

Maximizing Results from a High Efficiency Furnace Replacement Program

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ABSTRACT

Philadelphia Gas Works (PGW) introduced a suite of energy efficiency programs in 2011 to address the energy usage of residential, commercial, and industrial customers, create jobs, and reduce greenhouse gas emissions. Their Residential Heating Equipment Replacement Program (RHER), launched in April 2011, provides prescriptive rebates to PGW customers who purchase residential-sized natural gas heating equipment to encourage the purchase of the most efficient furnaces and boilers available.

The RHER was designed to cover a majority of the incremental costs of the high efficiency equipment, while still providing cost-effective savings. Initial rebates, modeled after other regional programs with lower efficiency requirements, were found to cover a smaller percentage of incremental costs than expected, so PGW significantly increased the rebates while still maintaining the projected cost-effectiveness. Another challenge was predicting the level of marketing needed to encourage demand that was consistent with the availability of program funding. Conservative initial marketing led to under-subscription, so program marketing was ramped up.

Research with contractors and participants has provided important information about the high-efficiency heating market. Contractor interviews provided data on the penetration of high efficiency furnaces and boilers, program awareness among contractors and residential customers, barriers to measure acceptance, incremental costs experienced in the market, and sufficiency of rebate levels. Interviews with participants provided information on customer motivation to purchase high efficiency equipment, importance of the rebate in the purchase decision, and information on high efficiency equipment provided by contractors to customers. Findings from the usage impact analysis are forthcoming.

Residential Heating Equipment Rebate Program

Philadelphia Gas Works (PGW) introduced a suite of energy efficiency programs in 2011 to address the energy usage of residential, commercial, and industrial customers, create jobs in the city of Philadelphia, and reduce greenhouse gas emissions. Their Residential Heating Equipment Replacement Program (RHER), launched in April 2011, provides prescriptive rebates to PGW customers who purchase residential-sized natural gas heating equipment to encourage the purchase of the most efficient furnaces and boilers available.

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Table 1: Residential Equipment Rebates

Measure	Original Rebate	Revised Rebate
Natural Gas Furnace 94% AFUE	\$250	\$500
Natural Gas Furnace 94% AFUE, ECM Fan	\$250	\$500
Natural Gas Water Boiler 94% AFUE (w/electronic ignition)	\$1,000	\$2,000

Another challenge was predicting the level of marketing needed to encourage demand that was consistent with the availability of program funding. Conservative initial marketing led to under-subscription, so program marketing was ramped up with outreach to neighborhood centers and district offices; advertisements on the subway and regional rail; internet and radio advertisements; HVAC manufacturer, supplier, and installer outreach; and multiple mass mailings to contractors. PGW has found existing HVAC contractor outreach to be the most effective tool.

Evaluation

The goals of the program evaluation are to provide information on the market for high efficiency furnaces and boilers in Philadelphia, and to provide information on the energy usage of the high efficient systems compared to the ones that were previously in place.¹

Contractor and Participant Interviews

Surveys were conducted with participating contractors and with customers who participated in the program to develop information on the high efficiency furnace market, incremental costs, and purchasing decisions.

HVAC contractors with two or more customers who received furnace or boiler rebates from PGW between July 2012 and February 2013 were selected for inclusion in the contractor survey. Table 2 shows that there were 38 contractors in this sample and that 20 interviews were completed with the participating contractors.

Table 2: HVAC Contractor Sample Disposition

	Contractors
Contractors with 2 or more rebates 7/2012 – 2/2013	38
Interview Completed	20
No Response	9
Refused	6
Wrong Number	2
Language Barrier	1

¹ PGW currently projects savings based on expected efficiency improvements with the new equipment. The impact evaluation will provide more precise data on actual savings experienced by comparing pre-replacement to post-replacement usage from customers' billing data.

PGW customers who received a RHER furnace or boiler rebate between October and December 2012, and who had a phone number or email address on file, were included in the participant sample frame. Table 3 shows that there were 67 furnace rebates and 57 boiler rebates in the sample frame. Thirty customers who received each a furnace rebate and 29 who received a boiler rebate were selected for in-depth interviews, and a total of 32 interviews were completed.

Table 3: RHER Participant Sample Disposition

	Furnace Rebate	Boiler Rebate	Total
Check Issue Date Between 10/1/12 and 12/31/12	77	60	137
Phone Number or Email Address in File	67	57	124
Sample Selected	30	29	59
Interview Completed	17	15	32
No Response	9	3	12
Refused	1	8	9
No Phone Number	3	3	6

Contractor Background and Knowledge

Contractors were likely to report that they had participated in other high efficiency HVAC rebate programs and that they were aware of additional rebates that HVAC manufacturers offered on their equipment. While 14 of the 20 contractors surveyed participated in other HVAC rebate programs, 16 of the 20 were aware of manufacturer rebates. This suggests that a potential marketing avenue is to request a list of participating contractors from the electric utility in Philadelphia and make sure that these contractors are aware of PGW’s RHER rebates.

Table 4 shows that the most common source of initial information for the contractors about PGW’s RHER was the equipment supplier. Other common responses were the internet (some specifically mentioned PGW’s website), a PGW mailing, or a PGW email. Additional marketing and education at the equipment supply houses could be beneficial means to increase program participation.

Table 4: How Contractor First Learned about the RHER

How Contractor First Learned about RHER	# Contractors
Supplier	8
Internet	3
PGW Mailing	3
PGW Email	2
Customer	1
City Displayed Brochure	1
Home Show	1
Trade Group	1
Total	20

Participant Program Knowledge

The most common initial source of program knowledge for the participant was the contractor, and additional participants who did not first hear about the program through the contractor still discussed the program with their contractor. PGW should have their outreach contractor continue to reach out to the HVAC contractors to increase program knowledge among HVAC contractors who work in Philadelphia. Participants noted many other information sources as well. Therefore, it is important that PGW provide outreach through a variety of means including press, realtors, and other energy programs.

Penetration of High Efficiency Furnaces and Boilers

Contractors were asked to report the percent of their 2012 installations that were high efficiency. Table 5 shows that there was a wide distribution of the percentage of installations reported that were high efficiency. While two of the contractors reported that less than ten percent of their gas furnace installations were high efficiency, six contractors reported that 10-24 percent were high efficiency, two reported that 25-49 percent were high efficiency, and nine reported that more than half of the gas furnace installations were high efficiency. The distribution was very similar for 2012 boiler installations. The variation may be due to the fact that some of the contractors are more likely to perform work in parts of the city where the housing stock has greater barriers to the high efficiency installations.

Table 5: Percent of 2012 Installations that were High Efficiency

Percent of 2012 Installations that were High Efficiency	# Contractors	
	Gas Furnace	Gas Boiler
<10%	2	2
10% - 24%	6	5
25% - 49%	2	3
50% - 74%	4	3
75% - 99%	4	5
100%	1	1
Don't Know	1	1
Total	20	20

When asked to compare how their high efficiency sales compared currently to before the rebates were available, most contractors said that their high efficiency sales had increased and 25 percent said that their high efficiency sales had greatly increased. Table 6 shows that the responses were very similar for furnaces and boilers. One contractor stated, "Now, we will be pushing everyone to high efficiency boilers because of the \$2,000 rebate." This provides evidence that the program has had a real impact on installations of high efficiency equipment.

Table 6: High Efficiency Sales Compared to Before Rebates were Available

High Efficiency Sales Comparison to Before Rebates	# Contractors	
	Gas Furnace	Gas Boiler
No Change	5	4
Somewhat Increased	3	3
Increased	6	7
Much Increased	5	5
Don't Know	1	1
Total	20	20

Customer Education about High Efficiency Equipment and Rebates

Contractor reports on how they educate customers about high efficiency equipment, shown in Table 7, suggest that additional contractor education about how to estimate savings and sell high efficiency equipment could be beneficial. Only two of the contractors reported that they use individual household information and only one contractor reported that he used household usage data to estimate energy savings from the installation of high efficiency equipment. Three of the contractors noted that they were wary about providing savings estimates to their customers for fear that they would be held accountable. Only one contractor noted that he educates customers about the environmental benefits of the high efficiency equipment.

Table 7: Contractor Report on Information Provided to Customers about High Efficiency Gas Furnaces and Savings

Information Provided to Customers About Gas Usage and High Efficiency Equipment	# Contractors – Gas Furnaces	# Contractors – Gas Boilers
AFUE Rating or Savings Estimate	9	7
PGW Website Information/Savings Calculation	5	7
Percent Savings/Cost Comparison	5	6
Manufacturer Literature and Forecasted Savings	3	4
Does Not Mention or Promise Savings	3	3
Environmental Benefit	1	1
Not much information	1	1

Many of the contractors noted that they use information from the PGW website to educate their customers. This information should be reviewed and PGW should consider adding information to help customers calculate potential savings from the high efficiency furnace based on their usage. PGW should also consider adding information geared specifically to HVAC contractors.

The customer interviews provided similar information about the lack of household-specific savings estimates provided by contractors. Customers often reported that they did not have detailed discussions about the benefits of the high efficiency equipment. Only one of the 32 participants who were interviewed stated that the contractor provided a savings estimate that was based on that customer's actual usage. We recommend that PGW provide training to contractors on how to estimate savings and how to sell high efficiency equipment.

Table 8: Customer Report on Information Contractor Provided about Gas Usage and Annual Cost of High Efficiency Furnace or Boiler Compared to Other Options

Information Contractor Provided about Gas Usage and Cost Compared to Other Options	Furnace Rebate	Boiler Rebate	Total
Did Not Discuss Much	4	8	12
Gas Savings, But not Specific Amount	7	4	11
Approximate Percent or Dollar Savings	3	2	5
Savings from Switching from Oil to Gas	1	2	3
AFUE Percentage Differences	2	0	2
Savings Based on Actual Usage	1	0	1

Rebate Sufficiency and Impact on Customers’ Purchase Decisions

Most contractors reported that the rebate played a large role in their sales presentation or that it helps in the sale. Additionally, Table 9 shows that most contractors stated that the rebate was important in making the sale of the high efficiency equipment and most contractors stated that the rebate was very important or important in the customer’s decision to purchase high efficiency equipment.

Table 9: Extent to Which High Efficiency Sales are Due to PGW’s Rebates

Extent to Which High Efficiency Sales are Due to PGW’s Rebates	# Contractors
Extremely Important (100%)	6
Very Important (60%-80%)	3
Important (25%-50%)	5
Somewhat Important (15%-25%)	2
Not Important (<10%)	3
Total	20

Seven of the 17 furnace rebate participants and one of the 15 boiler rebate participants stated that they would have purchased the high efficiency equipment in the absence of the rebate. However, the rebate did appear to be an important factor in the decision process for many of the participants. Even some of those who did not obtain replacement quotes for equipment that was not high efficient because they had already decided on high efficiency stated that they were moved to purchase the high efficiency because of the rebate. Seven of the 17 furnace participants and 14 of the 15 boiler participants stated that the rebate was very important or important in their decision to purchase the high efficiency equipment.

Table 10: Importance of the PGW Rebate in Participant’s Decision to Purchase the High Efficiency Furnace or Boiler

Importance of PGW Rebate in Decision to Purchase High Efficiency	Furnace Rebate	Boiler Rebate	Total
Very Important	5	12	17
Important	2	2	4
Helpful	3	0	3
Not Very Important	3	0	3
Not At All Important	4	1	5
Total	17	15	32

When asked about factors other than the rebate that influenced their purchase decision, participants were most likely to respond that it was their monthly cost savings, environmental issues, or installation/venting/size issues.

Table 11: Participant Report on Factors Other than the Rebate that Influenced Decision to Purchase the High Efficiency Furnace or Boiler

Factors that Influenced Decision to Purchase High Efficiency	Furnace Rebate	Boiler Rebate	Total
Monthly Costs / Gas Savings	11	11	22
Environmental Concerns	4	3	7
Installation Issues/Venting/Size	4	3	7
Resale Value	1	0	1
Condition of Existing Equipment	0	1	1
Maintenance	0	1	1
EnergyWorks Audit Recommendation	0	1	1

Contractors had very different perceptions regarding customer awareness of the rebates. Some contractors said that customers were always aware, some contractors said that customers were never aware, and some estimated a percentage between zero and 100 percent that were aware. However, most of the contractors said that customers who were aware of the rebate asked for a high efficiency quote and most contractors said that they would educate customers about the rebate if they were not aware. Additional customer marketing could be beneficial to increase customer awareness of the program and customer requests to contractors for information on the high efficiency equipment.

While 11 of the 20 contractors said that the furnace rebate was sufficient to encourage the purchase of the higher efficiency equipment, 15 said that the boiler rebate was sufficient. If additional marketing does not drive participation to the desired level, PGW should consider an additional increase in the furnace rebate amount.

Table 12: Contractor Report on Sufficiency of Rebate Amount

Rebate Amount is Sufficient to Encourage Purchase of Higher Efficiency Equipment	# Contractors	
	Gas Furnace	Gas Boiler
Yes	11	15
Sometimes	2	2
No	7	3
Total	20	20

Incremental Costs and Installation Barriers

About half of the contractors said that the incremental costs of high efficiency equipment varied widely by home. PGW may consider a rebate that varies based on whether additional venting is required or based on the size of the customer's home.

According to reports by the contractors, the rebate in most cases does not appear to reach the goal of covering 80 percent of the incremental costs. PGW may consider increasing the rebate amount.

- *High Efficiency Furnace Incremental Costs* ranged from \$600 to \$5,000. Contractors were most likely to estimate that the incremental costs of high efficiency furnaces were \$1,800 to \$2,500. The current rebate of \$500 covered 80 percent or more of the incremental costs for only one or two of the 17 contractors who estimated costs.
- *High Efficiency Boiler Incremental Costs* ranged from \$600 to \$7,000. Contractors were most likely to estimate that the incremental costs of high efficiency boilers were \$1,500 to \$4,000. The current rebate of \$2,000 covered 80 percent or more of the incremental costs for six of the 17 contractors who estimated costs.

The participant survey also found that the RHER very rarely covered 80 percent of the incremental costs of the high efficiency furnaces and boilers. At most, three of the 11 furnace rebate participants who provided a cost difference and one of the seven boiler rebate participants who provided a cost difference had 80 percent or more of that estimated difference covered by the \$500 furnace or \$2,000 boiler rebate.

Contractors were most likely to report that the customers did not install high efficiency equipment because of the cost, installation issues, and reluctance to use a new technology. Other barriers were convincing customers that they would save money and landlords who were not responsible for heating costs. The large percentage of installation issues suggests that the market for the high efficiency equipment may be a smaller group than PGW and its consultants initially estimated, suggesting the need for increased marketing and/or increased rebates.

Table 13: Contractor Report on Why Customers Do not Install High Efficiency Equipment

Reasons Customers do not Install High Efficiency Equipment	# Contractors
Cost	15
Installation issues	5
Does not intend to remain in home	2
Not comfortable with new technology	1
Landlord renting out home	1
Shorter warranty	1

Rebate Process

Contractors varied in the amount of work that they did for the customer on the rebate application. While some contractors completed the application and mailed it in for the customer, some filled out the equipment and/or contractor information, and some had the customer complete the entire form.

Recommendations made by contractors with respect to the rebate process included having an online application, removing the AHRI certificate requirement, having a one-page application mailer, providing the rebate in a form other than a Visa card, having someone available to explain denial reasons, and collecting contractor contact information. However, these issues do not appear to be major barriers to program participation (as compared to costs and installation issues).

The participant interviews found that the rebate form works well. Only four customers had any recommendations for improving the form. While two recommended an on-line rebate application, one suggested that the rebate forms for various programs should be combined, and another noted that it was confusing to determine the model type.

At least eleven of the 32 participants who were interviewed switched from oil to gas with the installation of their new heating equipment. PGW has a very visible piece of information on the oil to gas conversion flyer that states customers can receive up to an additional \$2,000 for installing a high efficiency heating system. PGW may want to consider integrating the conversion and high efficiency applications and delivery of these two rebates to facilitate the process for these customers.

Twenty-five of the 32 participants stated that their rebate application was accepted the first time. While most were satisfied with the process, two stated that they had problems and needed to resubmit several times due to processor error or incomplete information.

Furnace/Boiler Impact

Eighteen of the 32 participants stated that their home was more comfortable following installation of the new equipment. Some of these respondents had also made other energy efficiency improvements in their homes. Seventeen of the 32 respondents stated that they had reduced monthly costs after installing the new equipment. Some of these respondents had higher gas costs but lower oil costs because they switched their main heating fuel. An additional six respondents said that they could not yet tell if their costs were lower, as they had not yet had a winter in their home with the new equipment.

Contractor Recommendations

Other feedback provided by contractors related to marketing, an approved contractor list, and installation issues. Many contractors cited the need for additional marketing to both contractors and

customers. Two contractors suggested that PGW provide a list of approved contractors on their website. Several contractors discussed installation issues that are faced in Philadelphia.

Participant Satisfaction and Recommendations

Most participants reported that they were satisfied with the program. While 15 of the 17 rebate participants stated that they were very or somewhat satisfied, 14 of the 15 boiler rebate participants stated that they were very or somewhat satisfied.

Just over half of the participants had one or more recommendations for the program. The most commonly cited recommendations were to increase the rebate amount, to advertise the program more, and to provide a check instead of the debit card.

Summary of Findings

The contractor and participant interviews provided consistent information with respect to the market for high efficiency equipment, the installation experience, and challenges associated with the program.

While contractors were most likely to hear about the program through equipment suppliers, participants were most likely to learn about the program through their contractor. Many of the contractors participated in other rebate programs, so contacting electric program participant contractors in Philadelphia could be a good marketing resource for the program.

It appears that there is a great deal of variance in the installation costs and the incremental costs of the high efficiency equipment. However, the research showed that the rebate did not cover the goal of 80 percent of the incremental costs in most cases.

The program had a large impact on the installation of high efficiency furnaces and boilers. Contractors reported that their installations increased after the program was introduced, that the rebate was important in making their sale, and that customers placed a high importance on the rebate. Customers confirmed that the rebate was important in their decision-making process.

Contractors could use more information and education to assist in their sales of high efficiency equipment. They did not appear to be confident in estimating the potential cost savings from the higher efficiency equipment, and did not educate customers about other benefits, such as the environmental impact. Many contractors noted that they used information from the PGW website, so PGW could address some of these issues by providing more contractor information on their website.

Given the high frequency of installation barriers, the large cost differential for the high-efficiency equipment, and the contractors' lack of information about the benefits of high efficiency equipment, it appears that additional efforts may be needed to encourage high-efficiency installations. Forthcoming research will provide data on the usage impacts of these installations. Such information could be useful in marketing the program.