

---

**Subject** WPS Territory-wide Evaluation

**Heating Equipment Bonus Program Track 1  
Updated Analysis Results**

---

**To** Carol Stemrich,  
Public Service Commission of Wisconsin  
**cc** Monica Curtis, Sara Van de Grift, and Jill Krueger,  
WECC

---

**From** Carrie Koenig and Laura Schauer,  
Tetra Tech

---

Acknowledgement: Ralph Prah, Prah & Associates,  
contributed critical review

**Date** March 2, 2011

This memo updates the results from the Track 1 analysis for the WPS Territory-wide Heating Equipment Bonus program with year-end data. We also incorporate results from contractor interviews to provide context to the furnace analysis including why they feel the ECM market share is increasing.

The primary objective of Track 1 activities is to identify any potential impacts of the WPS programs' enhancements over the Focus on Energy program, particularly in terms of increased participation and/or savings. We completed this review using two data sources: market share data provided through the Furnace and Air Conditioner Tracking (FACTS) database provided by the Energy Center of Wisconsin and program participation and savings data captured in Wisconsin Energy Conservation Corporation's (WECC) program tracking database.

The remainder of this memorandum provides a brief description of the Heating Equipment Bonus program followed by a review of the ECM furnace and modulating boiler trends and conclusions.

## Program Description

The Heating Equipment Bonus program is an enhancement to the Focus Efficient Heating & Cooling (EHC) program. The goal of the Heating Equipment Bonus program is to increase the market share of high efficiency furnaces with electronically commutated motors (ECMs) and modulating boilers within the WPS service territory.

According to program documentation, hypothesized barriers to the sale of high efficiency furnace and boiler equipment are the incremental cost (assessed at \$700 for ECM furnaces and \$1,000 for boilers) and lack of contractor awareness and/or understanding about the





technology or Focus on Energy's programs.<sup>1</sup> To overcome this market barrier, the WPS Heating Equipment Bonus program provides a heating equipment bonus to participating households in addition to the cash-back reward provided by Focus on Energy. The bonus is provided to offset a greater portion of the incremental cost than that provided through Focus on Energy. Table 1 details the equipment, equipment requirements, and reward amounts promoted through the program.

**Table 1. WPS Heating Equipment Bonus Program Offerings**

Equipment	Requirements	Focus on Energy Cash-back Reward	WPS Heating Equipment Bonus	Total Reward
Gas furnace	<ul style="list-style-type: none"> <li>90% AFUE or greater</li> <li>Variable-speed motor/ECM</li> <li>Multiple stages of firing</li> <li>Purchase electricity from WPS</li> </ul>	\$150	\$250	\$400
Natural gas hot water boiler	<ul style="list-style-type: none"> <li>90% AFUE or greater</li> <li>Modulating burner</li> <li>Outdoor-air reset control</li> <li>Purchase natural gas from WPS</li> </ul>	\$400	\$200	\$600

Source: [http://www.focusonenergy.com/Incentives/Residential/Cash-Back\\_Rewards/Efficient\\_Heating\\_Cooling/Default.aspx](http://www.focusonenergy.com/Incentives/Residential/Cash-Back_Rewards/Efficient_Heating_Cooling/Default.aspx).

Customers were also eligible to receive an additional \$200 from the State Energy Efficient Appliance Rebate Program (SEEARP) for both the high efficiency ECM furnaces and the high efficiency boilers. The SEEARP program was closed on May 6, 2010, as funds were expended.

The program provides outreach to participating contractors and distributors through marketing materials and in-person outreach from Focus on Energy staff. The program also provides participating contractors with cooperative advertising funds. These funds are to be used to promote the program and advertise the incentives.

## Study Methodology

This Track 1 assessment for the Heating Equipment Bonus Program uses two sources for the analysis: the FACTS data published by ECW and the program participation data from the WECC database. This section describes each data source and methods for using the data.

### FACTS Data

One means for determining the potential impact of the Heating Equipment Bonus program on the uptake of high efficiency ECM furnaces and modulating boilers is to review the market share of the equipment within and outside the WPS service territories. We complete this comparative analysis using the FACTS data.

---

<sup>1</sup> Wisconsin Public Service. *Community Based Pilot Plan*. July 1, 2009.



FACTS reports sales volume data based on information provided by Wisconsin HVAC distributors who participate in the study. The data is collected and published quarterly.

ECW has been collecting furnace and air conditioner sales data since 1997 although they did not differentiate ECM furnaces until 2003. The reporting of boiler data is a new addition to FACTS as of August 2010.

Thirteen distributors provide furnace data and nine distributors provide boiler data. According to a discussion with ECW,<sup>2</sup> sales data included in FACTS accounts for approximately 70 percent and 50 percent of the furnace and boiler sales in the state, respectively.

The FACTS analysis documents furnace sales data at the county-level. While ECW collects county-level data for boilers, they do not provide the information for each county due to the relatively low number of sales estimated at that level. ECW provided the sales analysis for WPS and non-WPS territories based on the county-level definitions provided by Tetra Tech, discussed further in the next section.

### Defining WPS and Non-WPS Counties

The FACTS report details sales data at the county and state level. Therefore, it was necessary to determine which counties are to be classified as counties that are primarily served by WPS.

In the fall of 2010, the evaluation team submitted a report comparing the WPS territory to the rest of the state in terms of participation trends and market conditions.<sup>3</sup> This report detailed a methodology for defining WPS counties based on program participant data. The WPS territory is defined as any county where 70 percent or more of Focus program savings are attributed to WPS customers (Table 2). We distinguish between gas and electric counties as WPS' service territory varies by these fuels.

The FACTS analysis presented in this memorandum uses the electric counties to represent the furnace sales and gas counties to represent the boiler sales. Although furnaces achieve gas savings, the primary goal of the program is to achieve electric savings via the ECM. Therefore, we use the electric counties to illustrate sales trends.

**Table 2. County Assignments of WPS Territory Based on Percentage Electric and Gas Savings Customers Served by WPS**

County	Percentage of Focus Participants with Gas Savings and WPS Indicator	Include County Based on Gas Participation Rate	Percentage of Focus Participants with Electric Savings and WPS Indicator	Include County Based on Electric Participation Rate
Brown	92%	Yes	94%	Yes
Door	53%	No	71%	Yes

<sup>2</sup> Personal communication between Carrie Koenig of Tetra Tech and Andy Mendyk of ECW. September 7, 2010.

<sup>3</sup> Carrie Koenig, Dan Belknap, and Laura Schauer. *Focus on Energy Evaluation WPS Territory-wide Program Backcast Analysis*. September 15, 2010.



County	Percentage of Focus Participants with Gas Savings and WPS Indicator	Include County Based on Gas Participation Rate	Percentage of Focus Participants with Electric Savings and WPS Indicator	Include County Based on Electric Participation Rate
Forest	69%	No	93%	Yes
Kewaunee	91%	Yes	95%	Yes
Langlade	18%	No	80%	Yes
Lincoln	81%	Yes	96%	Yes
Manitowoc	93%	Yes	56%	No
Marathon	73%	Yes	83%	Yes
Marinette	85%	Yes	92%	Yes
Oneida	90%	Yes	95%	Yes
Portage	82%	Yes	76%	Yes
Sheboygan	79%	Yes	0%	No

### Issues for Consideration when Reviewing FACTS Data

We include three qualifiers in reviewing the analysis presented in this report that are based on the FACTS data. These qualifiers were raised by WECC and/or ECW staff throughout discussions regarding the data.

**Representativeness of ECM furnace and boiler sales.** Only distributors' sales data are included in the analysis. Any sales made directly from the manufacturer to the contractor are not captured in the data. While this may not occur frequently, ECW believes that this may be more of a concern for boiler data, where they project only 50 percent of the sales are captured, than for furnace data, which they believe to be more representative of sales (ECW estimates that 70 percent of sales are captured).

**Addition of new distributors.** ECW attempts to recruit new distributors to participate in the study annually. ECW added distributors to the data in 2006 and in 2009 (three distributors in 2009). New distributors' data is first represented in the year they were added; in other words, ECW does not receive years of historic data when adding the distributors.

One concern about the addition of new distributors is how it affects any longitudinal sales trend analysis. Depending on the profile of those distributors' sales, there may appear to be a spike or decline in percentage of sales that are ECM furnaces when, in reality, the spike in sales is a result of the addition of the new data.

The issue is further confounded for analysis at the county level. Should distributors sell more to select counties, the sales for those targeted counties will falsely appear to increase at a faster rate than the rest of the state.

Discussions with ECW indicate this is a possibility that may affect the analysis of the WPS counties compared with the rest of the state. The three distributors added in 2009 (first represented in Quarter 1, 2010, data) serve 31 out of the 72 Wisconsin counties. The new boiler data in particular is heavily weighted toward non-WPS counties.



ECW discussed the fact that the addition of new distributors strengthens the analysis by more accurately representing HVAC sales. This is indeed true; however, it is important to keep in mind the implications of the addition of these data when reviewing the longitudinal trend analysis within this memorandum.

**Influence of SEEARP on sales trends.** The program experienced a significant increase in program activity resulting from SEEARP, which was offered at the same time as the Heating Equipment Bonus. It is not sufficient to review the increase in WPS sales in 2010 to identify the impact of the heating equipment bonus; rather, we need to review the relatively increase in sales in WPS and the rest of the state to tease out the potential affect of the bonus. With that said, relatively low sample sizes for boiler technologies may make it difficult to determine if those differences are significant or a result of the representativeness (or lack thereof) of the data. We discuss this issue more in the trend analysis below.

### ***Program Participation Data***

In addition to the FACTS data, we have access to program data. WECC geocodes the program data and, through this process, attaches both electric and gas utility information. This information allows us to review changes in savings and participation rates over time across WPS territories and the rest of the state.

One of the metrics identified within the WPS Territory-wide detailed evaluation plan<sup>4</sup> was that the program increases participation within WPS' territory by 20 percent using 2007 as the baseline year. WECC recommended 2007 be used rather than 2008 as system bonus incentives were offered for the installation of furnaces and air conditioners in the summer in 2008, which created a spike in activity. The analysis in this report provides 2007 as well as 2008 and 2009 trend data, although the reader should keep in mind those bonuses when reviewing the 2008 data.

There are minor differences in quantity of installations between this analysis and data provided by WECC. The differences are less than one percent and do not affect the analysis. One explanation for the discrepancies is that we use the geocoded values to assign a case to the WPS territory whereas WECC uses the filed "BillToMeasure."

## **ECM Furnaces**

### ***Savings Trends per FACTS Data***

As discussed earlier, FACTS data is captured and recorded quarterly. A review of the data shows that there is a general upward trend in the sales of ECM furnaces although a quarter-by-quarter review indicates some volatility in the sales data by quarter. For example, between Quarters 3 and 4 of 2008, both territories saw a decline in the market share but both territories rebounded significantly from Quarter 1, 2009, to Quarter 2, 2009. The WPS territory saw another jump from Quarter 1, 2010, to Quarter 2, 2010, while the rest of state saw a similar, but slightly smaller increase (Figure 1).

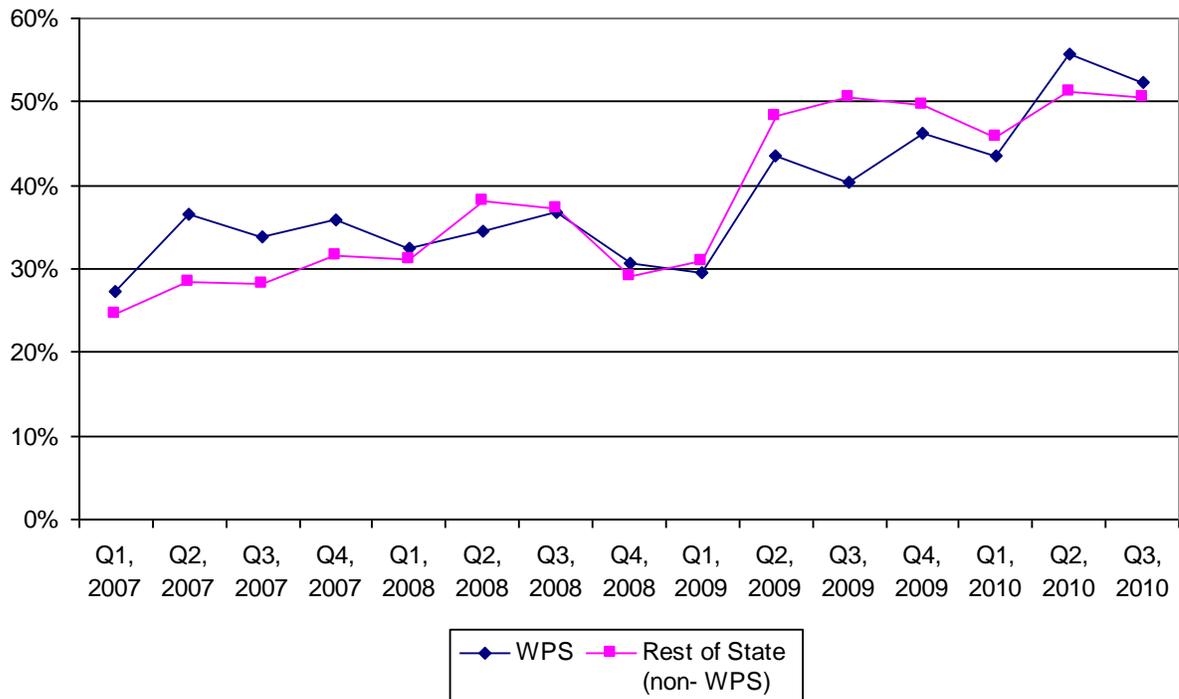
---

<sup>4</sup> The Focus on Energy Evaluation Team. *Focus on Energy Evaluation WPS Territory-wide Detailed Evaluation Plan*. April 28, 2010.



The figure illustrates some potentially seasonable trends in ECM furnace purchases when reviewing the data for the rest of the state. The trends show an increase in purchases of ECM furnaces in quarters two and three with a decrease in quarters one and four (the winter months). This pattern may be indicative of households replacing equipment due to emergency failures in those winter months. When these emergency purchases arise, customers have less of an opportunity (or inclination) to consider different types of equipment to purchase (e.g., more expensive higher efficiency furnaces with an ECM).

**Figure 1. ECM Market Share of High Efficiency Furnace Units from FACTS  
(Market Share = High Efficiency ECM Furnaces / All Furnace Sales)**



Because of the relatively up and down nature of the sales data by quarter, we present the year-to-date market share data for the ECM furnaces for the trend analysis (Table 3). The one exception is for 2010 as only the first three quarters of data are available.

Both the WPS territory and the rest of the state have experienced a growth in the percentage of their furnace sales that are accounted for in high-efficiency ECM furnaces. The growth in sales within the rest of the state was significantly greater than that in the WPS territory through 2009. The 2010 data shows a higher percentage of sales for the WPS territory than for the rest of the state, although that percentage is lower than in 2009.

**Table 3. ECM Market Share of High Efficiency Furnace Units from FACTS**

Year	WPS			Rest of State (non-WPS)		
	Total Sales Represented	Percentage of Sales that were a High-Efficiency ECM	Change in Percentage of Sales	Total Sales Represented	Percentage of Sales that were a High-Efficiency ECM	Change in Percentage of Sales
2007	8,312	31.4%		42,442	25.3%	
2008	7,959	31.4%	0.2%	47,914	30.2%	16.2%
2009	5,554	38.8%	18.9%	41,189	42.1%	28.1%
2010 (Q3)	4,922	49.0%	10.1%	28,385	45.9%	3.9%

### **Savings Trends per Program Database**

Next, we review the participant data to identify any participation trends that may provide insight into the effectiveness of the increased WPS bonus. We summarize participant counts by calendar year rather than program year. This decision was made for two reasons. First, FACTS data is provided by calendar, not program year (although the quarterly data could be transferred to program year if necessary). Second, the 18-month contract period needed to be normalized so it was representative of a 12-month period and comparable to other program years. Using calendar years avoided needing to normalize data from that year. We reviewed the data based on program year and found the participant counts to be very similar.

The number of furnaces rebated by the program has grown over the years for both territories. WPS saw a significantly lower increase rate than the rest of the state between 2007 and 2009 (Table 4).

**Table 4. EHC ECM Furnaces Rebated by Calendar Year**

Year	WPS	Percentage Change by Year (WPS)	Rest of State (non- WPS)	Percentage Change by Year (Rest of State)
2007	2,483		9,088	
2008	2,880	14%	13,354	33%
2009	3,561	19%	17,963	26%
2010	4,532	21%	20,398	12%

When looking at the number of 2010 furnaces rebated within the WPS territory, we see that the numbers have exceeded the 2009 rebates. This is similar to the rest of state, but the percentage of change in the WPS territory was greater than that for the rest of the state. Also, with the termination of the tax credits at the end of the year, a large number of applications were received in December and January for 2010 installations. The backlog of applications was processed in early 2011.

This data continues to raise two questions. First, was the heating equipment bonus in WPS' territory driving additional sales of high-efficiency ECM furnaces? Second, what impact did the SEEARP rebate, as well as the federal tax credits, have on the increased participation rate in both territories?



The SEEARP rebate, as discussed in the “Program Description” section above, was discontinued in early May 2010. We would expect to see a decrease in June once that rebate was no longer available if the population was driven by the SEEARP offering. Table 5 shows that indeed this is the case; for both WPS and the rest of the state, the numbers of ECM furnaces rebated decrease in June. However, the participation for both territories rebound in September and November. With the increase in the proportion of 2010 furnace sales in the WPS territory being greater than that of the rest of the state, coupled with the rebound of sales late in the year (after SEEARP funds were discontinued), it appears as though the additional bonus in the WPS territory was partially responsible for the increase in sales of ECM furnaces. The rest of the state, which did not offer all three rebates, also saw accelerated purchases in 2010 but that level of acceleration was not as great as in the WPS territory.

A third consideration (which also applies to boilers) is the federal tax credit, which ended at the end of 2010. There was significant increase in total furnaces rebated later in the program year, which program staff and contractors attribute to the tax credit ending. In fact, throughout the contractor interviews, contractors mentioned the federal tax incentive as a driving factor for the increase in the ECM furnace market share. It is unclear to contractors what the impact the removal of the tax credit will be on the sales of ECM furnaces. There is some thought that the high-efficient equipment may not be as popular.

**Table 5. 2010 EHC ECM Furnaces Rebated by Month**

Month (for 2010)	WPS	Rest of State (non-WPS)
January	434	2,138
February	433	1,546
March	453	1,678
April	512	1,884
May	475	1,826
June	273	1,096
July	374	1,356
August	336	1,629
September	448	2,003
October	294	1,399
November	471	1,908
December	534	1,935

## Modulating Boilers

### *Savings Trends per FACTS Data*

This section reviews the market share for modulating boilers. FACTS reports market share for modulating boilers starting in Quarter 2 of 2009 through Quarter 3 of 2010. The reader should use caution when interpreting the boiler data as it is relatively new and potentially not as representative of the market as the furnace data. As mentioned in the “Methodology” section above, the new boiler data is heavily weighted toward non-WPS counties.

Table 6 details the boiler sales data, provided to Tetra Tech by ECW. Most striking is that the WPS territory saw a significant increase in the percent of modulating boilers in Quarter 1 of



2010 compared to the rest of state, which saw a significant increase in Quarter 2 of 2010. One potential explanation is the impact of the SEEARP funds ending and the push to get applications in before the funds ran out. However, Quarter 3 in 2010 saw a market share increase in the WPS territory, which leads us to believe the additional funds were a factor in customers purchasing modulating boilers.

**Table 6. Condensing/Modulating Market Share of Residential-Sized Hot-Water Boilers (<300WBH)\***

Year	Quarter	WPS	Rest of State (non-WPS)
2009	Q2	47.1%	68.4%
2009	Q3	47.3%	66.0%
2009	Q4	48.1%	63.6%
2010	Q1	67.8%	64.8%
2010	Q2	69.7%	80.3%
2010	Q3	72.1%	70.2%

\* Calculated as number of modulating boilers sold / all residential boilers sold.

### ***Savings Trends per Program Database***

The hypothesis that the Heating Equipment Bonus is moving customers to purchase high efficiency boilers is further supported when reviewing program participation data (Table 7).

The number of participants in the WPS territory continues to increase annually, as they do in the rest of state. In 2010, the number of boilers rebated through the program exceeded 2009 numbers in the WPS territory while the rest of state saw no similar increase.

**Table 7. EHC Boilers Rebated by Calendar Year**

Year	WPS	Percentage Change by Year (WPS)	Rest of State (non- WPS)	Percentage Change by Year (Rest of State)
2007	128		448	
2008	189	32%	715	37%
2009	304	38%	937	24%
2010	425	28%	933	0%

We next review the trends by month to view any potential implications of the SEEARP rebates on program participation in 2010. Similar to the furnace trends, participation in the program dropped significantly in June for the WPS territory. A similar decrease occurred within the rest of the state in June. Both territories rebounded again later in the year (October). All else being equal, the increase in the boiler rebates in 2010 in the WPS territory leads us to believe the additional bonus is having an impact.

**Table 8. 2010 EHC Boilers Rebated by Month**

Month (for 2010)	WPS	Rest of State (non-WPS)
January	56	156
February	51	81
March	55	83
April	43	112
May	39	87
June	14	23
July	18	50
August	12	29
September	28	59
October	51	114
November	15	41
December	43	98

## Conclusions

The PSCW and WECC have decided to discontinue the Heating Equipment Bonus program for the next program year. We agree that the removal of the bonus from the heating equipment was most likely a prudent decision; while the data provides indication that the Heating Equipment Bonus program is increasing the sales of the high-efficiency ECM furnaces, it is not clear from the analysis to what extent that is happening. We would expect to see a relatively higher increase in sales within the WPS territory compared with the rest of the state in 2010 when the program began. This is evident when looking at both the sales data and the participant database analysis.

When looking at both the market and participation data received to-date for boilers, there is indication that the Heating Equipment Bonus program is increasing the sales for modulating boilers more than it is for furnaces. The number of high-efficiency boilers rebated in the WPS territory in 2010 has exceeded program participation in 2009. While this is similar to furnaces, the rest of state territory saw very different results. The total number of high-efficiency furnaces rebated in 2010 did not meet the number of rebates in 2009 where boilers it did.

Given how the WPS territory outperformed the rest of state territory for boilers in 2010, the bonus appears to have helped make a difference. This could be due to the high initial cost for the program-qualifying boilers. Any incentive that helps bring down the initial cost helps customers.

When looking at these results, we need to take into consideration the confounding affects of the SEEARP rebates as well as other federal tax incentives that were available in 2010. The SEEARP rebates clearly influenced a rapid push in the market to purchase high-efficiency HVAC equipment while those rebates were available. This push may have significantly influenced the sales cycle by moving households' purchasing process up so that they could receive the all three rebates. In addition, as contractors indicated, the federal tax credit may have been influencing customers in purchasing furnaces with ECM motors, which is evident in the rebound of rebates after the SEEARP funds ended.



As discussed in the “Survey Methodology” section, one of the metrics provided by WECC was an increase in program participation rates over the 2007 levels. We do see that there has been an increase in 2007 levels; however, the SEEARP rebates do not allow us to determine whether any rate of increase that we will see in 2010 is a direct result of the heating equipment bonus. We will also continue discussions with WECC as to the impacts of the system bonus incentives on the 2008 data.

As found in the participant results, the more financial incentives that are available, the more significant they become. To truly test the influence of the WPS rebate it would be ideal to be able to employ a study design where no other external influences could drive the trends. We could argue that the similarity in the drop in program participation in May between the WPS territory and the rest of the state is indicative that the SEEARP funds are driving participation to a larger extent than the WPS Heating Equipment Bonus. However, we also need to consider that those households for which the bonus would be a significant driver may have participated early in the year, pushed by combining the Heating Equipment Bonus with the SEEARP offering.

Third, relying on the FACTS boiler data to estimate program impacts on the high-efficiency boiler sales is premature. The data is relatively new (first published in August 2010). Additionally, ECW estimates only 50 percent of the market is represented within that analysis, which calls into question the representativeness of the data.