



BPA Energy Efficiency

Research Into Action – Evaluation of the Performance Tested Comfort Systems (PTCS) Program

BPA has offered PTCS as a residential HVAC certification program option to its utility customers since 2006. In FY2011, BPA contracted with Research Into Action, Inc. to conduct an evaluation of the PTCS program to inform future decisions around the design and implementation of the program.

Please see below for key conclusions and recommendations by Research Into Action. Each recommendation is followed by a response from the BPA Residential Team on corresponding actions, noting how findings have already been integrated or are pending further consideration. Evaluation conclusions have been summarized. For a more detailed description, please see the complete evaluation located at <http://www.bpa.gov/Energy/N/projects/PTCS/index.cfm>

RIA Recommendations and Program responses

Evaluation Conclusion: Many program participants (both utility managers and trade allies) believe that the PTCS program is unnecessarily complex.

RIA Recommendation: Identify program areas where complexity can be reduced. Examine program attributes with the help of a new program logic model to determine which elements are most critical, in distinction from those that are “nice to have.”

BPA Program team response:

The PTCS program released new forms for both heat pump measures and duct sealing measures in April 2011. Data entry fields were re-ordered in an attempt to follow the order in which a contractor completes work in the field. The PTCS site registry was re-organized so that data entry more closely matches the order of information on the forms. The heat pump form was reduced from four pages to two pages. Reporting requirements and refrigerant charge tests were streamlined, reducing the amount of data required per job.

RIA Recommendation: Ensure consistency between the links, resources, and support documents that are available on BPA's PTCS website and those on the RTF website.

BPA Program team response:

On May 18, 2011, Ecos (BPA's PTCS program vendor) re-launched the PTCS website with new resources, links to information, online job submittals and a more comprehensive reference section.

RIA Recommendation: Create a PTCS logic model to explicitly outline how program activities map to desired outcomes.

BPA Program team response:

This effort is currently underway with BPA Programs and Planning staff. Given the size of the program, identified changes may take several months to implement, and all stakeholders will be provided opportunity to provide feedback on logic model findings.



Evaluation Conclusion: The technical complexity of PTCS requires easily accessible, knowledgeable, and reliable technical support.

RIA Recommendation: Create a technical support mechanism that will enable contractors throughout the region to have access to reliable technical support.

BPA Program team response:

Ecos recently re-allocated their internal PTCS team to make more staff available for processing jobs through the site registry and to free up technical staff members to be more available to support contractor and utility questions. PTCS technical experts are now available during normal business hours 5 days a week by phone and email to provide support. As contractors complete PTCS training, they are given the contact information for their assigned trainer, who is then also available to them for follow-up technical support.



Evaluation Conclusion: While trade allies value the credibility PTCS testing and quality control provides to their customers, many have expressed dissatisfaction with the program's QA/QC protocol.

RIA Recommendation: Review the quality assurance/quality control processes for PTCS, including inspector training and qualifications, consistency across inspections, and coordination between the implementation contractors and local utilities.

BPA Program team response:

Quality Assurance (QA) inspectors are now meeting quarterly as a group to discuss the issues they see in the field and to receive additional training in order to ensure consistency in their inspection activities. These efforts have driven a notable increase in inspection consistency. To improve Quality Control (QC) procedures, Ecos has added new tools to ensure accurate data entry and quality control. BPA is working with Ecos to identify additional improvements including instant data validation for online forms, to streamline the entry and acceptance of PTCS jobs.



Evaluation Conclusion: The class materials were relatively well designed and included hands-on activities, as well as reference guides and a reference binder. However, the reference binder should be accentuated to provide easier access to information after the training.

RIA Recommendation: Insert dividers into the reference binder for easier access to each section. Add additional details to those slides that are discussed in class for the purpose of the reference binder

BPA Program team response:

The program will include this enhancement for future printings of reference binders.



Evaluation Conclusion: PTCS duct sealing is a complex job with a steep learning curve. The current training assumes that people enter the training with next to no knowledge and will leave the training knowing how to conduct all tests and meet specifications.

RIA Recommendation: Consider the steepness of the PTCS learning curve together with expected contractor job volume when involving and supporting trade allies in PTCS. Investigate ways to help contractors maintain their skills during dips in work activity, such as recertification requirements and refresher courses.

BPA Program team response:

The program is investigating ways to support contractors during the learning curve and throughout their on-going participation in PTCS. QA inspections will be used as opportunities to provide coaching for contractors who have infrequent participation in the program. Additional technical support is available via phone. Refresher trainings have been developed and are being delivered throughout the BPA service territory, as requested by utility program sponsors. Ecos will continue to work with contractors to provide refresher trainings as additional needs are identified. The program is exploring opportunities to offer skill-based Webinars via the PTCS web site as a reference for contractors.

RIA Recommendation: Research the feasibility of designing the course to address varying knowledge levels of incoming students – perhaps requiring some prerequisite knowledge for a more advanced course.

BPA Program team response:

The program will research existing resources for both introductory and advanced level trainings and determine whether the greatest value would be in developing new trainings, or providing additional information through currently available resources.

RIA Recommendation: Trade allies should complete a certain number of jobs per year to maintain their certification.

BPA Program team response:

The PTCS program will be implementing new contractor agreements in June 2011 that indicate a requirement of at least 1 completed job per 12 month period to maintain certification. This requirement will ensure that technicians are engaged in the program, while still considering that many technicians operate in utility service territories representing relatively small markets.



Evaluation Conclusion: The program does not have a mechanism to elicit contractor feedback after completing jobs. Currently, contractor feedback is collected immediately after training, but contractors are not yet able to identify what problems they may encounter when implementing PTCS specifications in the field.

RIA Recommendation: We recommend adding a formal feedback process to elicit trainee input after a period of practice to more accurately assess those areas contractors are finding difficult and where training in these areas can be addressed. Implement a yearly review of the program materials, with input from contractors, utilities and others.

BPA Program team response:

BPA will ensure that such reviews are built into the program calendar.



Evaluation Conclusion: Program participants find the heat pump portion of the PTCS protocols to be relatively straightforward. Participants widely agree that PTCS heat pump installations save energy over standard heat pump installations.

BPA Program team response:

BPA will continue its expectations for the delivery of energy savings while working to simplify the program for participating utilities and trade allies.



Evaluation Conclusion: Program participants would like to simplify the information collected on-site for heat pumps.

RIA Recommendation: Focus on-site data collection for heat pumps on what is most important to assure savings.

BPA Program team response:

PTCS forms for heat pumps have been simplified and are now 50% shorter. Only customer contact information and data inputs critical to meeting program specifications are required.

RIA Recommendation: Explore data collection methods that make the process faster and easier for contractors. Current technology, such as smart phone applications and live computerized reporting, might be an appropriate avenue to reduce the paperwork burden for trade allies.

BPA Program team response:

Data fields on forms have been re-ordered to match the way a contractor completes work in the field. To expedite processing, contractors receive validation of online forms as they input information. In addition, they can now save partially entered forms to be completed at a later time. Moving forward, the program will consider how technology might play a greater role in the collection of field data.



Evaluation Conclusion: Although two utilities in the Northwest offer a prescriptive duct sealing program, there is no research to estimate the relative impacts of prescriptive vs. performance duct sealing approaches.

RIA Recommendation: Review the results of the upcoming impact evaluation for a prescriptive duct sealing program at one Northwest utility and consider conducting an impact evaluation of the PTCS duct sealing protocol to compare results with the prescriptive program.

BPA Program team response:

BPA is closely watching the prescriptive duct sealing pilot underway at two utilities, and intends to review the evaluation report as soon as it becomes available. Results will be considered in terms of possible program implications for stakeholders and future energy savings.



Evaluation Conclusion: The 50% duct leakage reduction threshold required for PTCS job approval causes concern. The PTCS specification requires that PTCS-certified ducts test below a CFM reading that is generalized as a percent of the floor area, or to demonstrate a 50% reduction between pre- and post-CFM measurements. In some homes, the 50% reduction path is the only viable path for certification, but because there is no way to verify a duct leakage pre-test reading, the difference between the pre-reading and the post-reading cannot be independently verified.

RIA Recommendation: Consider including the threshold requirement as a variable in a PTCS impact evaluation.

BPA Program team response:

In those homes that are unable to achieve sealing to the appropriate percent of floor area, the 50% reduction threshold provides a target for contractors. QA inspectors are trained to look for work completed, and indicate if enough work was done to actually achieve the savings indicated, as well as verifying the final duct leakage. Major opportunities for duct sealing must be addressed. BPA is actively researching new program designs that take into consideration the inability to verify test-in results, and will include the threshold requirement in future impact evaluations of the PTCS protocol. (Note: A review of FY2011 duct sealing installations to date indicates that most duct sealing reductions were between 51% and 80%. The average leakage reduction for FY 2011 jobs is 69%.)



Evaluation Conclusion: Some program and market actors in the region feel that PTCS places a disproportionate emphasis on duct leakage testing rather than practicing proper duct sealing techniques. Generally, stakeholders identified the advantages of performance-based duct sealing as the ability to measure the effectiveness of the job and to collect field data in real time. Contacts often described this built-in measurement as a way of ensuring the quality of the job. However, due to the complicated nature of the duct leakage testing equipment, the amount of time it takes to learn how to use the equipment, and the time-intensity of using the equipment on job sites, many knowledgeable Northwest professionals are concerned that more time is spent on leakage testing than on actual duct sealing. This leads some stakeholders to question whether the program disproportionately focuses on the testing protocol.

RIA Recommendation: Determine whether the PTCS duct sealing protocol is optimally designed to achieve the program's desired result.

BPA Program team response:

BPA is actively researching this recommendation in collaboration with industry experts and stakeholders to consider what changes might be called for as the program matures.

