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[6450-01-P]

DEPARTMENT OF ENERGY

10 CFR Part 431

[Docket No. EERE-2013–BT–STD–0006]

RIN: 1904-AC55

Energy Conservation Standards for Commercial and Industrial Fans and Blowers: Availability of Provisional Analysis Tools

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

ACTION: Notice of Data Availability.

SUMMARY: The U.S. Department of Energy (DOE) has completed a provisional analysis of the potential economic impacts and energy savings that could result from promulgating an energy conservation standard for commercial and industrial fans and blowers. This analysis incorporates information and comments received after the completion of an analysis presented in a notice of data availability (NODA) published in December 2014. At this time, DOE is not proposing an energy conservation standard for commercial and industrial fans and blowers. This analysis may be used in support of the

Appliance Standards Federal Rulemaking Advisory Committee (ASRAC) commercial and industrial fans working group negotiations to develop a recommendation for regulating commercial and industrial fans. DOE encourages stakeholders to provide any additional data or information that may improve the analysis and to present comments submitted to this NODA and to the NODA published in December 2014 to the working group.

DATES: Information is available as of [INSERT DATE OF PUBLICATION IN THE FEDERAL REGISTER]

ADDRESSES: The analysis for this NODA is available at: http://www1.eere.energy.gov/buildings/appliance_standards/rulemaking.aspx?ruleid=25.

Interested persons are encouraged to submit comments using the Federal eRulemaking Portal at: http://www.regulations.gov. Follow the instructions for submitting comments. Alternatively, interested persons may submit comments, identified by Docket number EERE-2013–BT–STD–0006, by any of the following methods:

1) E-mail: to CIFB2013STD0006@ee.doe.gov. Include **EERE-2013–BT–STD–0006** in the subject line of the message. Submit electronic comments in WordPerfect, Microsoft Word, PDF, or ASCII file format, and avoid the use of special characters or any form of encryption.

2) Mail: Ms. Brenda Edwards, U.S. Department of Energy, Building Technologies Program, Mailstop EE–2J, Revisions to Energy Efficiency Enforcement Regulations, EERE-2013-BT-STD-0006, 1000 Independence Avenue, SW., Washington, DC 20585– 0121. Phone: (202) 586–2945. If possible, please submit all items on a CD, in which case it is not necessary to include printed copies.

3) Hand Delivery/Courier: Ms. Brenda Edwards, U.S. Department of Energy, Building Technologies Program, 6th Floor, 950 L'Enfant Plaza, SW., Washington, DC 20024. Phone: (202) 586–2945. If possible, please submit all items on a CD, in which case it is not necessary to include printed copies.

4) Instructions: All submissions received must include the agency name and docket number or RIN for this rulemaking.

Docket: The docket, which includes Federal Register notices, comments, and other supporting documents/materials, is available for review at www.regulations.gov. All documents in the docket are listed in the www.regulations.gov index. However, not all documents listed in the index may be publicly available, such as information that is exempt from public disclosure.

A link to the docket webpage can be found at: http://www.regulations.gov/#!docketDetail;D=EERE-2013-BT-STD-0006. The www.regulations.gov webpage contains instructions on how to access all documents in the docket, including public comments. See "ADDRESSES," for further information on how to submit comments through www.regulations.gov.

FOR FURTHER INFORMATION CONTACT: Ms. Ashley Armstrong, 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) 586-6590. E-mail: CIFansBlowers@ee.doe.gov

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. E-mail: peter.cochran@hq.doe.gov .

For further information on how to review other public comments and the docket, contact Ms. Brenda Edwards at (202) 586-2945 or by email: Brenda.Edwards@ee.doe.gov.

SUPPLEMENTARY INFORMATION:

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I. History of Energy Conservation Standards Rulemaking for Commercial and Industrial Fans and Blowers

The Energy Policy and Conservation Act of 1975 (EPCA), as amended, established the Energy Conservation Program for Certain Industrial Equipment under Title III, Part C. (42 U.S.C. 6311-6317, as codified)[1] Included among the various types of industrial equipment addressed by EPCA are commercial and industrial fans and blowers, the subject of this notice. (42 U.S.C. 6311(2) (A)) All references to EPCA refer to the statute as amended through the American Energy Manufacturing Technical Corrections Act (AEMTCA), Pub. L. 112-210 (December 18, 2012).

DOE initiated the current rulemaking by publishing a proposed coverage determination for commercial and industrial fans and blowers. 76 FR 37678 (June 28, 2011). This was followed by the publication of a Notice of Public Meeting and Availability of the Framework Document for commercial and industrial fans and blowers in the Federal Register. In the Framework Document, DOE requested feedback from interested parties on many issues related to analyses DOE would conduct as part of the rulemaking, such as the engineering analysis, the manufacturer impact analysis (MIA),

[1]For editorial reasons, upon codification in the U.S. Code, Part C was re-designated Part A-1.

the life-cycle cost (LCC) and payback period (PBP) analyses, and the national impact analysis (NIA). 78 FR 7306 (February 1, 2013). [2]

On December 10, 2014, DOE published a Notice of Data Availability (the "December 2014 NODA") that presented a provisional analysis estimating the potential economic impacts and energy savings that could result from promulgating a regulatory energy conservation standard for commercial and industrial fans and blowers. 79 FR 73246 .[3] The December 2014 NODA analysis relied on an electric input power based metric (i.e., "wire-to-air"), the fan energy index (FEI). The FEI of a fan was defined as the average electric input power, or fan energy rating, of a fan that exactly meets the efficiency level being analyzed (FER_{STD}), divided by the average electric input power or fan energy rating of the fan (FER). In the December 2014 NODA, the FER was calculated over a specific load profile based on the fan's flow at peak total efficiency[4] and at a specified speed.[5]

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[2] Supporting documents are available at: http://www.regulations.gov/#!docketDetail;D=EERE-2013-BT-STD-0006

[3] The December 2014 NODA comment period was originally scheduled to close on January 26, 2015. DOE subsequently published a notice in the Federal Register extending the comment period to February 25, 2015, to allow additional time for interested parties to submit comments.

[4] The efficiency of a fan is defined as the ratio of air output power to mechanical input power. Fan efficiency varies depending on the output flow and pressure. The best efficiency point or BEP represents the flow and pressure values at which the fan efficiency is maximized when operating at a given speed.

[5] In the December 2014 NODA, DOE calculated the FEI at the speed corresponding to the highest electric motor synchronous speed configuration that exists within the fan's operational speed range.

In October 2014, several energy efficiency advocates and representatives of fan manufacturers[6] (the "Joint Stakeholders") presented a different energy metric approach to DOE called "Fan Efficiency Ratio". The Joint Stakeholder approach included a fan efficiency only metric (FER_H) as well as a wire-to-air metric (FER_W).[7] This metric approach was described in more details by AMCA in a white paper ("AMCA white paper") published in December 2014 which AMCA included in comments to the December 2014 NODA.[8] (AMCA, No. 48 at p. 15) Based on the additional information received, and comments to the December 2014 NODA, DOE revised its analysis. This second NODA presents an analysis that characterizes fan performance and efficiency levels using a revised FEI metric that is based on the FER_W presented by the Joint Stakeholders. (See section III.A for details on the revised FEI metric)

II. Current Status

The analyses described in this NODA were developed to support a potential energy conservation standard for commercial and industrial fans. As DOE announced in an April 2015 notice, DOE intends to establish a negotiated rulemaking working group under the Appliance Standards and Rulemaking Federal Advisory Committee (ASRAC) in accordance with the Federal Advisory Committee Act (FACA) and the Negotiated Rulemaking Act (NRA) to negotiate proposed definitions, the equipment classes for

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[6] The Air Movement and Control Association (AMCA), New York Blower Company, Natural Resources Defense Council (NRDC), the Appliance Standards Awareness Project (ASAP), and the Northwest Energy Efficiency Alliance (NEEA).
[7] Supporting documents from this meeting, including presentation slides are available at: http://www.regulations.gov/# !documentDetail;D=EERE-2013-BT-STD-0006-0029
[8] All comments are available at: http://www.regulations.gov/#!docketDetail;D=EERE-2013-BT-STD-0006

which standards would be considered (including any system interaction effects), certain aspects of a proposed test procedure (if applicable), and proposed energy conservation standards for fans and blowers. 80 FR 17359 (April 1, 2015)

To examine these issues , and others as necessary, DOE will provide to all parties in the negotiation data and an analytic framework complete and accurate enough to support their deliberations. DOE is publishing this analysis to inform a prospective negotiation.

In this NODA, DOE is not proposing any energy conservation standards for commercial and industrial fans. DOE may revise the analyses presented in this NODA based on any new or updated information or data it obtains during the course of the rulemaking. DOE encourages stakeholders to provide any additional data or information that may improve the analysis.

III. Summary of the Analyses Performed by DOE

DOE developed a fan energy performance metric and conducted provisional analyses of commercial and industrial fans in the following areas: (1) engineering; (2) manufacturer impacts; (3) LCC and PBP; and (4) national impacts. The metric and provisional analyses incorporate information received after the completion of the analysis for the December 2014 NODA, including the published fan industry white paper "Fan Efficiency Ratios" and a database of confidential sales information provided by (AMCA).

The fan energy performance metric and the tools used in preparing these analyses and their respective results are available at: http://www.regulations.gov/#!docketDetail;D=EERE-2013-BT-STD-0006. Each individual spreadsheet includes an introduction that provides an overview of the contents of the spreadsheet. These spreadsheets present the various inputs and outputs to the analysis and, where necessary, instructions. Brief descriptions of the fan energy performance metric, of the provisional analyses, and of the supporting spreadsheet tools are provided below. If DOE proposes an energy conservation standard for commercial and industrial fans in a future NOPR, then DOE will publish a TSD containing a detailed written account of the analyses performed in support of the NOPR, which will include updates to the analyses made available in this NODA.

A. Energy Metric

Commercial and industrial fan energy performance is a critical input in the provisional analyses discussed in this notice. For the purpose of this NODA, DOE revised the fan energy metric used to represent fan performance and characterize the efficiency levels analyzed in the December 2014 NODA. The revised FEI metric is based on an approach similar to the wire-to-air metric presented by the Joint Stakeholders to DOE in October 2014. AMCA subsequently published a white paper in December 2014 that describes the Joint Stakeholder approach in more detail. AMCA included this white paper in its publicily-available comments to the December 2014 NODA, which additional stakeholders supported in their written comments on the December 2014

NODA.[9, 10] (Joint Stakeholders, No. 50 at p. 2; AMCA, No. 48 at p. 15; CAIous, No. 49 at p. 2; Morrison, No. 51 at p. 2)

In this NODA, the FEI is defined as the electric input power of a fan, or fan energy rating that exactly meets the efficiency level being analyzed (FER_{STD}), divided by the electric input power, or fan energy rating, of a given fan model (FER) at a given operating point (characterized by a value of flow and total pressure). For a given operating point, an FEI value less than one would indicate that the fan does not meet the efficiency level being analyzed for that given operating point, while a value greater than one would indicate that the fan is more efficient than the efficiency level being analyzed at that given operating point. For each fan operating point, the FEI is calculated as:

$$FEI = \frac{FER_{STD}}{FER}$$

In order to calculate the FER of a fan, DOE assumed default motor full load and part load efficiency values, as well as default transmission losses[11]:

$$FER_i = \frac{Q_i \times P_i}{\eta_{fan,i} \times 6343 \times \eta_{T,i}} + L_{M,i} = \frac{BHP_i}{\eta_{T,i}} + L_{M,i}$$

Where:

FER_i : electrical input power (hp) at operating point i;

[9] Supporting documents from the October 2014 meeting, including presentation slides are available at: http://www.regulations.gov/# !documentDetail;D=EERE-2013-BT-STD-0006-0029

[10] *AMCA, Introducing Fan Efficiency Ratios*, December 2014, http://www.amca.org/resources/FER_Whitepaper_single%20pages.pdf

[11] These default losses assumptions are presented in the LCC spreadsheet, in the "Default Losses" worksheet. The default transmission efficiency is equal to one in case of a direct driven fan.

Q_i: flow (cfm) at operating point i;

P_i: total pressure (in.wg) at operating point i;

$\eta_{fan,i}$: total fan efficiency (%) at operating point i;

$\eta_{T,i}$: default transmission efficiency (%) at operating point i (equals 100% f the fan is a direct driven fan);

$L_{M,i}$: default electric motor losses (hp) at operating point i;

BHP_i : shaft input power (hp) at operating point i;

6343: conversion factor to I-P units.

For the FER_{STD} calculation of a fan that exactly meets the efficiency level being analyzed, DOE used the same FER equation, except the calculation of the fan shaft input power is based on a minimum allowable fan total efficiency:

$$FER_{STD,i} = \frac{Q_i \times P_i}{\eta_{STD,i} \times 6343 \times \eta_{T,i}} + L_{M,i} = \frac{BHP_{STD,i}}{\eta_{T,i}} + L_{M,i}$$

Where:

$FER_{STD,i}$: Maximum allowable electrical input power (hp) at operating point i;

$BHP_{STD,i}$: Maximum allowable shaft input power (hp) at operating point i;

Q_i: flow (cfm) at operating point i;

P_i: total pressure (in.wg) at operating point i;

$\eta_{STD,i}$: minimum total fan efficiency (%) at operating point i ;

$\eta_{T,i}$: default transmission efficiency (%) at operating point i (the minimally compliant fan is assumed to always be belt-driven);

$L_{M,\mathrm{i}}$: default electric motor losses (hp) at operating point i;

6343: conversion factor to I-P units.

For all fan categories, the minimum fan total efficiency at a given operating point is expressed as a function of flow and total pressure, as follows:

$$\eta_{STD,i} = \eta_{target} \frac{Q_i \times P_i}{(Q_i + Q_0)(P_i + P_0)} = \frac{Q_i \times P_i}{BHP_{STD,i} \times 6343}$$

Where:

$\eta_{STD,i}$: Minimum total fan efficiency (%) at operating point i;

$BHP_{STD,i}$: Max allowable shaft input power (hp) at operating point i;

Q_0: flow constant equal to 250

P_0: total pressure constant equal to 0.4

η_{target}: constant used to establish the efficiency level[12]

6343: conversion factor to I-P units

This equation was based on the metric approach recommended by the Joint Stakeholders as well as on AMCA's proposed values for Q_0 and P_0 and on DOE's preliminary review of the applicability of this equation.[13]

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[12] The efficiency target is a constant that described the expected minimum allowable fan efficiency for very high flow and total pressure operating points at a given efficiency level.

[13] See AMCA's DOE Fan efficiency Proposal presented at the 59th AMCA Annual Meeting, January 24, 2015. http://www.amca.org/adovacy/documents/DOEFanEfficiencyProposal-AMCAAnnualMeetingRedux1-24-15.pdf

The primary difference between the revised FEI metric used in this NODA and the wire-to-air metric recommended by the Joint Stakeholders is that the Joint Stakeholders recommend using an equation expressing static efficiency[14] as a function of static pressure and flow when calculating FER and FER_{STD} at a given operating point for unducted fans (i.e. fans generally applied without a duct on their outlet), instead of using total efficiency as a function of total pressure and flow, as recommended for ducted fans.[15] In its white paper, AMCA states that a metric based on static efficiency should be used for unducted fans, to accommodate the selection of unducted fans based on the use of static pressure. AMCA noted, however, that this opinion is not shared across all the industry. Three additional representatives of the industry agreed that static efficiency should be the basis for any metric related to unducted fans because of existing selection practices, while one recommended using total efficiency for all fan categories. (Joint Stakeholders, No. 50 at p. 3; AMCA, No. 48 at p. 16; CES Group LLC, No. 40 at p. 1; Multi-wing, No. 52 at p. 2; Carrier, No. 43 at p. 6; Morrison, No. 51 at p. 2)

DOE understands that using static pressure may be useful for selecting unducted fans, however, because static efficiency is, by definition, calculated using total pressure, and because the shaft input power of a fan is a function of the fan's total output power

[14] Static efficiency is equal to the total efficiency multiplied by the ratio of static pressure to total pressure, at a given point of operation. Static pressure is the difference between fan total pressure and fan velocity pressure at a given point of operation.

[15] Unducted fans include the following fan categories: axial unhoused, centrifugal unhoused, and power roof ventilators.

and total efficiency, DOE maintained the use of an energy metric based on total pressure and total efficiency for all fan categories.[16] DOE does not believe this approach would prevent end-users from selecting fans using either static or total pressure.

B. Engineering Analysis

The engineering analysis establishes the relationship between the manufacturer production cost (MPC) and efficiency levels of commercial and industrial fans and blowers. This relationship serves as the basis for calculations performed in the other analysis tools to estimate the costs and benefits to individual consumers, manufacturers, and the nation.

As a first step in the engineering analysis, DOE established seven provisional fan groups based on characteristics such as the direction of airflow through the fan and the presence of a housing. While DOE analyzed seven provisional fan groups in this NODA, DOE expects the working group to discuss and ultimately recommend equipment classes for which standards would be considered. For each of the seven provisional fan groupings, DOE identified existing technology options that could affect efficiency. DOE then conducted a screening analysis to review each technology option and decide whether it: (1) is technologically feasible; (2) is practicable to manufacture, install, and service; (3) would adversely affect product utility or product availability; or (4) would have

[16] The fan's total output power is the power delivered to the air (or gas). It is proportional to the product of the fan airflow rate and fan total pressure (if air were incompressible).

adverse impacts on health and safety. The technology options remaining after the screening analysis consisted of a variety of impeller types and guide vanes. DOE used these technology options to divide the fan groups into subgroups and conducted a market-based assessment of the prevalence of each subgroup at the different efficiency levels analyzed using the sales data provided by AMCA. This NODA has fewer subgroups than the December 2014 NODA due to limitations in the sales data provided by AMCA. DOE analyzed six efficiency levels in this NODA, each representing a different efficiency target (η_{target}). AMCA presented results for an efficiency target of 62 percent for ducted fans.[17] This NODA includes one efficiency level representing the same efficiency target as well as additional levels above and below.

DOE estimated the MPCs for each technology option for each fan group as a function of blade or impeller diameter, independent of efficiency level. DOE then calculated MPCs for each fan group at each efficiency level analyzed by weighting the MPCs of each technology option within a group by its prevalence at the efficiency level being analyzed. The MPCs were derived from product teardowns and publically-available product literature and informed by interviews with manufacturers.

DOE's preliminary MPC estimates indicate that the changes in MPC as efficiency level increases are small or, in some fan groups, zero. However, DOE is aware that

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[17] See AMCA's DOE Fan efficiency Proposal presented at the 59th AMCA Annual Meeting, January 24, 2015. http://www.amca.org/adovacy/documents/DOEFanEfficiencyProposal-AMCAAnnualMeetingRedux1-24-15.pdf

aerodynamic redesigns are a primary method by which manufacturers improve fan performance. These redesigns require manufacturers to make large upfront investments for R&D, testing and prototyping, and purchasing new production equipment. DOE's preliminary findings indicate that the magnitude of these upfront costs is more significant than the difference in MPC of a fan redesigned for efficiency compared to its precursor. For this NODA, DOE included a conversion cost markup in its calculation of the manufacturer selling price (MSP) to account for these conversion costs. These markups and associated MSPs were developed and applied in downstream analyses. They are discussed in section C and presented in the engineering analysis and conversion cost spreadsheet.

The main outputs of the commercial and industrial fans engineering analysis are the MPCs of each fan group (including material, labor, and overhead) and technology option distributions at each efficiency level analyzed.

C. Manufacturer Impact Analysis

For the MIA, DOE used the Government Regulatory Impact Model (GRIM) to assess the economic impact of potential standards on commercial and industrial fan manufacturers. DOE developed key industry average financial parameters for the GRIM using publicly available data from corporate annual reports along with information received through confidential interviews with manufacturers. These values include average industry tax rate; working capital rate; net property, plant, and equipment rate;

selling, general, and administrative expense rate; research and development expense rate; depreciation rate; capital expenditure rate; and manufacturer discount rate.

Additionally, DOE calculated total industry capital and product conversion costs associated with meeting all analyzed efficiency levels. DOE first estimated the average industry capital and product conversion costs associated with redesigning a single fan model to meet a specific efficiency level. DOE estimated these costs for all technology options within each fan group. DOE multiplied the per model conversion costs by the number of models that would be required to be redesigned at each potential standard level to arrive at the total industry conversion costs. The number of models that would be redesigned was calculated using information from the AMCA sales database.

In the December 2014 NODA, DOE assumed a redesign time of six months and an additional testing time of six months. Five representatives of the industry commented that six months was not a representative redesign time and made recommendations ranging from 12 to 24 months. (AHRI, No. 53 at p. 8; AMCA, No. 48 at p. 4; Carrier, No. 43 at p. 2; Greenheck, No. 54 at p. 5; Morrison, No. 51 at p. 4) DOE revised its conversion cost estimates in this NODA to assume a redesign time of 12 months and additional testing time of 6 months.

The GRIM uses these estimated values in conjunction with inputs from other analyses including the MPCs from the engineering analysis, the annual shipments by fan group from the NIA, and the manufacturer markups for the cost recovery markup scenario from the LCC analysis to model industry annual cash flows from the base year through the end of the analysis period. The primary quantitative output of this model is the industry net present value (INPV), which DOE calculates as the sum of industry annual cash flows, discounted to the present day using the industry specific weighted average cost of capital, or manufacturer discount rate.

Standards can affect INPV in several ways including requiring upfront investments in manufacturing capital as well as research and development expenses, which increase the cost of production and potentially alter manufacturer markups. DOE expects that manufacturers may lose a portion of INPV due to standards. The potential loss in INPV due to standards is calculated as the difference between INPV in the base-case (absent new energy conservation standards) and the INPV in the standards case (with new energy conservation standards in effect). DOE examines a range of possible impacts on industry by modeling various pricing strategies commercial and industrial fan manufacturers may adopt following the adoption of new energy conservations standards for commercial and industrial fans.

In addition to INPV, the MIA also calculates the manufacturer markups, which are applied to the MPCs derived in the engineering analysis, to arrive at the manufacturer selling prices (MSPs) in the base case. For efficiency levels above the baseline, which require manufacturers to redesign models that do not meet the potential standards, conversion cost recovery markups were incorporated into the MSP in addition to the manufacturer markup. These conversion markups are based on the total conversion costs from the MIA and calculated to allow manufacturers to recover their upfront conversion costs. They are calculated by amortizing the conversion investment over the units shipped throughout the analysis period that were redesigned to meet the efficiency level being analyzed. The base case and standards case MSPs were used as inputs for downstream analyses.

D. Life-Cycle Cost and Payback Period Analyses

The LCC and PBP analyses determine the economic impact of potential standards on individual consumers, in the compliance year. The LCC is the total cost of purchasing, installing and operating a commercial or industrial fan over the course of its lifetime.

DOE determines the LCC by considering: (1) the total installed cost to the consumer (which consists of manufacturer selling price, distribution channel markups, and sales taxes); (2) the range of annual energy consumption of commercial and industrial fans as they are used in the field; (3) the operating cost of commercial and industrial fans (e.g., energy cost); (4) equipment lifetime; and (5) a discount rate that reflects the real consumer cost of capital and puts the LCC in present-value terms. The PBP represents the number of years needed to recover the increase in purchase price of higher-efficiency commercial and industrial fans through savings in the operating cost.

PBP is calculated by dividing the incremental increase in installed cost of the higher efficiency product, compared to the baseline product, by the annual savings in operating costs.

For each considered standards case corresponding to each efficiency level, DOE measures the change in LCC relative to the base case. The base case is characterized by the distribution of equipment efficiencies in the absence of new standards (i.e., what consumers would have purchased in the compliance year in the absence of new standards). In the standards cases, equipment with efficiency below the standard levels "roll-up" to the standard level in the compliance year.

To characterize annual fan operating hours, DOE established statistical distributions of consumers of each fan category across sectors (industry or commercial) and applications (clean air ventilation, exhaust, combustion, drying, process air, process heating/cooling, and others), which in turn determined the fan's operating hours. Recognizing that several inputs to the determination of consumer LCC and PBP are either variable or uncertain (e.g., annual energy consumption, lifetime, discount rate), DOE conducts the LCC and PBP analysis by modeling both the uncertainty and variability in the inputs using Monte Carlo simulations and probability distributions.

In addition to characterizing several of the inputs to the analyses with probability distributions, DOE developed a sample of individual fan selections (i.e., a fan models and the operating flow and pressure values for which they were purchased) using fan sales data provided by AMCA[18]. By developing this sample, DOE was able to perform the LCC and PBP calculations for each fan selection to account for the variability in energy consumption associated with each fan selection. DOE notes that when developing the LCC sample, it did not include fan sales data for which no flow and pressure selection information was available.

The primary outputs of the LCC and PBP analyses are: (1) average LCC in each standards case; (2) average PBPs; (3) average LCC savings at each standards case relative to the base case; and (4) the percentage of consumers that experience a net benefit, have no impact, or have a net cost for each fan group and efficiency level. The average annual energy consumption derived in the LCC analysis is used as an input in the NIA.

E. National Impact Analysis

The NIA estimates the national energy savings (NES) and the net present value (NPV) of total consumer costs and savings expected to result from potential new standards at each EL. DOE calculated NES and NPV for each EL as the difference between a base case forecast (without new standards) and the standards case forecast (with standards). Cumulative energy savings are the sum of the annual NES determined for the lifetime of a commercial or industrial fan shipped during a 30 year analysis period

[18] See description in LCC spreadsheet, LCC sample description worksheet.

assumed to start in 2019.[19] Energy savings include the full-fuel cycle energy savings (i.e., the energy needed to extract, process, and deliver primary fuel sources such as coal and natural gas, and the conversion and distribution losses of generating electricity from those fuel sources). The NPV is the sum over time of the discounted net savings each year, which consists of the difference between total energy cost savings and increases in total equipment costs. NPV results are reported for discount rates of 3 and 7 percent.

To calculate the NES and NPV, DOE projected future shipments[20] and efficiency distributions (for each EL) for each potential commercial and industrial fan category. DOE recognizes the uncertainty in projecting shipments and electricity prices; as a result the NIA includes several different scenarios for each. Other inputs to the NIA include the estimated commercial and industrial fan lifetime used in the LCC analysis, manufacturer selling prices from the MIA, average annual energy consumption, and efficiency distributions from the LCC.

IV. Issues on Which DOE Seeks Public Comment

DOE is interested in receiving comment on all aspects of this analysis. DOE is particularly interested in receiving comments and views of interested parties concerning the following issues:

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[19] The LCC and NIA spreadsheet provide results for a different compliance year (2019, 2020, and 2021).
[20] The "shipments" worksheet of the NIA spreadsheet presents the scope of the analysis and the total shipments value in units for the fans in scope.

1. DOE requests comments on the equation expressing fan total efficiency as presented in this notice, as a function of flow and total pressure.
2. DOE requests comment on the values of the flow constant (Q_0) and total pressure constant (P_0) used to calculate the minimum fan total efficiency at a given operating point.
3. DOE requests comments on the default transmission efficiency equation used in the FEI calculation.
4. DOE requests comments on the default motor losses assumptions used in the FEI calculation.
5. DOE requests comments on how manufacturers determine/would determine whether to redesign or eliminate a fan model that is not compliant at an operating point or points at which it has been sold previously.
6. DOE estimated the number of redesigns at each efficiency level based on the sales data provided by AMCA. DOE recognizes that the AMCA data does not include all commercial and industrial fan sales for the industry, and that existing fans can operate at more selection points than those at which they were sold as represented in the AMCA sales database. DOE requests comments on whether the resulting total conversion costs presented in the spreadsheets released with this NODA are representative of the industry at the efficiency levels analyzed. If not, how should the number of redesigns be adjusted to be representative of the industry?
7. DOE requests additional information to allow quantifying installation, repair, and maintenance costs for industrial and commercial fans.

8. DOE requests additional information to allow quantifying lifetimes for industrial and commercial fans.
9. DOE requests additional information to allow quantifying annual operating hours for industrial and commercial fans.
10. DOE seeks inputs and comments on the estimates of flow and total pressure operating points used in the energy use analysis.
11. DOE requests comments on how to account for consumers purchasing fans without providing any selection data (i.e., design flow and pressure values) in the LCC calculations.
12. DOE requests comment on determining the motor horsepower based on 120 percent of the fan shaft input power when performing the energy use calculation.
13. DOE requests comments on the method used in the LCC to identify fans that could be considered substitutes.
14. DOE seeks comments and inputs regarding the use of typical fan curves and efficiency curves in order to calculate fan shaft input power at different flow and

pressure values based on a fan selection's performance data at a single given design point.

15. DOE seeks inputs to support the development of trends in fan efficiency over time in the base case and in the standards cases.

The purpose of this NODA is to notify industry, manufacturers, consumer groups, efficiency advocates, government agencies, and other stakeholders of the publication of an analysis of potential energy conservation standards for commercial and industrial fans. Stakeholders should contact DOE for any additional information pertaining to the analyses performed for this NODA.

Issued in Washington, DC, on April 21, 2015.

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

[FR Doc. 2015-10036 Filed: 4/30/2015 08:45 am; Publication Date: 5/1/2015]