

## **ENERGY EFFICIENT MOTORS AND FOOD PROCESSING: REBATES AFTER EPACT?**

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### **INTRODUCTION**

Will the shifts currently underway toward more energy efficient motors render utility motor incentive programs obsolete? If so, what role do utilities play in encouraging customers to purchase more energy efficient motors in light of a market moving to greater and greater efficiencies? This paper will explore these issues more fully in the context of a recent evaluation we conducted for Delmarva Power & Light (hereafter referred to as Delmarva Power).

Delmarva Power's energy efficient motors rebate program was designed to encourage customers to begin motor retrofits in anticipation of new standards that become effective in 1997 as a result of the 1992 Energy Policy Act (EPAct). EPAct requires that all motors manufactured after October 1997 meet NEMA's 12-6C standard.

To date, the largest group of customers participating in this program are in food processing industries located in Delaware and on Maryland's Eastern Shore. These customers are primarily poultry processors that make heavy use of small industrial motors. The program design did not fully anticipate the special needs of this industrial segment.

A process evaluation of Delmarva Power's motors rebate program revealed large numbers of freeriders at the lower horsepower levels (less than 10 hp). Customer responses also showed that purchases by poultry processors are driven more by cost than by operating efficiencies. This paper examines the relationship between poultry processors and energy efficient motors in the context of Delmarva Power's motors rebate program.

### **BACKGROUND OF THE MOTORS PROGRAM**

Delmarva Power's Energy Efficient Motors Program was first offered in Maryland on July 1, 1993, and in Delaware on January 1, 1994. The program offers prescriptive rebates for customers purchasing energy efficient motors to replace failed motors, or for customers installing energy efficient motors in new mechanical systems.

Customers first learn of the program through technology seminars and equipment vendors. The program is designed to encourage motors distributors to stock and sell energy efficient motors to their customers.

Incentives are offered for qualifying motors up to 250 hp in Maryland and from 1 hp to 40 hp in Delaware. Rebate levels are determined by the motor's size and efficiency rating. Eligible equipment includes motors meeting the National Electrical Manufacturer's Association (NEMA) 12-6C or "Premium Efficient" standards for high-efficiency motors.

An "instant rebate" option is also available, with the incentive applied directly at the time of purchase. The instant rebate is designed to simplify program participation for both vendors and customers. The vendor can explain and apply at the same time, and the customer realizes an immediate benefit. Vendors also receive a \$10 incentive per application.

## **METHODOLOGY**

Delmarva Power's staff, the Delaware Public Service Commission, and the Office of the Public Advocate raised several issues regarding the energy efficient motors program in its first year of implementation. The utility wanted to assess how the program transformed the energy efficient motors market in its service territory. All parties were concerned about customers' and trade allies' assessments of rebate levels, and about the rebate's effectiveness in encouraging customers to install energy efficient motors.

To determine the program's effectiveness, we conducted telephone interviews with 23 participating and 101 nonparticipating customers. Participating customers represented a total of 112 rebates. While the total sample was small, poultry processors accounted for the single largest group of participating customers, representing 77% of the total sample.

To examine market issues regarding the effectiveness of rebate levels, we conducted in-person interviews with two major motor distributors participating in the program. We also conducted telephone interviews with representatives of three motor manufacturers. Again, the sample was small, but only two of the five trade allies participating since the program's inception remained active and could be included in the interview process. Representatives of motor manufacturers working most closely with these two trade allies were also contacted. The interviews were used to explore issues identified in the trade ally interviews from the large manufacturers' perspective.

## **FINDINGS FROM THE PROCESS EVALUATION**

### **Participant Motors Profile**

Motors most commonly rebated through this program are totally enclosed, fan cooled (TEFC) motors between 1 hp and 10 hp. The majority (58%) of the motors purchased by program participants were between 2.5 hp and 8 hp. The average motor size rebated for the program was 18 hp.

Participants in the food processing and manufacturing sectors tended to purchase the smaller horsepower motors, averaging 12.3 hp and 13.0 hp, respectively. In comparison, warehouse sector participants accounted for larger motors, averaging 89.8 hp, while customers in the other industries purchased motors averaging 36.5 hp.

Participants reported a wide range of uses for installed motors. In fact, 16 of 20 participants cited 20 different end uses.

### **Equipment Sold by Industry**

Forty-four percent of businesses participating in this program are in the food processing industries, primarily as poultry processors. This concentration of poultry processors is unique to Maryland's Eastern Shore, and these businesses account for most motors purchased below 10 hp. Due to these motors' extensive use—16 to 24 hours per day—and their operation in a "wash down" environment, equipment life averages two weeks to three months. Under normal operating conditions, such motors can last up to 10 years.

A smaller percentage of the motors are sold to customers in the canning, feed mills, plastics, and lumber industries. Participating customer types are displayed in Table 1.

**Table 1  
Participating Customers by Business Type and State**

Type of Customer	Location	
	Delaware	Maryland
	Percent	
Food Processing	1%	57%
Manufacturing	11	10
Warehouse	0	5
Education	0	1
Retail	4	0
Feed Mill	1	0
Other	1	9
Total	18	82

Assessing unique customer segments and identifying their unique motor needs is necessary in determining the appropriate strategy to reach each customer group. For example, had this been done in the program design process, strategies could have been developed to reduce freeridership among food processing participants.

**Customer Decision Making**

Participating and nonparticipating customers were asked about factors they considered when purchasing a new motor. Participants most often cited savings on energy bills (25%), while nonparticipants most often cited equipment availability (27%) and initial costs (21%).

The two participating trade allies emphasized that customer education is critical. It is especially important to identify and reach decision makers in target businesses. Among participants, the critical decision maker is often the purchasing agent. Trade allies expressed concern that these agents were not being reached by educational and promotional efforts addressing efficient motors. Trade allies particularly believed purchasing agents, unlike facility managers or plant engineers, do not understand the cost savings associated with energy efficient motors.

Among nonparticipants, the facility or plant manager is most likely to decide types and efficiency levels of motors chosen. Again, reaching these manager is essential to encourage the installation of energy efficient motors when cost savings may not be readily apparent.

**Market Transformation**

Trade allies we interviewed said that utility rebate programs actually lagged behind current market conditions. The availability and demand for premium efficiency motors (those meeting NEMA 12-C standards) are increasing. Sales data from the program's dominant motor trade allies indicate the percentage of motors sold meeting those standards has increased as much as 25% from 1992 to 1994.

Trade allies attribute this market transformation to manufacturers' decisions to produce premium efficiency motors and market them aggressively. In some cases, manufacturers "lead the way" in motor development, predominately producing motors that meet or exceed impending EPA standards.

Interviews with motor manufacturers' representatives confirmed the trade allies' assessment of market changes. The EPAAct legislation is no longer the driving force in this market; the *real* market transformation has occurred within the motor manufacturing industry. Competition, not legislation, will determine future operating efficiency standards. If utilities are to truly impact the energy efficient motors' market, they must now tie incentives to the ever-increasing new technologies rather than to meeting a specific legislative standard.

### **BARRIERS TO INSTALLING HIGH EFFICIENCY MOTORS**

The process evaluation revealed that four factors working within the food processing industry form the primary barriers to installing energy efficient motors. These are:

- Price
- Payback
- Availability
- Customers' lack of knowledge

#### **Price**

*"Price is the overriding factor."*

Energy efficient motors typically cost more than standard efficiency motors. This price differential, even if small, tends to encourage price-driven customers to select standard efficiency motors over energy efficiency motors. When price is combined with the customer's desire to "just install what was there before," encouraging change is difficult.

Both trade allies and motors manufacturers said price was the major influencing factor in the customer's purchase decision. Trade allies explained that many customers are more concerned with equipment's price than with its quality, energy efficiency, or even reliability.

#### **Rebate Levels**

Delmarva Power's current rebate for energy efficient motors ranges from \$5.00 to \$25.00 for 1 hp to 10 hp motors. Trade allies and customers do not believe the rebate levels are adequate. At high horsepower levels, trade allies specifically reported current rebates do not cover a significant percentage of incremental costs for motors between 75 hp and 100 hp.

Thirty percent of participants interviewed expressed dissatisfaction with Delmarva Power's rebate levels. Delmarva Power's motor rebate program was designed to provide a payback of not more than two years for motors operating at least 2,000 hours per year. We have seen, however, that most program participants received rebates for small motors with expected measure lives of two weeks to three months.

Given the low rebate levels, staff believed many program participants are indeed freeriders. That is, they would have purchased these motors without the rebate. The process evaluation revealed a 30% overall program freeridership rate, with a 47% rate for motors under 10 hp, thus confirming the utility staff's assessment.

The data also indicated that Delmarva Power and the Delaware Commission failed to account for the poultry processing industry's unique nature when designing the program. For example, freeridership was addressed for larger motors by establishing a 40 hp limit in Delaware.

#### **Availability**

Trade allies and equipment manufacturers indicated the availability of stock and ability to deliver it are also key factors influencing equipment purchasing decisions.

Interviewed program participants reported 90% of rebated motors were purchased to replace failed motors in existing applications; most of these replacements were designed to improve production.

Most purchases are made to meet an immediate need; so customers tend to buy a motor they know will fit that particular application. These customers may not be as interested in learning about the benefits of purchasing an energy efficient motor. In short, when customers need a new motor, they tend to buy whatever is available, and will generally not “shop around.” If a high efficiency motor is available (as is increasingly the case for lower horsepower motors), customers will purchase them, as shown in our evaluation.

However, customers buying a motor as part of an overall equipment or facility retrofit, such as a planned renovation or expansion, may be more interested in learning about the benefits of energy efficiency. Customers in these purchase situations may be better able to appreciate the role of energy costs when viewed in the context of the larger goal of improving operating efficiencies. Even in these cases, the rebate must be sufficient to offset incremental costs to a significant degree.

### **Lack of Knowledge**

According to the motor manufacturers’ representatives and trade allies interviewed, customers lack full awareness of the role motors play in their energy costs. This is a major barrier to purchasing a more efficient motor. Customers need to be educated by sales staff, many of whom are also unclear about the advantages of purchasing and installing energy efficient motors.

Motor manufacturers’ representatives said customers currently purchasing motors may even be unsure about the most basic motor components: its horsepower rating. Others are unaware of significant energy savings that can result from using a premium efficiency motor.

## **ROLE OF UTILITY PROGRAMS-STRATEGIES AND RECOMMENDATIONS**

Given these considerations, what role will utilities play in a post-EPA world? Can incentive programs—such as Delmarva Power’s—encourage greater efficiencies while reducing freeridership?

One study funded by the Wisconsin Center for Demand-Side Research in 1994<sup>1</sup> identified several attributes that distinguish the most successful utility motors programs. Such programs must:

- Be easy to understand and participate in for both vendors and dealers;
- Be marketed to energy decision makers and end users;
- Promote energy efficiency education; and
- Include incentives high enough to justify a utility’s avoided costs and conservation objectives.

This process evaluation indicates that merely adopting incentives will not meet the needs of unique customer segments. For example, food processing firms differ from other key segments in terms of the type and frequency with which they purchase new motors. To be truly effective at eliminating barriers to purchasing energy efficient motors, utilities should begin segmenting their customer base by what customers buy, when they buy, the applications they purchase equipment for, and their awareness of energy efficient options.

First, utilities should determine on an industry level the differences that exist between or within industry groups. Even though food processors are a subset of the manufacturing segment, their needs are clearly different from other types of manufacturing firms. Moreover, the concentration of a particular industry such as poultry processors means they have specific needs and concerns that may be different from other types of food processors. For example, the Eastern Shore of Maryland also has several large seafood warehouses. Unlike poultry processors, these customers tend to purchase larger horsepower motors for refrigeration while poultry processors tend to purchase smaller horsepower motors for production lines.

Industry segmentation, therefore, becomes the critical first step in determining the types of motors sold in a particular area of a utility’s service territory. To reach food processors (primarily the poultry processors), a more effective incentive may be to encourage a two-for-one purchase of energy efficient motors with less than 10 hp, but with a larger rebate to offset the additional cost. That way, customers will ensure they have a motor at the ready when needed while the utility will have realized its objective of encouraging sales of energy efficient motors.

To most effectively educate buyers at the appropriate times, utilities also need to determine when customers purchase equipment. As trade allies indicated, lack of education is an enormous barrier to increasing sales of energy efficient motors. Customers reached in a planning stage rather than an emergency stage may be more receptive to learning about the benefits of energy efficiency.

In recent years, more avenues have been created to promote customer education about energy efficiency. These programs can also be tailored to meet the specific needs of various target groups. For example, the U.S. Department of Energy's Motor Challenge Showcase Demonstration is an avenue available for utilities to promote customer education. The Showcase Demonstration teams motor systems users, equipment manufacturers, utilities, state energy offices, and other organizations to develop and implement strategies to meet specific industrial end uses, such as improving electric motor system performance at an industrial site. The site can then serve as a demonstration venue for customers considering efficient motor installations.

Training programs—including handbooks and seminars, calculation aids, economic analyses, and design assistance—can influence both end users and dealers. The Wisconsin Center study indicated that even computer software and simple reference tables allow an unsophisticated supplier or end user to evaluate purchasing options. For example, Delmarva Power now offers "Motormaster" economic analysis to show customers the life cycle cost benefits of high efficiency motors.

On-site assistance is another option. This may range from computerized audits to detailed engineering analyses. This service can help end users identify and evaluate applications in their facilities and processes that can potentially lead to high savings. Some utilities lend monitoring equipment to large customers and train them to properly use it.

Finally, the entire effort must be consistent in order to gain support from dealers, manufacturers, and end users.

#### **Joint Programs—The Future**

Joint motors programs offered by a consortium of regional utilities have been successful in encouraging manufacturers to continue to increase efficiency levels, and in attracting participation across a wide group of commercial and industrial customers.

A three-utility program in the Pacific Northwest currently requires minimum efficiencies higher than NEMA 12-D for motors up to 50 hp, and uses the NEMA 12-D values for larger motors. Motors manufactured by Toshiba and Baldor currently meet these standards, and this program appears to be popular with customers.<sup>2</sup>

The Midwest Motor Systems Consortium and its successor, the Responsible Power Management Program, are partnerships between all stakeholders in a motor systems market. These groups seek to change regional efficiency standards. They have also worked to publicize successful efficient motor systems applications and to develop a workshop on optimizing motor standards. Manufacturers contacted through our evaluation consistently cited the Wisconsin standards as a key factor in their decision to manufacture and market high-efficiency motors nationwide.

#### **SUMMARY**

This process evaluation shows that rebate programs lag behind the changing motors market. Future motors programs must be viewed in the broader focus on customer service. Utilities need to redesign programs to meet the unique needs of industry groups, and increase the educational resources available to customers.

Technology updates and seminars can be tailor-made to meet the needs of a particular industry group or segment. For example, describing changes in new motors technology, such as increased durability or improved energy savings, would be especially relevant to the poultry processing industry.

Utilities should also concentrate on targeting the right decision maker. Poultry processors, ideally, should plan for failed replacements rather than purchasing motors to meet their immediate needs. With advance planning, customers can purchase the right motor for the right job and can be educated about the benefits of energy efficiency at the same time.

Utilities should consider joining forces in the post-EPA world. Consortiums and other programs involving multiple utilities, manufacturers, and distributors in a region could help standardize both efficiency standards and rebate levels. This combined utility approach has been effective in Wisconsin, Washington State, and has been used by BC Hydro.

In the post-EPA world, utilities must be proactive, not reactive. Only in this way will utilities, dealers, and customers truly keep pace with the changing technologies in the motors market and utilities move their customers to higher levels of energy efficiency.

#### REFERENCES

1. Wisconsin Center for Demand-Side Research. *Energy Efficient Motors and Adjustable-Speed Drives Markets in Wisconsin*. Madison, WI 1994.
2. Reid, M. et al. *The Impact of National Energy Efficiency Standards on Commercial-Sector DSM Opportunities*. Washington D.C. Barakat & Chamberlin 1994.