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[6450-01-P]

DEPARTMENT OF ENERGY

10 CFR Part 430

[Docket No. EERE-2011-BT-NOA-0013]

Energy Conservation Program: Data Collection and Comparison with Forecasted Unit Sales of Five Lamp Types

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

ACTION: Notice of data availability.

SUMMARY: The U.S. Department of Energy (DOE) is informing the public of its collection of shipment data and creation of spreadsheet models to provide comparisons between actual and benchmark estimate unit sales of five lamp types (i.e., rough service lamps, vibration service lamps, 3-way incandescent lamps, 2,601–3,300 lumen general service incandescent lamps, and shatter-resistant lamps) that are currently exempt from energy conservation standards. As the actual sales do not exceed the forecasted estimate by 100 percent for any lamp type (i.e., the threshold triggering a rulemaking for an energy conservation standard), DOE has determined that no regulatory action is necessary at this time. However, DOE will continue to track sales data for these exempted lamps. Relating to this activity, DOE has prepared, and is making available on its website, a spreadsheet showing the comparisons of anticipated versus actual sales, as well as the

model used to generate the original sales estimates. The spreadsheet is available online at: http://www1.eere.energy.gov/buildings/appliance_standards/product.aspx/productid/63.

FOR FURTHER INFORMATION CONTACT:

Ms. Lucy deButts, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies, EE-2J, 1000 Independence Avenue, SW, Washington, DC 20585-0121. Telephone: (202) 287-1604. Email: five_lamp_types@ee.doe.gov

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Mr. Peter Cochran, U.S. Department of Energy, Office of the General Counsel, GC-33, 1000 Independence Avenue, SW, Washington, DC 20585-0121. Telephone: (202) 586-9496. Email: Peter.Cochran@hq.doe.gov.

SUPPLEMENTARY INFORMATION:

Table of Contents

I. Background

The Energy Independence and Security Act of 2007 (EISA 2007; Pub. L. 110-140) was enacted on December 19, 2007. Among the requirements of subtitle B (Lighting Energy Efficiency) of title III of EISA 2007 were provisions directing DOE to collect, analyze, and monitor unit sales of five lamp types (i.e., rough service lamps, vibration service lamps, 3-way incandescent lamps, 2,601–3,300 lumen general service incandescent lamps, and shatter-resistant lamps). In relevant part, section 321(a)(3)(B) of EISA 2007 amended section 325(l) of the Energy Policy and Conservation Act of 1975 (EPCA) by adding paragraph (4)(B), which generally directs DOE, in consultation with the National Electrical Manufacturers Association (NEMA), to: (1) collect unit sales data for each of the five lamp types for calendar years 1990 through 2006 in order to determine the historical growth rate for each lamp type; and (2) construct a model for each of the five lamp types based on coincident economic indicators that closely match the historical annual growth rates of each lamp type to provide a neutral comparison benchmark estimate of future unit sales. (42 U.S.C. 6295(l)(4)(B)) Section 321(a)(3)(B) of EISA 2007 also amends section 325(l) of EPCA by adding paragraph (4)(C), which, in relevant part, directs DOE to collect unit sales data for calendar years 2010 through 2025, in consultation with NEMA, for each of the five lamp types. DOE must then: (1) compare the actual lamp sales in that year with the benchmark estimate; (2) determine if the unit sales projection has been exceeded; and (3) issue the findings within 90 days of the end of the analyzed calendar year. (42 U.S.C. 6295(l)(4)(C))

On December 18, 2008, DOE issued a notice of data availability (NODA) for the Report on Data Collection and Estimated Future Unit Sales of Five Lamp Types (hereafter the “2008

analysis"), which was published in the Federal Register on December 24, 2008. 73 FR 79072. The 2008 analysis presented the 1990 through 2006 shipment data collected in consultation with NEMA, the spreadsheet model DOE constructed for each lamp type, and the benchmark unit sales estimates for 2010 through 2025. On April 4, 2011, DOE published a NODA in the Federal Register announcing the availability of updated spreadsheet models presenting the benchmark estimates from the 2008 analysis and the collected sales data from 2010 for the first annual comparison. 76 FR 18425. Similarly, DOE published NODAs in the Federal Register in the following three years announcing the updated spreadsheet models and sales data for the annual comparisons. 77 FR 16183 (March 20, 2012); 78 FR 15891 (March 13, 2013); 79 FR 15058 (March 18, 2014). This NODA presents the fifth annual comparison; specifically, section IV of this report compares the actual unit sales against benchmark unit sales estimates for 2014.[1]

EISA 2007 also amends section 325(l) of EPCA by adding paragraphs (4)(D) through (4)(H), which state that if DOE finds that the unit sales for a given lamp type in any year between 2010 and 2025 exceed the benchmark estimate of unit sales by at least 100 percent (i.e., more than double the anticipated sales), then DOE must take regulatory action to establish an energy conservation standard for such lamps. (42 U.S.C. 6295(l)(4)(D) – (H)) For 2,601–3,300 lumen general service incandescent lamps, DOE must adopt a statutorily prescribed energy conservation standard. For the other four types of lamps, the statute requires DOE to initiate an accelerated rulemaking to establish energy conservation standards. If the Secretary does not complete the accelerated rulemakings within one year of the end of the previous calendar year,

[1] The notices and related documents for the 2008 analysis and successive annual comparisons, including this NODA, are available through the DOE website at: http://www1.eere.energy.gov/buildings/appliance_standards/product.aspx/productid/63.

there is a "backstop requirement" for each lamp type, which would establish energy conservation standard levels and related requirements by statute. Id.

As in the 2008 analysis and previous comparisons, DOE uses manufacturer shipments as a surrogate for unit sales in this NODA because manufacturer shipment data are tracked and aggregated by the trade organization, NEMA. DOE believes that annual shipments track closely with actual unit sales of these five lamp types, as DOE presumes that retailer inventories remain constant from year to year. DOE believes this is a reasonable assumption because the markets for these five lamp types have existed for many years, thereby enabling manufacturers and retailers to establish appropriate inventory levels that reflect market demand. In addition, increasing unit sales must eventually result in increasing manufacturer shipments. This is the same methodology presented in DOE's 2008 analysis and subsequent annual comparisons, and the Department did not receive any comments challenging this assumption or the general approach.

II. Definitions

A. Rough Service Lamps

Section 321(a)(1)(B) of EISA 2007 amended section 321(30) of EPCA by adding the definition of a "rough service lamp." The statutory definition reads as follows: "The term 'rough service lamp' means a lamp that -- (i) has a minimum of 5 supports with filament configurations that are C-7A, C-11, C-17, and C-22 as listed in Figure 6-12 of the 9th edition of the IESNA [Illuminating Engineering Society of North America] Lighting handbook, or similar configurations where lead wires are not counted as supports; and (ii) is designated and marketed specifically for 'rough service' applications, with - (I) the designation appearing on the lamp

packaging; and (II) marketing materials that identify the lamp as being for rough service." (42 U.S.C. 6291(30)(X))

As noted above, rough service incandescent lamps must have a minimum of five filament support wires (not counting the two connecting leads at the beginning and end of the filament), and must be designated and marketed for "rough service" applications. This type of incandescent lamp is typically used in applications where the lamp would be subject to mechanical shock or vibration while it is operating. Standard incandescent lamps have only two support wires (which also serve as conductors), one at each end of the filament coil. When operating (i.e., when the tungsten filament is glowing so hot that it emits light), a standard incandescent lamp's filament is brittle, and rough service applications could cause it to break prematurely. To address this problem, lamp manufacturers developed lamp designs that incorporate additional support wires along the length of the filament to ensure that it has support not just at each end, but at several other points as well. The additional support protects the filament during operation and enables longer operating life for incandescent lamps in rough service applications. Typical applications for these rough service lamps might include commercial hallways and stairwells, gyms, storage areas, and security areas.

B. Vibration Service Lamps

Section 321(a)(1)(B) of EISA 2007 amended section 321(30) of EPCA by adding the definition of a "vibration service lamp." The statutory definition reads as follows: "The term 'vibration service lamp' means a lamp that -- (i) has filament configurations that are C-5, C-7A, or C-9, as listed in Figure 6-12 of the 9th Edition of the IESNA Lighting Handbook or similar

configurations; (ii) has a maximum wattage of 60 watts; (iii) is sold at retail in packages of 2 lamps or less; and (iv) is designated and marketed specifically for vibration service or vibration-resistant applications, with -- (I) the designation appearing on the lamp packaging; and (II) marketing materials that identify the lamp as being vibration service only." (42 U.S.C. 6291(30)(AA))

The statute mentions three examples of filament configurations for vibration service lamps in Figure 6-12 of the IESNA Lighting Handbook, one of which (i.e., C-7A) is also listed in the statutory definition of "rough service lamp." The definition of "vibration service lamp" requires that such lamps have a maximum wattage of 60 watts and be sold at a retail level in packages of two lamps or fewer. Similar to rough service lamps, vibration service lamps must be designated and marketed for vibration service or vibration-resistant applications. As the name suggests, this type of incandescent lamp is generally used in applications where the incandescent lamp would be subject to a continuous low level of vibration, such as in a ceiling fan light kit. In such applications, standard incandescent lamps without additional filament support wires may not achieve the full rated life, because the filament wire is brittle and would be subject to breakage at typical operating temperature. To address this problem, lamp manufacturers typically use a more malleable tungsten filament to avoid damage and short circuits between coils.

C. Three-Way Incandescent Lamps

Section 321(a)(1)(B) of EISA 2007 amended section 321(30) of EPCA by adding the definition of a "3-way incandescent lamp." The statutory definition reads as follows: "The term '3-way incandescent lamp' includes an incandescent lamp that -- (i) employs 2 filaments,

operated separately and in combination, to provide 3 light levels; and (ii) is designated on the lamp packaging and marketing materials as being a 3-way incandescent lamp." (42 U.S.C. 6291(30)(Y))

Three-way lamps are commonly found in wattage combinations such as 50, 100, and 150 watts or 30, 70, and 100 watts. These lamps use two filaments (e.g., a 30-watt and a 70-watt filament) and can be operated separately or together to produce three different lumen outputs (e.g., 305 lumens with one filament, 995 lumens with the other, or 1,300 lumens using the filaments together). When used in three-way sockets, these lamps allow users to control the light level. Three-way incandescent lamps are typically used in residential multi-purpose areas, where consumers may adjust the light level to be appropriate for the task they are performing.

D. 2,601–3,300 Lumen General Service Incandescent Lamps

The statute does not provide a definition of "2,601–3,300 Lumen General Service Incandescent Lamps"; however, DOE is interpreting this term to be a general service incandescent lamp[2] that emits light between 2,601 and 3,300 lumens. Lamps on the market that emit light within this lumen range are immediately recognizable because, as required by the Energy Policy Act of 1992, Pub. L. 102-486, all general service incandescent lamps must be

[2] "The term 'general service incandescent lamp' means a standard incandescent or halogen type lamp that — (I) is intended for general service applications; (II) has a medium screw base; (III) has a lumen range of not less than 310 lumens and not more than 2,600 lumens or, in the case of a modified spectrum lamp, not less than 232 lumens and not more than 1,950 lumens; and (IV) is capable of being operated at a voltage range at least partially within 110 and 130 volts." (42 U.S.C. 6291(30)(D)(i))

labeled with lamp lumen output.[3] These lamps are used in general service applications when high light output is needed.

E. Shatter-Resistant Lamps

Section 321(a)(1)(B) of EISA 2007 amended section 321(30) of EPCA by adding the definition of a "shatter-resistant lamp, shatter-proof lamp, or shatter-protected lamp." The statutory definition reads as follows: "The terms 'shatter-resistant lamp,' 'shatter-proof lamp,' and 'shatter-protected lamp' mean a lamp that -- (i) has a coating or equivalent technology that is compliant with [National Sanitation Foundation/American National Standards Institute] NSF/ANSI 51 and is designed to contain the glass if the glass envelope of the lamp is broken; and (ii) is designated and marketed for the intended application, with -- (I) the designation on the lamp packaging; and (II) marketing materials that identify the lamp as being shatter-resistant, shatter-proof, or shatter-protected." (42 U.S.C. 6291(30)(Z)) Although the definition provides three names commonly used to refer to these lamps, DOE simply refers to them collectively as "shatter-resistant lamps."

Shatter-resistant lamps incorporate a special coating designed to prevent glass shards from being dispersed if a lamp's glass envelope breaks. Shatter-resistant lamps incorporate a coating compliant with industry standard NSF/ANSI 51,[4] "Food Equipment Materials," and are labeled and marketed as shatter-resistant, shatter-proof, or shatter-protected. Some types of the

[3] The Federal Trade Commission issued the lamp labeling requirements in 1994 (see 59 FR 25176 (May 13, 1994)). Further amendments were made to the lamp labeling requirements in 2007 (see 16 CFR 305.15(b); 72 FR 49948, 49971-72 (August 29, 2007)). The package must display the lamp's light output (in lumens), energy use (in watts), and lamp life (in hours).

[4] NSF/ANSI 51 applies specifically to materials and coatings used in the manufacturing of equipment and objects destined for contact with foodstuffs.

coatings can also protect the lamp from breakage in applications subject to heat and thermal shock that may occur from water, sleet, snow, soldering, or welding.

III. Comparison Methodology

In the 2008 analysis, DOE reviewed each of the five sets of shipment data that was collected in consultation with NEMA and applied two curve fits to generate unit sales estimates for the five lamp types after calendar year 2006. One curve fit applied a linear regression to the historical data and extended that line into the future. The other curve fit applied an exponential growth function to the shipment data and projected unit sales into the future. For this calculation, linear regression treats the year as a dependent variable and shipments as the independent variable. The linear regression curve fit is modeled by minimizing the differences among the data points and the best curve-fit linear line using the least squares function.[5] The exponential curve fit is also a regression function and uses the same least squares function to find the best fit. For some data sets, an exponential curve provides a better characterization of the historical data, and, therefore, a better projection of the future data.

For 3-way incandescent lamps, 2,601-3,300 lumen general service incandescent lamps, and shatter-resistant lamps, DOE found that the linear regression and exponential growth curve fits produced nearly the same estimates of unit sales (i.e., the difference between the two forecasted values was less than 1 or 2 percent). However, for rough service and vibration service lamps, the linear regression curve fit projected lamp unit sales would decline to zero for both

[5] The least squares function is an analytical tool that DOE uses to minimize the sum of the squared residual differences between the actual historical data points and the modeled value (i.e., the linear curve fit). In minimizing this value, the resulting curve fit will represent the best fit possible to the data provided.

lamp types by 2018. In contrast, the exponential growth curve fit projected a more gradual decline in unit sales, such that lamps would still be sold beyond 2018, and it was, therefore, considered the more realistic forecast. While DOE was satisfied that either the linear regression or exponential growth spreadsheet model generated a reasonable benchmark unit sales estimate for 3-way incandescent lamps, 2,601-3,300 lumen general service incandescent lamps, and shatter-resistant lamps, DOE selected the exponential growth curve fit for these lamp types for consistency with the selection made for rough service and vibration service lamps.[6] DOE examines the benchmark unit sales estimates and actual sales for each of the five lamp types in the following section and also makes the comparisons available in a spreadsheet online: http://www1.eere.energy.gov/buildings/appliance_standards/product.aspx/productid/63.

IV. Comparison Results

A. Rough Service Lamps

For rough service lamps, the exponential growth forecast projected the benchmark unit sales estimate for 2014 to be 5,224,000 units. The NEMA-provided shipment data reported shipments of 7,267,000 units in 2014. As this finding exceeds the estimate by only 39.1 percent, DOE will continue to track rough service lamp sales data and will not initiate regulatory action for this lamp type at this time.

[6] This selection is consistent with the previous annual comparisons. See DOE's 2008 forecast spreadsheet models of the lamp types for greater detail on the estimates.

B. Vibration Service Lamps

For vibration service lamps, the exponential growth forecast projected the benchmark unit sales estimate for 2014 to be 2,729,000 units. The NEMA-provided shipment data reported shipments of 5,220,000 units in 2014. As this finding exceeds the estimate by only 91.3 percent, DOE will continue to track vibration service lamp sales data and will not initiate regulatory action for this lamp type at this time.

C. Three-Way Incandescent Lamps

For 3-way incandescent lamps, the exponential growth forecast projected the benchmark unit sales estimate for 2014 to be 49,107,000 units. The NEMA-provided shipment data reported shipments of 35,340,000 units in 2014. As this finding is only 72.0 percent of the estimate, DOE will continue to track 3-way incandescent lamp sales data and will not initiate regulatory action for this lamp type at this time.

D. 2,601–3,300 Lumen General Service Incandescent Lamps

For 2,601–3,300 lumen general service incandescent lamps, the exponential growth forecast projected the benchmark unit sales estimate for 2014 to be 34,110,000 units. The NEMA-provided shipment data reported shipments of 5,232,000 units in 2014. As this finding is 15.3 percent of the estimate, DOE will continue to track 2,601–3,300 lumen general service incandescent lamp sales data and will not initiate regulatory action for this lamp type at this time.

E. Shatter-Resistant Lamps

For shatter-resistant lamps, the exponential growth forecast projected the benchmark unit sales estimate for 2014 to be 1,671,000 units. The NEMA-provided shipment data reported shipments of 1,042,000 units in 2014. As this finding is only 62.4 percent of the estimate, DOE will continue to track shatter-resistant lamp sales data and will not initiate regulatory action for this lamp type at this time.

V. Conclusion

None of the shipments for rough service lamps, vibration service lamps, 3-way incandescent lamps, 2,601–3,300 lumen general service incandescent lamps, or shatter-resistant lamps crossed the statutory threshold for a standard. DOE will continue to monitor these five currently exempted lamp types and will assess 2015 sales by March 31, 2016, in order to determine whether an energy conservation standards rulemaking is required, consistent with 42 U.S.C. 6295(l)(4)(D)-(H).

Issued in Washington, DC, on March 10, 2015.

Kathleen B. Hogan
Deputy Assistant Secretary for Energy Efficiency
Energy Efficiency and Renewable Energy