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DEPARTMENT OF ENERGY

Office of Energy Efficiency and Renewable Energy

10 CFR Part 431

[Docket No. EE–DET–02–002]

RIN 1904–AA87

Energy Conservation Program for Certain Industrial Equipment: Determination Concerning the Potential for Energy Conservation Standards for Small Electric Motors

AGENCY: Office of Energy Efficiency and Renewable Energy, Department of Energy.

ACTION: Departmental determination.

SUMMARY: The Department of Energy (DOE or the Department) has determined, based on the best information currently available, that energy conservation standards for certain single-phase, capacitor-start, induction-run, small electric motors are technologically feasible and economically justified, and would result in significant energy savings. This determination initiates the process of establishing, by notice and comment rulemaking, test procedures and energy conservation standards for this equipment.

ADDRESSES: For access to the docket (EE–DET–02–002) to read background documents or comments received, visit the U.S. Department of Energy, Forrestal Building, Room 1J–018 (Resource Room of the Building Technologies Program), 1000 Independence Avenue, SW., Washington, DC, (202) 586–2945, between 9 a.m. and 4 p.m., Monday through Friday, except Federal holidays. Please call Ms. Brenda Edwards-Jones at the above telephone number for additional information regarding visiting the Resource Room. Please note: The Department's Freedom of Information Reading Room (formerly Room 1E–190 at the Forrestal Building) is no longer housing rulemaking materials.

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SUPPLEMENTARY INFORMATION:

I. Introduction

A. Authority

The National Energy Conservation Policy Act of 1978, amended the Energy Policy and Conservation Act (EPCA or the Act) to add a part C to title III of EPCA, to establish an energy-conservation program for certain industrial equipment. (42 U.S.C. 6311–6317) The Energy Policy Act of 1992 (EPACT), Public Law 102–486, also amended EPCA, and included amendments that expanded title III to include small electric motors. Specifically, EPACT amended section 346 of EPCA (42 U.S.C. 6317) to provide in paragraph (b) that the Secretary of Energy must prescribe testing requirements and energy conservation standards for those small electric motors for which the Secretary determines that standards ''would be technologically feasible and economically justified, and would result in significant energy savings.'' (42 U.S.C. 6317(b)(1)).

DOE construes section 346 in light of the provisions of section 325(n) and (o) of EPCA (which are in part B of title III of EPCA and apply specifically to residential appliances). DOE does so for two reasons. First, section 346(c) specifically makes the criteria in section 325(n) applicable to the determination for small motor standards. (42 U.S.C. 6317(c)) Second, and more generally, section 345(a) makes subsections (l) through (s) of section 325 applicable to provisions of part C of title III of EPCA which includes section 346. (42 U.S.C. 6316(a)).

Section 325(n) deals with petitions for amended standards. Paragraph (n)(2) of section 325(n) provides for an initial determination by DOE of technological feasibility, economic justification, and significant energy savings in deciding whether to grant a petition. This initial determination does not focus on specific standard levels. Paragraph (n)(2) further provides that the initial determination does not create any presumption with regard to the application of these statutory criteria for promulgating specific standards in a rulemaking pursuant to DOE's decision to grant a petition. Section 325(o)(2) requires that determinations of technological feasibility, economic justification, and significant energy saving must ultimately be based on specific standards levels that were proposed for public comment. (42 U.S.C. 6295(o)(2)) The textual linkage of these provisions of section 325 to section 346(b) implies that today's determination is similar in character and legal effect to an initial determination upon a petition for new or amended standards and that it does not create any presumptions with regard to the determination of specific standard levels yet to be proposed.

In addition to this structural analysis of EPCA, DOE is also of the view that, as a matter of policy, it is impractical to proceed on any other basis. It is impractical because, even if one or more design options have the potential for achieving energy savings, a determination that such savings could in fact be achieved cannot be made without first having developed test procedures to measure the energy efficiency of small motors designs, and then conducting an in-depth analysis of each design option. Such analysis might

show that no standard meets all three of the prescribed criteria: i.e., technological feasibility, economic justification and significant energy savings.

For these reasons, the Department construes section 346(b) and related provisions as requiring it to: (1) Determine preliminarily whether standards for small motors would be ''technologically feasible and economically justified, and would result in significant energy savings,'' and (2) if energy conservation standards appear to be warranted under these criteria, prescribe test procedures and conduct a rulemaking concerning such standards. During the standards rulemaking, the Department would describe whether, and at what level(s), to promulgate energy conservation standards. This decision would be based on in-depth consideration, with public participation, of the technological feasibility, economic justification, and energy savings of potential standard levels in the context of the criteria and procedures for prescribing new or amended standards established by section 325(o) and (p) (42 U.S.C. 6295(o), (p)).

Section 340(13)(F) of EPCA (42 U.S.C. 6311(13)(F)) provides the following definition for ''small electric motor'': The term ''small electric motor'' means a NEMA [National Electrical Manufacturers Association] general-purpose alternating-current single-speed induction motor, built in a two-digit frame number series in accordance with NEMA Standards Publication MG1–1987.

In NEMA Standards Publication MG1–1987, which is entitled ''Motors and Generators,'' the two-digit frame series encompasses NEMA frame sizes 42, 48, and 56, and motors with horsepower ratings ranging from ¼ to 3 horsepower. These motors operate at 60 hertz and have either a single-phase or a three-phase electrical design.

Section 346(b)(3) of EPCA (42 U.S.C. 6317(b)(3)) specifies that a standard prescribed for small electric motors shall not apply to any small electric motor that is a component of a covered product under section 322(a) of EPCA (42 U.S.C. 6292(a)) or of covered equipment under section 340 (42 U.S.C. 6311). Such products and equipment include residential air conditioners and heat pumps, furnaces, refrigerators and freezers, clothes washers and dryers, and commercial packaged air-conditioning and heating equipment.

B. Rulemaking Procedures

EPCA does not explicitly identify the rulemaking procedures that govern promulgation of test procedures and standards for small electric motors. In conducting rulemakings generally, the Department must, at a minimum, adhere to the procedures required by the Administrative Procedure Act (5 U.S.C. 551 *et seq.*) and section 501 of the Department of Energy Organization Act (DOE Organization Act) (42 U.S.C. 7191). Section 501 of the DOE Organization Act in essence requires the following: (1) Issuance of a notice of proposed rulemaking (NOPR), (2) an opportunity for comment, (3) an opportunity for presentation of oral comments, if there exists ''a substantial issue of fact or law'' or if the rule will have a ''substantial impact,'' and (4) publication of the final rule accompanied by appropriate explanation. Pursuant to Executive Order 12889, ''Implementation of the North American Free Trade Agreement,'' December 27, 1993, the comment period on a NOPR must be at least 75 days.

Consistent with section 345(a), in promulgating test procedures for small electric motors, the Department will also use procedures prescribed for adopting test procedures under parts B and C of EPCA. (42 U.S.C. 6293(b)(2) and 6314(b)) Therefore, in addition to the generic procedural requirements described above, the Department will provide an opportunity for oral comment (i.e., hold a public meeting) on the proposed test procedures, regardless of the ''substantial issue'' or ''substantial impact'' criteria, as it does in other EPCA test procedure rulemakings. See, for example, 42 U.S.C. 6314(b).

Consistent with section 345(a), in determining by rule whether to impose a specified standard level, the Department will use the following procedures:

1. The Department will issue an advance notice of proposed rulemaking (ANOPR), followed by a comment period (42. U.S.C. 6295 (p)(1));

2. The Department will issue a NOPR setting forth the maximum efficiency improvement that is technologically feasible and, if the proposed standard does not achieve this level, an explanation of why (42 U.S.C. 6295(p)(2)); and

3. The Department will hold a public meeting following issuance of the NOPR. (42 U.S.C. 6306(a)(1).)

In addition, the Department also has a policy, in conducting rulemakings on appliance standards, of allowing 75 days for comment on an ANOPR (rather than the 60 days required by EPCA), with at least one public hearing or meeting during this period. *Procedures for Consideration of New or Revised Energy Conservation Standards for Consumer Products*, 10 CFR part 430, subpart C, Appendix A (Process Rule).

C. Background

The Department began the analysis for this determination by collecting information from manufacturers of small motors and others. The Department conducted preliminary analyses and shared its preliminary findings regarding efficiency improvement in small motors. Subsequently, the Department received data and information, including that provided by both the National Electrical Manufacturers Association (NEMA) and the Small Motors and Motion Association (SMMA) (the NEMA/SMMA Working Group).

A key issue that arose early in this determination process is the definition of a ''small electric motor'' and precisely which motors are covered by this rulemaking. The definition of a ''small electric motor'' derives from the definition of the term ''general purpose motor.'' The EPCA definition [1] of a small motor is tied to the NEMA Standards Publication MG1–1987 performance requirements that NEMA has established for general purpose motors, such as the minimum levels for breakdown and locked rotor torque for small electric motors presented in MG1–1987 paragraph 12.32.

In this determination process, the Department considered only those classes of small electric motors covered under the EPCA definition which satisfy the performance requirements for general purpose motors established by NEMA Standards Publication MG1–1987, and which are not a component of another product covered under EPCA.

In consideration of the above, DOE finds that of the motors that satisfy the frame-size requirements of the small-motors definition, only a subset satisfies the other performance requirements of

[1] EPCA does not define the term ''general purpose motor,'' although it does define the terms ''definite purpose motor'' and ''special purpose motor.'' According to EPCA, ''definite purpose motor'' means ''any motor designed in standard ratings with standard operating characteristics or standard mechanical construction for use under service conditions other than usual or for use on a particular type of application and which cannot be used in most general purpose applications.'' Section 340(13)(B). (42 U.S.C. 6311 (13)(B)) Likewise, ''special purpose motor'' means ''any motor, other than a general purpose motor or definite purpose motor, which has special operating characteristics or special mechanical construction, or both, designed for a particular application. '' Id. at (C). Consequently, DOE must derive the term ''general purpose'' by eliminating those definite purpose motors and special purpose motors and must subsequently define the term within the context of NEMA performance characteristics that can operate successfully in many different applications.

the definition. Among single-phase motors with a two-digit frame size, the Department found that only capacitor-start motors, including both capacitor-start, induction run and capacitor-start, capacitor-run motors, can meet the torque requirements for NEMA general-purpose motors. Among three-phase small motors, the Department found that only non-servo motors can meet the NEMA performance requirements for general-purpose motors. Hence, the Department's analysis covered only these types of single- and three-phase small motors, and the Department identifies them in this determination as ''considered small motors.'' The annual commercial sales volume of considered small motors is approximately four million units for capacitor-start motors and one million units for three-phase motors. These motors are used in a wide variety of commercial and industrial machine and processing applications, with the largest being pumping equipment and commercial/industrial heating, ventilating, and air-conditioning equipment rated over 760,000 British thermal units per hour (Btu/h).

The Department then conducted an analysis that estimated the likely range of energy savings and economic benefits that would result from energy conservation standards for small electric motors, and prepared a report describing its analysis. In June 2003, the Department made the report ''Analysis of Energy Conservation Standards for Small Electric Motors'' available for public comment on its Web site at *http://www.eere.energy.gov/buildings/appliance_standards/commercial/small_electric_motors.html*. The report made no recommendation concerning the determination that the Department should make.

The Department received comments concerning its analysis of small motors from NEMA, SMMA, and the American Council for an Energy-Efficient Economy (ACEEE). In general, the comments received did not criticize specific elements of the Department's technical analysis. The ACEEE comment indicated that ACEEE found the analysis to be ''technically robust.'' (ACEEE, No. 3 at p. 1) [2] However, NEMA asserted that energy conservation standards for certain small motors were not economically justified and would harm U.S. motor manufacturers, and ACEEE claimed that energy conservation standards for small motors are unlikely to save much energy and would be a diversion from exploring other energy savings approaches. (NEMA, No. 1 at p. 2; ACEEE, No. 3 at p. 2) ACEEE commented that the Department could achieve greater energy savings if it did not restrict its analysis to capacitor-start, capacitor-run and capacitor-start, induction-run single-phase motors, and three-phase motors. ACEEE commented that these categories of small motors account for only four percent of domestic shipments and that much greater energy savings could be realized by switching between different types of small motors. (ACEEE, No. 3 at p. 1) ACEEE suggested that the Department encourage users of small motors to shift between classes of motors, such as from split-phase and shaded-pole motors to capacitor-start, capacitor-run and capacitor-start, induction-run motors; it commented that the substitution would yield greater savings than improvements that are restricted to the category of capacitor-start, induction-run motors. Further, ACEEE suggested replacing considered small motors with advanced types, such as electronically commutated permanent magnet motors. (ACEEE, No. 3 at p. 1) While the Department understands ACEEE's concern, the market transformation that ACEEE suggests is outside the scope of this determination since the purpose of energy conservation standards is to increase the energy performance of regulated products rather than change the product-purchase-and-use behavior of consumers.

The SMMA generally supported the findings of the NEMA/SMMA Working Group. (SMMA, No. 2 at p. 1) The main findings of the NEMA/SMMA Working Group pertained to the cost-efficiency relationship for small motors, and these findings were incorporated into the Department's engineering analysis for this determination.

NEMA commented that many small motors are used in other equipment that is subject to Federal energy conservation standards, and that small motors in those product applications are not within the scope of the Department's analysis and proceeding. (NEMA, No. 1 at p. 1) The Department agrees with NEMA, insofar as the EPCA definition of small motors and exclusions constrain the motors considered in the Department's analysis to a subset of the total population of small electric motors. As stated above, pursuant to section 346(b)(3) of EPCA (42 U.S.C. 6317(b)(3)), the Department did not consider in its analysis motors that are a component of a covered product or equipment.

In a related comment, NEMA requested that the Department designate small motors as ''covered equipment,'' which it asserted was done for general-service incandescent lamps although there was no standard for such lamps, and cited 59 FR 49468 (September 28, 1994). NEMA requested the designation so that States that are attempting to set efficiency standards for small motors would be preempted by the Federal action. (NEMA, No. 1 at p. 1) Section 345(a) of EPCA (42 U.S.C. 6316(a)) provides in part that section 327 of the Act (42 U.S.C. 6297), which addresses preemption of State energy conversation requirements by EPCA, shall apply to various equipment covered by part C of title III of EPCA, which includes small electric motors. Thus, State energy use and efficiency requirements for ''small electric motors,'' as defined in 42 U.S.C. 6311(13)(F), are already preempted to the extent provided in section 327 of EPCA (42 U.S.C. 6297). No further action by DOE is needed to provide for such preemption. Small motors that are not within EPCA's definition of small motors are not covered by EPCA; therefore, the Act does not preempt State energy use and efficiency requirements with respect to motors not covered by EPCA.

II. Discussion of the Analysis of Small Motors

A. Purpose and Content

The Department performed an analysis of the feasibility of achieving significant energy savings as a result of energy conservation standards for considered small electric motors. The Department presents the results of this analysis in a technical support document (TSD) for this determination. In subsequent analyses for the standards ANOPR, NOPR, and final rule, DOE will perform the more robust analyses required by EPCA. These analyses will involve more precise and detailed information that the Department will develop and receive during the standards rulemaking process, and will detail the effects of proposed energy conservation standards for small electric motors.

B. Methodology

To address EPCA requirements that DOE determine whether energy conservation standards for small motors would be technologically feasible and economically justified, and result in significant energy savings (42 U.S.C. 6317(b)(1)), the Department's analysis

[2] A notation in the form ''ACEEE, No. 3 at p. 1'' identifies a written comment the Department has received and has included in the docket of this rulemaking. This particular notation refers to a comment (1) by the American Council for an Energy-Efficient Economy (ACEEE), (2) in document number 3 in the docket of this rulemaking (maintained in the Resource Room of the Building Technologies Program), and (3) appearing on page 1 of document number 3.

consisted of five major elements: (1) Market research to better understand where and how small motors are used, (2) engineering analysis to estimate how different design options affect efficiency and cost, (3) life-cycle cost (LCC) analysis to estimate the costs and benefits to users from increased efficiency in small motors, (4) national energy savings analysis to estimate the potential energy savings on a national scale, and (5) national consumer impacts analysis to estimate potential economic costs and benefits that would result from improving energy efficiency in the considered small motors. The following is a brief description of each element.

1. Market Research

The Department conducted research on the market for considered small motors, including annual shipments, the current range of energy efficiencies, motor applications and utilization, market structure, and distribution channels. It used information from original equipment manufacturers (OEMs), trade associations that support industrial sectors, consultation with small motor manufacturers, and independent experts. Also, NEMA provided data, on its own initiative, to the Department on sales of two-digit-frame small motors to domestic customers by its member manufacturers, covering the period from 1971 to 2001. Based on its market research, the Department estimated that, on average, capacitor-start and three-phase small motors are used 2,500 hours annually at a loading of 70 percent of rating.

Based on its market research, including input from OEMs that incorporate small motors into their products and the NEMA/SMMA Working Group, the Department used seven years as the mean lifetime for capacitor-start motors, and nine years for three-phase motors.

Also based on its market research, the Department determined that the small motors considered in this determination are used in commercial and industrial settings with the corresponding tariffs. The Department estimated that approximately three-fourths of capacitor-start motors are used by utility customers on a commercial tariff, while virtually all users of small, three-phase motors are on an industrial tariff. Industrial electricity prices tend to be lower than commercial prices.

2. Engineering Analysis

In the engineering analysis, the Department examined methods for increasing energy efficiency that included increasing the amount of active material (e.g., the diameter of wire conductors), substituting a higher grade of steel for the magnetic components, improving the mechanical components and design (winding, bearings, and fan), and improving the quality control of components and assembly. Manufacturers of small motors use all of these methods of motor-efficiency improvement in their design and production processes. In general, the Department found that these methods may increase either the motor cost or size if there are no other changes in the motor-design parameters. In particular, the Department evaluated several ways to achieve increased efficiency, including (1) changing the quality of the grade of electrical steel, (2) changing the quantity of electrical steel (stack length), and (3) changing the magnetic flux density by adjusting the effective turns in the copper windings and/or changing the thickness of the steel laminations in the core of a small motor. In its preliminary engineering evaluation, the Department found the efficiency improvement method of changing flux density to be the most expensive of the three methods. As a result, the Department analyzed only the two lower-cost efficiency improvement methods to help maintain the simplicity and clarity of its analysis.

In particular, the Department examined a one-half-horsepower, capacitor-start, induction-run motor and a one-horsepower, three-phase motor as prototypes for improving the energy efficiency of small motors. To estimate the efficiency changes and additional costs resulting from design changes, the Department used two sets of data. The Department derived the first set by engaging an independent motor industry expert to estimate motor-efficiency costs from motor test data and design cost estimates. The expert obtained motor test data for a sample of small motors using a traditional motor performance program based on equivalent-circuit analysis to calculate efficiency changes resulting from changes in steel grades and stack lengths. This methodology was similar to methods commonly used by motor manufacturers. The NEMA/SMMA Working Group provided, on its own initiative, a comparable set of data in an aggregated form.

The Department had a concern that the cost-efficiency curves presented in the June 2003 report ''Analysis of Energy Conservation Standards for Small Electric Motors'' were based on 2001 materials pricing data, which represented a relative low-price point for many electrical steels (i.e., the steel used for building electric motor rotors and stators). The price of electrical steels has increased since 2001. However, the slope of the engineering analysis cost-efficiency curves depends on the price difference between the baseline unit (i.e., low efficiency steel) and the higher efficiency unit (i.e., better grade steel). Electrical steel price data collected in 2005 for the distribution transformer standards rulemaking along with a check of 2001 and 2005 pricing for specific steels used in small motors verified that the price differential between the baseline and high-efficiency steels did not increase between 2001 and 2005. For this reason, the Department determined that it was not necessary to update the material prices for the engineering analysis, because updating the material prices, or calculating average material prices representative of a multi-year period, would not significantly change the Department's engineering results.

3. Life-Cycle Cost Analysis

Based on its engineering analysis of the available technical data, the Department conducted a life-cycle cost (LCC) analysis to estimate the net benefit to users from increased efficiency in capacitor-start and three-phase small motors. The LCC analysis compared the additional up-front cost of a higher-efficiency motor to the discounted value of electricity savings over the life of the motor. The Department's LCC analysis used the following inputs: estimated average motor use in terms of hours and loading and typical motor lifetime (discussed above), estimated average prices for base motors and more-efficient motors, average electricity prices paid by users of capacitor-start and three-phase small motors, and the discount rate.

The Department received significant comment regarding its estimates of motor lifetimes. The Department understands that the typical lifetime of a small motor is not well documented. Most industry experts with whom the Department consulted suggested the average life for considered motors is at most ten years, depending on the use and physical environment. The NEMA/SMMA Working Group estimated an average life of five years for a capacitor-start motor and ten years for a three-phase motor. In view of these considerations, the Department estimated the mean lifetime for a capacitor-start motor at seven years and a three-phase motor at nine years. Moreover, the Department believes that the potential lifetime of a considered motor may be greater than that of the driven equipment. Thus, the actual motor lifetime may be limited by the

lifetime of the equipment it drives. In view of this issue, NEMA commented that the economic justification of energy conservation standards for the user was not good. Where simple payback periods range from 4.9 to 9 years, NEMA questioned whether the equipment driven by the small motor will last that long and, thus, enable the payback for the higher cost of improved efficiency to be realized. (NEMA, No. 1 at p. 2).

The Department acknowledges that a small motor's lifetime could be limited by the life of the equipment it drives. The Department used a distribution of lifetimes for small electric motors in its analysis. For capacitor-start motors, the analysis used the range of 5 to 9 years for the lifetime, and for polyphase motors the Department used a range of 7 to 11 years. Given existing data and the balance of diverse stakeholder and expert comments, the Department considers its current lifetime estimates to be reasonable and accurate for this determination analysis.

The Department estimated the base purchase price of typical capacitor-start and three-phase small motors using (1) prices listed in the 2001–2002 W.W. Grainger, Inc., catalog, (2) estimates of the percentage of the list price paid in different motor distribution channels, and (3) estimates of the distribution of sales among the three channels (motor manufacturer to OEM, motor manufacturer to distributor to original equipment manufacturer, and motor manufacturer to distributor to end user). The Department derived the price for a motor that incorporated design changes to improve efficiency by applying the estimated percentage of incremental cost from the engineering analysis to the average base price of the motor estimated from the Grainger, Inc., catalog.

The Department estimated average commercial and industrial electricity prices using the 2010 and 2020 forecasts from the Energy Information Administration's (EIA) *Annual Energy Outlook 2006.* It then derived average prices paid by users of capacitor-start and three-phase small motors based on the tariff classes of users (discussed above). Given that relatively small industrial establishments use considered small, polyphase (i.e., three-phase) motors more than larger establishments, and that small industrial establishments have higher electricity tariffs than larger industry, the Department estimated the electricity price for polyphase motors as five percent higher than the national average industrial price of electricity.

The Department derived a discount rate based on the weighted-average cost of capital for representative companies using products containing the considered small motors. After deducting for expected inflation, the Department estimated the average cost of capital for considered small motor owners as 7.5 percent.

4. National Energy Savings Analysis

To estimate national energy savings for small motors sold from 2010 through 2030, the Department calculated the energy consumption of two typical sizes of small motors: One-half horsepower, capacitor-start, induction-run motors, and one-horsepower, three-phase motors. The Department used both its own data and the NEMA/SMMA Working Group data for capacitor-start, induction-run motors. However, it used only its own data for three-phase motors because the NEMA/SMMA Working Group based its analysis on a one-half horsepower motor, which is less common than the one-horsepower motor, and which therefore has losses that may not be representative of considered small, three-phase motors. The Department calculated the energy efficiencies of small motors with improved-steel-grade and increased-stack-length design options, and extrapolated the results to a national average for all new capacitor-start, induction-run and three-phase motors (constituting the energy conservation standards cases).

The Department estimated the energy savings of the standards cases relative to two base cases—little improvement and moderate improvement in efficiency—in the absence of any standards. The Department formulated each base case using information from historical trends, and input from the NEMA/SMMA Working Group, provided on its own initiative. The Department also evaluated two small-motors-shipments scenarios, estimating national energy savings for average annual growth in shipments of 1 percent and 1.5 percent. These shipments scenarios are also based upon historical trends and input from the NEMA/SMMA Working Group.

To estimate potential energy savings from a possible energy conservation standard, the Department used an accounting model that calculated total end-use electricity savings in each year of a 35-year forecast. The model featured a product-retirement function to calculate the number of units sold in a given year, or vintage, which would still be in operation in future years. Some of the small motors sold in 2030 will operate through 2040. The retirement function assumed that individual motor lifetime is evenly distributed in a five-year interval around the mean lifetime.

The Department calculated primary energy savings associated with end-use electricity savings using data from EIA's *Annual Energy Outlook* 2006 (AEO). These data provided an average multiplier for relating end-use electricity to primary energy use (energy consumption by the power plant) for each year from 2010 to 2020. The Department extrapolated the trend in these years to derive factors for 2021 to 2040.

5. National Consumer Impacts Analysis

The Department estimated national economic impacts on end users in terms of the net present value (NPV) of cumulative benefits from 2010 to 2040. It considered these impacts under the same range of scenarios as it did for estimating national energy savings. It used the incremental equipment costs and energy savings for each energy-efficiency level that it applied in the LCC analysis. To simplify the analysis, the Department estimated the value of energy savings using the average AEO forecast electricity price from 2010 to 2020. The Department discounted future costs and benefits by using a seven-percent discount rate, according to the ''Guidelines and Discount Rates for Benefit Analysis of Federal Programs,'' issued by the Office of Management and Budget in 1992 (Circular No. A–94, Revised).

C. Analysis Results

1. Engineering Analysis

As described above, the Department conducted separate analyses of changes in the grade of electrical steel and a change in the stack length to improve the energy efficiency of small motors. In each case, the Department gave the base motor a ''per-unit'' cost of one. The Department related all design-option changes to the base motor per-unit cost of one. For example, if a change in electrical steel created a 10 percent change in the cost of materials, such as electrical steel, the Department assigned the per-unit number of 1.10 for the new design. In addition, the NEMA/SMMA Working Group provided, on its own initiative, comparable data, where each of four manufacturers selected a typical small motor to use as the base motor. For steel-grade design options, the NEMA data refer to the average values of the four manufacturers. For stack-change design options, the NEMA/SMMA Working Group provided data that it considered most typical. Tables 1 and 2 summarize the results of the analysis of steel-grade and stack-length

changes. For capacitor-start motors, the Department analyzed the cost of efficiency improvements for both 56-frame and 48-frame motors. These two frames represent distinct frame sizes that are common for one-half horsepower motors.

Overall, the Department's analysis and the NEMA/SMMA Working Group data were more comparable for the stack-change design options than they were for the design options related to steel-grade changes. The NEMA/SMMA Working Group estimated a much smaller efficiency improvement due to steel grade improvements than the Department's analysis.

TABLE 1.—CAPACITOR-START MOTORS, ½ HORSEPOWER, 4-POLE, OPEN DRIP-PROOF

	Grade A	Grade B	Grade B+	M47
Steel-Grade Design Options				
DOE Analysis, 56-Frame:				
Per-unit Cost	1.00	1.03	1.08	1.25
Efficiency	53.9%	57.4%	59.3%	60.5%
DOE analysis, 48-Frame:				
Per-unit Cost	1.00	1.03	1.10	1.25
Efficiency	62.6%	65.4%	66.8%	69.0%
		Grade 1	Grade 2	Grade 3
NEMA/SMMA data:				
Per-unit Cost		1.00	1.10	1.21
Efficiency		60.0%	61.7%	62.9%
	Base	Plus stack	Plus 2 stack	Plus 3 stack
Stack-Change Design Options				
DOE analysis, 56-Frame:				
Per-unit Cost	1.00	1.09	1.19	1.29
Efficiency	53.9%	58.1%	60.3%	62.0%
DOE analysis, 48-Frame:.				
Per-unit Cost	1.00	1.07	1.15	1.22
Efficiency	62.6%	63.5%	64.4%	65.1%
NEMA/SMMA data:				
Per-unit Cost	1.00	1.10	1.20	1.30
Efficiency	62.0%	64.3%	65.5%	66.5%

TABLE 2.—POLYPHASE MOTORS, 4-POLE, OPEN DRIP-PROOF

	Grade A+	Grade B+	M47
Steel-Grade Design Options			
DOE analysis, 1 horsepower:			
Per-unit Cost	1.0	1.04	1.20
Efficiency	76.4%	78.3%	81.2%
	Grade 1	Grade 2	Grade 3
NEMA/SMMA data, ½ horsepower:			
Per-unit Cost	1.00	1.10	1.20
Efficiency	68.1%	70.7%	72.1%
	Base	Plus stack	Plus 2 stack	Plus 3 stack
Stack-Change Design Options				
DOE analysis, 1 horsepower:				
Per-unit Cost	1.00	1.06	1.18	1.24
Efficiency	76.4%	77.2%	78.9%	79.2%
NEMA/SMMA analysis, ½ horsepower:				
Per-unit Cost	1.00	1.08	1.16	1.24
Efficiency	72.2%	73.1%	73.9%	74.1%

As stated above, the Department received no comments criticizing specific elements of its technical analysis. NEMA agreed with the Department's conclusions that it is technically feasible to increase the efficiency of small motors in frame sizes 42, 48, and 56 for three-phase and single-phase motors, and that improving grades of steel and redesigning laminations will provide increased efficiency, but at much higher capital costs. (NEMA, No. 1 at p. 2) ACEEE found the Department's analysis to be ''technically robust.'' (ACEEE, No. 3 at p. 1).

NEMA commented that manufacturer costs and impacts from a possible

standard may be high. It asserted that there will be high capital costs and, presumably, less economic benefit to the manufacturer than the Department described in its June 2003 determination report ''Analysis of Energy Conservation Standards for Small Electric Motors.'' (NEMA, No. 1 at p. 2) While the economic impacts of a possible standard on manufacturers may be substantial, DOE did not evaluate the full impact of possible standards on manufacturers in this determination. The Department instead used the presence of high-efficiency designs in the marketplace as an indicator of the probable economic feasibility of manufacturing high efficiency designs. The Department will address detailed economic impacts on manufacturers at such time that it conducts a manufacturer impact analysis for an energy efficiency standards rulemaking.

In addition, NEMA commented that there was a strong likelihood that OEMs will switch to alternative small motors that are not covered to avoid any added costs resulting from energy conservation standards. (NEMA, No. 1 at p. 2) The Department believes that shifting from, for example, a capacitor-start, induction-run small motor to a less efficient shaded-pole or split-phase small motor design would reduce potential energy savings. However, the Department understands that small motors are not generally interchangeable. Physical constraints in some current equipment designs may preclude the substitution of another type of motor for a considered small motor. Lacking clear evidence or data regarding the change in sales of considered small motors due to possible standards, the Department did not model this potential phenomenon in the determination analysis. (As explained below, the Department intends to undertake a rulemaking to develop standards for small motors. If it appears to DOE in the initial phases of the rulemaking that the potential for motor switching warrants further examination, the Department will address that issue in its analyses during the rulemaking.)

2. Life-Cycle Cost and Payback Period Analysis

The Department presents key results for capacitor-start motors in Tables 3 and 4 below. Using the DOE data for capacitor-start motors, the steel-grade options all have lower LCC than the base motor. However, results using the NEMA/SMMA average data show an increase in LCC at steel grade 3, with no change in LCC at steel grade 2. The DOE analysis shows the stack-length options increasing the LCC, while the NEMA/SMMA results show a slight decrease for the first option, but then an increase in LCC for the higher-efficiency stack change options.

TABLE 3.—IMPACTS OF EFFICIENCY IMPROVEMENT ON TYPICAL END USER, CAPACITOR-START, ½ HORSEPOWER, DOE DATA*

	Steel grade				Stack change		
	Grade A (base)	Grade B	Grade B+	M47	Plus stack	Plus 2 stack	Plus 3 stack
Motor Price-Buyer**	$103	$106	$114	$129	$111	$119	$126
Annual Operating Cost	$75	$72	$70	$68	$74	$73	$72
Life-Cycle Cost (7.5% DR)	$501	$487	$486	$490	$502	$505	$508
Change in LCC (WRT Base)		−$14.07	−$14.47	−$11.37	$1.51	$4.05	$7.47
Percent Change in LCC		−2.8%	−2.9%	−2.3%	0.3%	0.8%	1.5%
Payback Period (years)		1.0	2.2	3.7	6.7	7.2	7.9

* Data refer to a specific typical motor.
** Based on actual motor price in Grainger catalog.

TABLE 4.—IMPACTS OF EFFICIENCY IMPROVEMENT ON TYPICAL END USER, CAPACITOR-START, ½ HORSEPOWER, NEMA/SMMA DATA

	Steel grade*			Stack change**			
	Grade 1 (base)	Grade 2	Grade 3	Base	Plus stack	Plus 2 stack	Plus 3 stack
Motor Price-Buyer***	$117	$128	$141	$117	$128	$140	$152
Annual Operating Cost	$78	$76	$75	$76	$73	$72	$71
Life-Cycle Cost (7.5% DR)	$532	$532	$537	$518	$516	$520	$526
Change in LCC (WRT Base)		−$0.01	$5.20		−$2.63	$1.41	$7.36
Percent Change in LCC		0.0%	1.0%		−0.5%	0.3%	1.4%
Payback Period (years)		5.3	6.7		4.3	5.6	6.7

* Data are average of four manufacturers.
** Data reflect costs and performance of a typical motor.
*** Estimated by DOE based on Grainger catalog prices.

Tables 5 and 6 present results for small, polyphase motors. Although the base motors are different in the DOE and NEMA/SMMA data sets, it is the relative change for each motor that is of most interest. Using the DOE data, the steel-grade options both have lower LCC than the base motor. However, results based on the NEMA/SMMA average data show an increase in LCC at steel grade 3, with the LCC at steel grade 2 being equivalent to that for the base motor. Using the DOE data, the stack-length options moderately increase the LCC relative to the base motor, while the increase in LCC is more pronounced in the results based on the NEMA/SMMA data.

TABLE 5.—IMPACTS OF EFFICIENCY IMPROVEMENT ON TYPICAL END USER, POLYPHASE 1 HORSEPOWER, DOE DATA*

	Steel grade			Stack change		
	Grade A (base)	Grade B+	M47	Plus stack	Plus 2 stack	Plus 3 Stack
Motor Price-Buyer**	$119	$124	$143	$126	$140	$148
Annual Operating Cost	$98	$96	$93	$97	$95	$95
Life-Cycle Cost (7.5% DR)	$746	$736	$733	$747	$748	$752
Change in LCC (WRT Base)		−$10.49	−$12.98	$0.86	$1.69	$6.14
Percent Change in LCC		−1.4%	−1.7%	0.1%	0.2%	0.8%
Payback Period (years)		2.0	4.1	7.3	6.9	8.1

* Data refer to a specific typical motor.
** Based on actual motor price in Grainger catalog.

TABLE 6.—IMPACTS OF EFFICIENCY IMPROVEMENT ON TYPICAL END USER, POLYPHASE ½ HORSEPOWER, NEMA/SMMA DATA

	Steel grade*			Stack change**			
	Grade 1 (base)	Grade 2	Grade 3	Base	Plus stack	Plus 2 stack	Plus 3 stack
Motor Price-Buyer***	$125	$138	$151	$126	$136	$146	$156
Annual Operating Cost	53.9	$51.9	$50.9	$50.8	$50.2	$49.7	$49.5
Life-Cycle Cost (7.5% DR)	469	$469	$475	$450	$456	$463	$472
Change in LCC (WRT Base)		−$0.02	$6.02		$6.48	$12.96	$22.14
Percent Change in LCC		0.0%	1.3%		1.4%	2.9%	4.9%
Payback Period (years)		6.4	8.4		17.9	17.9	23.9

* Data are average of four manufacturers.
** Data reflect costs and performance of a typical motor.
*** Estimated by DOE based on Grainger catalog prices.

3. National Energy Savings and Consumer Impacts

The Department estimated national energy savings and consumer impacts of energy conservation standards for the considered small motors using its own engineering analysis data and the NEMA/SMMA Working Group data. The Department assumed that energy conservation standards would take effect in 2010, and estimated cumulative energy savings and NPV impacts relative to alternative base cases.

The results using the Department's analysis of design options indicate cumulative energy savings for capacitor-start, induction run-small motors ranging from 0.47 to 0.59 quad (see table 7). The corresponding NPV ranges from $0.28 to $0.35 billion. The results based on the data provided by the NEMA/SMMA Working Group, on its own initiative, show lower energy savings and economic benefits.

The results using the Department's analysis of design options for three-phase small motors indicate cumulative energy savings from 0.14 to 0.19 quad (see table 8). The corresponding NPV ranges from $0.08 to $0.11 billion. For the three-phase motors, the Department did not estimate national impacts using the data provided by the NEMA/SMMA Working Group, on its own initiative, because these data were based on a one-half horsepower motor instead of the more typical one-half horsepower size. The NEMA/SMMA data for half-horsepower motors show some efficiency gains, but with an increase in LCC, which would lead to a negative NPV.

TABLE 7.—CUMULATIVE ENERGY AND CONSUMER IMPACTS OF ENERGY EFFICIENCY IMPROVEMENT FOR ½ HORSEPOWER CAPACITOR START-INDUCTION-RUN MOTORS PROJECTED TO BE SOLD IN THE 2010–2030 PERIOD*

Future scenario	Energy savings (quads)		NPV (year 2005 dollars in billions, discounted at 7 percent to 2005)	
	DOE	NEMA/SMMA	DOE	NEMA/ SMMA
Low-efficiency-gain base case, low shipments growth	0.54	0.19	0.33	0.04
Low-efficiency-gain base case, high shipments growth	0.59	0.21	0.35	0.04
Moderate-efficiency-gain base case, low shipments growth	0.47	0.12	0.28	−0.05
Moderate-efficiency-gain base case, high shipments growth	0.51	0.12	0.30	−0.05

* The values given for each scenario correspond to the design option with the combination of highest energy savings and most favorable consumer NPV.

TABLE 8.—CUMULATIVE ENERGY AND CONSUMER IMPACTS OF ENERGY EFFICIENCY IMPROVEMENT FOR ONE-HORSEPOWER THREE-PHASE MOTORS PROJECTED TO BE SOLD IN THE 2010–2030 PERIOD *

Future scenario	Energy savings (quads)		NPV (year 2005 dollars in billions, discounted at 7 percent to 2005)	
	DOE	NEMA/ SMMA	DOE	NEMA/ SMMA
Low-efficiency-gain base case, low shipments growth	0.17	(1)	0.10	(1)
Low-efficiency-gain base case, high shipments growth	0.19	(1)	0.11	(1)
Moderate-efficiency-gain base case, low shipments growth	0.14	(1)	0.08	(1)
Moderate-efficiency-gain base case, high shipments growth	0.15	(1)	0.09	1

* The values given for each scenario correspond to the design option with the combination of highest energy savings and most favorable consumer NPV.
[1] Not available.

The differences between the results using the Department's analysis of design options and those using the data that the NEMA/SMMA Working Group provided on its own initiative reflect differences in estimates of the efficiency and cost increases associated with different design options.

D. Discussion

1. Significance of Energy Savings

Section 346(b)(1) of EPCA (42 U.S.C. 6317(b)(1)) mandates the Department to determine whether energy conservation standards for small motors would result in ''significant energy savings.'' NEMA commented that energy conservation standards for the considered small motors are not likely to save the threshold amount of one quad. (NEMA, No. 1 at p. 1) While the term ''significant'' is not defined in the Act, the U.S. Court of Appeals, in *Natural Resources Defense Council* v. *Herrington*, 768 F.2d 1355, 1373 (D.C. Cir. 1985), indicated that Congress intended ''significant'' energy savings in a similar context in section 325 of the Act (42 U.S.C. 6295(o)(3)(B)) to be savings that were not ''genuinely trivial.'' Using the Department's analysis of design options, the estimated energy savings of 0.61 to 0.78 quad over a 20-year period for the considered small motors are comparable to those the Department found to be significant for room air conditioners, where energy savings projected to result from standards ranged from 0.36 to 0.96 quad over a 30-year period. 62 FR 50122, 50142 (September 24, 1997). The Department believes that the estimated energy savings for the considered small motors are not ''genuinely trivial,'' and are, in fact, ''significant.''

2. Impact on Consumers

Section 346(b)(1) of EPCA requires that energy conservation standards for small motors be economically justified (42 U.S.C. 6317(b)(1)). Using the methods and data described in section II.B., the Department conducted an LCC analysis to estimate the net benefits to users from increased efficiency in the considered small motors. The Department then aggregated the results from the LCC analysis to the national level to estimate national energy savings and national economic impacts. Given the results on energy savings and economic benefits, the Department concluded that there is also likely to be reduced emissions from decreased electricity generation, decreased demand for the construction of electricity power plants, and potentially net indirect employment benefits from shifting expenditures from the capital-intensive utility sector to consumer expenditures. While the Department did not quantify these potential benefits, it concluded that the benefits are likely to be positive based on the results of the Department's analyses regarding energy conservation standards for similar products. The Department will provide detailed estimates of such impacts as part of the standards rulemaking process that will result from this determination.

III. Conclusion

A. Determination

Based on its analysis of the information now available, the Department has determined that energy conservation standards for certain small electric motors appear to be technologically feasible and economically justified, and are likely to result in significant energy savings. Consequently, the Department will initiate the development of energy-efficiency test procedures and standards for certain small electric motors.

All design options addressed in today's determination notice are technologically feasible. The Department's data, and data submitted by manufacturers, on their own initiative, show that the considered technologies are available to all manufacturers. These technologies include increased use of higher-grade steel, and greater amounts of electrical steel. The machinery and tools used to produce more-energy-efficient small motors are generally available to manufacturers.

The scenarios examined in the Department's analysis show that there is potential for significant energy savings. The combined savings for capacitor-start and polyphase motors range from 0.61 to 0.78 quad using DOE's data. They are lower using the NEMA/SMMA data.

For the considered capacitor-start, induction-run motors and using the DOE engineering data, all of the scenarios evaluated would result in economic benefits to the Nation as shown by the positive NPV. For the same motors, using the NEMA/SMMA data, three of the four scenarios evaluated have positive NPV. For the considered three-phase motors and using the DOE engineering data, all of the scenarios evaluated have positive NPV for at least one design option (national NPV was not calculated for three-phase motors based upon the NEMA/SMMA engineering data, because the data provided were for an unrepresentative size). While it is still uncertain whether further analyses will confirm these findings, the Department believes that standards for considered small motors appear economically justified based on balanced consideration of the information and analysis available to the Department at this time.

The Department has not produced detailed estimates of the potential adverse impacts of a national standard on manufacturers or on individual categories of users. The Department is instead relying on the presence of high-efficiency designs in the market place today as an indicator of the probable economic feasibility for manufacturers to exclusively produce high-efficiency designs if required by standards. During

the course of the standards rulemaking process, the Department will perform a detailed analysis of the impact of possible standards on manufacturers, as well as a more disaggregated assessment of their possible impacts on user-subgroups.

B. Future Proceedings

The Department will begin, therefore, the process of establishing testing requirements for small electric motors, which it expects will result in the publication of a proposed rule. During the rulemaking process, the Department will consider the Institute of Electrical and Electronics Engineers (IEEE) Standard 114–2001, *Test Procedures for Single-Phase Induction Motors.*

The Department also will begin a proceeding to consider establishment of energy conservation standards for small electric motors. Throughout the rulemaking process, the Department intends to adhere to the provisions of the Process Rule, where applicable. During the standards rulemaking, the Department will review and analyze the likely effects of industry-wide voluntary programs, such as ENERGY STAR and NEMA Premium®. In addition, any efforts by NEMA and SMMA to strengthen their efforts to promote voluntary standards for small motors will be considered. The Department will collect additional information about design options, inputs to the engineering and LCC analyses, and potential impacts on the manufacturers and consumers of small motors. During the standards rulemaking process, the Department will evaluate whether standards are technologically feasible and economically justified, and are likely to result in significant energy savings in accordance with the requirements of EPCA. (42 U.S.C. 6295(o)) If further analyses reveal that standards are not warranted, DOE will revise this determination and will not proceed to promulgate standards.

Issued in Washington, DC, on June 27, 2006.

Alexander A. Karsner,

Assistant Secretary, Energy Efficiency and Renewable Energy.

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DEPARTMENT OF COMMERCE

Patent and Trademark Office

37 CFR Part 1

[Docket No.: PTO–P–2005–0024]

RIN 0651–AB95

Changes To Information Disclosure Statement Requirements and Other Related Matters

AGENCY: United States Patent and Trademark Office, Commerce.

ACTION: Notice of proposed rulemaking.

SUMMARY: The United States Patent and Trademark Office (Office) is proposing changes to information disclosure statement (IDS) requirements and other related matters to improve the quality and efficiency of the examination process. The proposed changes will enable the examiner to focus on the relevant portions of submitted information at the very beginning of the examination process, give higher quality first actions, and minimize wasted steps. The Office is proposing the following changes relating to submissions of IDSs by applicants/patent owners: Before a first Office action on the merits, require additional disclosure for English language documents over twenty-five pages, for any foreign language documents, or if more than twenty documents are submitted, but documents submitted in reply to a requirement for information or resulting from a foreign search or examination report would not count towards the twenty document limit; permit the filing of an IDS after a first Office action on the merits only if certain additional disclosure requirements have been met; and eliminate the fees for submitting an IDS. Updates to the additional disclosure requirements would be required as needed for every substantive amendment. The Office is also proposing to revise the protest rule to better set forth options that applicants have for dealing with unsolicited information received from third parties.

DATES: To be ensured of consideration, written comments must be received on or before September 8, 2006. No public hearing will be held.

ADDRESSES: Comments should be sent by electronic mail over the Internet addressed to: *AB95.comments@uspto.gov*. Comments may also be submitted by mail addressed to: Mail Stop Comments-Patents, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313–1450; or by facsimile to (571) 273–7707, marked to the attention of Hiram H. Bernstein. Although comments may be submitted by mail or facsimile, the Office prefers to receive comments via the Internet.

Comments may also be sent by electronic mail message over the Internet via the Federal eRulemaking Portal. See the Federal eRulemaking Portal Web site (*http://www.regulations.gov*) for additional instructions on providing comments via the Federal eRulemaking Portal.

The comments will be available for public inspection at the Office of Patent Legal Administration, Office of the Deputy Commissioner for Patent Examination Policy, currently located at Room 7D74 of Madison West, 600 Dulany Street, Alexandria, Virginia, and will be available through anonymous file transfer protocol (ftp) via the Internet (address: *http://www.uspto.gov*). Because comments will be made available for public inspection, information that is not desired to be made public, such as an address or phone number, should not be included in the comments.

FOR FURTHER INFORMATION CONTACT: Hiram H. Bernstein ((571) 272–7707), Senior Legal Advisor, Office of Patent Legal Administration, Office of the Deputy Commissioner for Patent Examination Policy; or Robert J. Spar ((571) 272–7700), Director of the Office of Patent Legal Administration, Office of the Deputy Commissioner for Patent Examination Policy, directly by phone, or by facsimile to (571) 273–7707, or by mail addressed to: Mail Stop Comments-Patents, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313–1450.

SUPPLEMENTARY INFORMATION: The Office is proposing changes to the rules of practice in title 37 of the Code of Federal Regulations (CFR) to revise IDS practice. The Office is specifically proposing changes to §§ 1.17, 1.48, 1.55, 1.56, 1.97, 1.98, 1.99 1.291, 1.312, 1.555, and 1.948.

The Office will post a copy of this notice on its Internet Web site (*http://www.uspto.gov*). Additionally, individuals or organizations that need a copy for the purpose of providing comments, may send a request by phone or e-mail to Terry Dey at ((571) 272–7730 or *terry.dey@uspto.gov*) to receive an e-mail copy of the notice. When making a request for an e-mail copy, it is requested that persons please specify whether they wish to receive the document in MS-Word, WordPerfect, or HTML format.

The following definitions are intended to facilitate an understanding of the discussion of the proposed rules.