Home Performance with ENERGY STAR®

2009 Energy Solutions Program Plan

Kristin Riggins
Version 1.0

12/05/2008

1. 0 Program Overview

Home Performance with ENERGY STAR® (HPwES) is a national program from the U.S. Environmental Protection Agency (EPA) and U.S. Department of Energy (DOE). It is an innovative program that strives to produce an economically sustainable model that captures significant energy savings by encouraging a whole-house approach to energy efficiency improvements in existing homes. The program begins with a whole-house energy assessment performed by Building Performance Institute (BPI) trained and certified contractors or consultants. The infrastructure is then provided for homeowners to follow through and complete energy improvements to their homes.

1.1 Program Name: Home Performance with ENERGY STAR®

1.2 High Level Program Description:

HPwES is a multi-state approach coordinating efforts between the state sponsor, Missouri Department of Natural Resources' Energy Center (MDNR) and local partners. KCP&L will partner regionally with the Metropolitan Energy Center (MEC) and Missouri Gas Energy (MGE) to implement a successful program in the Kansas City area. The State of Kansas is also funding a portion of the program.

MDNR will conduct the role of coordinating agreements with local partners, produce a multi-state marketing plan, facilitate peer exchange, monitor quality assurance, and report results to the Department of Energy (DOE)/Environmental Protection Agency (EPA) HPwES Program.

MEC will manage the process flow of the local HPwES Program. This will include contractor recruiting, training and certifications, management of the lead generation process, whole house performance education for customers via workshops, and quality assurance delivery.

With the infrastructure in place, KCP&L and MGE will work to promote the program throughout respective service territories. This effort will include marketing, lead generation, and customer incentives. KCP&L's scope will also include an impact evaluation of the program within KCP&L's service territory in program year three.

1.3 Tariff Effective Date: KCPLMO: January 23, 2008; GMO: April 30, 2008; Kansas: Pending

1.4 Program Manager: Kristin Riggins

2.0 Market Assessment / Target Market:

HPwES is a program designed for existing homes of all ages. The state sponsored HPwES program is currently targeted to the Kansas City Metro area defined by a seven county territory consisting of Cass, Clay, Jackson, Johnson, Leavenworth, Platte, and Wyandotte counties. Customers who live outside of this area who are interested in HPwES are referred to the trained and certified contractors/consultant in

the metro area. It is at the discretion of the contractor/consultant to provide service to those customers.

KCP&L's program offerings and marketing efforts will be targeted to all residential customers who own existing homes within KCP&L's service territory. KCP&L will work with MEC to expand the contractor network into the remainder of KCP&L's territory beyond the original seven county metro area. Targeted host training cities will include St. Joseph and Warrensburg. Funding for the training is outside of the original grant money allocated to the metro counties. MEC will request that MDNR permit a no-cost territory expansion of the grant. In addition, KCP&L and MG&E will look to allocate additional funding as it makes sense within the program budget parameters.

A more targeted marketing effort will be utilized with data that is readily available. This will include information that can be obtained from Energy Analyzer users such as square footage of home, household size, projected energy usage, etc. Other methods to allow for more targeted marketing approach include databases of customers who have already participated in other KCP&L programs as well as zip code information in which the existing contractor network is serving.

2.1 Industry Overview

HPwES was introduced by the EPA/DOE in 2001. The pioneer program sponsors included Austin Energy, Wisconsin Focus on Energy, and New York Research and Development Authority (NYSERDA). Today it is offered in 22 states. More than 26,000 homes have been improved since the program inception saving homeowners an average of $400 a year on energy costs.

2.2 Customer Market Overview

2.2.1 Customer Needs

The HPwES program addresses a homeowner's need for lower utility bills and a comfortable home. In addition, there are environmental benefits that result from the program. The environmental benefits address the needs of a very targeted segment of homeowners. The following detail provides further description of how the program addresses the above mentioned customer needs.

2.2.1.1 Lower Utility Bills

Energy-efficient homes cost less to heat and cool. Energy related improvements will provide immediate dollars on a monthly basis in terms of lower utility bills. Investments in energy-efficient upgrades add value to a home.

HPwES can save 30 - 40% on heating and cooling costs. The exact dollar amount will vary depending on the homes design, size and the household's personal comfort level. For example, savings can average between $200 and $400 per year with proper upgrades to a high-efficiency heating system.

2.2.1.2 Comfortable Rooms

Eliminating cold spots or overheated rooms makes a home comfortable. Many homeowners also report reduced dust and more comfortable humidity levels in winter and summer.

2.2.1.3 Environmental Benefits

Most of the energy in our homes comes from the burning of fossil fuels (coal, natural gas) that produce pollution. A more efficient home produces less pollution.

- The average home is responsible for twice the air pollution than the average car. If one household in 10 used ENERGY STAR heating and cooling equipment, the change would prevent 17 billion pounds of air pollution and save about $1 billion in electricity costs.
- An average of 23,000 pounds of carbon dioxide are emitted annually in each American home.
- For every kilowatt hour of electricity saved in a home, about 2 ½ pounds of carbon dioxide (the gas thought to be primarily responsible for global warming) are prevented from being emitted. Sulfur dioxide and nitrous oxides (a gas that creates smog) are also prevented from being released. (One 60-watt light bulb used five hours per day for 30 days uses nine kilowatt hours of electricity.)

2.2.2 Market Segmentation

The current market base is very broad. It includes all residential homeowners with existing homes. There has been no previous marketing research conducted to determine the demographics or psychographics of homeowners who are more likely to participate. Based on the financial investment that a homeowner needs to make to improve their home, it can be presumed that the target market might include upper-middle to high income households. With the availability of financing options, the target market might include lower to middle income households with good credit history as well.

Although there is a lack of customer research data, KCP&L will utilize data that is readily available to implement a more targeted segmentation. This will include information that can be obtained from Energy Analyzer users such as square footage of home, household size, projected energy usage, etc. Other methods to allow for more targeted marketing approach include databases of customers who have already participated in other KCP&L programs as well as zip code information in which the existing contractor network is serving. This data will be available with the 360 database that is expected to launch in the first quarter of 2009.

2.3 Barriers to Entry:

The current economic environment may present a barrier to the energy savings impact of the program. The program requires a customer to make a significant up front investment in improving their home to realize substantial energy savings. However, given the downturn in the economy more consumers are making conscious decisions about where to make their financial investments. This may allow for a higher market penetration as consumers are feeling the impact of rising energy prices and understand the implications that energy consumption has on our current and future economic state. I believe that this awareness may cause more customers to make energy improvements, however believe that the current conditions will prevent major investments.

3.0 Program Design, Approach and Objectives:

HPwES offers whole-house solutions to high energy bills and homes with comfort problems. The program is managed by MDNR and MEC who recruit home improvement contractors who are qualified to perform comprehensive home assessments. The assessment includes an evaluation of the heating and cooling systems, windows, insulation, flow of air into and out of the house, as well as a safety check of gas appliances. Based on this assessment, participating contractors offer solutions to fix comfort problems and address high energy bills.

The goal of HPwES is to turn recommendations into improved homes. Participating contractors complete the needed renovations or work closely with other participating contractors who can. Another important element of HPwES is that, upon project completion, the contractor assesses the home's performance again to document that specified improvements were properly installed to achieve the estimated energy savings. Finally, all participating contractors are subject to quality assurance reviews by MEC to ensure that projects meet program standards and homeowners are assured of high-quality work.

3.1 Detailed Program Description/Design:

The program infrastructure is designed to accommodate a hybrid model of two business approaches for delivering HPwES: the contractor model and the consultant model. The contractor model is similar to a “one stop shop” concept. In this model a qualified contractor conducts a home energy assessment to identify opportunities to improve the energy efficiency and comfort of the home. The results of the assessment are then shared with the homeowner. The contractor will provide a scope of work detailing recommended cost-effective improvements. If the homeowner decides to implement the recommendations, the contractor will then complete the work in entirety or with sub-contractors. The contractor will then conduct a second assessment to ensure that the improvements were installed according to best practice standards and the home’s performance has been improved. The consultant model is one that increases the homeowner’s trust by providing the home energy assessment with an independent, third-party consultant. In this model a consultant conducts the energy assessment

to identify opportunities for energy efficiency and comfort improvement to the home. The consultant will then share the recommendations and scope of work with the homeowner as well as refer the homeowner to participating contractors that can complete the work. If the homeowner chooses to complete the work, the participating contractors of the homeowner's choice will complete the requested improvements. Once the contractor has completed the work the consultant will return to conduct a second assessment to verify the work and the improvements accomplished. In adopting a hybrid approach the program can capitalize on the strengths of both models while minimizing the weaknesses. Both consultants and contractors will be required to have a minimum of one person on staff with a BPI Building Analyst Professional Certification.

3.1.1 Contractor Recruitment

MEC is responsible for contractor recruitment within the defined metro area. MEC has developed relationships with several related organizations including: Air Conditioning Contractors of America (ACCA), National Association of the Remodeling Industry (NARI), Home Builders Association of Greater Kansas City (KCHBA), Kansas City Home Energy Raters Association (KCHERO), a local subgroup of the RESNET (Residential Energy Services Network) membership in KC metro area, Metropolitan Community College Business and Technology Departments, Johnson County Community College and several distributors of energy related building materials, such as Central Fiber. MEC has also developed an in-depth relationship with Affordable Comfort, Inc. (ACI) having hosted its national building performance conference in 2003 and was selected to host the 2009 conference. The relationship with HUEE is especially important to the program in that the participating utilities can and are willing to assist in marketing to their customers and helping to solicit contractors with which they already work in their industry and programs.

KCP&L will work with MEC to expand the contractor network into the remainder of KCP&L's territory beyond the original seven county metro area. Recruitment efforts will include holding workshops in target cities. Press releases and trade allies may be used to announce the events. The intent of the workshops is to explain the program and generate contractor interest in participating. Targeted host training cities will include St. Joseph and Warrensburg. Funding for the training is outside of the original grant money allocated to the metro counties. MEC will request that MDNR permit a no-cost territory expansion of the grant. In addition, KCP&L and MG&E will look to allocate additional funding as it makes sense within the program budget parameters.

3.1.2 Contractor Training

All participating consultants/contractors will be required to have one BPI certified Building Analysts on staff. Contractors will also be required to meet minimum business requirements for their industry and for the local area in which they intend to operate (such as insurance, proper licensing, etc.) MEC will provide training that will develop the knowledge base of potential and existing HPwES consultants/contractors. Successful completion of a written test and field test are required for BPI certification.

3.1.3 Contractor Program Requirements

Contractors and Consultants who have been trained in building science principles are required to perform a home energy assessment that includes visual and diagnostic energy inspections using a standardized form for the program. In addition to the initial home energy assessment, contractors are required to perform a homeowner interview to collect information about the home and homeowner's concerns, motivations and goals. Upon completion of the home energy assessment and the homeowner's interview, contractors will provide a report of recommendations for improvements to the customer.

Contractors will then assist customers with the implementation of recommended measures. Implemented measures can be completed by the contractor providing the inspection and recommendations or other contractors qualified in home energy inspection, building science, and proper installation techniques.

Following the completion of recommended improvement recommendations the contractor is required to perform a post assessment. The post assessment requirements are depend upon the scope of work provided in the recommendation report and the implemented improvements. Contractors are required to perform testing to verify the results of the improvements as well as test for heath and safety issues. Results of the test may be delivered to the customer in the form of a summary certificate.

3.1.4 Recommendation Report Criteria

The EPA/DOE require that the following information be presented within the recommendation report that contractors provide to customers.

3.1.4.1 Report Format

- Participating contractor name, contact information, and name of the technician completing the assessment
- Assessed home's address
- Date assessment was performed

- HPwES logo

3.1.4.2Home Energy Assessment Summary of Findings

- Air leakage visual inspection or diagnostic results.
- Insulation levels for walls, attic, rim-joists, and foundation (crawl, basement, or slab).
- Approximate age and condition of HVAC equipment (heating, cooling, and ventilation fans), water heating equipment, and condition of exhaust flues for HVAC or water heating equipment that consumes fossil fuel.
- Type and condition of windows and doors.
- Duct system visual inspection findings.
- Approximate age and condition of appliances.
- Any signs of moisture deposition, building performance failures or conditions affecting the durability of the home.
- Results of tests related to the use of combustion appliances (draft, spillage, carbon monoxide, combustion appliance zone (CAZ) depressurization and gas leak testing).

3.1.4.3 Improvement Recommendations

- Recommendations in the comprehensive work scope must address air leakage between the house and attached garage due to the potential for infiltration of carbon monoxide and other fumes.
- An estimation of energy savings from implementing the recommendations
- Specifications are under development by the EPA/DOE. 12/11/08
- An estimation of costs for the improvements

3.1.4.4 Post Assessment Requirements

The EPA/DOE require that the following test be performed during the post assessment.

- Confirmation of measures installed, a test-out form signed by the customer signifying their agreement that the job has been completed.
- Blower Door test after installation of any of the following measures:

- Enclosed cavity insulation representing more than 15% of the total building shell area.
- Air sealing.
- Sealing of ductwork outside the building envelope.
- Replacement of atmospherically vented combustion appliance with sealed combustion appliance (due to removal of an exhaust appliance from the home).

- Minimum house ventilation requirement calculation whenever changes to the building shell requiring a blower door test have occurred to ensure that the home is receiving adequate outside air per BPI Technical Standards.

- Combustion appliance tests on all combustion equipment including vented heating systems, water heaters, and ovens, in accordance with BPI Technical Standards, will be completed whenever changes to the building envelope and/or heating system have occurred. This inspection includes all of the following tests:
  - Carbon monoxide measurement at each appliance (including ovens).
  - Draft measurement and spillage evaluation for atmospherically vented appliances.
  - Worst-case negative pressure measurement for each CAZ.

- Inspection and testing of orphaned water heaters If a new central air conditioner, heat pump, or furnace is installed then installation contractor will provide a commissioning report documenting that the installation met the ACCA HVAC Quality Installation Specification.

*Detailed contractor requirements and example standardized reports can be found in Appendix A.

3.1.5 Quality Assurance

MEC will be responsible for ensuring that participating contractors maintain high standards for quality. The following quality assurance components will be managed by MEC:

- Contractor Agreements
- Reporting process
- Job report review process
- On-site inspection protocols

- Customer feedback mechanism
- Conflict resolution mechanism
- Record keeping and tracking

3.1.5.1 Contractor Agreements

All contractors must sign an agreement describing the terms of participation established by MEC.

3.1.5.3 Reporting and Job Report Review

All contractor jobs will require submission of the pre-assessment report, the scope of work when implemented, and the post-energy assessment report. Each element will be reviewed for high-risk indicators, errors or inconsistencies. These contractors will be flagged and counseled by the MEC quality assurance staff regarding the flagged items.

3.1.5.4 On-Site Inspection

EPA/DOE requires on-site inspections to be performed at a minimum of 5 percent for each participating contractor's completed jobs. MEC will conduct at least one on-site job inspection per quarter or a random sampling of 15 percent of the jobs completed by each participating contractors per quarter. On-site inspections are performed after improvements have been installed. Quality assurance staff will focus on evaluating the contractor's ability to perform the energy assessment, develop a scope of work, and properly install the improvements. The evaluation will include visual as well as diagnostic tests. The results of the inspection will be compared to the documentation the contractor reported to MEC. In addition to the sampling of on-site inspections MEC will have provide quality assurance pre and post inspections on contractor's first five jobs after entering the program. They will be accompanied by a MEC representative on each of those jobs.

3.1.5.6 Mentoring

MEC will mentor contractors through individual meetings on the findings of inspections. Part of the on-going training process will be directed at individual jobs performed by contractors related to job performance and the general concepts of building science they receive in training.

3.1.5.8 Record Keeping and Tracking

Records relating to QA will be made available by MEC on request to federal, state, local program provider and contractor representatives.

3.1.5.9 Contractor Response Time

MEC will evaluate contractor performance in relation to lead response time with lead generation tracking.

3.1.5.10 Sub-Performance

3.1.5.10.1 Installation and Performance

Contractors will be fully responsible for work completed incorrectly or installed items that do not meet the parameters in the work order for a job. The work must be corrected at the contractors' expense. MEC will mentor contractors on sub-performance work. If the contractor fails to correct the errors, it may ultimately result in removal from the program.

3.1.5.10.2 Customer Complaint Protocol

The case of a customer compliant will result in an automatic quality assurance site visit by MEC outside of the standard quarterly inspections. The complaint will be documented and MEC will mentor the contractor regarding the complaint and the quality assurance results. The contractor will be responsible for resolving the issue directly with the customer. If a contractor allows two unresolved customer complaints, the contractor will be removed from the program

3.1.6 Contractor Incentives

Realizing that program requirements may be perceived by contractors as an addition to work load and company expense, MEC will institute an incentive system designed to encourage a high level of program participation and reporting.

3.1.6.1Training and Certification Rebate

Contractors will make the initial payment for their pre-certification training and certification costs. Upon successful completion of the training and certification, the contractor will receive a rebate of 50 percent of the direct training cost. Targets for successfully completed jobs for the next two quarters will be established and contractors will receive 25 percent for meeting the first target and the remaining 25 percent upon successful completion of the second target. Ultimately, 100 percent of the contractors' cost for training and certification will be rebated by MEC.

3.1.6.2 Incentives for Reporting

After quality assurance on a contractor's initial five jobs, $25 per inspected job will be distributed each quarter to contractors after successfully completing on-

site inspection and mentoring. The incentive will be available for each quality assurance inspection. The incentive provides the contractor motivation to complete more jobs and submit the required paperwork since 15 percent of all jobs reported are inspected by MEC.

3.1.7 Tri-State Reporting System

MDNR will be responsible for program reporting requirements submitted to DOE/EPA. Program partners are responsible for submitting quarterly reports that provide basic information about the home assessments and home performance improvements.

MEC will provide the above reporting incentives to contractors/consultants. Contractors/consultants will be provided with standard report templates (attachment) that must be submitted to MEC on a quarterly basis.

3.1.8 KCP&L Incentive Strategy

KCP&L currently offers a financial incentive to eligible KCPL customers. Customers are eligible to receive $600 toward the comprehensive energy audit provided that they follow through with implementing at least one contractor/consultant recommended improvement. The improvement must also be installed by a HPwES contractor. If a customer takes advantage of KCPL's Cool Homes program or Energy Optimizer Program, they must implement a different recommendation in order to qualify for the $600 rebate. There is not a limit to the number of programs a customer may participate in. Customers who are eligible may also receive federal tax credits on certain energy efficiency improvements.

In addition to the $600 rebate, KCP&L will co-market other available programs that customers may utilize to achieve whole house energy efficiency improvements. Those programs include the following:

- Energy Optimizer - The Air Conditioning Cycling (ACC) is a program by which KCP&L can reduce residential and small commercial air conditioning load during peak summer days. The company achieves this load reduction by sending a paging signal to a control device attached to the customer's air conditioner. The control device then turns the air conditioner off and on over a period of time depending on the control and load reduction strategy establish by the company.
- Customers who participate will receive a Honeywell Energy Star programmable thermostat professionally installed in their home at no cost. The thermostat is programmable via the internet.
- Cool Homes- The Cool Homes Program will encourage residential customers to purchase and install energy-efficient central air conditioners and heat pumps

before they fail by providing financial incentives to offset a portion of the equipment's higher initial cost. KCPL customers may also qualify for basic maintenance services to bring the cooling system back to manufacturer's specifications. The program's long-range goal is to encourage contractors/distributors to use energy efficiency as a marketing tool, thereby stocking and selling more efficient units and moving the entire CAC and heat pump market toward greater energy efficiency.

- Energy Analyzer - The online energy information and analysis program allows all residential customers with computers to access their billing information and comparisons of their usage on a daily, weekly, monthly or annual basis. This tool will analyze what end uses make up what percent of their usage, and provide information on ways to save energy by end use through a searchable resource center. This tool also allows the user to analyze why their bill may have changed from one month to another. A home comparison also displays a comparison of the customer's home electric use versus an average similar home via an Energy guide label concept.

3.2 SWOT:

3.2.1 Strengths:

- The 'whole house' concept of HPwES has generated interest by other utilities. We are beginning to see an increased partnership level in the program.
- HPwES has created a contractor network that is serious about making the program a success.
- It is a national program from the EPA/DOE that has the ENERGY STAR backing.

3.2.2 Weaknesses:

- There are many different partners playing a number of different roles in the program. This makes communication more challenging. Without strong collaboration customers may receive mixed messaging that results in a misunderstanding of the program.
- There are many EPA/DOE program sponsor requirements that are not being monitored.
- Requires a significant customer investment
- There are not any low-interest/no-interest financing options available.

3.2.3 Opportunities:

[List positive environment attributes and how those attributes will be used to help achieve the objectives of the program.]

3.2.4 Threats:

- Tri-State program ends in September 2009. We do not now if MDNR will still be in the picture.

3.3 Marketing Approach:

3.3.1 Feature Promotion

In 2009 KCP&L will organize a home energy contest as a way to promote the program and as a tool for lead generation. A winning contestant will receive a major energy efficient retrofit of their home in a highly visible demonstration.

Details TBD

3.3.2 Website

HPwES has a program page on the KPC&L website. The program pages currently explain how the program works, how to contact a certified contractor for a home energy audit, customer benefits, and provide rebate application forms in pdf format that can be printed and mailed in.

The program pages will be enhanced in 2009 to feature an online application form with the capability of attaching the proper documentation that is necessary. Testimonials may also be added to the website as they are available.

The KCP&L homepage currently features a flash promotion for the program. This feature will continue through 2009.

The program will also be promoted through the Account Link portal where customers access their online billing information. This promotion is currently scheduled for September and October of 2009.

3.3.3 E-mail

An e-mail campaign will be utilized in May targeted to middle to upper income Missouri households.

Cost: $.014/email

3.3.4 Radio

Co-market with contractors.

3.3.5 Print Advertising

3.3.5.1 Direct Mail

3.3.5.2 Bill Inserts

Missouri bill insert still be sent in the June bill cycle.

Cost: $10,000

3.3.5.3 Newspaper

We will continue to utilize the Kansas City Star Energy Tip ads placed on Mondays. HPwES will be featured for three weeks in November and December 2009.

3.3.5.4

HPwES will be advertised in the Spring and Fall Parade of Homes.

Cost: $4,190

3.3.6 Sterling Acres

3.4 Sales Approach:

KCP&L will create sales collateral that will be available to the HPwES certified contractors. Co-marketing opportunities with the contractors will also be investigated.

3.5 Delivery Approach:

3.6.1 Program Process(es):

[Describe processes used to support program. How do customer's sign-up, what documentation is required? Describe rebate processes if applicable.]

3.6.2 Program Plan:

[Describe details to how the program will be executed. Describe the communication plan for internal departments (call center, executives, etc). Describe any vendor involvement and how interactions will be managed with those vendors. Who are the key channel partners? What training will be required and how will it be executed. What are the annual goals by participation, kW and/or kWh?]

3.6.3 Program Events:

[Calendar view of known milestones for launch, sales, marketing or program support.]

3.6.4 Regulatory / Legislative Approach:

Impacts of the economy have also spurred programs enacted by legislation that can have a positive impact on the participation in the program. Effective January 1, 2009 federal tax credits will be available for specific energy measures. The table below describes the measure specific credits.

Product Category	Product Type	Tax Credit Specification	Tax Credit	Notes
Windows & Doors	Exterior Windows and Skylights	ENERGY STAR qualified OR meets IECC[1]	10% of cost, up to $200[2] for all windows, skylights and storm windows	All ENERGY STAR labeled windows and skylights qualify for tax credit.Learn more about ENERGY STAR qualified windows and skylights. ▪ Installation costs are not included. ▪ For tax purposes, save your receipt and either the ENERGY STAR label from all your new windows OR the Manufacturer's Certification Statement. ▪ Use IRS Form 5695 EXIT ▪ Must be "placed into service" between Jan. 1–Dec. 31, 2009.
	Storm Windows	Meets IECC[1] in combination with the exterior window over which it is installed, for the applicable climate zone	10% of cost, up to $200[2] for all windows, skylights and storm windows	Manufacturer Certification Statement[3] will list classes of exterior window (single pane, clear glass, double pane, low-E coating, etc.)[4] that a product may be combined with to be eligible in specific climate zones. ▪ Installation costs are not included. ▪ Manufacturer's Certification Statement[3] required. ▪ For tax purposes, save your receipt and the Manufacturer's Certification Statement. ▪ Use IRS Form 5695 EXIT ▪ Must be "placed into service" between Jan. 1–Dec. 31, 2009.
	Exterior Doors	Meets IECC[1]	10% of cost, up to $500[2]	ENERGY STAR doors will almost always qualify, except for certain parts of California[4]. Learn more about ENERGY STAR qualified doors. ▪ Installation costs are not included. ▪ Manufacturer's Certification Statement[3] required. ▪ For tax purposes, save your receipt and the Manufacturer's Certification Statement. ▪ Use IRS Form 5695 EXIT ▪ Must be "placed into service" between Jan.

				1–Dec. 31, 2009.
	Storm Doors	In combination with a wood door assigned a default U-factor by the IECC[1], and does not exceed the default U-factor requirement assigned to such combination by the IECC	10% of cost, up to $500[2]	Eligibility will be confirmed by manufacturer and documented in the Manufacturer Certification Statement[3] ▪ Installation costs are not included. ▪ Manufacturer's Certification Statement[3] required. ▪ For tax purposes, save your receipt and the Manufacturer's Certification Statement. ▪ Use IRS Form 5695 EXIT ▪ Must be "placed into service" between Jan. 1–Dec. 31, 2009.
Roofing	Metal Roofs, Asphalt Roofs	ENERGY STAR qualified	10% of cost, up to $500[2]	All ENERGY STAR labeled metal roofs qualify for the tax credit. ▪ Must be expected to last 5 years OR have a 2 year warranty. ▪ Installation costs are not included. ▪ Manufacturer's Certification Statement[3] required. ▪ For tax purposes, save your receipt and the Manufacturer's Certification Statement. ▪ Use IRS Form 5695 EXIT ▪ Must be "placed into service" between Jan. 1–Dec. 31, 2009.
Insulation	Insulation	Meets 2000 IECC & Amendments	10% of cost, up to $500[2]	▪ For insulation to qualify, its primary purpose must be to insulate. (example: vapor retarders are covered, siding does not qualify). ▪ Must be expected to last 5 years OR have a 2 year warranty ▪ Installation costs are not included. ▪ Manufacturer's Certification Statement[3] required. ▪ For tax purposes, save your receipt and the Manufacturer's Certification Statement. ▪ Use IRS Form 5695 EXIT ▪ Must be "placed into service" between Jan. 1–Dec. 31, 2009.
HVAC	Central A/C	Split Systems: EER >=12.5 SEER >= 15 Package systems: EER >= 12 SEER >= 14	$300[2]	For a list of qualified products, go to the Consortium for Energy Efficiency product directory EXIT , click on the Air Conditioners and in the "CEE Tier" enter "Residential Tier 2." Note — not all ENERGY STAR products will qualify for the tax credit. ENERGY STAR specification:

				Split Systems: EER >= 11.5 & SEER >= 14 Package systems: EER >= 11 & SEER >= 14 ▪ Manufacturer's Certification Statement[3] required. ▪ For tax purposes, save your receipt and the Manufacturer's Certification Statement. ▪ Use IRS Form 5695 EXIT ▪ Must be "placed into service" between Jan. 1–Dec. 31, 2009.
	Air Source Heat Pumps	HSPF >= 9 EER >= 13 SEER >= 15	$300[2]	Note — not all ENERGY STAR products will qualify for the tax credit. ENERGY STAR specification: Split systems: HSPF >= 8.2 & EER >= 11.5 & SEER >= 14 Package systems: HSPF >= 8 & EER >= 11 & SEER >= 14 ▪ Manufacturer's Certification Statement[3] required. ▪ For tax purposes, save your receipt and the Manufacturer's Certification Statement. ▪ Use IRS Form 5695 EXIT ▪ Must be "placed into service" between Jan. 1–Dec. 31, 2009.
	Geo-Thermal Heat Pump	Same criteria as ENERGY STAR: Closed Loop: EER >= 14.1 COP >= 3.3 Open Loop: EER >= 16.2 COP >= 3.6 Direct Expansion: EER >= 15 COP >= 3.5	30% of the cost, up to $2,000.	All ENERGY STAR labeled geo-thermal heat pumps qualify for the tax credit. ▪ Manufacturer's Certification Statement[3] required. ▪ For tax purposes, save your receipt and the Manufacturer's Certification Statement. ▪ Use IRS Form 5695 EXIT ▪ Must be "placed into service" between Jan. 1, 2008–Dec. 31, 2016.
	Gas, Oil, Propane Furnace or Hot Water Boiler	Furnaces: AFUE >= 95 Boiler: AFUE >= 95	$150[2]	For a list of qualifying products go to the Gas Appliance Manufacturing Association EXIT Note — not all ENERGY STAR products will qualify for the tax credit. ENERGY STAR specification: Furances: AFUE >= 90 Boilers: AFUE >= 85 ▪ Manufacturer's Certification Statement[3] required. ▪ For tax purposes, save your receipt and the Manufacturer's Certification Statement. ▪ Use IRS Form 5695 EXIT

				▪ Must be "placed into service" between Jan. 1–Dec. 31, 2009.
	Advanced Main Air Circulating Fan	No more than 2% of furnace total energy use	$50[2]	For a partial list of qualifying products go to the Gas Appliance Manufacturing Association EXIT ▪ Manufacturer's Certification Statement[3] required. ▪ For tax purposes, save your receipt and the Manufacturer's Certification Statement. ▪ Use IRS Form 5695 EXIT ▪ Must be "placed into service" between Jan. 1–Dec. 31, 2009.
Water Heaters	Gas, Oil, Propane Water Heater	Energy Factor >= 0.80 or a thermal efficiency of at least 90%.	10% of installed cost, up to $300[2]	Note: ENERGY STAR qualified high-efficiency gas storage water heaters will not qualify for the tax credit. All ENERGY STAR qualified whole-home gas tankless and gas condensing models will qualify. ENERGY STAR criteria: Whole-Home Tankless: Energy Factor >= 0.82 Gas Condensing: Energy Factor >= 0.8 For a partial list of qualifying products go to the Gas Appliance Manufacturing Association EXIT . ▪ Manufacturer's Certification Statement[3] required. ▪ For tax purposes, save your receipt and the Manufacturer's Certification Statement. ▪ Use IRS Form 5695 EXIT ▪ Must be "placed into service" between Jan. 1–Dec. 31, 2009.
	Electric Heat Pump Water Heater	Energy Factor >= 2.0	10% of installed cost, up to $300[2]	This is more than twice as efficient as the current federal standard. ▪ Manufacturer's Certification Statement[3] required. ▪ For tax purposes, save your receipt and the Manufacturer's Certification Statement. ▪ Use IRS Form 5695 EXIT ▪ Must be "placed into service" between Jan. 1–Dec. 31, 2009.

[1]Either the 2001 Supplement of the 2000 International Energy Conservation Code or the 2004 Supplement of the 2003 International Energy Conservation Code.

[2]Subject to a $500 maximum per homeowner for all improvements combined.

[3]A Manufacturer's Certification is a signed statement from the manufacturer certifying that the product or component qualifies for the tax credit. The IRS encourages manufacturers to provide these Certifications on their website to facilitate identification of qualified products. Taxpayers must keep a copy of the certification statement for their records, but do not have to submit a copy with their tax return.

[4]Additional information on exterior window features may be viewed at Anatomy of an Energy Efficient Window.

[5]Biomass Fuel means any plant-derived fuel available on a renewable or recurring basis, including agricultural crops and trees, wood and wood waste and residues (including wood pellets), plants (including aquatic plants), grasses, residues, and fibers.

The IRS defines "placed in service" as when the property is ready and available for use.

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In addition to the federal tax credits, Missouri residents may also be eligible for a tax deduction of up to $1000 per year, $2000 lifetime for the cost of an energy audit by a certified auditor or the improvements recommended in the energy audit report.

Lastly, Missouri will have a sales tax holiday for a seven day period beginning April 19th and ending April 25th in which the sale of all ENERGY STAR labeled appliances will be exempt from state sales tax up to $1500 per appliance. /Describe what needs to happen within the regulatory and legislative environments.

4.0 Budget:

4.0 Projected Annual Savings / Participation

The charts below describe the participant, kWh, and kW goals. The participant goals were developed based on the budget that was set for the program with the stipulation and agreement.

Home Performance with ENERGY STAR									
Participation Goal		2008 Actual		2009	2010	2011	2012	2013	Total Program
KCPLMO	51.5%	51	28	52	52	52	52	0	259
KCPLKS	48.5%	0	0	0	0	0	0	0	0
KCPL SubTotal		51		52	52	52	52	0	259
GMO-MPS	79.0%	60	8	79	79	79	79	19	395
GMO-SJLP	21.0%	16	0	21	21	21	21	5	105
GMO SubTotal		67		100	100	100	100	33	500
Total Program		**118**		**152**	**152**	**152**	**152**	**33**	**759**

Home Performance with ENERGY STAR							
kWh/kW Goal	1432 kWh/part	**2,008**	**2,009**	**2,010**	**2,011**	**2,012**	**2,013**
KCPLMO	.56 kW/part						
Annual Savings (kWh)		74,464	74,464	74,464	74,464	74,464	0
Annual Savings (kW)		29	29	29	29	29	0
Cummulative Savings (kWh)		74,464	148,928	223,392	297,856	372,320	372,320
Cummulative Savings (kW)		29	58	87	116	146	146
KCPLKS							
Annual Savings (kWh)		0	0	0	0	0	0
Annual Savings (kW)		0	0	0	0	0	0
Cummulative Savings (kWh)		0	0	0	0	0	0
Cummulative Savings (kW)		0	0	0	0	0	0
KCPL Total							
Annual Savings (kWh)		74,464	74,464	74,464	74,464	74,464	0
Annual Savings (kW)		29	29	29	29	29	0
Cummulative Savings (kWh)		74,464	148,928	223,392	297,856	372,320	372,320
Cummulative Savings (kW)		29	58	87	116	146	146
GMO-MPS							
Annual Savings (kWh)		75,419	113,128	113,128	113,128	113,128	37,709
Annual Savings (kW)		29	44	44	44	44	15
Cummulative Savings (kWh)		75,419	188,547	301,675	414,803	527,931	565,640
Cummulative Savings (kW)		29	74	118	162	206	221
GMO-SJLP							
Annual Savings (kWh)		20,048	30,072	30,072	30,072	30,072	10,024
Annual Savings (kW)		8	12	12	12	12	4
Cummulative Savings (kWh)		20,048	50,120	80,192	110,264	140,336	150,360
Cummulative Savings (kW)		8	20	31	43	55	59
GMO Total							
Annual Savings (kWh)		95,467	143,200	143,200	143,200	143,200	47,733
Annual Savings (kW)		37	56	56	56	56	19
Cummulative Savings (kWh)		95,467	238,667	381,867	525,067	668,267	716,000
Cummulative Savings (kW)		37	93	149	205	261	280

The target participation goals are set annually at 52 participants in the KCP&L Missouri territory, 48 in the KCPL&L Kansas territory (if approved) and 100 participants in the GMO territory.

4.2 *Program Cost Effectiveness:*

The HPwES program was originally designed under the CEP portfolio as a non-impact program in KCP&L's portfolio of CEP programs, meaning it was not originally designed to have a direct energy efficiency impact. Similar to the Energy Analyzer which educates the customer on their own energy usage, the HPwES program was designed as an informational program to educate the customer on energy efficiency improvements needed on their home. Neither program had energy savings directly tied to the results of the program. As a non-impact or educational program, benefit/cost analysis is difficult. Both of these programs were to work together with the suite of CEP programs; they were designed to act as the catalyst to encourage customers to take the next step in improving the energy efficiency of their homes.

In the years since the development of the CEP, many partners joined together to work toward the initiative of implementing a successful, regional HPwES program, including MDNR, MEC, and KCP&L. With the increased efforts to deliver the program, KCP&L redesigned the program to compliment a cohesive regional plan between the partners. As a result of this redesign and the requirement for a customer to apply at least one energy efficiency home improvement to qualify for the rebate, KCP&L believed that this program would deliver measurable energy savings and that it would now be appropriate to complete a cost/benefit analysis of the program. With a lack of historical data for the HPwES program, KCP&L turned to the EPA, NYSERDA, and the Austin Energy Home Performance with ENERGY STAR® program studies to obtain savings and demand estimates. The three programs were selected in order to gauge potential results from a cooling state (Texas) and a heating state (New York), as well as a mix (EPA) that would be the most comparable to our local climate.

KCP&L believes that the EPA's estimated energy and demand savings are the most indicative of what KCP&L can expect to achieve with the program. The estimates are derived from EPA studies based on a mixed climate zone with summer peaking. Added insulation, infiltration, duct leakage, and HVAC tune-up were the variables used to determine the estimate.

The EPA used a base case house of 2,000 square feet, built in the 1975-1984 era with three bedrooms. The study was weighted by fuel type and construction type. Fuel type included 80% gas and 20% electric and construction type was weighted at 73% basements, 15% crawl space, and 12% slab homes. These statistics were sourced from 1997 RECS data provided by the Energy Information Administration, the official energy statistics from the U.S Government. The results of the study estimated energy savings of 1,432 kWh per home per year with summer peaking demand savings of 0.56 kW.

Using an estimated energy savings of 1,432 kWh per home and a demand savings of .56 kW, the following test results were derived:

Total Resource Cost Test: 1.18

Societal Test: 1.33

Participant Test: 3.31

Ratepayer Impact Measure Test: .66

Utility Cost Test: 1.03

5.0 Potential Risks and Exit Strategy

The original tri-state grant is scheduled to expire September of 2009. Currently, through the grant MDNR is the state sponsor. It is not clear at this point whether or not MDNR will remain as the sponsor or not. In order to mitigate the risk of the program coming to a halt do to lack of funding for quality control, KCP&L and MEC should develop a plan to continue the program. This will involve becoming sponsors of the program and developing an implementation plan that will need to be approved by ENERGY STAR. The implementation plan should describe how we will address all of the EPA/DOE program requirements. The two largest components to address will be quality assurance and a customer call center.

6.0 Program Life-Cycle Plan

The HPwES program is the introductory to growth state of the program life-cycle. It is important at this stage to continue to raise awareness in the program. We will continue to monitor the program participation to determine the life cycle stage. If we have not seen a large growth in the program by 2010, I would recommend added enhancements to the program or making changes. One enhancement that should be investigated is the potential for a financing option. In addition, we may look at measure specific incentives.

7.0 Appendix:

[Purpose of the section is to give program manager ability to attach additional relevant information to the program plan documents that do not fit within the standard structure of the document. Examples include marketing collateral, historical program information, etc.]

Appendix A
Pre-Assessment

Homeowner Interview

The contractor is required to conduct an in-person interview to collect information about the home and homeowner's concerns, motivations and goals. The information gathered can vary based on climate, housing type, site layout, etc.; the objective is to begin to establish a good base of information from which to address the homeowners' concerns. Information that may be valuable includes:

- Age of home, years that family has lived there, number of occupants.
- Remodeling, additions, window replacement, bonus rooms.
- Basic information about HVAC system(s), type of fuel, age of systems (if known).

- Use of unvented fireplaces and space heaters (if used, educate homeowner on moisture, carbon monoxide and fire risks, and inform them that envelope improvement cannot be performed unless they are removed or vented with a retrofit kit, if applicable).
- Swimming pool – dates and hours/day of pump operation, heated or not, heating source(s) andlocation(s), ventilation strategy if indoors.
- Utility bills
- Comfort complaints (cold rooms/hot rooms, drafts, moisture and humidity).
- Ice damming, wet crawlspaces or other common climate-specific problems.

Apendix

Optional Steps for the Homeowner Interview

Pre-Assessment Telephone Interview

When scheduling the HPA, some participating contractors conduct a quick telephone interview with the homeowner to collect basic information on the home and the homeowner's concerns and motivations, so as to be more prepared, focused and time efficient during the home visit. A lead screening tool is available for participating contactors to use.

Disaggregate Energy Bills and Discuss Analysis with Homeowner

If energy consumption history is available, it can be extremely valuable for the participating contractor in building an understanding of the home's energy performance and motivating the homeowner to invest in recommended measures.

By breaking down the energy use, the contractor can more effectively identify the best energy improvement plan, educate the homeowner on the benefits of core air sealing, insulation, high-efficiency HVAC, water heating, and electric base-load measures such as lighting and appliances. A utility bill disaggregation tool is available for participating contractors to use.

Quick Walk-Through with Homeowner

Conduct a walk-through with the homeowner to ascertain additional information (homeowner has opportunity to bring up any issues or concerns that s/he has with any major items in the assessment). The contractor can take this opportunity to inspect major appliances and lighting with the customer and educate them on the benefits of replacing older appliances and lighting with ENERGY STAR qualified products.

Building Envelope Inspection

The building envelope offers many opportunities for energy efficiency improvements. Therefore, participating contractors are required to conduct an inspection of the building envelope:

1) Collect basic information on the envelope of the home:

- Record house type, age and condition.
- Note key features of home typical of house type (porch roof, multiple roof lines, cantilevers, bay windows, dormers, kneewall attics, attic access, crawlspaces, basements, attached garages).
- Note configuration of home additions, if any.
- Sketch house floor plan with orientation and exterior measurements; calculate floor area, and volume.

2) Note condition of external building envelope features (siding, trim, fascia, soffit areas, etc.):

- Look for signs of moisture or ice dam damage (if applicable) on walls and soffits that may have resulted from building performance problems.
- Check for roof moisture damage (stains, soft or rotted deck or rafters, wet or moisture-damaged insulation) from roof leaks or inadequate ventilation.
- Note any issues with shading or exposure to sun (linked to issues with hot/cold rooms and can help prioritize window-related measures).
- Note any grading features, downspout terminations, or sprinklers that may direct water towards the foundation or affect the performance of an exterior wall.

Optional Step for Basic Building Envelope Inspection

Renewable Energy Opportunities

Record house orientation, observe site layout and look for opportunities for renewable energy technology (e.g., access to sunlight on south and west sides)

3) Envelope Thermal Characteristics

- Determine the thermal boundary of the home and identify thermal bypasses.
- Record type(s), amount and condition of insulation in all components of the thermal boundary. For guidance on default and de-rated R-values, see Building Performance Institute(BPI) Technical Standards1.
    - Attic flats, slopes, knee walls, knee wall flats, dropped soffits, etc., as appropriate for type of home and per configuration of additions.
    - Basement and crawlspace walls or ceilings.
    - Rim joists.
    - Attic staircase walls.
- Window inspection: Note condition of windows, type, age, signs of moisture damage and air infiltration around windows.
- Door inspection: Note type and condition of all doors to exterior (including garage) – especially note if doors are un-insulated, in poor condition, or if they are leaky and in need of weatherstripping or door sweeps.

Optional Steps for Envelope Thermal Inspection

Exterior Wall Insulation Levels

An optic probe can often be used to determine wall insulation levels. It is usually inserted next to electrical outlets or behind wall hangings. This tool can also be used to inspect potential moisture problems found with an infrared camera

Window Details

Some energy savings tools in particular require some details regarding window area and orientation, framing type, number of panes and/or presence of storm windows. Otherwise, such information is most important if it is known that replacement windows are to be included in the scope of work.

4) Envelope air leakage characteristics

- Visual Inspection of attic and basement to identify paths of air leakage revisions.
    - Attic: openings in wall top plates, electrical and plumbing runs, open areas around flues and chimneys, recessed light housings, around exhaust fans, open framing cavities, dropped soffits and ceilings.
    - Basement: openings around electrical and plumbing runs and around flue pipes and chimneys, accessible sill plate areas, basement windows, exterior doors, and accessible rim/band joist areas.
- Blower door test: This test is an effective way to locate air leaks and educate the customer on air leakage issues. When the recommended work scope includes air sealing, attic insulation, enclosed cavity insulation representing 15% of the total building envelope area, sealing of the ducts outside the thermal envelope, or replacing atmospherically vented combustion appliances with sealed combustion appliances, follow ASHRAE 119 standard on blower door test procedures.
    - With blower door depressurizing the home, identify major leakage areas in living area (e.g. window trim, baseboards, upper trim, cabinets, dropped soffits, pocket doors, recessed lighting, duct chases/plenums, band joists, transitions between porch roof and exterior walls, fireplaces, cantilevered floors, etc.).
    - Identify any significant misalignments of the pressure and thermal boundaries and ways to correct them.
    - Inspect walls or ceiling between an attached garage and the living space for air leakage.

Blower Door Test Caution:

Do NOT conduct this test if fireplace or wood stove has recently been used.

Do NOT conduct this test if there is evidence of exposed and/or friable contaminants (asbestos, lead dust, bio-aerosols or other dangerous materials) that might become airborne or otherwise be introduced into the living space by conducting the test.

Optional Steps for Inspections during Blower Door Test

Use of Infrared Camera

Some of the more successful home performance contractors have learned that using an infrared camera during a blower door test is an effective way to identify where insulation and air sealing are needed. It is also an effective sales tool when the contractor has the customer(s) involved in the assessment. Showing the infrared images to the customer(s) and relating them to problems that were identified during the homeowner interview demonstrate expertise and builds trust, leading to higher customer motivation and stronger sales.

Zonal Pressure Differential Tests

Using the blower door and a manometer, conduct zonal pressure differential tests if needed to diagnose particular problem areas within the building (e.g., to determine how much an attic or garage is communicating with the living space compared to the outside). This test can help focus the inspection and speed up the diagnostics tests.

Heating, Ventilation, and Air Conditioning (HVAC) and Domestic Hot Water (DHW) Systems Visual Inspection

The HVAC and DHW systems can offer dramatic comfort and energy savings opportunities. Therefore, participating contractors will perform a basic visual inspection of the HVAC and DHW systems in the home as follows:

1) Determine number and type of thermostats:

- Note number of heating and/or cooling zones.
- Note whether thermostats are programmable or manual.
    - If programmable, check status of setback periods and, if not being used, educate homeowner on the benefits of scheduled setbacks based on their lifestyle.

2) Visually inspect heating system:

- Verify system information: age, model, heat in/out, general condition and maintenance history.
- Check for evidence of back draft/flame roll-out.
- If boiler, verify that pressure relief valve is present and not obstructed.

- If condensing unit, check the condensate line for signs of blockage or leaks.
- Check exhaust vent for proper fitting and termination.

3) Visually inspect air conditioning system:

- Verify system information: age, model, capacity (sometimes available on nameplate).
- Check condensate line(s) for blockage or leaks.
- Note any issues around compressor/fan unit in yard, such as recirculation/air flow obstruction from built features or plantings or problems with coil blockage from leaves, twigs or other debris.
- Record number of window or wall units, model and EER if available.
- Check for insulation on refrigerant line set.

4) Visually inspect distribution systems:

- Inspect air filter(s) and ask homeowner how frequently they are replaced.
- Verify presence of secondary overflow pans when air handling unit is within, above or adjacent to finished living space and verify presence of condensate drain line or float disconnect switch.
- Note the presence of any ducts or air handlers in garages (this requires a recommendation to relocate or create air-tight enclosures to isolate them from garage and prevent transportation of carbon monoxide and other fumes from the garage to the living space).
- Record insulation level of ducts in unconditioned spaces.
- Check for ductwork leaks, disconnects, crimps, signs of moisture presence, return leaks near combustion equipment, damage or other atypical conditions (inspection will include inaccessible ducts to extent possible).
- For hydronic systems, record insulation levels and note opportunity for pipe insulation if practical, especially on long pipe runs if there are comfort issues.
- For baseboard systems, check for condition and positioning of covers and for presence of dust, webs and other material on the fins.

5) Visually inspect DHW system:

- Record approximate age, model, capacity, condition.
- Check for evidence of back draft/flame roll-out.

- Verify that pressure relief valve is present and not obstructed.
- Note temperature setting on water heater. This is a good opportunity to educate homeowner on standby losses and scalding threats if it's above 120 degrees F, and reduce the setting if homeowner approves.
- Check for signs of leakage from water heater tank vessel.
- Conduct visual inspection of water heater and hot water pipes for efficiency improvements (presence or lack of insulation, convective loop, and feasibility of retrofitting insulation on tank and/or pipes.

6) Combustion appliance zone (CAZ) safety inspection:

- Make sure that there are no flammable or explosive materials near any combustion source. This is a good opportunity to recommend moving them to a safe place.

7) Living space safety inspection:

- Note number, location and operability of CO detectors and smoke detectors in living space. Codes in some jurisdictions may require them.
- Note presence of unvented gas fireplaces and propane or kerosene space heaters and discuss with and educate the homeowner – explain that envelope work cannot be performed unless they are removed or vented with a retrofit kit.

8) Inspect mechanical exhaust ventilation:

• Check whether mechanical exhaust venting systems in bathrooms and kitchen, if present, are designed, installed and terminated properly.

• If garage is attached, note whether exhaust fan is present and operable in garage.

• Note presence and operability of power attic or whole-house exhaust fans and inform homeowner of correct operation.

• Determine required ventilation rate per ASHRAE 62.2-2007 or BPI Technical Standards2.

Optional Steps for HVAC System Inspection

In addition to a basic visual inspection of the HVAC system, there is additional information that may be needed in order to produce energy savings estimates for replacement measures. This information can include:

Thermostat Settings:

Ask the homeowner about average thermostat settings for both summer and winter (this information can be important for analyzing energy consumption and savings).

Heating and Cooling Systems:

1) Review maintenance records and/or ask homeowner about frequency, type and last occurrence of maintenance.

2) If the heat pump or air conditioner is more than 10 years old or the furnace or boiler is more than 15 years old consider recommending replacement with ENERGY STAR qualified equipment.

3) Estimate AFUE of heating system and HSPF/SEER of heat pump/cooling system via product nameplate information, looking product up in Gas Appliance Manufacturers Association (GAMA) or Air Conditioning and Refrigeration Institute (ARI) directories, instrumented testing (see next section) or a combination thereof. Having a good understanding of operating efficiency helps the contractor produce a more accurate estimation of energy savings. Some energy modeling software will require a good estimate of AFUE, HSPF and SEER in order to predict accurate energy savings.

4) Check central air conditioning systems for proper refrigerant charge and airflow across the indoor coil to determine if they are in balance to operate as efficiently as possible. EPA refrigerant certification is required to handle refrigerants and most jurisdictions may require this be completed by a licensed HVAC contractor.

Air Handlers and Ductwork:

1) Determine condition of air handler and coil and need for cleaning.

2) Conduct a test to determine adequacy of air flow, using one of the following methods: Duct Blaster® or other plenum pressure-matching air flow test, flow plate, flow hood, static pressure test, and/or temperature rise/drop tests.

3) If ducts or an air handler are located outside of home's pressure boundary and cannot be relocated inside, conduct a test to determine duct leakage, using a metered and calibrated duct pressurization device.

4) Inspect for condensation moisture or damage from condensation on exterior of duct liner (in hot humid climate) or interior of A/C only ducts (in cold climate) for ducts outside conditioned space.

5) Check air return grills are properly sized.

Water Heater:

Estimate Energy Factor (EF) of water heater based on model number. Most energy modeling software will ask for EF for the purpose of estimating energy consumption.

Mechanical Ventilation:

Educate homeowner on the benefits of a timer-operated or humidity controlled bathroom exhaust fan.

Instrumented Tests on Combustion Appliances, Combustion Appliance Zone (CAZ) and Living Space

1) Combustion appliance and CAZ tests.

Performing these tests can help identify problems that affect the health and safety of the customer. Therefore, participating contractors will perform diagnostic tests on combustion equipment including vented heating systems, water heaters and ovens, in accordance with the BPI Technical Standards3 or an equivalent method developed by the HPwES Program Sponsor in accordance with their Partnership Agreement and approved by EPA and DOE. This inspection includes:

- Carbon monoxide measurement at each appliance.
- Draft measurement and spillage evaluation for atmospherically vented appliances.
- Worse-case negative pressure measurement for each CAZ.

Examples of acceptable alternative diagnostic testing standards that cover a portion, but not all, of the diagnostic testing covered by BPI include:

- ASTM Standard E1998-02, "Standard Guide for Assessing Depressurization-Induced Backdrafting and Spillage from Vented Combustion Appliances".
- Canada General Standards Board 51.71-95, "The Spillage Test Method to Determine The Potential for Pressure Induced Spillage from Vented, Fuel-fired, Space Heating Appliances, Water Heaters and Fireplaces".
- National Fuel Gas Code (ANSI Z223.1/NFPA 54, Annex H).

Note: Vented appliances that are going to be replaced with direct vent or power vented equipment as part of the work scope do not have to be tested, except as an interim test if the home is air sealed as part of the work scope prior to installation of the new equipment (having the heating equipment installed first would prevent the need for such a test).

2) Ambient carbon monoxide readings.

The contractor will take ambient carbon monoxide readings in CAZ zones and in main living spaces and continuously monitor carbon monoxide levels in the ambient air around technician during combustion tests.

Optional Steps for Instrumented Tests

Steady State Efficiency (SSE) Test

This test can be performed relatively quickly while conducting other combustion tests on a furnace or boiler. It can provide good information for the contractor in evaluating the condition and operation of the equipment. Some energy modeling software will use the SSE as an input in order to estimate baseline energy consumption.

Gas Leak Test

Small gas leaks present a health and safety threat, waste energy, and emit methane, a greenhouse gas 22 times more powerful than carbon dioxide. Using gas leak detection equipment, check for gas leaks at all accessible gas pipe connections, T's, elbows, unions, and fittings, from the gas meter to the inlet to each combustion

appliance. Any gas leak discovered with detection equipment will be verified with a commercial soap solution before making repairs.

Moisture Inspection

- Check basement and crawlspace for moisture deposition or damage on basement floors, walls, sill plate area, around basement windows and bulkhead doors.
- Determine whether there is continuous moisture barrier in the crawlspace.
- Check around exterior of foundation for signs of moisture deposition from such sources as faulty gutters or watering too close to the foundation.
- Check attic for moisture deposition or damage on roof deck, rafters, joists, and insulation (wet or moisture-compacted insulation).
- Inspect condition of windows and look for signs of condensation or other conditions that could cause damage or affect durability.
- If there is evidence of high moisture levels in the living space, check for discoloration on walls behind headboards, furniture – corners of closets on exterior walls, and other areas of stagnation and cold temperature for moisture deposition or damage and conditions that promote fungal growth.

Optional Appliance and Lighting Inspection

1) Record approximate age, type and condition of major appliances and showerheads. If applicable, determine number, age and condition of room air conditioners (check with homeowner if the assessment is performed outside of the cooling season and they could be in storage).

- *If homeowner has any older (>10 years) appliances, discuss benefits of replacing them with ENERGY STAR qualified appliances.*
- *Educate homeowner on water and energy savings from low-flow showerheads and toilets.*

2) Inspect high-use lighting areas for any obvious opportunities to upgrade to ENERGY STAR compact fluorescent lamps (CFLs) or fixtures. Check with homeowner to get estimated daily burn-time for lighting to be recommended for replacement (important for estimating energy savings calculation).

HPwES HPA Summary Report

Reviewing the findings with the customer is the culmination of the HPA process. This is the opportunity to present the homeowner with the improvement opportunities discovered during the HPA and solutions for improving the performance of the customer's home. Therefore, the participating contractor will discuss inspection findings and present a recommended scope of work to the homeowner.

At a minimum, the following elements are required to be included in an HPA Summary Report provided to a homeowner after the HPA has been completed:

- Participating contractor name, contractor contact information, and name of technician completing the HPA.
- Assessed home's address.
- Date assessment was performed.
- HPwES logo.
- Existing conditions:
    - Air leakage visual inspection or diagnostic results.
    - Insulation levels for walls, attic, rim-joists, and foundation (crawl, basement, or slab).
    - Approximate age and condition of HVAC equipment (heating, cooling, and ventilation fans), water heating equipment, and condition of exhaust flues for HVAC or water heating equipment that consumes fossil fuel.
    - Type and condition of windows and doors.
    - Duct system visual inspection findings.
    - Approximate age and condition of appliances.
    - Any signs of moisture deposition, building performance failures or conditions affecting the durability of the home.
    - Results of tests related to the use of combustion appliances (draft, spillage, carbon monoxide, combustion appliance zone (CAZ) depressurization and gas leak testing).
- A set of recommendations that is reasonably comprehensive in identifying measures that save energy, address combustion safety, comfort, moisture deposition, durability or other building performance problems.
- Recommendations in the comprehensive work scope must address air leakage between the house and attached garage due to the potential for infiltration of carbon monoxide and other fumes.

- An estimate of energy savings from recommended improvements and improvement installation cost.

Estimating Energy Savings

To be developed.

Section 3: Post-installation Test or "Test-out" Protocols

3.1. Introduction

One of the features that distinguish HPwES as a value-added service for residential customers is the series of instrumented tests and inspections that the home performance contractor performs after the improvements have been made to a home. These tests support the "do-no-harm" principal which is a hallmark of home performance contracting. While there is no guarantee that any home will operate safely under all conditions, the home performance contractor is uniquely concerned about health and safety of the occupants. In addition to addressing health and safety issues that may be directly affected by the home performance work, some of the tests provide valuable information on the effectiveness of air and duct sealing measures installed.

3.2. Required and Recommended Elements

3.2.1 Program Oversight of Post Installation or "Test-out" Requirements

To ensure that the "test-out" is performed adequately by participating contractors, Program Sponsors need to adopt "test-out" requirements in their program policies and procedures that meet or exceed the guidance in this document. The following guidance and test-out template are offered to assist Program Sponsors with the development of their "test-out" procedures. When a participating contractor completes home performance improvements for a customer, they will perform the post-installation tests and inspections described in this section, and enter the results in a "Post-Installation Tests and Inspections" Form (the National Program offers a template form that can be used or modified by Program Sponsors). If any of the tests or inspections show the need for corrective action, the contractor can record the action item(s) in the document or postpone completing the Form (including having the customer sign it) until those corrective actions have been made. The job will not be considered complete until the Program Sponsor has received a signed Post-Installation Tests and Inspection Form that indicates that all standards have been met (i.e., all tests and inspections have been passed successfully) and that no further actions are required.

3.2.2 Post Installation Test or "Test-out" Requirements

The required post-installation tests depend upon the scope of work:

1) Confirmation of measures installed, can be a simple check-off list that the participating contractor uses to confirm that all contracted measures have been installed. The customer would also sign the test-out form signifying their agreement that the job has been completed.

2) Blower Door test will be completed after installation of any of the following measures:

• Enclosed cavity insulation representing more than 15% of the total building shell area.

• Air sealing.

Optional Elements for Program Test-Out Requirements

Two-Part or Duplicate Forms for Customer Copy

While it raises program cost overheads slightly, providing the customer with a copy of the post-installation test form is recommended, because it provides the customer with a record of the test-out details, as well as a record that they signed off on the completion of the job, in case any subsequent issues arise.

Additional Information

Programs may find it valuable as a customer information piece to include additional details on the test-out form, such as summary information on the projected energy savings to be expected from the measures installed and/or environmental emissions prevented. Alternatively, this information could be included on a program-generated certification of completion that is sent to the customer after a completed job has been reported to the Program Sponsor (see Section 4: HPwES Summary Certificate).

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• Sealing of ductwork outside the building envelope.

• Replacement of atmospherically vented combustion appliance with sealed combustion appliance (due to removal of an exhaust appliance from the home).

3) Minimum house ventilation requirement calculation will be performed whenever changes to the building

shell requiring a blower door test have occurred to ensure that the home is receiving adequate outside air per BPI Technical Standards[4].

4) Combustion appliance tests on all combustion equipment including vented heating systems, water heaters, and ovens, in accordance with BPI Technical Standards, will be completed whenever changes to the building envelope and/or heating system have occurred. This inspection includes all of the following tests:

• Carbon monoxide measurement at each appliance (including ovens).
• Draft measurement and spillage evaluation for atmospherically vented appliances.
• Worst-case negative pressure measurement for each CAZ.

5) Inspection and testing of orphaned water heaters: water heaters may not be left venting alone into a previously shared chimney without ensuring the chimney meets appropriate NFPA requirements under the new condition and the water heater has been tested and passed all required combustion safety tests (spillage, draft, CAZ depressurization).

6) If a new central air conditioner, heat pump, or furnace is installed then installation contractor will provide a commissioning report documenting that the installation met the ACCA HVAC Quality Installation Specification.

[4] BPI Technical Standards are currently being modified and this Guide will be updated to reflect any revisions.

Optional Post Installation Test or "Test-out" Requirements

Gas Leak Detection

Check all accessible gas/propane lines for leaks using a combustible gas detector.

Radon Testing

Perform a radon test at the finish of any job including air sealing in the scope of work.

Section 4: HPwES Summary Certificate

4.1. Introduction

Homeowners who choose to invest in upgrading the energy performance and comfort of their home are often interested in having a "Summary Certificate" that documents the improvements, as well as the organizations and companies involved in their home performance improvement. This "Summary Certificate" is recommended when an estimated energy savings of 20% or more is achieved through improvement measures.

Local Program Sponsors who want to develop their own "Summary Certificate" must ensure that it includes the required elements specified below and is submitted to the National Program for approval prior to being distributed.

4.2. Required and Recommended Elements

The required elements of the "Summary Certificate" are:

- The National HPwES logo mark and mission statement.
- Address of home where improvements were completed.
- Names of companies performing and verifying improvements.
- Date of improvements completion.
- Specific home improvements completed (e.g., attic insulation increased to R-30, SEER 14 air conditioner installed, air sealing performed).

Optional Elements for the Summary Certificate Include:

- *Estimated energy savings or home performance results achieved. (e.g. HERS® Index)*
- *Estimated environmental impacts of improvements.*
- *Local Program Sponsor logo mark and mission statement (if applicable).*
- *Program representative signature block.*