

Keys to Home Performance Program Improvements

- ▶ **Simplicity:** A whole-home upgrade is a complicated endeavor, but that does not mean that whole-home programs need to be equally complicated. Exploring every avenue to streamline and automate program steps can lower implementation costs.
- ▶ **Standardization:** Streamlining a program requires transparent and well-defined program standards. The Arizona HPwES program looked to industry efforts, including the Standard Work Specifications for Home Energy Upgrades (SWS) and Home Performance Extensible Markup Language (HPXML), as the cornerstone for program improvements.
- ▶ **Flexibility:** HPXML enabled the program to open its market to a wide range of energy assessment tools. Access to these tools gave contractors more choice and control of how they delivered home performance.
- ▶ **Quality:** Delivering consistent and reliable upgrades not only requires a definition of quality, but also a means to manage that quality over time and across all personnel, both program and contractor.

Home Performance with ENERGY STAR[®] (HPwES) encourages a whole-home assessment approach to provide the most comfortable, efficient living space, looking at all systems for improvement. Since launching the Arizona HPwES program in March 2010, electric utility Arizona Public Service (APS) and Arizona's HPwES Sponsor, FSL Home Energy Solutions (FSL), have focused on continuous improvements designed to elevate customer and contractor experience while boosting program cost-effectiveness.

The program saw success in its early years of implementation, quickly growing to serve more than 2,300 homes in its second program year and more than 4,000 in its sixth year. During this program expansion, three areas for improvement emerged:

- ▶ **Contractor satisfaction:** Participating contractors were frustrated that the program's mandatory energy assessment software was difficult and time-consuming to use. Contractors also complained that the program's home energy reports were

difficult to produce outside of an office, could not easily be customized, and required several hours to complete, even for smaller projects.

- ▶ **Installation quality:** Quality assurance (QA) reviews completed by APS and FSL revealed that the quality of home upgrades varied drastically across contractors in the program, and both contractors and program staff were expending a significant amount of labor on call-backs.
- ▶ **Program cost effectiveness:** As the volume of upgrades grew, the incremental costs associated with the required energy assessment software and QA increased, presenting a long-term risk to the cost-effectiveness of the program. APS recognized the need to address these issues and improve the cost-effectiveness of the program.

Strategies for Success

APS and FSL identified three major strategies to overcome the challenges they experienced with their HPwES program and implemented them from 2012

Provide more flexibility with HPXML

Programs have many software platforms available to them, and until recently, each one used different methods to compile and analyze upgrade data. This lack of uniformity can increase contractor costs for infrastructure and training, especially in regions where multiple program jurisdictions exist.

Industry efforts led to the development of standard definitions and a common computer language to facilitate the sharing and aggregation of upgrade data from energy assessment software to home performance program software and beyond. These two standards, BPI-2100 for data transfer (also known as HPXML) and BPI-2200 for data collection, define methods for the home performance industry to standardize data practices.

For more information, see www.hpxmlonline.com.

through 2013. These strategies utilize two industry standards: HPXML and SWS. These standards allow APS to leverage industry expertise and incorporate better consistency and transparency into the program process.

Strategy #1: Leverage industry standards to streamline data processes.

APS shifted to a more flexible program software platform that accepted data transfer of contractors' upgrade data from multiple energy assessment software. Accepting various data required using a new data transfer standard, commonly called HPXML, which allows for the sharing and aggregation of data from numerous software programs. In addition to data aggregation, the new software also reduced the time needed for QA activities.

As part of the software procurement process, APS identified these key requirements:

- ▶ The software platform must receive HPXML files from third-party energy assessment software vendors and parse out a subset of data for the program's quality assurance and reporting.





- ▶ The software platform must have reliable data validation that automates part of the QA review process by creating dashboards, alert triggers, and other tools while identifying areas of interest that require attention by the QA team.
- ▶ The software's platform's contractor portal must be simple, reliable, minimize duplicate data submissions, and alert users of data entry errors.

Strategy #2: Develop an integrated software platform with the help of stakeholder feedback.

In 2012, APS and software provider EnergySavvy launched the program's new online portal, which enabled customers to find a contractor; allowed contractors to submit customer applications and manage upgrade projects; and provided the program implementation team with a streamlined QA and rebate authorization system.

While developing the portal, APS worked regularly with energy assessment software vendors to help them integrate the HPXML data transfer standard into their products. This collaboration allowed APS to better understand how each of the vendor tools worked. The vendors also gave critical feedback regarding the program's proposed data collection requirements, validation inputs, and helpful recommendations to inform the program's roll-out plan.

To achieve a smooth transition, APS worked closely with participating contractors to notify them of proposed changes and obtain feedback. The program organized a focus group of leading contractors to get detailed feedback during the planning and design processes. The focus group challenged the program team to streamline the reporting process, remove unnecessary steps, and improve the program's rebate application experience. The focus group also helped contractors understand the program's perspective. Prior to the launch of the new program software, APS turned to these contractors again to help with product testing.

Increase consistency with SWS

Building science training for contractor personnel was typically guided by the trainer's personal experience, which left room for interpretation. For instance, early in the APS HPwES program, the program staff, trainers, and installers defined "properly installed" measures slightly differently. This led to inconsistencies not only in the upgrade work done by contractors, but also in QA reviews, as FSL's QA team had to make judgement calls on whether an installed measure passed or failed the QA review.

The SWS identify the desired outcomes of individual measures performed during a whole-house energy upgrade. These standards synthesize 40 years of building science expertise within the U.S. Department of Energy (DOE) Weatherization Assistance Program and the greater industry.

For more information, see <https://sws.nrel.gov>.



“Contractors will leave a code book under the seat of a truck, but people carry their phones everywhere. Keep it visual. Keep it digital.”

—Chris Baker, APS
regarding best practices
for installer training

Strategy #3: Improve technical guidance and quality management tools.

To resolve issues of subjectivity around a program’s definition of quality and contractors’ new employee knowledge gap, APS and FSL looked for strategies to drive standardization of work product by clarifying the program’s technical requirements. Those requirements needed to be easy for new employees to learn and adopt, as well as accessible to installers, not only at the office but also when they were working in homes.

The program searched for a strategy to standardize work scopes and cultivate greater consistency in installation details, along with a delivery method that could be used for to train new hires and provide ongoing training reminders to more experienced staff.

In partnership with Advanced Energy, FSL launched a new training program called “Success with Home Energy Upgrades,” based on DOE’s SWS, and included visual tools called “critical details” for both print and mobile devices. Training topics included diagnostics, software, measures, and sales.

The curriculum includes dozens of critical details, each focused on a specific problem and resolution (e.g., how to seal a plenum). Each critical detail lists the tools and materials needed to install the measure and includes images that show the right way and wrong way to complete that improvement. With the critical details tool, the program helped address the knowledge gap with new installers on their first day, and with the detailed images and instructions, installers were more successful at executing the installation to program standards.

To reinforce the usage of the Success with Home Energy Upgrades tool, FLS’s QA team began referring to critical details in field QA reports. When an issue is identified, the QA team sends the contractor a corrective action report detailing the issues found and a corresponding critical detail, which defines a clear expectation of installation characteristics. By combining the SWS-based critical detail as the technical standard for installation and visual tools to show how to meet those standards, FSL made this content more structured and easy to transfer from installer to installer.

Example of a Critical Detail



CRITICAL DETAIL: SWS 3.1003.6

SUCCESS WITH WEATHERIZATION

CAPPING SOFFITS

Prepare work area.

Install support material (e.g., 2X) for spans wider than 24 inches.

NOTICE: If air sealant is a foam plastic, it must be covered with an approved thermal barrier (e.g. rockwool, slag wool).

Install and fasten rigid sheathing over soffit/dropped ceiling.



Air-seal all gaps, holes and seams of rigid sheathing.

Seal all gaps, holes and seams in adjacent framing.

Notes: Be cautious when installing support material since excessive hammering may crack interior surfaces

(e.g. drywall)





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Results

Through program improvements, Arizona HPwES set out to improve contractor satisfaction, reduce labor costs, and increase the quality of service. Results are summarized in the box below.

-  **50%** increase in contractor satisfaction after launch of HPXML-based software environment.
-  **50%** decrease in quality assurance administrative labor following implementation of the new software environment.

-  **31%** decrease per project in contractor administrative labor following implementation of a more streamlined online reporting, rebate approval, and QA process.
-  Better project quality and consistency after launching Success with Home Energy Upgrades training.

FSL uses a scoring tool to rank the performance of contractors on three variables: results from field quality assurance reviews, quality of the work scope when compared to energy assessment data, and customer satisfaction survey results.

Compared to 2012 scores—before the program’s new training and online resources were available—the program saw the following improvements in its contractors’ scores in 2015:



The net impact of implementing the HPXML-compliant software and market-based energy assessment software options for contractors, coupled with the development of the real-time technical guidance and tool based on SWS and training, has been a more efficient and cost-effective program that is better able to serve its 4,000 customers. Finding new and innovative strategies to improve program delivery while reducing program costs has positioned HPwES to continue to be a key part of the APS’s energy efficiency portfolio.

Advice for Program Administrators

- ▶ **Build on existing standards resources:** Standards consolidate industry expertise, and tools such as HPXML and SWS can make implementation of improvements easier and more cost-efficient.
- ▶ **Regularly evaluate your process:** Take time to regularly unpack your program procedures and set key performance indicators (KPI). Look for duplication of efforts or issues that create the potential for costly errors. Quarterly KPI reviews worked well for APS.
- ▶ **Create a forum for constructive industry feedback:** When streamlining a program, the program needs to work for your contractors. When planning and implementing improvements, make sure the contractor’s perspective is included in every step of the process.
- ▶ **Train the company, not just the individuals:** Contractor personnel changes are constant. Focus on equipping the company with tools to manage quality and deliver a consistent product. Take into account that the majority of the training becomes ingrained in the field, not the classroom.
- ▶ **Transparency and clarity are key:** Ambiguity creates confusion, increases cost, and breeds frustration. Using well-published standards and clear guidance will help drive program success.

The **Home Upgrade Program Accelerator** is designed to help home energy upgrade programs bring energy efficiency to more homes across the country by leveraging data management strategies that minimize costs while improving overall program effectiveness.

Home Performance with ENERGY STAR is a systematic approach to improving energy efficiency and comfort in homes, while lowering utility bills.