

Tracking Energy Efficient Market Shares: What Really Happened in the Wisconsin Residential HVAC Market!

*Rick G. Winch, Opinion Dynamics Corporation
Richard Hasselman, Energy Center of Wisconsin
Amy C. Boyer, Opinion Dynamics Corporation*

ABSTRACT

Market transformation has emerged as a central policy objective of publicly-funded energy efficiency programs in many areas of the country (Eto et al. 1996). This policy shift has brought about a need to explore new methods of “tracking” or evaluating energy efficiency programs. Toward this goal, this paper presents a look into the world of tracking energy efficiency markets through the use of an on-going sales tracking system.

The discussion begins with a historical perspective and description of the process used by the Energy Center of Wisconsin to establish such a system for the Wisconsin residential and small commercial central heating and air conditioning market. The continuing success of the tracking system is linked to 1) finding “common ground” between parties interested in energy efficiency and the “keepers of the data”—namely distributors of central heating and air conditioning equipment; and 2) re-packaging the information collected and providing it to the “keepers of the data” in order to sustain their interest. Next, we present both historical and quarterly market data which provide insights into the long-term sustainability of markets in the absence of utility sponsored energy efficiency programs. Especially noteworthy is the fact that, in absence of utility sponsored incentive and information programs, energy efficiency markets have declined substantially from their historical highs in some market areas while remaining the same in others. Finally, the authors, based on supplemental interviews and ongoing communications with the “keepers of the data,” provide insight into the changes taking place within various Wisconsin market areas.

Historical Perspective and Scoping Study

Between the late 1970’s and early 1990’s, a variety of energy efficiency programs were offered across the state of Wisconsin. Many of these programs—funded through utility rates and administered by gas and electric utilities—were designed to encourage contractors to offer and consumers to buy high efficiency residential and small commercial central heating and central air conditioning systems. In order to evaluate the success of these efforts, various studies were undertaken to assess the impact of programs on the market share or penetration rate of energy efficient equipment.

The process began with efforts to track HVAC related sales through consumer surveys (WCDSR 1994). This technique, while successful for two household appliances (e.g, refrigerators, water heaters), was unsuccessful for central heating and cooling systems because of the difficulty consumers had in locating and reporting brand names and model

numbers—information critical to determining a system’s energy efficiency rating. In addition to consumer surveys, efforts were made on a national level to work with HVAC manufacturers and their associations (EPRI 1995). Most manufacturers were not concerned with local markets or found it too cumbersome to track sales to a specific geographical area. As a result of these and other efforts, which ran into significant barriers to implementation, the decision was made to collect HVAC sales information from contractor “panel groups” in various regions of the state (ECW 1996). This method, while expensive, proved to be highly successful.

Slowly, the HVAC contractor “panel group” methodology led to a scoping study, targeting HVAC distributors. The primary goal of the scoping study (ECW 1997) was to collect historical distributor sales information and to look for more cost-effective methods of collecting high efficiency HVAC market share information.

Through the scoping study we found HVAC Distributors to be logical “data providers” because of their ability to 1) accurately track sales to fairly precise geographical areas; and 2) distinguish between the efficiency levels of various products. We also found that distributors had a keen interest in market share information for various regions of the state. Distributor interest in market share information was driven by two issues. First, distributors were very interested in better understanding the relative success of their marketing efforts in various regions of the state (e.g., cooperative advertising with contractors, direct sales force initiatives, etc.). Second, many distributors wanted a system that would help them refute market share information provided through the manufacturers they represent. Key to both issues was the fact that distributors overwhelmingly agreed that market share information provided by the Air Conditioning and Refrigeration Institute (ARI) and the Gas Appliance Manufacturers Association (GAMA), while very accurate at a statewide level, is extremely inaccurate when broken down into various regions within the state.

We found that few distributors make any attempt to provide market specific sales results to their respective manufacturers. For example, we found numerous situations where distributors received all manufacturer shipments into a single location and then shipped units to various branches around the state without formally tracking and reporting this information to their manufacturers. Since manufacturers ultimately provide sales data by various “marketing areas” within a state to ARI and GAMA, the lack of distributor provided data forces manufacturers to make assumptions about the ultimate distribution of sales across the state—often spreading sales across the state by population or, in some cases, buying power index or BPI. This process greatly distorts the reality of a distributor’s market share in both the markets they serve as well as the markets they do not serve.

Establishing the Wisconsin HVAC Tracking System

The Energy Center of Wisconsin established the residential and small commercial HVAC tracking system (hereinafter referred to as the “*System*”) in 1997. Within this section, we review the process used to establish the *System*. While energy policymakers were very enthusiastic supporters during the establishment of the *System*, gaining the interest of residential and small commercial central heating and cooling distributors (located both within and outside of Wisconsin) was considerably more challenging.

Distributor interest in accurate market share information for various key markets across the State of Wisconsin provided the impetus needed to establish an on-going system. We found that distributor information systems currently collect the data needed to track sales to fairly precise geographical levels. As is the case with many information systems, it was simply an issue of helping distributors realize the power of their own systems. For example, we found that within the “typical” system, each unit sold was associated with a contractor and the contractor’s associated billing information (including zip code). Other distributors found it easier to associate a unit sale with a county tax indicator (information which again was associated with a contractor’s billing information). These discoveries provided the foundation upon which the *System* was built (the details of which are provided in the next section).

We were able to offer distributors several other inducements to participate. First, their participation in the *System* was free—providing timely data on a quarterly basis (to be discussed more fully in the next section) was their “entry fee.” Second, we stressed that participating in the *System* not only provided them with an opportunity to demonstrate their commitment to Wisconsin’s energy efficiency markets but could also provided distributors (as a group) with a platform from which to move forward with energy efficiency program ideas and requests for energy efficiency program funding. Third, and highly related to our second point, we emphasized that distributors could benefit through less interference from influences outside of the HVAC industry. For example, the *System* could provide distributors with a platform from which to collectively design programs which took typical equipment ordering processes into account. This was a particularly sensitive issue as many utilities within Wisconsin have, over time, designed programs which disrupted local markets. Central air conditioning rebate programs are one example. One can only imagine the problems that occur when distributors are stocked almost exclusively with 10 SEER units and a utility (at the last minute) decides to offer an aggressive rebate program promoting 12 SEER units. Fourth, distributors were left with the thought that other sectors (e.g., large commercial, industrial) and other types of energy using equipment (e.g., boilers, air-to-air heat exchangers, rooftop units) could be added to the *System* over time. Finally, distributors were assured that the *System* would be maintained by Opinion Dynamics Corporation (ODC)—an independent market research firm. Many distributors were not comfortable supplying detailed sales information directly to the Energy Center of Wisconsin (the project sponsor) because of the Center’s close relationship with Wisconsin’s electric and gas utilities—many distributors and contractors view utilities as potential competitors in a deregulated market. ODC summarizes or “repackages” the information for dissemination to distributors and the Center. ODC and its employees are bound by strict confidentiality agreements.

System Specifications

The purpose of this section is to outline the “nuts and bolts” of the *System* as well as the responsibilities of the organizations involved. The discussion includes a review of the type of data required and the methods used to collect, analyze, and disseminate the information to interested parties.

General Information Needs. As previously discussed, Wisconsin’s HVAC industry and energy policy makers benefit from a sales tracking *System* in a number of important ways. Distributors have a need for accurate market share information and, over time, the

System could enhance their ability to implement energy efficiency programs. Energy policy makers have a need for more reliable information on energy efficiency markets. Specifically, percentage splits between the sale of high efficiency and standard efficiency equipment in various regions of the state.

Data Requirements. HVAC distributors provide residential and small commercial forced air furnace and central air conditioning sales information on a quarterly basis. This information is provided at a county or zip code level. As illustrated in Table 1, for forced air furnaces, distributors are asked to break down their unit sales into two categories: standard efficiency (i.e., non-condensing or less than 90% AFUE) and high-efficiency (i.e., condensing or 90% AFUE or greater).¹ Similar information (broken down by SEER 10, 11, 12, 13, and 14 or higher) is collected for central air conditioning equipment.

**Table 1: Forced Air Heating Systems:
Example Data Collection Form**

Distributor: XYZ Supply Company 242 Distributor Avenue Milwaukee, WI 54242		
Unit Type: Forced Air heating systems 150,000 BTU's or less		
Sector: Residential and small commercial		
County:	Number of Units Sold -- 1st Quarter 1999	
	<i>Non-condensing (AFUE < 90%)</i>	<i>Condensing (90%+ AFUE)</i>
Milwaukee	300	2,000
Sheboygan	200	500
Washington	300	1,000
Ozaukee	100	400
Waukesha	200	1,000
Walworth	50	200
Etc.		
Total	1,150	5,100

Through our conversations with distributors and other industry experts, we estimate that just over 80 percent of the residential and small commercial forced air furnaces sold in Wisconsin are distributed by *System* participants. This includes distributors with corporate headquarters or branch locations within Wisconsin as well as distributors located in

¹ High efficiency forced air furnaces are defined as those with an Annual Fuel Utilization Efficiency (AFUE) of 90 percent or higher. According to the Consumer Guide to Home Energy Savings, AFUE is the most accurate estimate of fuel use because it is a measure of the system's efficiency that accounts for start-up and cool-down and other operating losses that occur under real operating conditions.

neighboring states who sell some equipment into Wisconsin. All distributors provide sales information by efficiency level on a quarterly basis.

Data Analysis Plan. The data analysis is quite simple yet the information provided is very informative. The focus is to aggregate sales information for specific geographical areas (grouping Wisconsin's 72 counties into 23 marketing areas) and to determine individual distributor market shares as well as the market share of high efficiency equipment.

As previously stated, HVAC distributors provide sales information at a county or zip code level. Each distributor's individual sales information by efficiency level is then aggregated to the 23 key marketing areas. Computing individual distributor market shares simply involves dividing individual distributor's sales in a given marketing area (by efficiency level and overall) by total sales in that marketing area.

Information Dissemination. Distributors receive information on a quarterly basis for both forced air furnaces and central air conditioners. The report outlines their own individual unit sales and market share by efficiency level (and overall) for each marketing area. They do not receive unit sales or market share information for other distributors. The Energy Center of Wisconsin also receives information on a quarterly basis. The Center's reports, for both forced air furnaces and central air conditioning, include a breakdown of the number of units sold (by efficiency level) in each of the 23 key marketing areas. This information is in aggregate format and does not include information specific to particular distributorships. Example forced air furnace reports for distributors and the Energy Center of Wisconsin are illustrated below.

Figure 1: Sample Distributor Furnace Sales Report Form

		Standard Efficiency Units (Less than 90% A.F.U.E.)			High Efficiency Units (90% or greater A.F.U.E.)			Overall		
		Units Sold		Market Share	Units Sold		Market Share	Units Sold		Market Share
Market Area	Company	All Distributors	Company		All Distributors	Company		All Distributors		
1.	Madison - SW									
	1st Qtr	0	212	0.0%	9	1,053	0.9%	9	1,265	0.7%
	2nd Qtr	1	239	0.4%	5	1,077	0.5%	6	1,316	0.5%
	3rd Qtr	2	529	0.4%	3	2,122	0.1%	5	2,651	0.2%
	4th Qtr	0	419	0.0%	0	1,476	0.0%	0	1,895	0.0%
	YTD	3	1,399	0.2%	17	5,728	0.3%	20	7,127	0.3%
2.	Green									
	1st Qtr	2	6	33.3%	19	64	29.7%	21	70	30.0%
	2nd Qtr	2	11	18.2%	11	74	14.9%	13	85	15.3%
	3rd Qtr	1	13	7.7%	4	108	3.7%	5	121	4.1%
	4th Qtr	7	34	20.6%	15	81	18.5%	22	115	19.1%
	YTD	12	64	18.8%	49	327	15.0%	61	391	15.6%
3.	Rock - Wal									
	1st Qtr	26	189	13.8%	104	456	22.8%	130	645	20.2%
	2nd Qtr	21	135	15.6%	64	441	14.5%	85	576	14.8%
	3rd Qtr	9	198	4.5%	63	751	8.4%	72	949	7.6%
	4th Qtr	37	269	13.8%	137	599	22.9%	174	868	20.0%
	YTD	93	791	11.8%	368	2,247	16.4%	461	3,038	15.2%

Figure 2: Sample Energy Center of Wisconsin Furnace Sales Report Form

1999 Market Share Report Residential and Small Commercial Forced Air Furnaces (<=150,000 BTU's)						
Report for: Energy Center of Wisconsin 595 Science Drive Madison, WI 53711-1060						
Market Area	Standard Efficiency Units (Less than 90% A.F.U.E.)		High Efficiency Units (90% or greater A.F.U.E.)		Overall Units Sold	
	All Distributors	Market Share	All Distributors	Market Share	All Distributors	Market Share
1. Madison - SW						
1st Qtr	212	16.8%	1,053	83.2%	1,265	100.0%
2nd Qtr	239	18.2%	1,077	81.8%	1,316	100.0%
3rd Qtr	529	20.0%	2,122	80.0%	2,651	100.0%
4th Qtr	419	22.1%	1,476	77.9%	1,895	100.0%
YTD	1,399	19.6%	5,728	80.4%	7,127	100.0%
2. Green						
1st Qtr	6	8.6%	64	91.4%	70	100.0%
2nd Qtr	11	12.9%	74	87.1%	85	100.0%
3rd Qtr	13	10.7%	108	89.3%	121	100.0%
4th Qtr	34	29.6%	81	70.4%	115	100.0%
YTD	64	16.4%	327	83.6%	391	100.0%
3. Rock- Wal						
1st Qtr	189	29.3%	456	70.7%	645	100.0%
2nd Qtr	135	23.4%	441	76.6%	576	100.0%
3rd Qtr	198	20.9%	751	79.1%	949	100.0%
4th Qtr	269	31.0%	599	69.0%	868	100.0%
YTD	791	26.0%	2,247	74.0%	3,038	100.0%

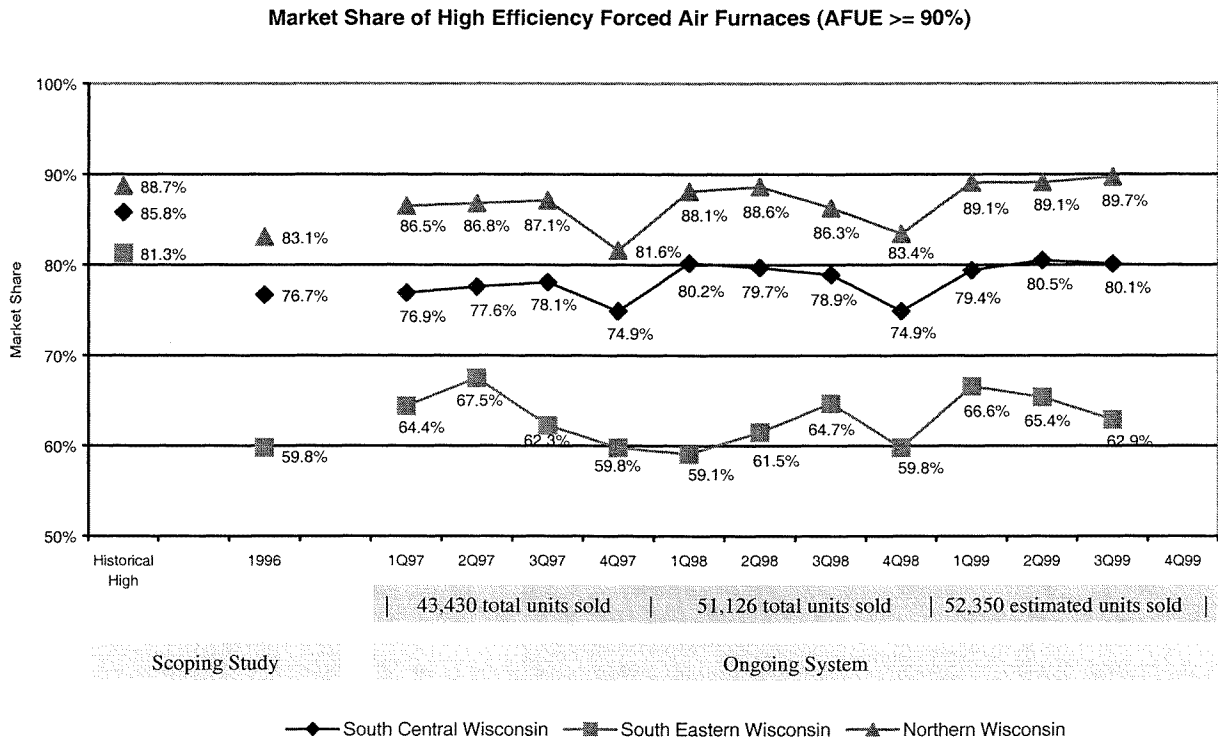
A Look at the Data Collected

During the scoping study, HVAC distributors participated in individual on-site interviews and provided both 1996 and historical sales splits² between high efficiency and standard efficiency forced air furnaces for three major regions: Southcentral, Southeastern, and Northern Wisconsin. It is important to note that during the scoping study distributors made their best attempt to “estimate” historical and 1996 forced air furnace sales by efficiency level. Because of the importance placed on accuracy and the unprecedented access the project team was given to distributors’ data processing personnel, we believe the estimated splits between standard efficiency and high efficiency units to be highly accurate. However, we found that without a more thorough effort, it would be difficult for distributors to provide highly accurate counts and breakdowns by various geographical areas of interest on a regular basis. On a long-term basis the project team felt that accuracy by precise geographical areas (e.g., by county) was important in order to be able to track the success of various energy efficiency programs that are likely to vary from area to area (or in some cases, offered in some areas but not in others). The scoping study was particularly valuable in helping us understand that an ongoing process was needed in order 1) to improve accuracy for precise geographic areas, and 2) to guarantee the long-term interest of distributors.

A look at the data collected through the scoping study (for historical highs and 1996) and the *System* (quarterly for 1997 through 1999) provide us with the market share of high efficiency forced air furnaces by various regions of the state. Historical information is displayed in Figure 3.

² The amount of historical information provided is largely a function of the capabilities of each distributor’s computer system. Some distributors provided up to eight years of historical information while others were only able to provide 1996 statistics.

Figure 3: Market Share of High Efficiency Forced Air Furnaces (AFUE >+ 90%)



Since the first quarter of 1997, market shares within each area of the state have remained relatively stable. The figure does show some quarterly fluctuations but shares have been fairly constant over time.

The Need for Supplemental “Qualitative” Research

The quantitative sales information provided in the previous section identifies a significant decline in the Southeastern Wisconsin high efficiency forced air furnace market. Unfortunately, it provides little insight into the reasons for the decline. For this information, we look to the results of the distributor feedback originally collected during in-depth interviews conducted as part of the initial scoping study and updated through regular telephone conversations. Distributors serving the Southeastern Wisconsin market—with a few exceptions—consistently speak of a continual decline in the percentage of high efficiency forced air furnaces sold. Both distributors working within and outside of Southeastern Wisconsin listed a number of factors which they believe have contributed to the decline. Many distributors said that the decline in the Southeastern Wisconsin market is not attributable to any single factor but is the result of a combination of many factors.

The list which follows outlines all of the reasons distributors gave for the decline in the Southeastern Wisconsin market for high-efficiency forced air furnaces. The list begins with the most frequently and often most strongly held opinions regarding the reason for the decline and ends with reasons that were offered by only a few distributors.

The elimination of gas and electric utility rebate programs and other promotional efforts. Rebate programs not only helped offset the increased cost of high efficiency equipment but also sent a message to consumers that high efficiency equipment is preferable.

The competitive nature of the Milwaukee Metro market—the major metropolitan area within Southeastern Wisconsin. A few contractors realized sizable short-term profits by offering standard efficiency units to consumers who were ONLY being offered high efficiency units by competing contractors. As more and more contractors began specifying standard efficiency units (or at least giving the customer the option of a standard efficiency unit) the price of standard efficiency units was driven down—increasing the incremental cost of high efficiency equipment.

Concern about the reliability of high efficiency furnaces among some customers, builders and HVAC contractors. Many problems were encountered within the first five years of the introduction of high efficiency forced air furnaces—ranging from heat exchanger failures to basic design flaws. Some consumers, builders and HVAC contractors became skeptical and are now reluctant to install high efficiency equipment.

Builders are switching to standard efficiency equipment in order to make new housing more affordable and to compete with new out-of-state competitors. Moving to standard efficiency forced air furnaces is a relatively easy way to reduce total

building costs. In the Milwaukee Metro area, large out-of-state builders have aggressively entered the market. Many of these builders bring along “an 80% (standard efficiency) mentality.”

A more rational decision making process. Utilities promoted high efficiency furnaces so aggressively that some customers never questioned the validity of the claimed savings. As rebates and informational programs have been scaled back or eliminated, customers and contractors—especially in situations involving small- to modest-sized homes—started to look more closely at the payback associated with high efficiency equipment.

People were more concerned about household energy consumption in the early 1980s. Stable energy prices have dramatically reduced the attention given to energy efficiency.

Lower equipment and installation costs for standard efficiency units—especially when “class B” chimneys can be avoided in retrofit situations. The customer not only pays a lower price for the standard efficiency unit but also avoids the expense associated with relining the existing chimney.

More transient home buyers. With no intention of owning a home over the long-term, these homeowners scrutinize the upfront cost—paying less attention to operating costs.

Salespeople are not skilled at selling high efficiency equipment—it is “easier” to sell on price which often translates into specifying standard efficiency equipment. Poor high efficiency equipment sales skills are magnified in the Southeastern Wisconsin market because of competing contractors who routinely specify standard efficiency equipment.

Manufacturers have developed new standard efficiency models, further “fragmenting the market” and “clouding” some of the differences between standard and high efficiency products. New variations in standard efficiency equipment have given contractors further opportunities to discuss and promote them.

Compared to the rest of Wisconsin, the Southeastern Wisconsin market has a high concentration of multi-family housing. Multi-family property owners are more concerned with the initial cost of the equipment—the tenant typically pays the heating bill.

Southeastern Wisconsin has fewer heating degree days than Northern Wisconsin. Since the average annual home heating requirements for a home located in Southeastern Wisconsin is lower than a similar home located in Northern Wisconsin it is harder to justify the purchase of high-efficiency equipment from a payback perspective.

Summary and Conclusions

This paper has described the approach used to establish a residential and small commercial HVAC sales tracking system in Wisconsin. Finding “common ground” between parties interested in energy efficiency and the “keepers of the data” was paramount to the establishment of the system. Key factors in establishing the system include: 1) building close personal relationships with distributors involved in the system, 2) providing distributors with market share information in order to sustain their interest; 3) linking system participation to distributor’s ability to become collective players in state energy efficiency issues; 4) rigorously protecting the confidentiality of individual distributor’s sales information; and 5) housing the data collection and reporting function within an independent market research firm bound by strict confidentiality agreements.

The information collected through the system highlights a 21 percentage point decline in the market share of high efficiency forced air furnaces in Southeastern Wisconsin from both its historical high and in comparison to other regions of the state—providing some challenge to the hypothesis that the Wisconsin forced air furnace market has been transformed toward the purchase of high efficiency units (Kushler et al. 1996). Distributors gave many compelling reasons why they think the Southeastern Wisconsin market has declined. While some reasons are also applicable to other areas of the state other reasons are exclusively a “Milwaukee or Southeastern Wisconsin phenomenon.” These reasons include 1) the competitive nature of the Milwaukee Metro market, 2) changes in the Milwaukee area new construction market, 3) more transient Milwaukee homeowners, 4) the high concentration of multi-family housing in Southeastern Wisconsin, and 5) lower annual Southeastern Wisconsin heating loads.

Most importantly, the *System* was critical in identifying this market phenomena and providing policy makers with information from which to form a future course of action. Continuation of the *System* will allow policy makers, market researchers, and market planners to monitor the outcome of various corrective actions that may be taken.

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