulty completing the boiler incentive and completion certification forms, program staff were concerned about the accuracy of the data on the forms, boiler savings were much less than expected, and most of the tune-ups occurred at schools and universities, which tend to have smaller boilers that operate less than the boilers at other commercial institutions. While this helps explain the lack of savings, questions remain about the viability of the market for boiler tune-ups.

- Little progress has been made delivering energy savings from building tune-up projects, with only one new project being initiated since the start of BTO. Several other building tune-up projects started as part of the BPS Test, but they have taken years to complete and a couple have been discontinued. Explanations for the lack of progress include the split in responsibilities between NEEA and the PMC for delivery of tune-up projects, differences in the goals for NEEA (market transformation) and Energy Trust (resource acquisition and project delivery), the

lack of a well defined process to move projects forward to completion, and little motivation from trade allies to recruit building tune-up projects.

- The seven projects recruited for the RCx portion of BTO have successfully progressed through the investigation phase. These projects will likely deliver energy savings and help BTO meet its goals, although preliminary estimates show the levelized cost of the savings are above Energy Trust's benchmark. The PMC was successful recruiting participants from the target population of downtown Portland property owners, its enhanced screening worked well, and projects started in a timely fashion. Service providers have shown they can deliver the RCx services defined by the program.

Conclusions and Recommendations

1. **Conclusion:** Program staff described BTO as a pilot, yet the overall program was not sold to Energy Trust's Board as a pilot and it had resource acquisition targets and a 2-year performance-based program management contract like other Energy Trust programs. While some performance requirements were adjusted, the ability of the program to test approaches for obtaining energy savings from building operation improvements was limited because BTO was not set up as a pilot. Nevertheless, a lot was learned through the openness and diligence of program staff and contractors.

   Recommendation: Energy Trust needs to consider whether or how it should conduct pilot programs. Conducting a pilot program with a small set of projects using a resource acquisition framework is not conducive to testing program alternatives, since resource acquisition documentation, reporting requirements, and performance goals draw significant resources away from the pilot effort. While a pilot program can deliver energy savings, it should be set up to test specific delivery approaches with clear research questions and methods. The Evaluation Team should be involved in pilot program development. This additional development and evaluation effort has a cost, but allows for a more thorough test of program delivery approaches.

2. **Conclusion:** The results show it is hard to justify a stand-alone boiler tune-up program or a program path that only offers boiler tune-ups. While some of the challenges in boiler tune-up program delivery could be addressed through improvements in the forms and data collection and with experience, it is not clear there is a market with sufficient savings opportunities for boiler tune-ups. The limited savings opportunity does not justify the investment in the program infrastructure to make the program successful.

   Recommendation: If Energy Trust is able to more clearly identify a market for boiler tune-ups and can target the boilers with savings potential, focused attention on boiler tune-ups might be justified. Otherwise, boiler tune-ups should be one of the service options available within Energy Trust's Building Efficiency (BE) program and tune-ups should be used in combination with other measures to improve boiler and building efficiency. The incentive forms should be simplified as much as possible, with input from boiler contractors, to improve the consistency and quality of data

collected from the tune-ups. Continued experience with boiler tune-ups will help show whether further research and development of this service offering is warranted.

3. **Conclusion:** Ultimately, BTO has not been able to test the building tune-up process. Much of the program emphasis has been placed on RCx, where the PMC has more experience and control. It is not clear whether the tune-up process developed by NEEA can be a cost-effective way to acquire energy savings from O&M improvements in buildings.

   Recommendation: Evaluation results suggest that testing the viability of building tune-ups requires a more comprehensive and integrated effort. This may be beyond the primary goals of Energy Trust, but defining and testing a tune-up approach that has the potential for quickly and cost-effectively delivering energy savings from O&M measures is clearly needed. Such a test could address these questions:
   - Can tune-up projects be done in a timely fashion? Most of the BTO building tune-up projects took a couple of years to complete and experienced delays. For tune-up projects to be successful, does this process need to be significantly shortened?
   - Are incentives needed to implement the recommendations from a tune-up investigation? The one completed BTO building tune-up project implemented the recommended measures without an incentive and the total payback was less than a year. Ideally a tune-up project should be finding low cost measures. Are such measures enough of an incentive for an owner to proceed?
   - Is the tune-up process different from a RCx process? The steps in the BTO tune-up are similar to those used in the RCx process, but with somewhat less rigor. The tune-up service providers included some controls contractors, while the RCx service providers all had commissioning backgrounds. Should these two processes be more clearly distinguished from one another and if so, how?

4. **Conclusion:** The RCx approach being used by BTO appears to be a viable way to produce energy savings from O&M measures. While this type of program is a valuable part of Energy Trust's portfolio, the cost is higher than their other energy efficiency programs.

   Recommendation: Energy Trust plans to incorporate RCx into the BE program. This is a good way to reduce the infrastructure costs of RCx, while continuing to offer the service. Energy Trust should continue to maintain a modest RCx approach to gain experience with the delivery of this service and to explore how it can integrate into existing service offerings. Energy Trust should track similar programs in other states as well as initiatives at NEEA to learn from their experiences.

5. **Conclusion.** Organizations involved with energy efficiency have pointed to the large energy savings potential from O&M improvements in existing buildings, but have had mixed success tapping this potential. Any existing buildings energy efficiency program that strives to significantly improve the performance of existing buildings will need to address building O&M. However, programs focused on O&M have

tended to be expensive and difficult to manage. The results for BTO are consistent with this experience.

Recommendation. One way Energy Trust can address this issue is to merge these services into the BE program. We believe Energy Trust should more fully explore how it can leverage existing program infrastructure to obtain energy savings from O&M services, asking questions such as: To what extent can O&M services be integrated with existing building efficiency and training programs? Like new construction programs, can there be a "whole buildings" approach for existing buildings that offers a comprehensive range of integrated services that aim to produce a high performance building? How should O&M be included with new energy efficient equipment programs to ensure the long-term reliability of energy savings? O&M services often have difficulty standing on their own because the energy savings are not large enough to justify the investment in the project. To survive, either the investment needs to be reduced, or the services need to be included in a more comprehensive package.