

Defining the Opportunity to Brand Premium Efficient Motors

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ABSTRACT

How can industrial managers improve motor system efficiency if they can't recognize the opportunity? With new motor efficiency specifications taking hold in the market through the Energy Policy Act of 1992 (EPAct), there is now an opportunity to establish a brand for motors that exceeds federal standards. In 1996, a number of market transformation programs voluntarily adopted a common definition of premium efficiency as part of a Consortium for Energy Efficiency (CEE) initiative. While the number of utilities and manufacturers adopting CEE's specification has increased over time, consumers lack an easy way to readily identify and purchase premium efficient motors. A premium efficiency brand may be a solution, but there is little experience in the private or public sector when it comes to establishing a national brand for industrial products. For instance, it is unclear whether a government sanctioned brand, such as ENERGY STAR®, or an industry sanctioned brand, such as NEMA Premium, or some form of co-branding would be the most compelling or more recognizable to consumers and have the most desirable impact on the marketplace. This paper will explore the context and the opportunity for a premium-efficiency motor brand.

Background

The Energy Policy and Conservation Act of 1992 (EPAct) requires that most industrial and commercial motors manufactured or imported after October 1997 meet new minimum efficiency standards.¹ These standards are defined in the National Electrical Manufacturers Association (NEMA) Standard MG-1 (Table 12-10) as determined by the Institute of Electrical and Electronic Engineers (IEEE) test procedure 112 Method b.

In anticipation of the EPAct rulemaking, a number of utilities, states, and public-benefits organizations came together through the Consortium for Energy Efficiency (CEE) to develop a national motors initiative to encourage the market for motors with energy efficiency levels that exceed federal minimum standards, (i.e., "premium-efficiency" motors). These organizations came together because new minimum standards were going to cause many utility energy efficiency programs to revise their motor specifications. In addition, many utilities which had relatively small-scale programs, or no motors program at all, started to consider developing or expanding a motors program in order to increase the value they offered to key customers. In 1995, this group recognized that creating a national

¹ The Energy Policy and Conservation Act as amended, 42 U.S.C. 6291-6317, establishes energy efficiency standards and test procedures for commercial and industrial electric motors.

definition for “premium-efficiency” motors for utilities (and other CEE members) to adopt would help set clear targets for manufacturers as well.²

In 1996, CEE launched its *Premium Efficiency Motors Initiative*, including a common set of specifications with the same product coverage as EPart.³ While a voluntary initiative, the specifications have been embraced by a growing number of motor manufacturers over the years. CEE’s motor efficiency specifications are promoted nationally by a variety of utilities, statewide and regional market transformation administrators, environmental groups, research organizations and state energy offices. Since 1996, utilities serving 11 percent of the nation have incorporated CEE’s motors initiative into their programs and are helping to persuade motor manufacturers to offer product lines that exceed EPart’s minimum efficiency standards.

Opportunity

Because even small efficiency improvements often make economic sense for equipment operated thousands of hours per year; the overall opportunity for energy savings from more efficient motors remains large. All industrial and commercial motors accounted for roughly 906 billion kWh in 1997.⁴ (ACEEE 2001) Energy efficient (EPart) motors tend to be 1 to 7 percent more efficient than standard efficiency motors. Motors meeting CEE’s premium efficiency specifications are 0.8 to 4.0 percent more efficient than EPart motors. Therefore, a conservative assumption would be that programs involved in CEE’s initiative will encourage motors that are on average 2 percent more efficient than a customer would otherwise purchase. Assuming that enough program reach is attained within the next few years to achieve an additional 1 percent stock penetration of motors 2 percent more efficient than the end-user would otherwise have acquired, the total annual savings yielded by the initiative would be about 181 GWh and 41.4 GW, of which 80 percent is co-incident with peak demand, or 33 MW. (CEE 2001).

Utility and other programs targeted at industrial and commercial motor users can provide substantial value to key customers. By enabling a customer to cost-effectively reduce its energy bill without compromising motor performance, a utility provides a valuable service. Typically, the annual operating cost of a motor far outstrips the initial purchase price. For instance a typical 75 horsepower (hp) motor running at full load for 8,000 hours per year would consume about \$24,000 worth of electricity at \$0.05 per kWh. A typical purchase price for such a motor is about \$4,000. A utility that helps a customer address the operating costs of a motor, will help that customer with, by far, the largest expense associated with the motor. As the utility industry enters a highly competitive, market-driven

² Even the largest utility represents only a small fraction of the motor manufacturers’ market. However, if many utilities include common product specifications as part of their motors programs, manufacturers will be given a clear indication of the value of offering a wide selection of premium-efficiency motors.

³ CEE’s Motors Initiative provides a common definition for a nominal full-load efficiency level above NEMA 12-10 for all electric motors covered by the Energy Policy Act of 1992: NEMA design A and B, three phase, integral horsepower, general purpose, open drip proof (ODP) and totally enclosed fan cooled (TEFC) motors with six poles (1200 rpm), four poles (1800 rpm) and two poles (3600 rpm). See CEE’s website, <http://www.ceeforamt.org/>, for details.

⁴ Includes integral horsepower motors in the commercial and industrial sectors from 1-to- 200 horsepower.

environment, such services will help utilities build stronger relationships with their customers. If all motors (between 1-200 horsepower) in just the manufacturing industry were upgraded to CEE levels, savings would be about 20,000 GWH/Year or 3.5 percent of motor system energy use (Rosenberg 2000).

Motor Market Transformation

A variety of public and private stakeholders have an interest in high-efficiency motors, including public energy efficiency program administrators, utilities, environmental groups, motor manufacturers and distributors as well as the federal government. The reasons for their interest range from resource conservation, a cleaner environment, providing greater customer value and service and higher profits. A premium motor brand would help each of these stakeholders realize its goals in the marketplace. The brief summaries below are intended to help better understand each stakeholders' perspective and describes how a premium motor brand relates to their market objectives.

Market Transformation Efforts

State and local regulatory bodies commonly require utilities and other publicly-funded organizations to promote the market for energy-efficient products and services on a local, state, or regional basis. Greater adoption of energy-efficient products is viewed as a "public good" because it conserves natural resources, delays the need for new power plants, promotes a cleaner environment, and lowers consumer operating costs. Unfortunately natural barriers, such as low customer awareness, lack of motivation for suppliers to promote efficiency opportunities, and lack of technical expertise tend to slow market adoption of efficiency measures. Market transformation programs help address these market barriers.

Market transformation programs that are applied to electric motors seek a permanent, sustainable change in the market toward energy efficient motors in the short-term and, ultimately, to accelerate the movement from a component focus to a systems-oriented focus. Utilities and other publicly-funded organizations seek to introduce motor energy-efficient motors and motor-related services faster by enhancing the demand for them (market-pull) or by enhancing their supply (market-push). (ACEEE 1996)

One way utilities and public benefit funded groups attempt to transform the motors market is through CEE's Premium Efficiency Motor Initiative. Utilities and others can participate in CEE's motor initiative simply by including the initiative's specifications in its motors program. All motors programs, including educational/promotional, technical assistance, and incentive programs, are eligible for inclusion in the initiative. The CEE specifications are a set of efficiency levels above those specified in EPAct. For the purposes of this initiative, motors meeting these specifications are referred to as "CEE premium-efficiency motors."

A critical component of the specifications is educational materials that assist customers in making prudent motor selections. There is no cost to participate in the initiative. Utilities and others wishing to participate in the initiative simply inform CEE of their intent to adopt the CEE equipment and/or appropriate application components in whole or in part. A simple letter of intent, provides this information. Participants deploy a number of program strategies, including:

- the use of the levels in developing motor selection recommendations for educational campaigns;
- use of program levels as a purchasing specification;
- customer rebates or financing for purchase of qualifying motors;
- distributor rebates for purchase or stocking of qualifying motors; and
- selection of qualifying motors as a condition for receiving a customized incentive.

While participation in CEE’s motors initiative helps to encourage the market for premium motors, it lacks a brand identity. CEE is not a brand. Rather, its emphasis is on facilitating greater demand for and supply of premium motors through common motor specifications.

Manufacturer Efforts

Manufacturers commonly promote “higher-end” products, including those that have higher efficiency, through greater marketing and advertising. For motors there has been no one industry recognized brand or efficiency level that designates a premium-efficiency product. In fact there has been little consistency in the premium-efficiency motor market other than the fact that certain lines of motors generally exceed federal minimum efficiency standards. Today manufacturers market premium efficiency motors by a variety of names and with only partial alignment to CEE’s premium efficiency specifications, as seen in Table 1. This situation leaves the consumer asking, “How much more efficient is the motor than the minimum efficiency standards required by law?” and “Is the incremental cost of the premium-efficiency motor justified by better performance, i.e., increased reliability, longer life, energy savings, etc.” As described later on in this paper, motor manufactures have recently addressed this situation through NEMA PremiumTM - - an industry-endorsed premium efficiency specification and brand.

Table 1. Comparison of Manufacturer Premium Efficiencies with CEE Specifications

Motor Manufacturer	Premium Motor Name	Percent of Premium Line Matching CEE Efficiency Specifications (ODP, TEFC)
Baldor	Super E	100
Dayton-Grainger	WattStopper	83
Marathon	Premium Efficient-Blue Chip	81
Magnetek	E-Plus	67
Reliance	Premium Efficient-XE	78
Toshiba	Premium Efficient	67
US Motors	Premium Efficient	62
WEG	Top Premium Efficient	54

Industrial motors are marketed by way of a classical component distribution chain. The chain starts with manufacturers who distribute their motors to Original Equipment Manufacturers (OEMs) (approximately 50%), Distributors (approximately 45%), and End-Users that are predominantly process plants, manufacturing plants, commercial buildings,

and public works (approximately 5%) (NEEP, 1999). Figure 1 demonstrates this classical component chain in detail.

Many sales that go through a distributor are “hurried sales” because of motor failure at a plant. The distributor’s customer is concerned with the financial implications surrounding a motor purchase (they are concerned with energy savings, but not as a primary driver), whether those implications are lost money from a plant being down or the initial cost of a motor. These plants cannot afford to be down or out of operation, so “panic” decision-making occurs when purchasing a motor, not a planned decision. Hence there is seldom time for adequate evaluation -- availability, price and familiarity with the manufacturer will likely take precedent.

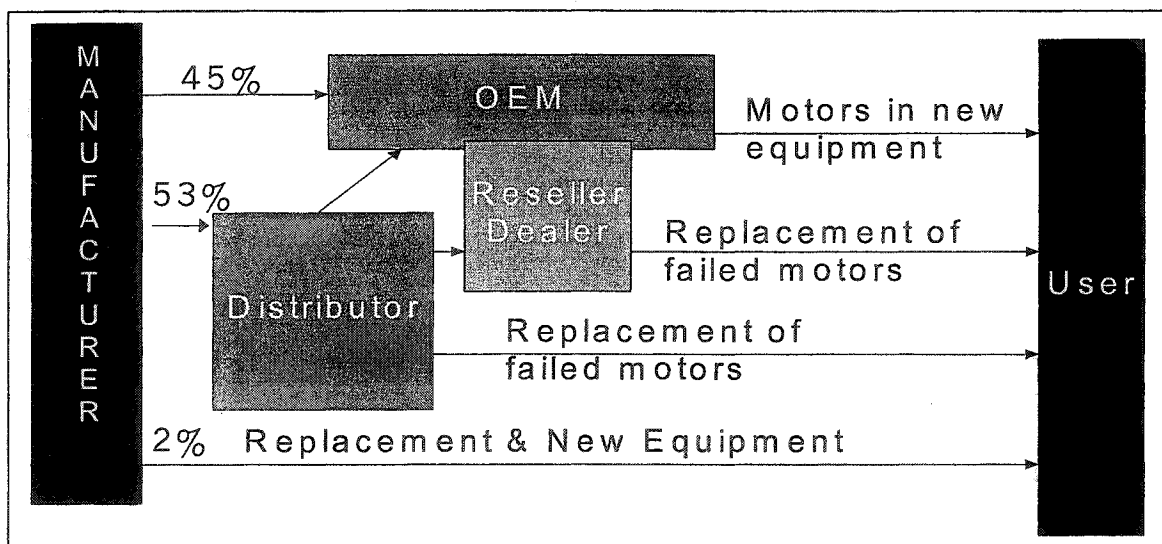


Figure 1. How Motors Reach the Market (NEMA 2001)

Government Efforts

The U.S. Department of Energy’s Office of Industrial Technologies (DOE-OIT) is taking a leading role in promoting a motor systems approach rather than emphasizing premium efficient motors *per se*. OIT’s BestPractices program offers a variety of valuable resources—publications, software tools, and training information—that are specific to motor systems. For instance, MotorMaster+ 3.0 software is a powerful motor selection and management tool that catalogs over 20,000 AC motors. DOE also offers technical publications, including, *Buying an Energy-Efficient Electric Motor*, *Replacing an Oversized and Underloaded Electric Motor*, and *Optimizing Your Motor Drive System* that help customers select the right motor for a specific applications. DOE-OIT’s tools can be extremely helpful to customers in selecting the appropriate motor for their application, but it does not provide a brand to help consumers identify premium motors.

Market Perceptions of Premium Motors

In January of 2000, San Diego Gas & Electric conducted a study of motor dealers and customers to better understand the dynamics of the motor market. It was apparent from the

study that consumers did not think of electric motors as falling into just two categories – EPAct and CEE Premium Efficient – with respect to their operating cost. In fact, hardly anyone recognized either of those two designations. Rather, consumers, to the extent that they grouped motors at all, perceived at least three and sometimes four distinct levels of energy efficiency.

- **Standard**, which they regarded as both the least expensive and the least efficient motors they could buy – but possibly quite reliable depending upon the brand.
- **High Efficiency**, somewhat more efficient but – if four categories were perceived -- not capable of delivering much in terms of energy savings. Some consumers believed the terms, high efficiency and premium efficiency were interchangeable.
- **Premium Efficient**, which most said they always asked for and believed they purchased. (Recall, however, that the dealers claimed their customers usually asked for “energy efficient” motors, a designation they equated with EPAct.)
- **Ultra-High Efficient sometimes called Federal**, which they tended to avoid, perhaps because they felt they were too expensive.

The dealers, who were generally more conversant about motors than the consumers, thought in terms of three categories:

- **Standard**, which was the lower efficiency, pre-EPAct motors that had been their regular product. The dealers said they had few, if any of the older models remaining in stock.
- **EPAct**, which accounted for the bulk of their sales. They thought these were very good motors.
- **Premium Efficient**, which they kept available at a considerably higher price, in the event the customer requested a highly efficient model.

When it came to comparing motors on energy consumption, most consumers and dealers were more apt to think in terms of numbers, not nominal categories. They thought in terms of percent efficiency, for example, 87%, 92%, 94% and so forth. However, they had trouble relating these numbers to their three or four categories. Some could not decide, for example, at what point “premium efficiency” could be said to begin. To some consumers, for example, “premium efficient” meant 90 or above, whereas high was in the 80s and standard was below that.

To make matters worse, consumers and dealers were aware that different manufacturers define premium efficiency differently. Despite their uncertainty, consumers said they tried to compare the numbers in order to, first, avoid getting a less efficient replacement and, second, to reduce their energy consumption even further. Different consumers maintained different standards in terms of the percent efficiency numbers they would accept. One might set their minimum level at 87% while another might require at least a 90% and a third might look for a 92% or a 93%. Importantly, though, once the

consumer located a motor that met his or her minimum efficiency requirement, he or she was not strongly inclined to try to improve upon it. Moreover, many seemed to look for the same number regardless of horsepower. Beyond that, many consumers readily acknowledged they were unsure just why a more energy efficient motor was more expensive, or for that matter, just what actually made it more energy efficient.

A few thought of premium efficient motors as being more high tech, almost experimental. This made them uneasy, and they tended to shy away on that basis alone. Furthermore, consumers pointed out that it was difficult to determine the amount of money a given premium efficient motor would actually save over the alternative possibilities. The dealers agreed that this process could become complicated.

Plainly the entire motor decision process with respect to efficiency was very unstructured, inexact and in many instances probably incorrect from a purely technical standpoint. However, this did not appear to be especially bothersome to the consumers. They felt they were doing the best they could (SDG&E 2000).

Problem

As the SDG&E study clearly demonstrates motor buyers and distributors are unclear on what “efficient” motor alternatives are available on the market. Those who are aware, are likely hearing a mixed message with some marketers claiming that all EPA-compliant motors are “energy-efficient”, and others claiming that only products meeting CEE specifications are energy-efficient. The lack of clarity and consistency in the premium-efficiency market has resulted in not only confusion, but lower sales of premium-efficiency motors, lost energy savings and other benefits. Clearly there is a need for greater consumer awareness of premium-efficiency motors and their benefits.

Product complexity is also part of the problem, making it difficult for consumers to identify premium motors and to participate in programs that promote them. Currently many utility motor programs use tables to identify qualifying motors. Since motor efficiencies vary by motor type (ODP or TEFC), speed (1200, 1800, and 3600 rpm) and size (1 to 200 horsepower), these tables often contain up to 114 separate combinations of qualifying motors. To participate in a motor program, the customer has to first look-up a motor in a catalog and note its efficiency (two steps). Then look up the corresponding efficiency requirement in the ‘rebate table’, considering type, speed and size (four steps). A premium brand, or label, would greatly simplify this process making it easier for a customer to identify and purchase the motor.

Benefits of Branding – Why Brand?

If there were a ‘qualifying label’ or a ‘brand’, the six steps described above could be reduced to two: look up the motor in the catalog and check whether it carries the ‘brand’. The ‘branding’ solution not only makes it easier to promote premium motors and to participate in programs; it also makes it easier for buyers to identify the best alternative regardless of program participation. Branding premium efficiency motors could be a significant step toward sustainable transformation of the market, by making identification and selection of qualifying products a much less complicated activity.

Branding can provide benefits to both buyers and sellers. For buyers, brands give identity to specific products that they like or don't like, want or don't want. More importantly, a brand assists a buyer in evaluating the quality of a product, especially when the buyer lacks the time or ability to judge a product's characteristics (Pride & Ferrell 1985).

This ideology is important when applied to promoting premium efficient motors. Often those purchasing a motor lack the time and/or expertise to identify the most cost-effective product. A brand would help reduce the resources needed to fully educate consumers about the life-cycle benefits of high-efficiency equipment.

Why A Premium Motor Brand Is Needed Now

There has been steady progression in the motor market to the point where the premium brand is needed today. This progression has followed a series of steps over approximately a ten-year period. This series of steps is broken down below.

Motors Became Regulated

The Energy Policy Act of 1992 (EPAAct), which took effect in October of 1997, was a policy mandating minimum energy efficiency levels for motors. Prior to EPAAct, motors meeting the efficiencies listed in Table 12-10 of NEMA's MG-1 were considered to be energy efficient. EPAAct established a new mandatory baseline for standard efficiency motors. With regard to labeling, all manufacturers must have a compliance certification number supplied by DOE printed on the nameplate of qualifying motors. In addition motor nameplates, packaging materials, and catalogues may also be marked with the encircled lower case letters "ee" to indicate that a motor meets the applicable standards. The certification number and the optional label tells consumers that the motor complies with minimum standards, but does not help them determine which products exceed EPAAct standards. (DOE 1999)

Promotion of Motors Exceeding Regulation

The Consortium for Energy Efficiency (CEE) worked with its member utilities and others to develop a common "premium" efficiency specification for motors in 1996. CEE's motor specifications are voluntary levels, with the purpose of promoting greater demand for high-efficiency electric motors. As participation in CEE's premium motors initiative grew more motor manufacturers began to make qualifying products available to meet the demand. To differentiate their products in the market, manufacturers and other organizations also began to identify their product lines as meeting CEE's specifications.⁵ While CEE has never intended for its name to be used as a brand, it was becoming a "defacto" brand in the market.

Increasing adoption of its "premium-efficiency" specifications coupled with increasing product availability nationwide led CEE to begin exploring opportunities for a premium-efficiency brand. In the summer of 2000, CEE approached the U.S. Environmental Protection Agency (US EPA), the National Electrical Manufacturer Association (NEMA),

⁵ CEE does not endorse any company or organization, their products or technologies and is not responsible for manufacturer claims. It only provides common efficiency specifications for motors and other products.

and the Electrical Apparatus Service Association (EASA), about developing a common brand for motors.

Industry Response

The motor industry has responded to changes in the motor market caused largely by EPA's minimum efficiency standards and CEE's initiative. NEMA recently adopted CEE's specifications for 4-pole motors (for enclosed and open type products) into its premium-efficiency motor program, NEMA Premium™. NEMA's adoption is a significant step forward since 4-pole motors are a large segment of the market. In order to send a common, coherent message to the market on premium-efficiency motors, CEE's Motors Committee recommended that ENERGY STAR and CEE align with NEMA Premium™ on 2-pole, 4-pole and 6-pole motors.

Released in 2001, the NEMA Premium line offers a brand to motors that carry the NEMA label and meet NEMA Premium's specifications. While NEMA is a broadly recognized and respected industry association, its expertise is in standards, not efficiency labeling. There is no doubt that a NEMA brand will be recognized by technical and engineering staff; however, it may lack the name recognition and resources to reach those who are not already acquainted with the organization. (NEMA 2001)

Government Response

Energy Star program is a federally-sponsored labeling program whose aim is to create greater market demand for products with superior energy performance. This labeling program is a voluntary one, with the participants engaging in it for the national recognition benefits.

For the purpose of deciding what products to label, Energy Star goes through a product development process, resulting in a "go" or "no-go" decision. (EPA 2000). EPA completed this process for motors and released a draft specification for premium motors on April 6, 2001. The draft specifications are an indication of EPA's intention to move forward with a label for premium-efficiency motors under the Energy Star brand.

Energy Star is a national marketing platform that focuses solely on energy efficiency; however, it lacks the recognition in industry that NEMA possesses. Energy Star's presence in the market is leveraged by many utilities and other public-benefit organizations that support it. Two premium efficiency labels will likely cause additional confusion for consumers as well as for motor distributors and program administrators that advise them. Choosing between an Energy Star brand or a NEMA brand for premium efficient motors is difficult because of the many trade-offs; furthermore it may be unnecessary. A co-branding approach could be used to leverage the strengths of both.

Bringing the Responses Together

A co-branding strategy that utilizes both the EPA and NEMA brands may prove the most effective. While a co-branding approach is new to the motor market, it has been successfully implemented with transformers. Since 1991, NEMA and Energy Star have been pursuing a co-branding strategy with high-efficiency transformers.

Under its Energy Star Transformers program, EPA references NEMA's standard TP-1 for low voltage products. In the transformer industry and in the market, the specification is referred to as ENERGY STAR® /NEMA TP-1; it is also supported by a CEE's commercial and industrial high-efficiency transformers initiative. As EPA and NEMA have shared a common technical specification for transformers, so motors may be able to share a common marketing platform, i.e., ENERGY STAR® /NEMA Premium motors, and a common premium-efficiency specification.

From a marketing and a technical perspective an ENERGY STAR /NEMA Premium motors co-branding strategy would incorporate the best of both worlds. With support from CEE and the repair industry (via EASA), a co-branding strategy would be strongly supported by the motor manufacturing, sales, repair and utility industries as well as by the federal government (EPA and DOE). More importantly it would simplify the task of buying motors for the consumer. Whether the consumer recognized NEMA Premium or ENERGY STAR, a single, coherent message would be communicated via the joint brand. Sending a consistent and clear message, will likely help increase the sales of premium motors and open the door for CEE, EASA, NEMA, and ENERGY STAR to pursue other motor-related market transformation opportunities, such as motor management and motor systems (e.g., pumps, fans, and air compressors).

Conclusions/Recommendations

As a variety of market stakeholders prepare comments on ENERGY STAR's draft specification it is evident that the process of establishing a brand, itself, is helping to mobilize the various market players. Once established, the real power of branding can be unleashed. First of all, it will increase the ease and efficiency of moving decisions in a "favorable" direction, i.e., toward more appropriate and optimal motors in terms of size, configuration, operation and efficiency. It also offers the opportunity to carry similar savings on the brand's coat-tails. For example a premium motor brand could provide a platform for introducing information on quality motor repair. Finally the presence of a brand (and the infrastructure behind it) enable an initiative to take advantage of market-related events, such as the current energy crisis in California.

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