DEPARTMENT OF ENERGY

10 CFR Part 431

[Docket No. EERE–2006–STD–0125]

RIN 1904–AB58

Energy Conservation Program: Energy Conservation Standards for Refrigerated Bottled or Canned Beverage Vending Machines

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

ACTION: Notice of proposed rulemaking and notice of public meeting.

SUMMARY: The Energy Policy and Conservation Act prescribes energy conservation standards for certain commercial and industrial equipment and requires the U.S. Department of Energy (DOE) to administer an energy conservation program for this equipment. In this notice, DOE is proposing new energy conservation standards for refrigerated bottled or canned beverage vending machines. DOE is also announcing a public meeting on its proposed standards.

DATES: DOE will hold a public meeting on Wednesday, June 17, 2009 from 9 a.m. to 4 p.m. in Washington, DC. DOE must receive requests to speak at the public meeting no later than 4 p.m. Wednesday, June 3, 2009. DOE must receive a signed original and an electronic copy of statements to be given at the public meeting no later than 4 p.m. Wednesday, June 10, 2009.

DOE will accept comments, data, and information regarding the notice of proposed rulemaking (NOPR) before and after the public meeting, but no later than July 28, 2009. See section VII, ''Public Participation,'' of this NOPR for details. Hada Flowers

ADDRESSES: The public meeting will be held at the U.S. Department of Energy, Forrestal Building, Room 8E–089, 1000 Independence Avenue, SW., Washington, DC 20585–0121. Please note that foreign nationals visiting DOE Headquarters are subject to advance security screening procedures, requiring a 30-day advance notice. If you are a foreign national and wish to participate in the public meeting, please inform DOE as soon as possible by contacting Ms. Brenda Edwards at (202) 586–2945 so that the necessary procedures can be completed.

Any comments submitted must identify the NOPR for beverage vending machines, and provide docket number EERE–2006–STD–0125 and/or RIN number 1904–AB58. Comments may be submitted using any of the following methods:

- *Federal eRulemaking Portal: http://www.regulations.gov.* Follow the instructions for submitting comments.
- *E-mail: beveragevending.rulemaking@ee.doe.gov.* Include docket number EERE–2006–STD–0125 and/or RIN 1904–AB58 in the subject line of the message.
- *Postal Mail:* Ms. Brenda Edwards, U.S. Department of Energy, Building Technologies Program, Mailstop EE–2J, 1000 Independence Avenue, SW., Washington, DC 20585–0121. Telephone: (202) 586–2945. Please submit one signed original paper copy.
- *Hand Delivery/Courier:* Ms. Brenda Edwards, U.S. Department of Energy, Building Technologies Program, 950 L'Enfant Plaza, SW., 6th Floor, Washington, DC 20024. Please submit one signed original paper copy.

For detailed instructions on submitting comments and additional information on the rulemaking process, see section VII, ''Public Participation,'' of this document.

Docket: For access to the docket to read background documents or comments received, visit the U.S. Department of Energy, Resource Room of the Building Technologies Program, 950 L'Enfant Plaza, SW., 6th Floor, Washington, DC 20024, (202) 586–2945, between 9 a.m. and 4 p.m. Monday through Friday, except Federal holidays. Please call Ms. Brenda Edwards at the above telephone number for additional information regarding visiting the Resource Room. Please note: DOE's Freedom of Information Reading Room (Room 1E–190 at the Forrestal Building) no longer houses rulemaking materials.

FOR FURTHER INFORMATION CONTACT: Mr. Charles Llenza, U.S. Department of Energy, Building Technologies Program, EE–2J, 1000 Independence Avenue, SW., Washington, DC 20585–0121, (202) 586–2192, *Charles.Llenza@ee.doe.gov* or Ms. Francine Pinto, Esq., U.S. Department of Energy, Office of General Counsel, GC–72, 1000 Independence Avenue, SW., Washington, DC 20585–0121, (202) 586–9507, *Francine.Pinto@hq.doe.gov.*

SUPPLEMENTARY INFORMATION:

I. Summary of the Proposed Rule

The Energy Policy and Conservation Act (EPCA), as amended, specifies that any new or amended energy conservation standard the U.S. Department of Energy (DOE) prescribes for the equipment covered by this notice shall be designed to ''achieve the maximum improvement in energy efficiency * * * which the Secretary determines is technologically feasible and economically justified.'' (42 U.S.C. 6295(o)(2)(A), and (v)) Further, the new or amended standard must ''result in significant conservation of energy.'' (42 U.S.C. 6295(o)(3)(B) and (v)) In accordance with these and other statutory criteria discussed in this notice, DOE proposes to adopt new energy conservation standards for refrigerated bottled or canned beverage vending machines, hereafter referred to as ''beverage vending machines.'' The proposed standards, shown in Table I–1, would apply to all beverage vending machines manufactured 3 years after publication of the final rule establishing the energy conservation standards and offered for sale in the United States. (42 U.S.C. 6295(v)(4))[1]

TABLE I–1—PROPOSED STANDARD LEVELS

Equipment class*	Proposed standard level** Maximum Daily Energy Consumption (MDEC) *kWh/day*
A	$0.055 \times V + 2.56$†
B	$0.073 \times V + 3.16$††

* See section IV.A.2 of this notice for a discussion of equipment classes.
** ''V'' is the refrigerated volume (ft^3) of the refrigerated bottled or canned beverage vending machine, as measured by the American National Standards Institute (ANSI)/Association of Home Appliance Manufacturers (AHAM) HRF–1–2004, ''Energy, Performance and Capacity of Household Refrigerators, Refrigerator-Freezers and Freezers.''
† Trial Standard Level (TSL) 6.
†† TSL 3.

DOE's analyses indicate that the proposed energy conservation standards, trial standard level (TSL) 6 for Class A equipment and TSL 3 for Class B equipment would save a significant amount of energy—an estimated 0.098 quadrillion British thermal units (Btu), or quads, of cumulative energy over 30 years (2012 to 2042). See section V.A for a detailed description of TSLs. The economic impacts on commercial customers (*i.e.,* the average life-cycle cost (LCC) savings) are positive for both equipment classes.

The cumulative national net present value (NPV) of the proposed standards from 2012 to 2042 ranges from $0.105 billion (at a 7-percent discount rate) to $0.273 billion (at a 3-percent discount rate) in 2008$. This is the estimated total value of future operating cost savings minus the estimated increased equipment costs, discounted to 2008$. The benefits and costs of the standards can also be expressed in terms of annualized 2008$ values over the forecast period 2012 through 2042. Using a 7-percent discount rate for the annualized cost analysis, the cost of the standards is estimated to be $11.1 million per year in increased equipment and installation costs, while the annualized benefits are expected to be $20.5 million per year in reduced equipment operating costs. Using a 3-percent discount rate, the annualized cost of the standards is expected to be $9.4 million per year, while the annualized benefits of the standards are expected to be $21.4 million per year. (See section V.B.3 for additional details.) If DOE adopts the proposed standards, it expects manufacturers will lose 22.9 to 25.3 percent of the industry net present value (INPV), which is approximately $13.2 to $14.6 million.

DOE estimates that the proposed standards will have environmental benefits leading to reductions in greenhouse gas emissions (*i.e.,* cumulative (undiscounted) emission reductions) of 5.14 million tons (Mt) of carbon dioxide (CO_2) from 2012 to 2042.[2] Most of the energy saved is electricity. In addition, DOE expects the energy savings from the proposed standards to eliminate the need for approximately 46 megawatts (MW) of electric generating capacity by 2042. These results reflect DOE's use of energy price projections from the U.S. Energy Information Administration (EIA)'s *Annual Energy Outlook 2009* (*AEO2009*).[3] DOE also estimated that the net present value benefits of the proposed standards from reducing CO_2 emissions would range from $0 to $49.6 million using a 7-percent discount rate and $0 to $96.4 million using a 3-percent discount rate, although the method for developing these estimates is now under review. The net present value benefits of the proposed standards from reducing oxides of nitrogen (NO_X) emissions would range from $109,000 to $1.13 million using a 7-percent discount rate and from $187,000 to $1.93 million using a 3-percent discount rate. Finally, the net present value benefits of the proposed standards from reducing Hg emissions would range from $0 to $1.0 million using a 7-percent discount rate and $0 to $1.73 million using a 3-percent discount rate.

DOE proposes that the standards in today's NOPR for Class A and Class B beverage vending machines represent the maximum improvement in energy efficiency that is technologically feasible and economically justified. DOE proposes that the benefits to the Nation of the proposed standards (energy savings, commercial customer average LCC savings, national NPV increase, and emission reductions) outweigh the costs (loss of manufacturer INPV). Furthermore, DOE proposes that the proposed standards are technologically feasible because the technologies required to achieve these levels already exist.

DOE requests comment and further data or information on whether the

[1] This provision was redesignated by EISA, section 316(d)(1), as 42 U.S.C. 6295(v)(3).

[2] Additionally, the standards would result in emissions reductions for nitrogen oxides (NO_X) or generate a similar amount of NO_X emissions allowance credits in areas where such emissions are subject to regulatory or voluntary emissions caps.

[3] DOE intends to use EIA's *AEO2009* to generate the results for the final rule. The *AEO2009* Early Release contains reference case energy price forecasts, which shows higher commercial electricity prices at the national level compared with the *AEO2008* on a real (inflation adjusted) basis. If these early release energy prices remain unchanged in the final release, then incorporation of the *AEO2008* forecasts would likely result in reduced payback periods, greater life-cycle cost savings, and greater national net present value for the proposed standards.

energy savings and related benefits of TSL 6 outweigh the costs, including potential manufacturer impacts. DOE seeks comment on the magnitude of the estimated decline in INPV at TSL 6, and what impact this level could have on industry parties, including small businesses. DOE is particularly interested in receiving comments, views, and further data or information from interested parties concerning: (1) Why the private market has not been able to capture the energy benefits proposed in TSL 6; (2) whether and to what extent parties estimate they will be able to transfer costs of implementing TSL 6 on to consumers; (3) whether and to what extent parties estimate distributional chain intermediaries (such as wholesalers or bottlers) will be able to absorb TSL 6 implementation costs and in turn transfer these costs to on-site consumers, who ultimately benefit from the energy gains associated with the proposed standard.

II. Introduction

A. Overview

DOE proposes to set energy conservation standards for beverage vending machines at the levels shown in Table I–1. The proposed standards would apply to equipment manufactured 3 years after publication of the final rule establishing the energy conservation standards and offered for sale in the United States. DOE has tentatively found that the standards would save a significant amount of energy (see section III.C.2) and result in a cleaner environment. In the 30-year period after the new standards become effective, the Nation would tentatively save 0.098 quads (sum of 0.088 quads for Class A machines and 0.010 quads for Class B machines) of primary energy. These energy savings also would tentatively result in significantly reduced emissions of air pollutants and greenhouse gases associated with electricity production by avoiding the emission of 5.14 Mt of CO_2, up to 0.69 kt of NO_X, and up to 0.085 tons of Hg. In addition, DOE expects the standards to prevent the construction of 0.046 new 1,000 MW power plants by 2042. In total, DOE tentatively estimates the total net present value to the Nation of these standards to be $0.105 billion (sum of a positive net present value of $0.105 billion for Class A machines and zero [less than $0.5 million] for Class B machines) from 2012 to 2042 in 2008$.

Commercial customers would see benefits from the proposed standards. Although DOE expects the installed cost of the higher efficiency beverage vending machine to be approximately 4.8 percent higher than the average price of machines available today, when weighted by shipments across equipment classes, the energy efficiency gains would result in lower energy costs, saving customers about 19.8 percent per year on their energy bills. Based on DOE's LCC analysis for equipment with known shipments, DOE tentatively estimates that the mean payback period for higher efficiency beverage vending machines would be between 3.8 and 6.0 years depending on equipment class. In addition, when the net results of these equipment price increases and energy cost savings are summed over the lifetime of the higher efficiency equipment, customers could save approximately $49 to $316 (depending on equipment class) compared to their expenditures on today's baseline beverage vending machine.

B. Authority

Title III of EPCA sets forth a variety of provisions designed to improve energy efficiency. Part A of Title III (42 U.S.C. 6291–6309) provides for the Energy Conservation Program for Consumer Products Other Than Automobiles. The amendments to EPCA contained in the Energy Policy Act of 2005 (EPACT 2005), Public Law 109–58, include new or amended energy conservation standards and test procedures for some of these products, and direct DOE to undertake rulemakings to promulgate such requirements. In particular, section 135(c)(4) of EPACT 2005 amends EPCA to direct DOE to prescribe energy conservation standards for beverage vending machines. (42 U.S.C. 6295(v))

Because of its placement in Part A of Title III of EPCA, the rulemaking for beverage vending machine energy conservation standards is bound by the requirements of 42 U.S.C. 6295. However, since beverage vending machines are commercial equipment, DOE intends to place the new requirements for beverage vending machines in Title 10 of the Code of Federal Regulations (CFR), Part 431 (''Energy Efficiency Program for Certain Commercial and Industrial Equipment''), which is consistent with DOE's previous action to incorporate the EPACT 2005 requirements for commercial equipment. The location of the provisions within the CFR does not affect either their substance or applicable procedure, so DOE is placing them in the appropriate CFR part based on their nature or type and will refer to beverage vending machines as ''equipment'' throughout the notice.[4] The test procedures for beverage vending machines appear at Title 10 CFR 431.293 and 431.294.

EPCA provides criteria for prescribing new or amended standards for covered equipment. As indicated above, any new or amended standard for beverage vending machines must be designed to achieve the maximum improvement in energy efficiency that is technologically feasible and economically justified. (42 U.S.C. 6295(o)(2)(A) and (v)) But EPCA precludes DOE from adopting any standard that would not result in significant conservation of energy. (42 U.S.C. 6295(o)(3) and (v)) Moreover, DOE may not prescribe a standard for certain equipment if no test procedure has been established for that equipment. (42 U.S.C. 6295(o)(3) and (v)) EPCA also provides that, in deciding whether a standard is economically justified, DOE must determine whether the benefits of the standard exceed its burdens after receiving comments on the proposed standard. (42 U.S.C. 6295(o)(2)(B)(i) and (v)) To the greatest extent practicable, DOE must consider the following seven factors:

1. The economic impact of the standard on manufacturers and consumers of the equipment subject to the standard;
2. The savings in operating costs throughout the estimated average life of the covered equipment in the type (or class) compared to any increase in the price, or in the initial charges for, or maintenance expenses of, the equipment likely to result from the imposition of the standard;
3. The total projected amount of energy savings likely to result directly from the imposition of the standard;
4. Any lessening of the utility or the performance of the covered equipment likely to result from the imposition of the standard;
5. The impact of any lessening of competition, as determined in writing by the Attorney General, that is likely to result from the imposition of the standard;
6. The need for national energy conservation; and
7. Other factors the Secretary considers relevant.

Id.

Further, the Secretary may not prescribe an amended or new standard if interested parties have established by a preponderance of the evidence that the standard is likely to result in the unavailability in the United States of any equipment type (or class) with performance characteristics (including reliability), features, sizes, capacities, and volumes that are substantially the same as those generally available in the United States. (42 U.S.C. 6295(o)(4) and

[4] Because of their placement into 10 CFR 431, beverage vending machines will be referred to as ''equipment'' throughout this notice.

(v)) In addition, EPCA, as amended (42 U.S.C. 6295(o)(2)(B)(iii) and 6316(a)), establishes a rebuttable presumption that any standard for covered products is economically justified if the Secretary finds that ''the additional cost to the consumer of purchasing a product complying with an energy conservation standard level will be less than three times the value of the energy (and as applicable, water) savings during the first year that the consumer will receive as a result of the standard,'' as calculated under the test procedure in place for that standard. See section III.D.2.

C. Background

1. History of Standards Rulemaking for Beverage Vending Machines

On August 8, 2005, section 135(c)(4) of EPACT 2005 amended section 325 of EPCA, in part, to direct DOE to issue energy conservation standards for the equipment covered by this rulemaking, which would apply to equipment manufactured 3 years after publication of the final rule establishing the energy conservation standards. (42 U.S.C. 6295(v)(1), (2) and (3) [5]) The energy use of this equipment has never been regulated at the Federal level.

Section 135(a)(3) of EPACT 2005 also amended section 321 of EPCA, in part, by adding definitions for terms relevant to this equipment. (42 U.S.C. 6291(40)) EPCA defines ''refrigerated bottled or canned beverage vending machine'' as ''a commercial refrigerator that cools bottled or canned beverages and dispenses the bottled or canned beverages on payment.'' (42 U.S.C. 6291(40)) Section 136(a)(3) of EPACT 2005 amended section 340 of EPCA in part by adding a definition for ''commercial refrigerator, freezer, and refrigerator-freezer.'' [6]

During the course of this rulemaking, Congress passed the Energy Independence Security Act of 2007 (EISA 2007), which the President signed on December 19, 2007 (Pub. L. 110–140). Section 310(3) of EISA 2007 amended section 325 of EPCA in part by adding subsection 325(gg) (42 U.S.C. 6295(gg)). This subsection requires any new or amended energy conservation standards adopted after July 1, 2010, to incorporate ''standby mode and off mode energy use.'' (42 U.S.C. 6295(gg)(3)(A)) Because any standards associated with this rulemaking are required by August 2009, the energy use calculations will not include ''standby mode and off mode energy use.'' To include standby mode and off mode energy use requirements for this rulemaking would take considerable analytical effort and would likely require changes to the test procedure. Given the statutory deadline, DOE has decided to address this requirement when the energy conservation standards for beverage vending machines are reviewed in August 2015. At that time, DOE will consider the need for possible amendment in accordance with 42 U.S.C. 6295(m).

As an initial step to comply with EPCA's mandate to issue standards for beverage vending machines and to commence this rulemaking, on June 28, 2006, DOE published a notice of a public meeting and of the availability of its framework document for this rulemaking. 71 FR 36715. The framework document described the procedural and analytical approaches that DOE anticipated using to evaluate energy conservation standards for beverage vending machines and identified various issues to be resolved in conducting the rulemaking. DOE held a public meeting on July 11, 2006, to present the contents of the framework document, describe the analyses it planned to conduct during the rulemaking, obtain public comment on these subjects, and inform and facilitate interested parties' involvement in the rulemaking. DOE also gave interested parties an opportunity after the public meeting to submit written statements in response to the framework document.

On June 16, 2008, DOE published an advance notice of proposed rulemaking (ANOPR) concerning energy conservation standards for beverage vending machines. 72 FR 34094. In the ANOPR, DOE described and sought comment on its proposed equipment classes for this rulemaking and on the analytical framework, models, and tools (*e.g.,* LCC and national energy savings (NES) spreadsheets) that DOE used to analyze the impacts of energy conservation standards for beverage vending machines. In conjunction with the ANOPR, DOE also published on its Web site the complete ANOPR technical support document (TSD),[7] which included the results of DOE's preliminary (1) Engineering analysis, (2) markups analysis to determine equipment price, (3) energy use characterization, (4) LCC and payback period (PBP) analyses, (5) NES and national impact analyses (NIA), and (6) manufacturer impact analysis (MIA). In the ANOPR, DOE requested comment on these results and on a range of other issues including equipment classes, operating hours of compressors and lighting, refurbishment cycles, LCC baseline levels, base and standards case forecasts, differential impacts of new standards on future shipments by equipment class, selection of candidate standard levels, and the approach to characterizing energy conservation standards for beverage vending machines.

DOE held a public meeting in Washington, DC, on June 26, 2008, to present the methodology and results of the ANOPR analyses and solicit oral and written comments. Public comments focused on DOE's assumptions and approach and are addressed in detail in this NOPR.

2. Miscellaneous Rulemaking Issues

a. Consensus Agreement

After the ANOPR, Dixie-Narco stated that it would like the National Automatic Merchandising Association (NAMA) to facilitate and submit a consensus recommendation on behalf of the industry no later than December 15, 2008. Dixie-Narco stated that it would also like the new standards to take effect no later than January 1, 2010. (Dixie-Narco, No. 36 at p. 3) [8]

DOE supports efforts by interested parties to work together to develop and present to DOE recommendations on equipment categories and standard levels. Such recommendations are welcome throughout the standards rulemaking process. However, DOE did

[5] The relevant statutory provisions were renumbered pursuant to section 316 of the Energy Independence and Security Act of 2007, Public Law 110–140.

[6] This definition reads as follows:

''(9)(A) The term 'commercial refrigerator, freezer, and refrigerator-freezer' means refrigeration equipment that—

(i) Is not a consumer product (as defined in section 321 [of EPCA; 42 U.S.C. 6291(1)]);

(ii) Is not designed and marketed exclusively for medical, scientific, or research purposes;

(iii) Operates at a chilled, frozen, combination chilled and frozen, or variable temperature;

(iv) Displays or stores merchandise and other perishable materials horizontally, semivertically, or vertically;

(v) Has transparent or solid doors, sliding or hinged doors, a combination of hinged, sliding, transparent, or solid doors, or no doors;

(vi) Is designed for pull-down temperature applications or holding temperature applications; and

(vii) Is connected to a self-contained condensing unit or to a remote condensing unit.''
(42 U.S.C. 6311(9)(A))

[7] See *http://www1.eere.energy.gov/buildings/appliance_standards/commercial/beverage_machines_tsd.html.*

[8] A notation in the form ''Dixie-Narco, No. 36 at p. 3'' identifies a written comment that DOE has received and has included in the docket of this rulemaking. This particular notation refers to (1) A comment submitted by Dixie-Narco, (2) in document number 36 in the docket of this rulemaking, and (3) appearing on page 3 of document number 36.

not receive any consensus recommendations before publication of this NOPR. While DOE still encourages a consensus recommendation and will attempt to incorporate it into this rulemaking, any recommendation submitted to DOE during the NOPR comment period will be considered as a public comment.

b. Design Requirements

At the ANOPR public meeting, the Northwest Power and Conservation Council (NPCC) stated that under EISA, the Federal Government can regulate more than one characteristic of equipment, perhaps as a performance standard as well as a prescriptive standard. (NPCC, Public Meeting Transcript, No. 29 at p. 83) [9]

EPCA provides that an ''energy conservation standard'' must be either (A) ''a * * * level of energy efficiency'' or ''a * * * maximum quantity of energy use,'' or (B) for certain specified equipment, ''a design requirement.'' (42 U.S.C. 6291(6)) Thus, an ''energy conservation standard'' cannot consist of both a design requirement and a level of efficiency or energy use. Id.[10] Moreover, item (A) above indicates that a single energy conservation standard cannot have measures of both energy efficiency and energy use. Furthermore, EPCA specifically requires DOE to base its test procedure for this equipment on American National Standards Institute (ANSI)/American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Standard 32.1–2004, ''Methods of Testing for Rating Vending Machines for Bottled, Canned or Other Sealed Beverages.'' (42 U.S.C. 6293(b)(15)) The test methods in ANSI/ASHRAE Standard 32.1–2004 consist of means to measure energy consumption, not energy efficiency.

For the reasons stated above, DOE does not intend to develop efficiency standards or design requirements for this equipment. Instead, DOE intends to develop standards for maximum levels of energy use for beverage vending machines, and manufacturers could meet these standards with their own design methods.

c. Combination Vending Machines

Combination vending machines have a refrigerated volume for the purpose of cooling and vending ''beverages in a sealed container,'' and are therefore covered by this rule. However, beverage vending is not their sole function. Combination machines also have non-refrigerated volumes for the purpose of vending other, non-''sealed beverage'' merchandise. In the ANOPR, DOE addressed several comments from interested parties regarding combination vending machines. Specifically, these parties were concerned that regulating vending machines that contain both refrigerated and non-refrigerated products could result in confusion about what this rulemaking covers, or could result in manufacturers taking advantage of loopholes to produce equipment that does not meet the standards. In response, DOE stated that that the language used in EPCA to define beverage vending machines is broad enough to include any vending machine, including a combination machine, as long as some portion of that machine cools bottled or canned beverages and dispenses them upon payment. (42 U.S.C. 6291(40)) DOE interprets this language to cover any vending machine that can dispense at least one type of refrigerated bottled or canned beverage, regardless of the other types of vended products (some of which may not be refrigerated). 73 FR 34105–06.

III. General Discussion

A. Test Procedures

On December 8, 2006, DOE published a final rule in the **Federal Register** that incorporated by reference ANSI/ASHRAE Standard 32.1–2004, with two modifications, as the DOE test procedure for this equipment. (71 FR 71340, 71375; 10 CFR 431.294) The first modification specified that in section 6.2, Voltage and Frequency, equipment with dual nameplate voltages must be tested at the lower of the two voltages only. 71 FR 71340, 71355 The second modification specified that (1) any measurement of ''vendible capacity'' of refrigerated bottled or canned beverage vending machines must be in accordance with the second paragraph of section 5 of ANSI/ASHRAE Standard 32.1–2004, Vending Machine Capacity; and (2) any measurement of ''refrigerated volume'' of refrigerated bottled or canned beverage vending machines must be in accordance with the methodology specified in section 5.2, Total Refrigerated Volume (excluding subsections 5.2.2.2 through 5.2.2.4) of ANSI/Association of Home Appliance Manufacturers (AHAM) HRF–1–2004, ''Energy, Performance and Capacity of Household Refrigerators, Refrigerator-Freezers and Freezers.'' *Id.*

B. Technological Feasibility

1. General

DOE considers design options technologically feasible if they exist in the marketplace or if research has progressed to the development of a working prototype. ''Technologies incorporated in commercially available equipment or in working prototypes will be considered technologically feasible.'' 10 CFR part 430, subpart C, appendix A, section 4(a)(4)(i)

In each standards rulemaking, DOE conducts a screening analysis based on information it has gathered regarding all current technology options and prototype designs. In consultation with interested parties, DOE develops a list of design options for consideration in the rulemaking. All technologically feasible design options are candidates in this initial assessment. Early in the process, DOE eliminates from consideration any design option (a) that is not technologically feasible; (b) that is not practicable to manufacture, install, or service; (c) that will have adverse impacts on equipment utility or availability; or (d) for which there are health or safety concerns that cannot be resolved. Chapter 4 of the TSD accompanying this notice contains a description of the screening analysis for this rulemaking.

In the ANOPR, DOE eliminated seven of the technologies considered in the market and technology assessment. Higher efficiency evaporator and condenser fan blades, low-pressure differential evaporators, and defrost mechanisms were eliminated because they are not expected to improve energy efficiency. (73 FR 34108–09) Thermoacoustic refrigeration, magnetic refrigeration, electro-hydrodynamic heat exchangers, and copper rotor motors were eliminated because they are in the research stage. Therefore, they would not be practicable to manufacture, install, or service on the scale necessary to serve the relevant market at the time of the effective date of the standard. Because these technologies are in the research stage, there are also no working prototypes that allow DOE to assess whether they would have any adverse impacts on utility to significant subgroups of customers, result in the unavailability of any types of equipment, or present any significant

[9] A notation in the form ''NPCC, Public Meeting Transcript, No. 29 at p. 83'' identifies an oral comment that DOE received during the June 26, 2008, ANOPR Public Meeting. This comment was recorded in the public meeting transcript in the docket for this rulemaking (Docket No. EERE–2006–STD–0125). This particular notation refers to a comment (1) Made during the public meeting by NPCC; (2) recorded in document number 29, which is the public meeting transcript filed in the docket of this rulemaking; and (3) appearing on page 83 of document number 29.

[10] Beverage vending machines are not one of the specified equipment for which EPCA allows a standard to consist of a design requirement. (42 U.S.C. 6291(6)(B), 6292(a))

adverse impacts on health or safety. (73 FR 34109) DOE believes that all the efficiency levels discussed in today's notice are technologically feasible because there is equipment on the market or there are working prototypes at all of the efficiency levels analyzed. Chapter 4 of the TSD includes a discussion of the technological feasibility of the design options considered in the screening analysis.

2. Maximum Technologically Feasible Levels

In considering whether to adopt new standards for a type or class of beverage vending machines, DOE must ''determine the maximum improvement in energy efficiency or maximum reduction in energy use that is technologically feasible'' for such equipment. (42 U.S.C. 6295(p)(1) and (v)) If the standards are not designed to achieve such efficiency or use, the Secretary shall state the reasons for this in the proposed rule. *Id.* The values in Table III–1 represent the energy use levels that would achieve the maximum reductions in energy use that are technologically feasible at this time for beverage vending machines. DOE identified these maximum technologically feasible (''max-tech'') levels for the equipment classes analyzed as part of the engineering analysis (chapter 5 of the TSD). For both equipment classes, DOE applied the most efficient design options available for energy-consuming components.

TABLE III–1—MAX-TECH ENERGY USE LEVELS

Equipment class	Max-tech level *kWh/day*
A	MDEC = 0.045 × V + 2.42
B	MDEC = 0.068 × V + 2.63

''V'' is the refrigerated volume of the refrigerated bottled or canned beverage vending machine, as measured by ANSI/AHAM HRF–1–2004, ''Energy, Performance and Capacity of Household Refrigerators, Refrigerator-Freezers and Freezers.''

C. Energy Savings

1. Determination of Savings

DOE used the NES spreadsheet to estimate energy savings. The spreadsheet forecasts energy savings over the period of analysis for TSLs relative to the base case. DOE quantified the energy savings attributable to an energy conservation standard as the difference in energy consumption between the trial standards case and the base case. The base case represents the forecast of energy consumption in the absence of new mandatory efficiency standards. The NES spreadsheet model is described in section IV.G of this notice and in chapter 11 of the TSD accompanying this notice.

The NES spreadsheet model calculates the energy savings in site energy or kilowatt hours (kWh). Site energy is the energy directly consumed at building sites by beverage vending machines. DOE expresses national energy savings in terms of the source energy savings, which are the energy savings used to generate and transmit the energy consumed at the site. Chapter 11 of the TSD contains a table of factors used to convert kWh to Btu. DOE derives these conversion factors, which change with time, from EIA's *AEO2009.*

2. Significance of Savings

EPCA prohibits DOE from adopting a standard that would not result in significant additional energy savings. (42 U.S.C. 6295(o)(3)(B) and (v)) 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 to be savings that were not ''genuinely trivial.'' The estimated energy savings for the trial standard levels considered in this rulemaking range from 0.001 to 0.107 quadrillion Btu (quads); therefore, DOE considers them significant within the meaning of section 325 of the Act.

D. Economic Justification

1. Specific Criteria

As noted earlier, EPCA provides seven factors to be evaluated in determining whether an energy conservation standard is economically justified. The following sections discuss how DOE has addressed each factor thus far in this rulemaking. (42 U.S.C. 6295(o)(2)(B)(i) and (v))

a. Economic Impact on Manufacturers and Commercial Customers

DOE uses an annual cash-flow approach in determining the quantitative impacts of a new or amended standard on manufacturers. This includes both a short-term assessment based on the cost and capital requirements between the announcement of a regulation and when the regulation comes into effect, and a long-term assessment. Impacts analyzed include INPV, cash flows by year, and changes in revenue and income. Next, DOE analyzes and reports the impacts on different types of manufacturers, paying particular attention to impacts on small manufacturers. DOE then considers the impact of standards on domestic manufacturer employment, manufacturing capacity, plant closures, and loss of capital investment. Finally, DOE takes into account the cumulative impact of regulations on manufacturers. For a more detailed discussion of the MIA, see chapter 13 of the TSD.

For customers, measures of economic impact are generally the changes in installed price and annual operating costs (*i.e.,* the LCC). Chapter 8 of the TSD presents the LCC of the equipment at each TSL. The LCC is one of the seven factors to be considered in determining the economic justification for a new or amended standard. (42 U.S.C. 6295(o)(2)(B)(i)(II) and (v))

b. Life-Cycle Costs

The LCC is the total customer expense for a piece of equipment over the life of the equipment *(i.e.,* purchase price plus maintenance and operating costs). The LCC analysis compares the life-cycle costs of equipment designed to meet new or amended energy conservation standards with the life-cycle cost of the equipment likely to be installed in the absence of such standards. DOE determines these costs by considering (1) total installed price to the purchaser (including manufacturer selling price (MSP), sales taxes, distribution channel markups as shown in Table IV–3, and installation cost), (2) the operating expenses of the equipment (energy cost and maintenance and repair cost), (3) equipment lifetime, and (4) a discount rate that reflects the real cost of capital and puts the LCC in present value terms.

Recognizing that each type of commercial customer who uses a beverage vending machine is unique, DOE analyzed variability and uncertainty by performing the LCC and PBP calculations for seven types of businesses. Six of these typically purchase and install beverage vending machines in their buildings: office/healthcare (including a large number of firms engaged in financial and other services, medical and dental offices, and nursing homes); retail (including all types of retail stores and food and beverage service facilities); schools (including colleges, universities and large groups of housing facilities owned by State governments, such as prisons); manufacturing facilities and military bases (typically large utility customers that pay industrial rates for their electricity consumption); and ''other'' (including warehouses, hotels/motels, and assembly buildings). The seventh business type, which is the most common purchaser of the equipment, is a local bottler or vending machine operator that typically has the machine installed in one of the other six business types, provides vending services, and splits the coin box receipts through a contractual arrangement with the site owner. For a more detailed discussion of the LCC analysis, see chapter 8 of the TSD.

c. Energy Savings

While significant energy conservation is a separate statutory requirement for imposing an energy conservation standard, EPCA requires DOE to consider the total projected energy savings that are expected to result directly from the standard in determining the economic justification of such a standard. (42 U.S.C. 6295(o)(2)(B)(i)(III), and (3), and (v)) DOE used the NES spreadsheet results in its consideration of total projected savings. Section IV.G.1 of this notice discusses the savings figures.

d. Lessening of Utility or Performance of Equipment

In establishing equipment classes, evaluating design options, and assessing the impact of potential standard levels, DOE tried to avoid having new standards for beverage vending machines lessen the utility or performance of the equipment under consideration in this rulemaking. (42 U.S.C. 6295(o)(2)(B)(i)(IV) and (v)) None of the proposed trial standard levels considered in this rulemaking involves changes in equipment design or unusual installation requirements that would reduce the utility or performance of the equipment. See chapter 4 and chapter 16 of the TSD for more detail.

e. Impact of Any Lessening of Competition

EPCA directs DOE to consider any lessening of competition likely to result from standards. It directs the Attorney General to determine in writing the impact, if any, of any lessening of competition likely to result from imposition of a proposed standard. (42 U.S.C. 6295(o)(2)(B)(i)(V) and (ii), and (v)) DOE has transmitted a written request to the Attorney General soliciting a written determination on this issue.

f. Need of the Nation To Conserve Energy

The non-monetary benefits of the proposed standards are likely to be reflected in improvements to the security and reliability of the Nation's energy system, and in reduced reliance on foreign sources of energy. Reductions in the overall demand for energy will reduce the Nation's reliance on foreign sources of energy and increase reliability of the Nation's electricity system. DOE conducted a utility impact analysis to show the reduction in installed generation capacity. Reduced power demand (including peak power demand) generally improves the security and reliability of the energy system.

The proposed standards are likely to result in improvements to the environment. In quantifying these improvements, DOE has defined a range of primary energy conversion factors and associated emission reductions based on the generation that energy conservation standards displaced. DOE reports the environmental effects from each trial standard level for this equipment in the draft environmental assessment in chapter 16 of the TSD. (42 U.S.C. 6295(o)(2)(B)(i)(VI) and (v))

g. Other Factors

EPCA allows the Secretary of Energy, in determining whether a standard is economically justified, to consider any other factors the Secretary deems to be relevant. (42 U.S.C. 6295(o)(2)(B)(i)(VII) and (v)) Under this provision, DOE considered LCC impacts on identifiable groups of customers, such as customers of different business types who may be disproportionately affected by any national energy conservation standard. In particular, DOE examined the LCC impact on small businesses (*i.e.,* those with low annual income) that may not be able to afford a significant increase in the purchase price (''first cost'') of beverage vending machines. Some of these customers may retain equipment past its useful life. Large increases in first cost also could preclude the purchase and use of equipment altogether.

2. Rebuttable Presumption

Section 325(o)(2)(B)(iii) of EPCA states that there is a rebuttable presumption that an energy conservation standard is economically justified if the additional cost to the consumer of a product that meets the standard level is less than three times the value of the first-year energy (and, as applicable, water) savings resulting from the standard, as calculated under the applicable DOE test procedure. (42 U.S.C. 6295(o)(2)(B)(iii)) DOE's LCC and PBP analyses generate values that indicate the cost-effectiveness of products meeting potential energy conservation standards. These values include, but are not limited to, the 3-year payback period contemplated under the rebuttable presumption test discussed above. (See chapter 8 of the TSD that accompanies this notice.) However, DOE routinely conducts a full economic analysis that considers the full range of impacts, including those to the consumer, manufacturer, Nation, and environment, as required under 42 U.S.C. 6295(o)(2)(B)(i). The results of this full analysis serve as the basis for DOE to definitively determine the economic justification for a potential standard level (thereby supporting or rebutting the results of any preliminary determination of economic justification).

IV. Methodology and Discussion of Comments

DOE used two spreadsheet tools to determine the impact of energy conservation standards on the Nation. The first spreadsheet calculates LCCs and PBPs of potential new energy conservation standards. The second spreadsheet provides shipments forecasts and then calculates NES and NPV impacts of potential new energy conservation standards. DOE also assessed manufacturer impacts, largely through use of the Government Regulatory Impact Model (GRIM).

Additionally, DOE estimated the impacts that energy conservation standards for beverage vending machines have on utilities and the environment. DOE used a version of EIA's National Energy Modeling System (NEMS) for the utility and environmental analyses. The NEMS model simulates the energy economy of the United States and has been developed over several years by EIA primarily to prepare the *Annual Energy Outlook* (*AEO*). NEMS produces a widely known baseline forecast for the Nation through 2025 and is available on the DOE Web site.[11] The version of NEMS used for efficiency standards analysis is called NEMS–BT[12] and is based on the *AEO2008* version with minor modifications. NEMS offers a sophisticated picture of the effect of standards, since it measures the interactions between the various energy supply and demand sectors and the economy as a whole.

A. Market and Technology Assessment

When beginning an energy conservation standards rulemaking,

[11] *http://www.eia.doe.gov/oiaf/aeo/overview.*

[12] EIA approves use of the name NEMS to describe only an AEO version of the model without any modification to code or data. Because the present analysis entails some minor code modifications and runs the model under various policy scenarios that deviate from AEO assumptions, the name NEMS–BT refers to the model used here. For more information on NEMS, refer to *The National Energy Modeling System: An Overview 1998.* DOE/EIA–0581 (98), February 1998. BT is DOE's Building Technologies Program. NEMS–BT was formerly called NEMS–BRS.

DOE develops information that provides an overall picture of the market for the equipment concerned, including the purpose of the equipment, the industry structure, and market characteristics. This activity includes both quantitative and qualitative assessments based primarily on publicly available information. The subjects addressed in the market and technology assessment for this rulemaking include equipment classes, manufacturers, quantities, and types of equipment sold and offered for sale; retail market trends; and regulatory and non-regulatory programs. See chapter 3 of the TSD for further discussion of the market and technology assessment.

1. Definition of Beverage Vending Machine

EPCA defines the term ''refrigerated bottled or canned beverage vending machine'' as ''a commercial refrigerator that cools bottled or canned beverages and dispenses the bottled or canned beverages on payment.'' (42 U.S.C. 6291(40)) Thus, coverage of equipment under EPCA as a beverage vending machine in part depends on whether it cools and dispenses ''bottled beverages'' and/or ''canned beverages.'' Based on comments on the framework document, DOE tentatively decided to consider a broader definition for the terms ''bottled'' and ''canned'' as they apply to beverage vending machines. Such a definition would avoid unnecessary complications regarding the material composition of the container and eliminate the need to determine whether a particular container is a bottle or a can. A bottle or can in this context refers to ''a sealed container for beverages,'' so a bottled or canned beverage is ''a beverage in a sealed container.'' In the ANOPR, DOE sought comment on this broader definition and on whether it is consistent with the intent of EPCA. DOE did not receive any comments on this definition. Therefore, DOE is proposing to define a bottled or canned beverage as ''a beverage in a sealed container.''

2. Equipment Classes

When evaluating and establishing energy conservation standards, DOE generally divides covered equipment into equipment classes by the type of energy used, capacity, or other performance-related features that affect efficiency and factors such as the utility of such feature(s). (42 U.S.C. 6295(q)) DOE routinely establishes different energy conservation standards for different equipment classes based on these criteria.

Certain characteristics of beverage vending machines have the potential to affect their energy use and efficiency. Accordingly, these characteristics could be the basis for separate equipment classes for these machines. DOE determined that the most significant criterion affecting beverage vending machine energy use is the method used to cool beverages. DOE divided covered equipment into two equipment classes, Class A and Class B. DOE defines these terms as follows:

- Class A means a refrigerated bottled or canned beverage vending machine that is fully cooled.
- Class B means any refrigerated bottled or canned beverage vending machine not considered to be Class A.

The Class A beverage vending machine equipment class comprises machines that cool product throughout the entire refrigerated volume. Class A machines generally use ''shelf-style'' vending mechanisms and a transparent (glass or polymer) front. Because the next-to-be-vended product is visible to the customer and any product can be selected by the customer off the shelf, all bottled or canned beverage containers are necessarily enclosed within the refrigerated volume.

In Class B beverage vending machines, cold, refrigerated air is directed at a fraction (or zone) of the refrigerated volume. This cooling method is used to assure that the next-to-be-vended product will be the coolest product in the machine. These machines typically have an opaque front and use a ''stack-style'' vending mechanism.

B. Engineering Analysis

The engineering analysis develops cost-efficiency relationships to show the manufacturing costs of achieving increased efficiency. DOE has identified the following three methodologies to generate the manufacturing costs needed for the engineering analysis: (1) The design-option approach, which calculates the incremental costs of adding design options to a baseline model that will improve its efficiency; (2) the efficiency-level approach, which provides the relative costs of achieving increases in energy efficiency levels without regard to the particular design options used to achieve such increases; and (3) the cost-assessment (or reverse engineering) approach, which provides ''bottom-up'' manufacturing cost assessments for achieving various levels of increased efficiency based on detailed cost data for parts and material, labor, shipping/packaging, and investment for models that operate at particular efficiency levels.

1. Approach

In this rulemaking, DOE is adopting a design-option approach, which calculates the incremental costs of adding specific design options to a baseline model. DOE decided on this approach after receiving no response to its ANOPR request for the manufacturer data needed to execute an efficiency-level, approach-based analysis. The design-option approach allows DOE to make its engineering analysis methodologies, assumptions, and results publicly available, allowing advocates, manufacturers, and other interested parties the opportunity to review and comment on this information. Using the design-option approach, cost-efficiency relationship estimates are based on manufacturer or component supplier data or derived from engineering computer simulation models. Chapter 5 of the TSD contains a detailed description of the equipment classes analyzed and analytical models used to conduct the beverage vending machine engineering analysis based on the design-option approach.

2. Equipment Analyzed in the Engineering Analysis

DOE analyzed three beverage vending machines of different sizes for both equipment classes to assess how energy use varies with size. DOE chose a small, medium, and large machine for Class A and Class B beverage vending machines, based on current market offerings. See chapter 3 of the TSD for a detailed description of the Class A and Class B equipment classes.

In the ANOPR, DOE responded to several comments and presented a detailed discussion of its equipment class selection methodology. 73 FR 34103. For the NOPR, DOE increased the physical case dimensions based on a reevaluation of equipment currently on the market, even though the equipment classification methodology has not changed since the ANOPR. The case dimension increases affected the engineering parameters that are a function of case dimension, including wall area, vendible capacity, and refrigerated volume. The changes to refrigerated volume and assumed vendible capacity are summarized in Table IV–1. All changes are described in detail in chapter 5 of the TSD.

TABLE IV–1—CONFIGURATIONS OF THE BEVERAGE VENDING MACHINES ANALYZED

	Class A			Class B		
	Small	Medium	Large	Small	Medium	Large
Vendible Capacity *number of cans*	300	400	500	450	650	800
Refrigerated Volume ft^3	17	22	34	17	22	26

3. Analytical Models

DOE's design-option-based engineering analysis relies on four analytical models to develop the relationship between cost and increased efficiency: the cost model, baseline model, design-options analysis, and energy consumption model. The cost model estimates the core case cost of a beverage vending machine for each equipment class. The core case cost is the fully absorbed production cost of components that do not consume energy. The baseline model, which defines baseline specifications and incorporates energy consuming components for each equipment class, estimates the energy-consumption and cost of the typical equipment (*i.e.,* units of typical efficiency) on the market today. The design-options analysis develops cost-efficiency input data for a list of potential energy-saving technologies that can be integrated into the baseline model to increase efficiency. The energy consumption model calculates the daily energy consumption (DEC) of beverage vending machines at the various performance levels achieved by implementing these design options. Chapter 5 of the TSD includes a detailed description of each analytical model and its role in calculating the cost-efficiency data results of the engineering analysis.

a. Cost Model

DOE used a cost model to estimate the core case cost (*i.e.,* the fully absorbed production cost of the structure, walls, doors, shelving and fascia of the case, but not the cost of any energy-using components) of beverage vending machines. This model was adapted from a cost model developed for DOE's rulemaking on commercial refrigeration equipment.[13] The approach for commercial refrigeration equipment involved disassembling a self-contained refrigerator, analyzing the materials and manufacturing processes for each component, and developing a parametric spreadsheet to model the cost to fabricate (or purchase) each component and the cost of assembly. Because of the similarities in manufacturing processes between self-contained commercial refrigeration equipment and beverage vending machines, DOE was able to adapt the commercial refrigeration equipment cost model for beverage vending machines by maintaining many of the assumptions about materials and manufacturing processes but modifying the dimensions and types of components specific to beverage vending machines. To confirm the accuracy of the cost model, DOE obtained input from interested parties on beverage vending machine production cost estimates and on other assumptions DOE used in the model. Chapter 5 of the TSD provides details of the cost model.

Following the ANOPR, DOE received no comments regarding its cost model; therefore, no significant changes were made to the methodology used in the NOPR analysis. Since the ANOPR, all dollar amounts have been updated to 2008$ using the producer price index.

b. Baseline Models

As mentioned above, the engineering analysis calculates the incremental costs for equipment with efficiency levels above a baseline model in each equipment class. DOE defined baseline specifications for each equipment class, including dimensions, numbers of components, operating temperatures, nominal power ratings, and other features needed to calculate energy consumption. The baseline specifications define the energy consumption and cost of the typical equipment (*i.e.,* units of typical efficiency) on the market today, namely beverage vending machines meeting the ENERGY STAR Tier 1 efficiency level. (See chapter 3 of the TSD for further details on the ENERGY STAR criteria.)

DOE established baseline specifications for each equipment class modeled in the engineering analysis by reviewing available manufacturer data, selecting several representative units based on that data, and then aggregating the physical characteristics of the selected units. This process created a representative unit for each equipment class with average characteristics for physical parameters (*e.g.,* volume, wall area), and typical performance for energy-consuming components (*e.g.,* fans, lighting). See chapter 5 of the TSD for these specifications.

DOE received one comment regarding the baseline refrigerant. In the ANOPR, DOE stated that hydrofluorocarbon (HFC) refrigerants would be the basis of its analyses because of the phaseout of hydrochlorofluorocarbons (HCFCs) in 2010,[14] and the volatility and availability issues associated with hydrocarbon (HC) refrigerants and CO_2. Coca-Cola commented that it is phasing out HFCs and that it should not have any refrigeration equipment with HFC refrigerants by 2012. (Coca-Cola, Public Meeting Transcript, No. 29 at pp. 179–180) The Joint Comment stated that while manufacturers and customers are interested in alternatives to HFC refrigerants, it considers the use of HFC refrigerants a good default assumption with respect to costs and performance. (Joint Comment, No. 34 at p. 2)

While DOE acknowledges the use of some alternative refrigerants (*i.e.,* HCs and CO_2) elsewhere in the world, the majority of the U.S. beverage vending machine industry uses HFC refrigerants. Since the analysis should be based on the refrigerant most widely used in beverage vending machines, DOE will continue to use HFC refrigerants as the basis for its technical analysis in this rulemaking.

c. Design Options

In the market and technology assessment for the ANOPR, DOE defined an initial list of technologies that could reduce the energy consumption of beverage vending machines. In the screening analysis for the ANOPR, DOE screened out four of these technologies based on four screening criteria: technological feasibility; practicability to manufacture, install and service; impacts on equipment utility or availability; and impacts on health or

[13] See *http://www.eere.energy.gov/buildings/appliance_standards/commercial/refrigeration_equipment.html* for further detail on and validation of the commercial refrigeration equipment cost model.

[14] EPA is phasing out the production and importation of certain HCFC refrigerants (*i.e.,* HCFC–142b and HCFC–22) in new equipment in the United States by January 1, 2010. EPA is phasing out the production and importation of all HCFC refrigerants in new equipment in the United States by January 1, 2015. (42 U.S.C. 7671(d))

safety. 73 FR 34108–09. The remaining technologies became inputs to the ANOPR engineering analysis as design options.

For the NOPR, DOE did not receive any comments suggesting revisions to the list of ANOPR design options. Therefore, the design option inputs remain the same for the NOPR engineering analysis. However, the Joint Comment stated that DOE must document that the energy savings potential of light-emitting diode (LED) lighting has received adequate consideration (Joint Comment, No. 34 at p. 2).

DOE's consideration of LED lighting technology is documented in the Engineering Analysis Spreadsheet and chapter 5 of the TSD. Since the issuance of the ANOPR, DOE has carefully reviewed the LED technology design option and revised the cost and energy usage data for the NOPR. The LED price and energy use updates are adapted from the commercial refrigeration rulemaking.[15] These changes are based on conversations with LED manufacturers and information gathered on existing LED systems for beverage vending machines. As a result of these conversations, DOE better understands how LED lighting can be configured to replace fluorescent systems in order to save energy without sacrificing utility. In certain applications, the focused light from LED systems delivers the same amount of light to the space being illuminated as fluorescent systems and allows for a reduction in the wattage consumed. As a result, overall energy consumption for lighting decreases. Implemented across the installed base of beverage vending machines, LED systems could result in considerable energy savings. Estimates of these savings can be found in chapter 5 of the TSD.

d. Energy Consumption Model

The energy consumption model estimates the DEC of beverage vending machines at various performance levels using a design-option approach. The model is specific to the categories of equipment covered under this rulemaking, but is sufficiently generalized to model the energy consumption of both covered equipment classes. For a given equipment class, the model estimates the DEC for the baseline and the energy consumption of several levels of performance above the baseline. The model is used to calculate each performance level separately.

In developing the energy consumption model, DOE made certain assumptions, including general assumptions about the analytical methodology and specific assumptions regarding load components and design options. DOE based its energy consumption estimates on new equipment tested in a controlled-environment chamber under the procedures and conditions specified in ANSI/ASHRAE Standard 32.1–2004, ''Methods of Testing for Bottled, Canned, and Other Sealed Beverages.'' [16] Manufacturers of beverage vending machines must certify that their equipment complies with Federal standards using this test method, which specifies a certain ambient temperature, humidity, and other requirements. One relevant specification that is absent from ANSI/ASHRAE Standard 32.1–2004 is the operating hours of the display case lighting during a 24-hour period. DOE assumes the operating time to be 24 hours (*i.e.,* that display case lighting is on throughout the 24-hour period) when conducting the analyses for this rulemaking. Chapter 5 of the TSD details these and other beverage vending machine considerations.

The energy consumption model calculates DEC from two major components: (1) Component energy consumption, and (2) compressor energy consumption (expressed as kWh/day). Component energy consumption is a sum of the direct electrical energy consumption of fan motors, lighting, vend mechanisms, control systems, and coin and bill validators. Compressor energy consumption is calculated from the total refrigeration load, expressed as Btu/h, and a compressor model based on the 10-coefficient compressor model in American Refrigeration Institute (ARI) Standard 540–2004, ''Performance Rating of Positive Displacement Refrigerant Compressors and Compressor Units.'' The total refrigeration load is a sum of the component heat load and non-electric load. The component heat load is a sum of the heat emitted by evaporator fan motors and lighting affecting refrigerated space. (Condenser fan motors are outside the refrigerated space of a beverage vending machine and do not contribute to the component heat load.) The non-electric load is the sum of: the heat contributed by radiation through glass doors in Class A machines; heat conducted through walls and doors; and sensible and latent loads from warm, moist air infiltration through vend doors and cracks. Chapter 5 of the TSD provides details on component energy consumption, compressor energy consumption, and heat load models.

During the framework public meeting, DOE asked for comments on which normalization metric, vendible capacity, or refrigerated volume would be most appropriate for setting standards for beverage vending machines. Based on public comments, DOE decided to use refrigerated volume in the ANOPR. 73 FR 34105. Following the ANOPR, a comment submitted by the American Council for an Energy-Efficient Economy (ACEEE), Appliance Standards Awareness Project (ASAP), Natural Resources Defense Council (NRDC), and NPCC (hereafter ''Joint Comment'') stated that using internal refrigerated volume instead of a 12-ounce can count for rating beverage vending machines is appropriate. (Joint Comment, No. 34 at p. 3).

4. Engineering Analysis Results

The results of the engineering analysis are reported as cost-efficiency data (or ''curves'') in the form of DEC (in kWh) versus MSP (in dollars). DOE developed six curves representing the two equipment classes and three representative sizes analyzed in each equipment class. The methodology for developing the curves started with determining the energy consumption for baseline equipment and the full cost of production for this equipment. Above the baseline, DOE implemented design options using the ratio of cost to savings, and implemented only one design option at each engineering level analyzed. Design options were implemented until all available technologies were employed (*i.e.,* at a max-tech level). Table IV–2 shows the engineering analysis results. See TSD chapter 5 for additional detail on the engineering analysis and TSD appendix B for complete cost-efficiency results.

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[15] See *http://www.eere.energy.gov/buildings/appliance_standards/commercial/refrigeration_equipment.html* for further detail on and validation of the commercial refrigeration equipment LED price and usage data.

[16] These test procedures are incorporated by reference at 10 CFR 431.294.

Table IV-2 Engineering Analysis Cost-Efficiency Results

Equipment Class	Size Analyzed	Metric	Efficiency Level											
			Baseline	1	2	3	4	5	6	7	8	9	10	11
A	Small	MSP $/ft^3	$1,817.34	$1,856.20	$1,868.92	$1,876.79	$1,881.93	$1,893.33	$2,003.03	$2,027.85	$2,043.67	$2,055.07	$2,204.35	$2,971.76
		DEC kWh/day/ft^3	9.00	6.10	5.73	5.57	5.47	5.27	3.95	3.73	3.63	3.58	3.33	3.25
	Medium	MSP $/ft^3	$2,187.45	$2,222.07	$2,243.64	$2,251.52	$2,257.59	$2,268.99	$2,378.69	$2,408.68	$2,427.84	$2,439.23	$2,602.29	$3,456.21
		DEC kWh/day/ft^3	9.18	6.53	5.97	5.81	5.70	5.51	4.19	3.95	3.83	3.79	3.52	3.43
	Large	MSP $/ft^3	$2,368.67	$2,426.95	$2,433.02	$2,440.90	$2,453.62	$2,563.32	$2,593.31	$2,613.58	$2,624.98	$2,840.85	$3,846.11	n/a
		DEC kWh/day/ft^3	10.24	6.75	6.62	6.46	6.21	4.89	4.60	4.46	4.41	4.05	3.94	n/a
B	Small	MSP $/ft^3	$1,468.18	$1,521.33	$1,544.13	$1,557.72	$1,591.67	$1,603.07	$2,023.72	$2,909.47	n/a	n/a	n/a	n/a
		DEC kWh/day/ft^3	11.49	4.96	4.62	4.51	4.31	4.28	3.78	3.69	n/a	n/a	n/a	n/a
	Medium	MSP $/ft^3	$1,667.51	$1,716.84	$1,739.63	$1,744.77	$1,760.59	$1,796.01	$1,807.41	$2,228.06	$3,247.02	n/a	n/a	n/a
		DEC kWh/day/ft^3	12.31	5.56	5.20	5.12	4.99	4.76	4.72	4.22	4.12	n/a	n/a	n/a
	Large	MSP $/ft^3	$1,725.34	$1,779.80	$1,802.60	$1,819.53	$1,854.95	$1,866.35	$2,287.00	$3,439.97	n/a	n/a	n/a	n/a
		DEC kWh/day/ft^3	12.76	5.85	5.48	5.33	5.07	5.03	4.52	4.41	n/a	n/a	n/a	n/a

In addition to the design-option efficiency levels above, DOE calculated intermediate efficiency levels to bridge large performance level gaps created by certain design options. For instance, in a representative, medium-sized Class A machine, the LED design option leads to a considerable decrease in energy consumption between efficiency levels 5 and 6. Intermediate efficiency levels are necessary to create an even distribution of performance levels that are achievable without using a specified combination of design options. Chapter 5 of the TSD discusses these intermediate efficiency levels and the methodology behind their selection in more detail.

C. Markups To Determine Equipment Price

This section explains how DOE developed the distribution channel (supply chain) markups to determine installed costs for beverage vending machines (chapter 6 of the TSD). DOE used the supply chain markups it developed (including sales taxes and installation costs), along with the MSPs developed from the engineering analysis, to arrive at the final installed equipment prices for baseline and higher-efficiency beverage vending machines. As explained in the ANOPR, 73 FR 34113, DOE defined three distribution channels for beverage vending machines to describe how the equipment passes from the manufacturer to the customer. For the ANOPR analysis, DOE estimated market shares of 68 percent, 27 percent, and 5 percent for the manufacturer/beverage bottler (distribution channel #1), manufacturer/wholesaler/operator (distribution channel #2), and manufacturer/wholesaler/site owner (distribution channel #3) channels, respectively, for all beverage vending machines, based on market estimates from consultants. That is, 68 percent of all sales were estimated to pass from the manufacturer directly to a bottler; 27 percent were estimated to pass from the manufacturer through a wholesaler to a beverage machine operator; and 5 percent were estimated to pass from the manufacturer through a wholesaler to the owner of the premises where the machine operated. In the latter case, the owner of the premises also owned the beverage vending machine. 73 FR 34113.

Regarding distribution channels for vending machines and the calculation of the overall cost markups, Royal Vendors commented that distribution channel #1 (direct sales to major bottlers) will be around 85 percent to 90 percent (Royal Vendors, No. 29 at p. 39). Dixie-Narco stated its sales percentages through the three distribution channels would be 85 percent, 12 percent and 3 percent, respectively. (Dixie-Narco, No. 29 at p. 40) Both comments gave increased importance to direct sales to major bottlers and deemphasized sales through wholesalers to vending operators and site owners. NPCC asked if the markups would be lower if DOE increased the market share of channel #1 from 68 percent to 80 or 85 percent. (NPCC, No. 29 at p. 52)

For the NOPR, DOE updated its assumptions regarding the percentage breakdown of market distribution through the different channels to determine customer markups for purchasing beverage vending machines. These updates were to increase the fraction of the market through distribution channel #1 to 85 percent and reduce the fraction of the market distribution through other channels in line with manufacturer comments. Table IV–3 provides the revised estimated distribution channel shares (in percentage of total sales) through each of the three distribution channels.

Table IV-3 Distribution Channel Market Shares for Beverage Vending Machines

Channel 1	Channel 2	Channel 3
Manufacturer ↓ Beverage Bottler/Distributor	Manufacturer ↓ Equipment Wholesaler/Distributor ↓ Vending Machine Operator	Manufacturer ↓ Equipment Wholesaler/Distributor ↓ Site Owner
85%	**10%**	**5%**

For each step in the distribution channels presented above, DOE estimated a baseline markup and an incremental markup, which are additional amounts added when equipment is sold and installed. A baseline markup is applied for the purchase of baseline equipment. An incremental markup is applied to the incremental increase in MSP for the purchase of higher efficiency equipment.

DOE developed markups for each step of a given distribution channel based on available financial data as described in the ANOPR analysis. 73 FR 34113–14. DOE continued to use the same sources of data for the NOPR analysis, but updated the input assumptions to the most recent data where possible.

Average overall markups in each distribution channel can be calculated using estimates of the shipments of beverage vending machines by distribution of State population. Since markups are not uniform among wholesalers, DOE used the Excel spreadsheet-based Crystal Ball program, which employs Monte Carlo analysis, to reflect this uncertainty in the LCC analysis. Table IV–4 and Table IV–5 show overall baseline and incremental markups for sales within each distribution channel. Chapter 6 of the TSD provides additional detail on markups.

TABLE IV–4—OVERALL AVERAGE BASELINE MARKUPS BY DISTRIBUTION CHANNEL INCLUDING SALES TAX

	Manufacturer direct	Wholesaler/ Distributor	Overall weighted average
Markup	1.000	1.460	1.069
Sales Tax	1.070	1.070	1.070
Overall Markup	1.070	1.562	1.144

TABLE IV–5—OVERALL AVERAGE INCREMENTAL MARKUPS BY DISTRIBUTION CHANNEL INCLUDING SALES TAX

	Manufacturer direct	Wholesaler/ Distributor	Overall weighted average
Markup	1.000	1.200	1.030
Sales Tax	1.070	1.070	1.070
Overall Markup	1.070	1.284	1.102

D. Energy Use Characterization

The energy use characterization estimates the annual energy consumption of beverage vending machines. This estimate is used in the subsequent LCC and PBP analyses (chapter 8 of the TSD) and NIA (chapter 11 of the TSD). DOE estimated the energy use for machines in the two equipment classes analyzed [17] in the engineering analysis (chapter 5 of the TSD) based on the DOE test procedure.[18] DOE assumed all Class A machines to be installed indoors and subject to a constant air temperature of 75 °F and relative humidity of 45 percent, matching test conditions in the DOE test procedure. 73 FR 34114–15. Based on market data and discussions with several beverage vending machine distributors, DOE assumed that 25 percent of Class B machines are placed outdoors and the remaining 75 percent are installed indoors. DOE sought but did not receive comment on this distribution. Thus, DOE maintained the distribution for the NOPR analysis of Class B machines.

In response to the ANOPR, the Edison Electric Institute (EEI) commented that it would be helpful for interested parties if DOE would provide the annual energy usage of Class B machines located outdoors versus machines located indoors (EEI, No. 37 at p. 2). EEI also commented that it would be helpful if DOE collected data on peak kW demands for machines located both indoors and outdoors. Such data would help determine if the new energy conservation standards will have any impact on the peak kW demands based on DEC, especially for equipment located outdoors on hot summer days (EEI, No. 37 at p. 2). EEI further commented that DOE should calculate energy savings separately for indoor and outdoor machines based on actual estimated ambient conditions for the machines (test procedure for indoor machines, climate data for outdoor machines). Also, for outdoor machines, DOE should estimate a percentage of machines that will be affected by solar heat gain because of southern or western exposures (EEI, No. 37 at p. 4).

In response to the EEI request, DOE is including the annual energy usage of Class B machines located outdoors versus machines located indoors in the TSD of today's NOPR. However, DOE does not plan to obtain peak demand data for indoor and outdoor machines. During the ANOPR public meeting, DOE presented the statement that 100 percent of Class A machines were intended to be installed indoors and that, based on

[17] Class A and Class B vending machines are described in section II.A.2 of the ANOPR. 73 FR 34103–34104.

[18] DOE incorporated ANSI/ASHRAE Standard 32.1–2004 by reference, with two modifications, as the DOE test procedure for the beverage vending machines. 71 FR 71340, 71375 (Dec. 8, 2006); 10 CFR 431.294.

inquiries to distributors, 75 percent of Class B machines appeared to be installed indoors (DOE, No. 29 at pp. 53–54). Interested parties discussed the implications of that assumption, but made no challenge to the assumption itself. Therefore, the vast majority of all beverage vending machines appear to be in conditioned environments. As a result, DOE does not believe that outdoor beverage vending machines will have a significant impact on peak loads for utilities.

During the ANOPR public meeting, participants discussed the impact of refurbished machines, their energy use profile, and energy efficiency upgrades to existing machines based on accounting demands (Coca-Cola, No. 29 at pp. 88–89). Dixie-Narco commented that it has kits listed on the U.S. Environmental Protection Agency (EPA) Web site that upgrade existing machines to meet ENERGY STAR Tier 2 (Dixie-Narco, No. 29 at pp. 90–91).

DOE acknowledges this information, but it does not have the authority to regulate refurbished vending machines. DOE has carefully considered its authority to establish energy conservation standards for rebuilt and refurbished beverage vending machines in light of these comments, and has tentatively concluded that its authority does not extend to rebuilt and refurbished equipment.

Throughout the history of the energy conservation standards program, DOE has not regulated used consumer products or commercial equipment that has been refurbished, rebuilt, or undergone major repairs, since EPCA only covers new covered equipment distributed in commerce.[19] DOE concludes that rebuilt or refurbished beverage vending machines are not new covered equipment under EPCA and, therefore, are not subject to DOE's energy conservation standards or test procedures.

Regarding the energy consumption model, Coca-Cola commented that moisture removal could account for nearly 12 percent of vending machine energy consumption in a reload situation, which is an intermittent occurrence. (Coca-Cola, No. 29 at p. 32 and No. 29 at p. 65) DOE accounts for the effect of ambient humidity changes on the hourly energy consumption calculation through use of weather files. However, DOE has not modeled a product reload situation because it is an intermittent occurrence and DOE has no information about total reload times or schedules in actual use. A reload of product is not part of the daily energy consumption test required by ASHRAE Standard 32.1–2004, which DOE used as the basis for the energy consumption calculations.

Several commenters discussed the use of lighting controls and their impact on beverage vending machine energy use. Several manufacturers and other interested parties commented that having lighting and/or occupancy controls will help reduce energy consumption, especially when these machines go into ''sleep mode.'' (Coca-Cola, No. 29 at p. 78; Dixie-Narco, No. 29 at pp. 69–71; EEI, No. 37 at p. 3; Dixie-Narco, No. 36 at pp. 1, 2; PepsiCo, No. 29 at pp. 20–21; and Naval Facilities Engineering Service Center (NFESC), No. 41 at p. 1). PepsiCo stated that it is difficult to determine an average lighting operation time, but that turning the lights off should be encouraged. (PepsiCo, Public Meeting Transcript, No. 29 at p. 74) Coca-Cola stated that beverage vending machines may not incorporate lighting in the near future. (Coca-Cola, Public Meeting Transcript, No. 29 at p. 78) Royal Vendors stated that although automated refrigeration and lighting controls may become more popular, the current methodology is reasonable and consistent for the purposes of this analysis.

Having lighting controls and setting them properly at the factory does reduce beverage vending machine energy consumption when the machine goes into sleep mode. However, DOE does not have the authority to mandate lighting controls and/or occupancy sensors as a design requirement simultaneously with an energy conservation standard due to the definition of ''energy conservation standard'' in 42 U.S.C. 6291(6). See section II.C.2.c for further detail. Also, the current DOE test procedure does not provide a mechanism to account for the reduction in DEC resulting from lighting controls and/or occupancy sensors in the machines. However, EPCA as amended by EISA 2007 states that ''at least once every 7 years, the Secretary shall review test procedures for all covered products * * *.'' 42 U.S.C. 6293(b)(1)(A). DOE may consider incorporating a mechanism to account for the reduction in DEC resulting from lighting controls and/or occupancy sensors during its review of the test procedure for beverage vending machines. DOE has not included the impact of these lighting controls as part of the engineering or energy use characterization analyses for this rulemaking and is retaining the assumption of a 24-hour lighting operation period.

NFESC commented that the DOE analysis should not neglect the added electricity load on air-conditioned buildings. (NFESC, No. 41 at p. 3) Specifically, the comment stated that the appropriate question to ask is whether the added electricity required (as building cooling load) represents a significant percentage of the electricity required to operate the beverage vending machine. NEFSC calculations indicated that the added building cooling load electric demand represents an annual addition most probably on the order of 15% to the basic load imposed by operating the vending machine.

DOE acknowledges that it did not account for the additional cooling load imposed by the BVM on the whole building cooling load, and correspondingly, any space cooling energy benefits that come from the reduction of the BVM's electrical load. DOE accepts that such a cooling energy use reduction will likely occur. At the same time, any reduction in BVM energy use will also result in an increase in heating energy use within the buildings. This impact on building heating and cooling loads would only occur for those BVMs located indoors. The relative cooling-energy-use benefit to heating-energy-use penalty is a function of the climate location, building type and size, and the placement of the BVMs within the building. The BVM could be located in uncooled portions of an industrial building, in the entering vestibules in a grocery store or in a supermarket, or in the core of an office building. The relative monetary benefits are also a function of the relative heating and cooling fuel costs. The quantification of the relative benefits impact would have required an extensive whole-building heating and cooling energy use analysis. Such studies of the impacts coming from lighting energy use within buildings have been done in the past. However, lighting tends to have a load profile that correlates with the cooling energy use in buildings. This is less true for BVMs since they operate on a 24-hour basis. Considering both the cooling benefits and the heating penalties from reductions in BVM energy use, DOE believes, that the 15% figure suggested by the NFESC comment overstates the likely benefits. Therefore, DOE determined that an extensive whole-building analysis was not warranted.

As discussed in the engineering analysis above, DOE analyzed the three typical sizes (small, medium, and large vendible capacities), each with a

[19] As an example, this position was taken and discussed in the distribution transformers final rule, 72 FR 58203.

different refrigerated volume as measured by ANSI/AHAM HRF–1–2004 and shown in Table IV–1.

DOE used the same methodology to calculate the annual energy consumption for Class A and Class B vending machines as described in the ANOPR analysis. 73 FR 34115–16. For Class A vending machines, DOE calculated the annual energy consumption as the product of the average DEC (from the DOE test procedure indoor test condition of 75 °F, 45 percent relative humidity), times 365 days per year, which did not vary by State. For Class B vending machines, DOE used a weighted average between the annual average energy consumption for an outdoor machine and an indoor machine. To calculate a weighted energy use of all Class B machines, DOE added aggregated State-by-State results using data from each of the 237 Typical Meteorological Year 2 (TMY2) weather stations to the annual energy consumption of the remaining 75 percent of Class B machines located indoors.

DOE developed the annual energy consumption for each equipment class at each efficiency level for every State as inputs to the LCC and PBP analyses. Chapter 7 of the TSD shows the annual average energy consumption estimates by equipment class and efficiency level.

E. Life-Cycle Cost and Payback Period Analyses

In response to the requirements of section 325(o)(2)(B)(i) of EPCA (42 U.S.C. 6295(o)(2)(B)(i)), DOE conducted LCC and PBP analyses to evaluate the economic impacts of possible new beverage vending machine standards on individual customers. This section describes the analyses and the spreadsheet model DOE used. TSD chapter 8 provides details of the model and of all inputs to the LCC and PBP analyses.

The effects of standards on individual commercial customers include changes in operating expenses (usually lower) and total installed price (usually higher). The LCC is the total cost for a unit of beverage vending machines, over the life of the equipment, including purchase and installation expense and operating costs (energy expenditures and maintenance). To compute the LCC, DOE summed the installed cost of the equipment and its lifetime operating costs discounted to the time of purchase. The PBP is the change in purchase expense due to a given energy conservation standard divided by the change in first-year operating costs resulting from the standard. Otherwise stated, the PBP is the number of years it would take for the customer to recover the increased costs of a more efficient product through energy savings. DOE measures the changes in LCC and PBP associated with a given energy use standard level relative to a base case forecast of equipment energy use. The base case forecast reflects the market absent mandatory energy conservation standards. DOE believes LCC is a better indicator of economic impacts on consumers.

DOE also analyzed the effect of changes in operating expenses and installed price by calculating the PBP of potential standards relative to a base case. The PBP estimates the amount of time it would take the commercial customer to recover the anticipated, incrementally higher purchase expense of more energy efficient equipment through lower operating costs. The data inputs to the PBP calculation are the purchase expense (otherwise known as the total installed cost or first cost) and the annual operating costs for each selected design. The inputs to the equipment purchase expense were the equipment purchase price and installation price, with appropriate markups. The inputs to the operating costs were the annual energy consumption, electricity price, and repair and maintenance costs. The PBP calculation uses the same inputs as the LCC analysis but, since it is a simple payback, the operating cost is for the year the standards take effect, assumed to be 2012. For each efficiency level analyzed, the LCC analysis required input data for the total installed price of the equipment, operating cost, and discount rate.

DOE calculated the LCC for all customers as if each would purchase a new beverage vending machine in the year the standards take effect for newly manufactured equipment. Section 135(c)(4) of EPACT 2005 amended EPCA to add new subsections 325(v)(2), (3), and (4) (42 U.S.C. 6295(v)(1), (2), and (3)), which directs the Secretary to issue a final rule for refrigerated bottled or canned beverage vending machines no later than August 8, 2009. The energy conservation standard levels in the rule apply to all equipment manufactured 3 years after publication of the final rule. Consistent with EPCA, DOE used these dates in the NOPR analyses.

At the ANOPR public meeting, Dixie-Narco suggested that the industry has made great strides in partnership with the bottlers to reduce the energy consumption by over 50 percent in the last 5 years for both Class A and Class B beverage vending machines. Dixie-Narco stated that a vast majority of the machines will meet ENERGY STAR levels when the new DOE standards go into effect in 2012. (Dixie-Narco, No. 29 at pp. 17–19) The Joint Comment stated that provided DOE can confirm industry's assertion that the market has already shifted to ENERGY STAR Tier 2, DOE should take that level as the baseline rather than ENERGY STAR Tier 1. (Joint Comment, No. 34 at p. 3)

DOE does not agree that it should use ENERGY STAR Tier 2 as the baseline for the present analysis, because not all new products are expected to meet the Tier 2 level by 2012. (PepsiCo, No. 29 at p. 152), though most are expected to meet Tier 2 even without a minimum standard at Tier 2 (Dixie Narco, No. 29 at pp. 150–151; Coca-Cola, No. 29 at p. 149; PepsiCo, No. 29 at p. 149). In other rules, DOE has consistently based the baseline levels for the LCC analysis on products available in the marketplace. DOE used a distribution of efficiency levels based on its assessment of the future market for beverage vending machines when establishing the base case for the NIA. This distribution in the 2012 baseline market includes 10 percent of shipments at approximately the ENERGY STAR Tier 1 efficiency level and 90 percent of shipments at approximately the ENERGY STAR Tier 2 efficiency level. Thus, the baseline market includes efficiency levels at and above the LCC baseline efficiency, which is approximately ENERGY STAR Tier 1.

Regarding equipment lifetime, Dixie-Narco stated that it believes that the life expectancy of beverage vending machines will be 10 to 12 years by 2012. (Dixie-Narco, No. 29 at pp. 17–19) Coca-Cola commented that the lifetime has gone down from 13 years to about 10 years, and that the machine typically undergoes one refurbishment cycle during its life. Coca-Cola uses a financial model to replace or upgrade components or subsystems that need to be changed, which may or may not result in a change in energy profile. (Coca-Cola, No. 29 at pp. 86–87) Coca-Cola further commented that the lifetimes of legacy machines may be extended because of refurbishment and that it upgrades the energy efficiency of existing machines based on account needs and account demands. (Coca-Cola, No. 29 at pp. 88–89) Dixie-Narco stated that it currently has kits listed on the EPA Web site to upgrade existing machines to meet ENERGY STAR Tier 2 level. (Dixie-Narco, No. 29 at pp. 90–91)

Based on the information provided by the manufacturers in this discussion, DOE has changed the input assumptions for the life-cycle cost analysis and the shipment analysis model to reflect the revised equipment life estimates to 10 years with one refurbishment cycle. The DOE analysis of proposed standard levels does not account for future, unknown energy impacts from refurbishments that may or may not occur during the 10-year equipment life or that provide energy benefits in conjunction with life extension. See chapter 8 of the TSD for further information.

Regarding the electricity prices and forecasts DOE used in the LCC analysis, EEI asked if DOE used Manufacturing Energy Consumption Survey (MECS) data for the beverage vending machines installed in the manufacturing sector. (EEI, No. 29 at p. 104) EEI recommended that DOE use EIA data for industrial electricity prices, as a large number of beverage vending machines are located in industrial facilities.

During the ANOPR public meeting, EEI asked if DOE considered separately the summer and winter energy usage of some of the outdoor machines, as summer use may be greater and at a higher commercial rate than winter use in certain climates. (EEI, No. 29 at p. 106) In its written comment, EEI recommended that DOE use seasonal rates and MECS data. (EEI, No. 37 at p. 3)

DOE used the EIA industrial electricity prices for averaging State-by-State electricity prices for the percentage of machines located in industrial, manufacturing, and government facilities for the ANOPR and NOPR analyses. DOE did not use seasonal variation in commercial electricity rates in its LCC analysis because seasonal variation in electricity rates differs throughout the country and even by utility, significantly complicating the analysis. The impact of higher energy consumption on the relatively small fraction of beverage vending machines located outdoors in the summer compared to winter was deemed to be of little impact on Class B equipment and of no impact on Class A equipment.

Regarding electricity price forecasts, the Joint Comment suggested that DOE use the most recent EIA *AEO* high price case for energy price forecasts [20] and include the cost and value of peak electricity demand in the analysis. (Joint Comment, No. 34 at p. 3) ACEEE asked DOE to review EIA *AEO* price applicability and offered to provide a list of alternative price forecasts. (ACEEE, No. 29 at pp. 107–108)

DOE updated its NOPR analysis to use the *AEO2009* reference case scenario for the base electricity price and electricity price forecasts into the future. The NOPR provides a sensitivity analysis based on the *AEO* high and low price scenarios. DOE continued to use the *AEO* forecasts, as it has done for other rules, and did not explore alternative electricity price forecasts. DOE believes that analyzing the results using the high-price and low-price scenarios provides sufficient insight into the likely range of electricity price impacts. DOE has no evidence that alternative scenarios are better predictors of future electricity costs.

Regarding future climate change legislation and its impact on the price of electricity, the Joint Comment suggested including the value of carbon emissions in the LCC and NPV analyses. (Joint Comment, No. 34 at p. 3)

The intent of Federal carbon control legislation, and the ensuing cost of carbon mitigation to electricity generators, is as yet too uncertain to incorporate into the energy price forecasts that DOE uses. The costs of carbon mitigation to electricity generators resulting from the regional programs are also very uncertain over the forecast period for this rulemaking. Even so, EIA did include the effect of the Northeast Regional Greenhouse Gas Initiative (RGGI) in its *AEO2009* Early Release energy price forecasts. Western Climate Initiative (WCI) did not provide sufficient detail for EIA to model the impact of the WCI on energy price forecasts. Therefore, the energy price forecasts used in today's final rule do include the impact of one of the two regional cap-and-trade programs to the extent possible. In addition, the Nation will benefit from reduction of carbon emissions as part of a national impact. Because of the range of possible values of emissions reductions, DOE shows them separately in order to take the impact into consideration. Putting the values into the overall NPV calculation will bury the effects. DOE believes it is important for the decision maker to be fully aware of the economic impacts of a proposed energy conservation standard. For these reasons, DOE will continue to report the results of the monetization of the value of carbon emissions in the Environmental Assessment (section V.B.6).

In the discussion of discount rates, Royal Vendors commented that Coca-Cola and PepsiCo purchase approximately 90 percent of all beverage vending machines. (Royal Vendors, No. 32 at p. 1) Royal Vendors and Dixie-Narco made similar remarks about the size of the market purchases by these two entities in a discussion of distribution channels. (Royal Vendors and Dixie-Narco, Public Meeting Transcript, No. 29 at pp. 39–40) In accordance with the comments regarding distribution channels, DOE modified the mix of commercial customers so that bottlers represent 85 percent of commercial customers. DOE also used the same 85 percent weight of bottlers to develop the discount rate distribution among beverage vending machine purchasers.

During the ANOPR public meeting, Coca-Cola commented that beverage vending machine maintenance costs are approximately $90 per year, energy upgrade costs vary based on the kit used, and a remanufacturing cycle costs around $500 to $600. (Coca-Cola, No. 29 at pp. 113–116) DOE received no other comments on this issue.

DOE has updated its maintenance cost assumptions to more closely reflect Coca-Cola's comments. This resulted in a minor decrease in assumed annual maintenance cost from $165 in the ANOPR analysis to $154 in the NOPR analysis.

Also during the ANOPR public meeting, participants discussed how the energy cost benefits should be reflected in the LCC analysis. Coca-Cola stated that energy subsidy contracts are pre-negotiated as part of the location contract based on considerations such as volume of throughput and length of the contract. (Coca-Cola, No. 29 at pp. 125–126) Any kind of energy subsidy machine owners pay to locate their machines on-site is pre-negotiated as part of the location contract. Also, energy cost reductions due to the use of higher efficiency equipment would be reflected in a reduced subsidy paid to the site. However, no market data have been provided to DOE that would allow computation of the actual allocation of energy cost benefits for the site owner and the vending machine owner. To account for such energy cost benefits for purposes of computing life cycle cost and payback period, DOE assumes that operating cost savings due to energy cost savings are transferred to the owner/operator of the beverage vending machine through the location contract. This is analytically equivalent to assuming that energy subsidies are reduced by the amount of the energy cost reductions.

Table IV–6 summarizes the inputs and key assumptions DOE used to calculate the economic impacts of

[20] EIA high and low price cases are based on EIA's assumed average world price for oil and the adjustments of the economy and the energy sector to that key assumption. In the high price case in *AEO2008*, the average electricity price in 2030 was about 2.2 percent higher than in the reference case. Since the supplemental tables for the AEO 2009 were not yet available, DOE used the ratio of high and low price cases from *AEO2008* to scale the *AEO2009* reference case. See chapter 8 of the TSD for additional information.

various energy consumption levels on customers. Equipment price (which includes Manufacturer's Selling Price, markups, and sales taxes), installation price, and baseline and higher efficiency all affect the installed cost of the equipment. Annual equipment energy consumption, electricity prices, electricity price trends, and repair and maintenance costs affect the operating cost. The effective date of the standard, discount rate, and lifetime of equipment all affect the calculation of the present value of annual operating cost savings from a proposed standard. Table IV–6 also shows how DOE modified these inputs and key assumptions for the NOPR analysis.

TABLE IV—6 SUMMARY OF INPUTS AND KEY ASSUMPTIONS USED IN THE LCC AND PBP ANALYSES

Input	ANOPR description	Changes for NOPR
Baseline Efficiency Level	Energy savings (changes in equipment energy consumption) and energy cost savings are compared to a pre-selected baseline efficiency level (in this case Level 1). Baseline MSP and equipment energy consumption depend on the baseline efficiency level.	No changes.
Higher Efficiency Levels	A certain number of higher efficiency levels are pre-selected up to the max-tech level for LCC and PBP analyses. These higher efficiency levels affect MSP and equipment energy consumption.	No changes.
Baseline Manufacturer Selling Price	Price charged by manufacturer to either a wholesaler or large customer for baseline equipment.	No changes.
Standard-Level Manufacturer Selling Price Increases.	Incremental change in manufacturer selling price for equipment at each of the higher efficiency levels.	No changes.
Markups and Sales Tax	Associated with converting the manufacturer selling price to a customer price (chapter 6 of TSD).	Distribution of sales among market channels changed based on comments on the ANOPR. Sales tax rates updated to January 2009.
Installation Price	Cost to the customer of installing the equipment including labor, overhead, and any miscellaneous materials and parts. The total installed cost equals the customer equipment price plus the installation price.	Installation price updated to 2008$.
Equipment Energy Consumption	Site energy use associated with the use of beverage vending machines, which includes only the use of electricity by the equipment itself.	Updated to reflect results of the energy analysis.
Electricity Prices	Average commercial electricity price ($/kWh) in each State and for seven classes of commercial and industrial customers, as determined from EIA data for 2003 converted to 2007$.	Average commercial electricity price ($/kWh) in each State and for seven classes of commercial and industrial customers, as determined from EIA data for 2003, updated to 2008 prices.
Electricity Price Trends	Reflects the *AEO2007* reference case forecast future electricity prices.	Reflects the *AEO2009* reference case to forecast future electricity prices.
Maintenance Costs	Labor and material costs associated with maintaining the beverage vending machines (*e.g.,* cleaning heat exchanger coils, checking refrigerant charge levels, lamp replacement) included annualized costs of two refurbishment cycles.	Updated basic maintenance cost to 2008$. Based on industry comment on the ANOPR, included an updated annualized cost of one refurbishment/remanufacturing cycle.
Repair Costs	Labor and material costs associated with repairing or replacing components that have failed.	Updated costs to 2008$.
Equipment Lifetime	Age at which the beverage vending machine is retired from service (estimated to be 14 years).	Based on industry comment on the ANOPR, reduced average service life to 10 years, with 15 years as a maximum.
Discount Rate	Rate at which future costs are discounted to establish their present value to beverage vending machine purchasers.	Updated discount rates for all classes of purchasers based on weighted average cost of capital figures from 2008.
Rebound Effect	Rebound effect was not taken into account in the LCC analysis.	No change.
Analysis Period	The time span over which DOE calculated the LCC (*i.e.,* 2012–2042).	No change.

The following sections contain brief discussions of the methods underlying each input and key assumption in the LCC analysis.

1. Manufacturer Selling Price

The ''baseline MSP'' is the price manufacturers charge to either a wholesaler/distributor or very large customer for beverage vending machines meeting baseline efficiency levels. DOE developed the baseline MSPs using a cost model (detailed in chapter 5 of the TSD). DOE used the efficiency level closest to ENERGY STAR Tier 1 as the baseline in the NOPR analysis. The baseline efficiency level represents the least efficient equipment likely to be sold in 2012.

DOE developed MSPs for the two equipment classes consisting of three possible equipment sizes. Not all covered equipment sizes have shipments of more than a few percent of the total.[21] (See chapter 10 of the TSD.) DOE estimated the MSPs for Class A and Class B equipment at the three representative rated volumes between the baseline efficiency level and up to seven more efficient levels. See chapter 5 of the TSD for details.

2. Increase in Selling Price

The standard level MSP increase is the change in MSP associated with producing equipment at lower energy consumption levels to meet higher standards. DOE developed MSP increases associated with decreasing equipment energy consumption (or higher efficiency) levels in the engineering analysis. See chapter 5 of the TSD for details. DOE developed MSP increases as a function of equipment energy consumption for each equipment class.

3. Markups

As discussed earlier, overall markups are based on one of three distribution channels for beverage vending machines. The distribution channels defined in the ANOPR were also used for the NOPR analysis, but DOE modified the relative fractions of shipments through each distribution channel based on input from interested parties. Based on input received by DOE, site owners purchase approximately 5 percent of equipment from wholesaler/distributors, vending machine operators purchase 10 percent of equipment from wholesaler/distributors, and beverage bottler/distributors purchase 85 percent of equipment directly from manufacturers. See chapter 10 of the TSD for details.

4. Installation Costs

DOE derived installation costs for beverage vending machines from the U.S. Bureau of Labor Statistics (BLS) data.[22] BLS provides median wage rates for installation, maintenance, and repair occupations that reflect the labor rates for each State. These data allow DOE to compute State labor cost indices relative to the national average for these occupations. DOE incorporated these cost indices into the analysis to capture variations in installation cost by location. DOE calculated the installation cost by multiplying the number of person-hours by the corresponding labor rate as reported by Foster-Miller, Inc.[23] Foster-Miller data are more specific to the beverage vending machine industry and service calls, and were used whenever possible. DOE decided that the installation costs (including overhead and profit) represent the total installation costs for baseline equipment. Because data were not available to indicate how installation costs vary by class or efficiency, DOE considered installation costs to be fixed and independent of equipment cost or efficiency. Although the LCC spreadsheet allows for alternative scenarios, DOE did not find a compelling reason to change its basic premise for the NOPR analysis. See chapter 8 of the TSD for details.

As described earlier, the total installed cost is the sum of the equipment purchase price and installation price. DOE derived the customer equipment purchase price for any given efficiency level by multiplying the baseline MSP by the baseline markup and adding to it the product of the incremental MSP and incremental markup. Because MSPs, markups, and sales taxes can differ depending on location, the resulting total installed cost for a particular efficiency level will not be a single-point value, but a distribution of values. DOE used a Monte-Carlo analysis [24] to determine this distribution of values. See chapter 8 of the TSD for details.

5. Energy Consumption

DOE based its estimate of the annual electricity consumption of beverage vending machines on the energy use characterization described in section IV.D. DOE did not change the ANOPR methodology. See chapters 7 and 8 of the TSD for details.

6. Electricity Prices

Electricity prices are necessary to convert the electric energy savings into energy cost savings. Because of the wide variation in electricity consumption patterns, wholesale costs, and retail rates across the country, it is important to consider regional differences in electricity prices. DOE divided the continental United States into the 50 States and the District of Columbia. DOE used reported average effective commercial electricity prices which are the average commercial prices in each state, multiplied times a factor that adjusts the price to account for the fact that different types of commercial customers historically have higher or lower prices than average. (See chapter 8 of the TSD for details.) Effective commercial prices were estimated for four of the six building types. Lower industrial electricity prices were assumed to apply to the manufacturing plants and Federal facilities. State level commercial and industrial prices were collected from the EIA publication, ''State Energy Consumption, Price, and Expenditure Estimates (SEDS).'' [25] The latest available prices from this source are for 2008. See chapter 8 of the TSD for details.

Different kinds of businesses use electricity in different amounts at different times of the day, week, and year, and therefore face different effective prices. To make this adjustment, DOE used the 2003 CBECS data set to identify the average prices that the four kinds of commercial businesses in this analysis pay compared with the average prices all commercial customers pay. (DOE assumed manufacturing and Federal facilities pay the average industrial price.) Once the building type prices are adjusted, the resulting estimated prices paid become the electricity prices used in the analysis. To obtain a weighted average national price, the prices paid by each building in each state are weighted by the estimated sales of beverage vending machines in each state to each prototype building type (U.S. Census Bureau 2002, 2004a–2004c). The state/building type weights are the probabilities that a given beverage vending machine shipped will be operated within a given price. For evaluation purposes, the prices and weights can be depicted as a cumulative probability distribution. The effective prices range from approximately 5 cents per kWh to approximately 30 cents per kWh. This approach includes regional

[21] Comments received at the ANOPR stage from interested parties indicated that small volume machines were never more than about 10 percent of the total (Royal Vendors, No. 29, p. 141); that small machines are financially unattractive (Coca-Cola, No. 29, p. 141); and that shipments range from 10 percent medium to 100 percent medium machines, depending on the manufacturer, with the rest being large (Royal Vendors, No. 29, pp. 141–142).

[22] Bureau of Labor Statistics, Occupational Employment and Wage Estimates (May 2007). Available at *http://www.bls.gov/oes/oes_dl.htm.*

[23] Foster-Miller, Inc. ''Vending Machine Service Call Reduction Using the VendingMiser.'' Report BAY–01197. Foster-Miller, Inc., Waltham, MA. February 18,2002.

[24] The Monte-Carlo analysis is a numerical simulation approach using random values from known statistical distributions.

[25] *http://www.eia.doe.gov/emeu/states/_seds.html.*

variations in energy prices and provides for estimated electricity prices suitable for the target market, yet reduces the overall complexity of the analysis. Chapter 8 of the TSD describes the development and use of State-average electricity prices by building type in more detail.

7. Electricity Price Trends

The electricity price trend provides the relative change in electricity prices until 2030. Estimating future electricity prices is difficult, especially considering that many States are attempting to restructure the electricity supply industry. DOE uses the most recent *AEO* reference case to forecast energy prices for standards rulemakings. DOE applied the *AEO2009* reference case as the default scenario and extrapolated the trend in values from 2020 to 2030 of the forecast to establish prices for 2030 to 2042. This method of extrapolation is in line with methods the EIA uses to forecast fuel prices for the Federal Energy Management Program (FEMP). DOE intends to update its analysis for the final rule to reflect the *AEO2009* electricity price forecasts when final versions are available.

8. Repair Costs

The repair cost is the cost to the customer of replacing or repairing beverage vending machine components that have failed. DOE based the annualized repair cost for baseline efficiency equipment on the report ''Vending Machine Service Call Reduction Using the VendingMiser,'' [26] and adjusted the cost to 2008 prices. Because data were not available to indicate how repair costs vary with equipment efficiency, DOE considered two scenarios: (1) repair costs that varied in direct proportion with the manufacturer price of the equipment, and (2) repair costs that did not increase with efficiency.

DOE used the first scenario as the default annualized repair cost scenario in the LCC and PBP analyses. Spreadsheets can be used to calculate LCC and PBP based on the second scenario as well. See chapter 8 of the TSD for details.

9. Maintenance Costs

DOE estimated annualized maintenance costs for beverage vending machines from data provided by Coca-Cola at the ANOPR public meeting. Coca-Cola estimated that average equipment maintenance costs are $98.20 (2008$) for preventive maintenance for both beverage vending machine classes. In addition to routine maintenance, industry contacts stated that most beverage vending machines are fully refurbished every 5 years at an average cost of approximately $550. DOE calculated the annual cost of refurbishment by assuming one refurbishment (in year five), and then annualizing the present value of the cost using the discount rate that applied to the business type owning the beverage vending machine. DOE added the two maintenance cost components to produce an overall annual maintenance cost of approximately $154 (2008$). Because data are not available on how maintenance costs vary with equipment efficiency, DOE held maintenance costs constant even as equipment efficiency increased. See chapter 8 of the TSD for details.

10. Lifetime

DOE defined lifetime as the age when a beverage vending machine unit is retired from service. DOE based the lifetime on comments it received during the ANOPR. DOE concluded that a typical lifetime is 10 years and a maximum lifetime is 15 years. Beverage vending machine equipment is typically replaced when buildings are renovated about every 10 years, which is before the equipment would have physically worn out. As a result, there is a used-equipment market for these products. Because the salvage value to the original purchaser is very low, DOE did not take this value into account in the LCC analysis. Chapter 3 of the TSD contains a discussion of equipment life.

11. Discount Rate

The discount rate is the rate at which future expenditures are discounted to establish their present value. DOE derived discount rates for the LCC analysis by estimating the cost of capital for companies that purchase beverage vending machines. The cost of capital is commonly used to estimate the present value of cash flows to be derived from a typical company project or investment. For most companies, the cost of capital is the weighted average of the cost to the company of equity and debt financing. DOE estimated the cost of equity financing with the Capital Asset Pricing Model (CAPM), which is among the most widely used models to estimate such costs. CAPM considers the cost of equity to be proportional to the amount of systematic risk for a company. The cost of equity financing tends to be high when a company faces a large degree of systematic risk and low when the company faces a small degree of systematic risk.[27]

To estimate the weighted average cost of capital (WACC; defined as the weighted average cost of debt and equity financing) of purchasers, DOE used a sample of companies involved in the six ownership categories, according to their type of activity. DOE sought financial information for all firms in the full sample involved in the seven types of businesses drawn from a database of 7,460 U.S. companies on the Damodaran Online Web site.[28] In cases where one or more of the variables needed to estimate the discount rate was missing or could not be obtained, DOE discarded the firm from the analysis. Overall, it discarded about 36 percent of the firms in the full database for this reason, resulting in a final count of 4,139 firms. This WACC approach for determining discount rates accounts for the current tax status of individual firms on an overall corporate basis. DOE did not evaluate the marginal effects of increased costs, and thus depreciation due to more expensive equipment, on the overall tax status. See chapter 8 of the TSD for details.

DOE used the final sample of 4,139 companies to represent beverage vending machine purchasers. For each company in the sample, DOE derived the cost of debt, percent debt financing, and systematic company risk from information on the Damodaran Online Web site. Damodaran estimated the cost of debt financing from the long-term government bond rate (4.39 percent) and the standard deviation of the stock price. DOE then determined the weighted average values for the cost of debt, range of values, and standard deviation of WACC for each category of the sample companies. Deducting expected inflation from the cost of capital provided estimates of real discount rate by ownership category.

The above methodology yielded the following average after-tax discount rates, weighted by the percentage shares of total purchases of beverage vending machines: (1) 5.54 percent for bottlers and distributors, (2) 6.25 percent for manufacturing facilities, (3) 4.81 percent for office and health care businesses, (4)

[26] Foster-Miller, Inc. ''Vending Machine Service Call Reduction Using the VendingMiser.'' Report BAY–01197. Foster-Miller, Inc. Waltham, MA. February 18, 2002.

[27] Aswath Damodaran, Leonard N. Stern School of Business, New York University. Available at *http://www.stern.nyu.edu/~adamodar/New_Home_Page/data.html.* Accessed December 15, 2008. See also the Investopedia Web site definition of Beta, the measure of such volatility: *http://www.investopedia.com/terms/b/beta.asp.* Accessed April 1, 2009.

[28] Aswath Damodaran, Leonard N. Stern School of Business, New York University. Available at *http://www.stern.nyu.edu/~adamodar/New_Home_Page/data.html.* Accessed December 15, 2008.

6.00 percent for retail stores, (5) 2.35 percent for schools and colleges, (6) 3.03 percent for military bases, and (7) 5.23 percent for all other types of businesses.[29] See chapter 8 of the TSD for details.

12. Payback Period

The PBP is the amount of time it takes the customer to recover the incrementally higher purchase cost of more energy efficient equipment as a result of lower operating costs. Numerically, the PBP is the ratio of the increase in purchase cost (*i.e.,* from a less efficient design to a more efficient design) to the decrease in annual operating expenditures. This type of calculation is known as a ''simple'' PBP because it does not take into account changes in operating cost over time or the time value of money; that is, the calculation is done at an effective discount rate of 0 percent.

The equation for PBP is

$$PBP = \Delta IC/\Delta OC$$

Where:

PBP = payback period in years,

ΔIC = difference in the total installed cost between the more efficient standard level equipment (energy consumption levels 2, 3, etc.) and the baseline (energy consumption level 1) equipment, and

ΔOC = difference in annual operating costs.

The data inputs to the PBP analysis are the total installed cost of the equipment to the customer for each energy consumption level and the annual (first-year) operating costs for each energy consumption level. The inputs to the total installed cost are the equipment price and installation cost. The inputs to the operating costs are the annual energy cost, annual repair cost, and annual maintenance cost. The PBP uses the same inputs as the LCC analysis, except that electricity price trends and discount rates are not required. Since the PBP is a ''simple'' (undiscounted) payback, the required electricity cost is only for the year in which new energy conservation standards take effect—in this case, 2012. The electricity price used in the PBP calculation of electricity cost was the price projected for 2012, expressed in 2008$, but not discounted to 2008. Discount rates are not used in the PBP calculation.

As discussed in section III.D.2, section 325(o)(2)(B)(iii) of EPCA states that there is a rebuttable presumption that an energy conservation standard is economically justified if the additional cost to the consumer of a product that meets the standard level is less than three times the value of the first-year energy (and, as applicable, water) savings resulting from the standard, as calculated under the applicable DOE test procedure. However, as stated in section III.D.2, DOE does not rely on the rebuttable presumption payback criteria when examining potential standard levels, but does consider it as part of a full analysis that includes all seven relevant statutory criteria under 42 U.S.C. 6295(o)(2)(B)(i).

F. Shipments Analysis

DOE developed forecasts of the number of units shipped for the base case and standards cases and included those forecasts in the NES spreadsheet. The shipments portion of the spreadsheet forecasts shipments of beverage vending machines from 2012 to 2042. DOE developed shipments forecasts for the two equipment classes by accounting for the shipments replacing the existing stock of beverage vending machines in new commercial floor spaces and old equipment removed through demolitions. Chapter 10 of the TSD provides additional details on shipments forecasts.

The shipments analysis is a description of beverage vending machine stock flows as a function of year and age. The shipment analysis treats each of the two classes of equipment independently, such that future shipments in any one class are unaffected by shipments in the other equipment class. In addition, the relative fraction of shipments in each equipment class compared to all beverage vending machine shipments is assumed to be constant over time. DOE recognizes that a business or a beverage vending machine owner can choose to use different classes of beverage vending machines to sell the same product if the equipment is in the required temperature range and is suitable for the environment in which the equipment will be placed. The decision to adopt one equipment class over another within the same temperature range will depend on first costs, operating costs, machine location (*e.g.,* outdoors versus indoors), and the perceived ability to merchandise product.

DOE received many comments on the shipment analysis and assumptions in the ANOPR. Many comments addressed the declining size of the beverage vending machine market. Royal Vendors estimate that the current beverage vending machine stock is about 2.3 or 2.5 million units. Further, Royal Vendors commented that the population of machines is decreasing and that replacements purchased are less than ''normal shrinkage.'' (Royal Vendors, No. 32 at p. 1) Dixie-Narco stated that a significant number of machines are being pulled out of the marketplace, partly because of the number of locations (particularly schools) that no longer allow vending machines. (Dixie-Narco, No. 29 at p. 44) Coca-Cola said that it has removed between 200,000 and 250,000 beverage vending machines since 2006 and that future shipments will only be replacements. (Coca-Cola, No. 29 at p. 140) PepsiCo agreed that the number of machines is decreasing and it doesn't see this trend reversing anytime soon. (PepsiCo, No. 29 at pp. 43–44) It attributed this, in part, to the ''very high cost'' of vandalism. NAMA also noted that there has been a decline in beverage vending machine sales over the last 5 or 6 years. NAMA attributed this to the removal of vending machines from school districts. (NAMA, No. 29 at pp. 48–49) The Joint Comment recommended that DOE conduct an independent annual sales forecast of equipment, stating that it was not clear why school district soda bans would result in the removal of vending machines rather than replacing sodas with healthier beverages in existing machines. (Joint Comment, No. 34 at p. 2) EEI suggested that DOE obtain data to monitor the downward trend in shipments and incorporate any observed reductions of the market into the analysis. (EEI, No. 37 at p. 2) EPA offered to share aggregated shipment data of ENERGY STAR qualified equipment with DOE. (EPA, No. 29 at p. 48)

DOE also received input on sales of new and replacement equipment. Royal Vendors stated that the overall current stock is approximately 90 percent Class B machines and 10 percent Class A machines, of which it builds large and medium Class A machines. However, trends are changing. In the future, the overall stock will more closely resemble ratios of 60/40 or 50/50 between Class A and Class B machines. (Royal Vendors, No. 29 at p. 139 and No. 29 at pp. 163–167). This data was also confirmed by data from The Cadmus Group (2006).[30]

DOE has updated its shipments model for the NPV analysis to reflect the comments it received. The model now reflects that there is zero growth in the number of vending machines and that new machines will only replace old and

[29] These discount rates are what private companies pay as beverage vending machine purchasers. Government agencies use 3-percent and 7-percent discount rates for economic calculations.

[30] Cadmus Group. 2006. ''Saving Energy in Vending Machines: Opportunities for the Regional Technical Forum.'' Presentation for the Northwest Power Conservation Council. Available at *http://www.nwcouncil.org/energy/rtf/meetings/2006/2006_09.* Accessed on January 5, 2009.

retired machines. DOE also updated its shipments analysis model to reflect more closely comments on the breakdown of shipments between equipment classes as well as the different sizes.

Dixie-Narco commented that it currently has kits listed on the EPA Web site to upgrade existing machines to meet ENERGY STAR Tier 2. (Dixie-Narco, No. 29 at pp. 90–91) DOE accepts the comment and has assumed that a high percentage of the machines shipped in 2012 in the base case shipment forecast will meet ENERGY STAR Tier 2 levels even without energy conservation standards.

The results of the shipments analysis are driven primarily by historical shipments data for the two equipment classes of beverage vending machines under consideration. The model estimates that, in each year, the existing stock of beverage vending machines either ages by one year or is worn out and replaced. In addition, new equipment can be shipped into new commercial building floor space and old equipment can be removed through demolitions. DOE chose to analyze all efficiency levels analyzed in the LCC in the NIA. DOE determined shipments forecasts for all levels analyzed in the NIA and NPV analysis.

Because several different types of businesses own beverage vending machines and use them in a variety of locations, machines are divided into several market segments. Table IV–7 gives the business locations and the approximate size of the market segments from 2002 to 2005.

TABLE IV—7 MARKET SEGMENTS FOR THE BEVERAGE VENDING MACHINES (2004–2007)

	Percent of machines
Business Location:	
Manufacturing	36.2
Offices	19.5
Retail	8.0
Schools/Colleges	13.0
Health Care	6.2
Hotels/Motels	3.6
Restaurants/Bars/Clubs	0.7
Correctional Facilities	2.1
Military Bases	3.0
Other	7.8
Total	100.0
Ownership:	
Bottlers and Vendors	95.0
Business Owned	5.0
—Manufacturing	1.5
—Offices and Health Care	1.4
—Retail/Restaurants/Bars/Clubs	0.8
—Schools, Colleges, and Public Facilities (including Correctional)	0.8
—Military Bases	0.4
—Other (including hotels/motels)	0.1
—Site Owned	5.0
Total	100.0

Table IV–8 shows the forecasted shipments of the three typical sizes of beverage vending machines for Class A and Class B units for selected years and cumulatively between 2012 and 2042. As equipment purchase price increases with higher efficiency levels, a drop in shipments could occur relative to the base case. On the other hand, as annual energy consumption is reduced, equipment sales could increase due to more frequent installations and use of beverage vending machines by retailers. DOE has no information to calibrate either relationship. Therefore, although the spreadsheet allows for changes in projected shipments in response to efficiency increases or energy consumption decreases, DOE presumed for the NOPR analysis that shipments would not change in response to the changing TSLs. Table IV–8 also shows the cumulative shipments for the 31-year period between 2012 and 2042 for all beverage vending machines. Comments from the ANOPR public meeting indicated that there has been a substantial decrease in shipments since 2000 and that future shipments are not expected to increase for the foreseeable future. These shipments are entirely for replacements, but the stock of beverage vending machines has also been declining at a significant rate. DOE has estimated a current level of shipments of about 90,000 units per year. This rate is consistent with observed declines in stock, expected retirement rates based on stated stock lifetimes, and extra removals due to vandalism and other causes, as stated by interested parties. Consistent with public comment, these shipment rates (which equals replacements) are assumed to be constant through 2042, which results in a continuing decline in the stock of beverage vending machines from recent levels of about 2.4 million units to a level of about 944,000 units by 2020, at which point the stock stabilizes. Chapter 10 of the TSD provides additional details on the shipments analysis.

TABLE IV—8 FORECASTED SHIPMENTS FOR BEVERAGE VENDING MACHINES (BASELINE EFFICIENCY, LEVEL 1) FOR SELECTED YEARS

[Thousands of units shipped]

Equip. class	Size	Thousands of units shipped								
		2012	2015	2020	2025	2030	2035	2040	2042	Cumulative shipments* *2012–2042*
A	L	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	383.6
A	M	37.1	37.1	37.1	37.1	37.1	37.1	37.1	37.1	1,150.9
A	S	....	....	....	....	....	....	....	....	....
B	L	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	313.9
B	M	30.4	30.4	30.4	30.4	30.4	30.4	30.4	30.4	941.6
B	S	....	....	....	....	....	....	....	....	....

* The cumulative shipments do not equal the totals across each row because all years from 2012 to 2042 are included in the calculation.

G. National Impact Analysis

The NIA assesses future NES and the national economic impacts of different efficiency levels of beverage vending machines. The analysis measures economic impacts using the NPV metric (*i.e.,* future amounts discounted to the present) of total commercial customer costs and savings expected to result from new standards at specific efficiency levels. For the NOPR analysis, DOE used the same spreadsheet model used in the ANOPR to calculate the energy savings and the national economic costs and savings from new standards, but with updates to specific input data.

Unlike the LCC analysis, the NES spreadsheet does not use distributions for inputs or outputs. DOE examined sensitivities by applying different scenarios. DOE used the NES spreadsheet to calculate national energy savings and NPV using the annual energy consumption and total installed cost data from the LCC analysis and estimates of national shipments for the two equipment classes. DOE forecasted the energy savings, energy cost savings, equipment costs, and NPV of benefits for both beverage vending machine classes from 2012 to 2057. The forecasts provided annual and cumulative values for all four output parameters.

DOE calculated the NES by subtracting energy use under a standards scenario from energy use in a base case (no new standards) scenario. Energy use is reduced when a unit of beverage vending machine in the base case efficiency distribution is replaced by a more efficient unit. Energy savings from this replacement for each equipment class are the same national average values as calculated in the LCC and PBP spreadsheet on a per-unit basis. Table IV–9 shows key inputs to the NIA. In the NIA analysis for the NOPR, DOE did not include a rebound effect. As the ANOPR discussed, a rebound effect occurs when a piece of equipment that is made more efficient is used more intensively, so that the expected energy savings from the efficiency improvement do not fully materialize. Because beverage vending machines operate on a 24-hour basis to maintain adequate conditions for the merchandise being retailed, a rebound effect resulting from increased refrigeration energy consumption seemed unlikely. Thus, DOE did not account for a rebound effect in the LCC analysis. There were no comments on this issue. Chapter 11 of the TSD provides additional information about the NES spreadsheet.

On the topic of shipments by efficiency levels, Coca-Cola commented that, essentially, all machines will be in the same efficiency class, which is the optimal point between price and performance. (Coca-Cola, No. 29 at p. 148) PepsiCo stated that every machine it approves for purchase must meet ENERGY STAR Tier 2. This includes purchases by PepsiCo bottlers as well. (PepsiCo, No. 29 at p. 149) Dixie-Narco stated that vending distributors (or operators and independent bottlers) do not mandate ENERGY STAR Tier 2, but that they are only a small part of the business. (Dixie-Narco, No. 29 at pp. 150–152) USA Technologies commented that much of the industry is already meeting Tier 2 and that 80 to 90 percent of the machines sold are probably at the Tier 2 levels (USA Technologies, No. 29 at pp. 101–102).

DOE understands that the major bottlers that purchase over 85 percent of the new machines require ENERGY STAR Tier 2, which went into effect on July 1, 2007. Therefore, most of the machines that will be purchased in 2012 when the new standards take effect are expected to meet Tier 2 levels. In response to the input received, DOE has changed the distribution of efficiency levels to reflect an estimate of 90 percent of the market meeting ENERGY STAR Tier 2 levels by 2012 in the base case market efficiency distribution. DOE does not have information on how the distribution of efficiency levels might change over the analysis period (2012 to 2042) and therefore assumed that the distribution in 2012 remained constant. See section IV.G.1 for more details.

Regarding the period of the rulemaking analysis, EEI commented that DOE should consider using a 20-year analytical timeframe if typical machines only have a 10-year lifetime and the analysis covers ''two lifetimes.''

The Department of Energy's appliance standards program is conducted pursuant to Title III, Parts A and A–1 of EPCA (42 U.S.C. 6291–6317). The program includes consumer products, such as refrigerators and freezers, central air conditioners and central air conditioning heat pumps, furnaces and water heaters, and certain commercial and industrial equipment, including electric motors and commercial heating and air conditioning equipment and water heaters.

EPCA directs DOE to conduct a series of rulemakings to consider whether to amend the existing energy conservation standards. EPCA also directs DOE to set any new standard such that the maximum improvement in energy efficiency is achieved that is technologically feasible and economically justified. In addition, the amount of energy saved must be significant. (42 U.S.C. 6296(o)(2)) DOE calculates the net present value (NPV) of new or amended standards to estimate the impacts of standards on the nation. In performing the NPV analysis for the first energy conservation standards rulemakings, DOE selected a 30-year analysis period, beginning on the effective date of the standard, because it closely matched the lifetime of the longest lived products among the products being considered for standards. Matching the lifetime of the longest lived products allows for a full turnover of the stock.[31] In subsequent years, for the next few rulemakings, DOE used the same analysis end-date as the initial rulemakings, but with the appropriate start-of-standard date, resulting in a shorter analysis period. Then, in the 1990's rulemakings, DOE found that using the same end-date of the analysis would result in analyses that could not capture the full impact of amended standards. As a result, DOE determined it was necessary to change the end-date of the analyses. DOE settled on the 30-year analysis period, which allows DOE to capture the full life of any product that was shipped in the first year in which that standard became effective. Because products have varying lifetimes, DOE uses a 30-year analysis period to maintain a consistent time frame to compare the energy savings and economic impacts from all the standards rulemakings. For consistency and for ease in comparing results across rulemakings, DOE settled on a 30-year analysis period for subsequent rulemakings.

DOE believes that using a 30-year analysis period is appropriate. In order to compare energy savings for residential product classes or commercial equipment classes across appliance rulemakings where the various products and equipment classes have different lifetimes, DOE must use at least the lifetime of the longest-lived product or equipment type for assessment, since the annual energy consequences of improving the longest-lived residential products or commercial equipment would not be known until all of the market for such product or equipment consisted of improved units. That would not happen until the last of the pre-standard equipment is retired. Thirty years is a practical estimate for that event for short- and long-lived equipment.

To compare economic costs and savings for products or equipment using discounted present value, it is common in economics to use the stream of benefits and costs over the lifetime of the equipment. In DOE energy conservation standards rulemakings, the outer limit for economic benefits and costs is established at the last year of life

[31] Refrigerators have an average lifetime of 19 years, and, based on industry data (Technical Support Document: Energy Efficiency Standards for Consumer Products: Refrigerators, Refrigerator-freezers, & Freezers, July 1995) on when refrigerators are retired, DOE estimates the refrigerators are retired as early as 13 years and as late as 24 years (*i.e.*, vintaging). DOE rounded up 24 years to 30 years in order to end the analysis on a decade.

of the oldest equipment purchased during the 30-year period used for energy savings comparisons.

There are also economic consequences for choosing different time periods over which to compare rules. As an example, consider two different time periods that could be used to compare two rules, one for 30-year equipment and one for 20-year equipment with identical costs and savings, but a shorter 20-year lifetime. If the 30-year period comparison period were shortened to 20 years to compare the two rules there would be significant consequences for NPV. Approximately one-third of the (undiscounted) savings from equipment with a 30-year life would be not counted, and the value of the savings would be reduced by about 15 percent at a 7 percent discount rate and by about 24 percent at a 3 percent discount rate. In addition, the investment required for shorter-life equipment that would have been required with a 30-year comparison would be ignored if the lifetime of the shorter-lived equipment is used to compare rulemakings. Therefore, DOE believes the 30-year analytical period enables it to fully capture the impacts of standards on the nation as well as to compare the relative economic impacts of different rulemakings. DOE will continue to use the 30-year analytical timeframe for this rulemaking. DOE will consider changes to the analytical period in other rulemakings, where appropriate; such as rulemakings for products with significantly shorter lifetimes (both average life and the life of the oldest product when retired).

On the topic of site-to-source energy conversion factor, EEI commented that DOE should account for the fact that more than 29 States now have renewable portfolio standards that will increase the amount of zero emissions and zero Btu electricity production sources by 2010, 2015, 2020, or 2025. These factors will reduce the overall heat rate faster than the *AEO* forecast, and DOE should not use fossil fuel power plant heat rates as a ''proxy'' for renewable electricity generation stations (EEI, No. 37 at p. 3).

DOE will continue to use *AEO2009* base electricity price and the price projections as long as no other credible and publicly available data that could be used to generate or revise the site-to-source energy conversion factors are made available to DOE.[32]

TABLE IV–9—SUMMARY OF NATIONAL ENERGY SAVINGS AND NET PRESENT VALUE INPUT

Input	ANOPR Description	Changes for NOPR
Shipments	Annual shipments from shipments model (chapter 9 of the ANOPR TSD, Shipments Analysis).	No growth in shipments; based on industry comments on the ANOPR, all shipments are replacements.
Effective Date of Standard	2012	No change.
Base Case Efficiencies	Distribution of base case shipments by efficiency level.	Efficiency mix changed based on industry comment.
Standards Case Efficiencies	Distribution of shipments by efficiency level for each standards case. Standards case annual market shares by efficiency level remain constant over time for the base case and each standards case.	No change.
Annual Energy Consumption per Unit	Annual weighted-average values are a function of energy consumption level per unit, which are established in chapter 7 of the ANOPR TSD, Energy Use Characterization.	No change.
Total Installed Cost per Unit	Annual weighted-average values are a function of energy consumption level (see chapter 8 of the ANOPR TSD).	No change.
Repair Cost per Unit	Annual weighted-average values increase with manufacturer's cost (chapter 8 of the ANOPR TSD).	No change.
Maintenance Cost per Unit	Annual weighted-average value equals $165.44 (chapter 8 of the ANOPR TSD).	Annual weighted-average value equals $154 (chapter 8 of the TSD).
Escalation of Electricity Prices	EIA *AEO2007* forecasts (to 2030) and extrapolation beyond 2030 (chapter 8 of the ANOPR TSD).	Updated to *AEO2009* forecasts.
Electricity Site-to-Source Conversion	Conversion varies yearly and is generated by DOE/EIA's NEMS* model (a time-series conversion factor that includes electric generation, transmission, and distribution losses).	Conversion varies yearly and is generated by DOE/EIA's NEMS model. Calculated marginal rates by year.
Discount Rate	3% and 7% real	No change.
Present Year	Future costs are discounted to 2008	Future costs are discounted to 2009

[32] DOE is committed to using the latest *AEO* forecast that is appropriate for its analysis. For example, if an updated *AEO* forecast is available for the final rule analysis, DOE will use that forecast. However, if an updated AEO forecast is published after the final rule analysis is completed, but before the final rule is published, the analysis will remain unchanged. DOE may conduct some sensitivity analyses, if appropriate, to determine if its conclusions would change based on the updated *AEO* forecast.

TABLE IV–9—SUMMARY OF NATIONAL ENERGY SAVINGS AND NET PRESENT VALUE INPUT—Continued

Input	ANOPR Description	Changes for NOPR
Rebound Effect	As explained in the LCC inputs section, DOE does not anticipate unit energy consumption to rebound above the levels used in the LCC analysis and passed to the NIA analysis. Further, the shipments model develops shipment projections to meet historical market saturation levels. The shipment model does not adjust shipments as a function of unit energy consumption levels, because DOE has no information with which to calibrate such a relationship.	No change.

1. Base Case and Standards Case Forecasted Efficiencies

Components of DOE's estimates of NES and NPV are the energy efficiencies of shipped equipment that DOE forecasts over time for the base case (without new standards) and for each standards case. The forecasted efficiencies represent the distribution of energy efficiency of the equipment under consideration that is shipped over the forecast period (*i.e.,* from the assumed effective date of a new standard to 30 years after the standard becomes effective).

The average annual energy consumption of the BVMs shipped in a given year depends on the per-unit energy consumption of BVM equipment at each efficiency level and the mix of efficiency levels of new units that is shipped in each year. Per-unit energy consumption at each efficiency level is determined in the energy use characterization. (See chapter 7 of the TSD.) The standards affect the mix of annual shipments by efficiency level as briefly described below. (See chapter 11 for details.)

Because no published data were available on market shares broken down by efficiency level, DOE developed estimates based on comments from interested parties at the ANOPR public meeting. These comments concerned approximate market shares of current shipments by equipment class and size, and approximate shipments by efficiency level for the base case (*i.e.,* without new standards).

DOE developed base case efficiency forecasts based on the estimated market shares by equipment class and efficiency level. Because there are no historical data to indicate how equipment efficiencies or relative equipment class preferences have changed over time, DOE assumed that forecasted market shares would remain frozen at the 2012 efficiency level until the end of the forecast period (30 years after the effective date or 2042).

For its estimate of standards case forecasted efficiencies, DOE used a "roll-up" scenario to establish the market shares by efficiency level for the year that standards become effective (*i.e.,* 2012). Information available to DOE suggests that equipment shipments with efficiencies in the base case that did not meet the standard levels under consideration would roll up to meet the new standard levels. Also, DOE assumed that all equipment efficiencies in the base case that were above the standard levels under consideration likely would not be affected.

2. Annual Energy Consumption, Total Installed Cost, Maintenance Cost, and Repair Costs

The difference in shipments by equipment efficiency level between the base case and standards case was the basis for determining the reduction in per-unit annual energy consumption that could result from new standards. The beverage vending machine stock in a given year is the total number of beverage vending machines shipped from earlier years that survive in the given year. The NES spreadsheet model tracks the number of beverage vending machines shipped each year and estimates the total beverage vending machine stock for each year. The annual energy consumption by efficiency level for each equipment class comes from the LCC analysis on a per-unit basis. Similarly, the total installed, maintenance, and repair costs for each efficiency level for each equipment class analyzed in the LCC are on a per-unit basis. Using the total estimated shipments and total estimated stock by equipment class and efficiency level, DOE calculates the annual energy consumption for the beverage vending machine stock in each year, the maintenance and repair costs associated with the equipment stock, and the total installed costs associated with new shipments in each year based on the standards scenario and associated distribution of shipments by efficiency level.

As explained above, DOE assumes that all Class A machines and 75 percent of Class B machines are installed indoors and that 25 percent of Class B machines are located outdoors. To calculate a weighted energy use for all Class B machines, DOE added aggregated results based on State-by-State TMY2 weather station data to the annual energy consumption of the remaining 75 percent of Class B machines that are located indoors. DOE further aggregated energy consumption at the State level to arrive at the national average energy consumption, using the 2000 Census population data.[33] Table IV–10 presents the national average annual energy consumption figures for the three different sizes of Class B machines.

[33] The U.S. Census Bureau,"2000 Census," *http://factfinder.census.gov/servlet/GCTTable?_bm=y&-geo_id=01000US&-_box_head_nbr=GCT-PH1&-context=gct&-ds_name=DEC_2000_SF1_U&-tree_id=4001&-format=US-9.* Accessed March 25, 2007.

TABLE IV–10—NATIONAL AVERAGE ANNUAL ENERGY CONSUMPTION FOR CLASS B MACHINES, BY EFFICIENCY LEVELS

Size	Annual energy consumption (all locations, kWh)						
	Level 1 (Baseline)	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Large	2019	1890	1842	1760	1746	1561	1526
Medium	1925	1799	1731	1658	1645	1463	1431
Small	1724	1606	1505	1505	1495	1313	1285

Table IV–11 shows annual energy consumption for each size of Class A machine. National average energy consumption figures are identical to State energy consumption figures. These national average annual energy consumption figures are used in the subsequent LCC, PBP, and NES analyses.

TABLE IV–11—ANNUAL ENERGY CONSUMPTION FOR CLASS A MACHINES, ALL SIZES AND ALL LOCATIONS, BY EFFICIENCY LEVELS

Size	Average annual energy consumption (all locations, kWh)							
	Level 1 (Baseline)	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8
Large	2464	2267	2099	1916	1785	1679	1610	1438
Medium	2383	2011	1916	1734	1529	1442	1383	1252
Small	2227	1924	1734	1551	1442	1361	1307	1186

DOE's energy use characterization assumes that there are no controls limiting display lighting or compressor operation in a beverage vending machine to certain hours of the day. As a result, the display lighting or compressor operation would not be affected by occupancy patterns in the building. However, using occupancy sensors and other controllers might reduce a vending machine's energy requirements during long periods of non-use, such as overnight and weekends. This occupancy controller option is often used when de-lamping a vending machine is not advisable (*i.e.,* when a vending machine does not have a captive audience or when de-lamping results in reduced vending sales revenues). Controllers can either be added on or enabled in certain beverage vending machines. See section IV.D for additional discussion of lighting controls and occupancy sensors. See chapter 7 in the TSD.

3. Escalation of Electricity Prices

DOE uses the most recent *AEO* reference case to forecast energy prices for standard rulemakings. DOE used the *AEO2009* reference case forecasts for future electricity prices, extended out to the end of the analysis period. DOE extrapolated the trend in values from 2020 to 2030 of the forecast to establish prices for the remainder of the analysis period. DOE intends to update its analysis for the final rule to reflect the *AEO2009* electricity price forecasts when final versions of these price forecasts are available.

4. Electricity Site-to-Source Conversion

The site-to-source conversion factor is a multiplier used for converting site energy, expressed in kWh, into primary or source energy, expressed in quadrillion Btu (quads). The site-to-source conversion factor accounts for losses in electricity generation, transmission, and distribution. For the ANOPR, DOE used site-to-source conversion factors based on U.S. average values for the commercial sector, calculated from *AEO2008,* Table A5. The average conversion factors vary over time because of projected changes in electricity generation sources (*i.e.,* the power plant types projected to provide electricity to the country). For the NOPR, DOE developed marginal site-to-source conversion factors that relate the national electrical energy savings at the point of use to the fuel savings at the power plant. These factors use the NEMS model and the examination of the corresponding energy savings from standards scenarios considered in DOE's utility impact analysis (chapter 14 of the TSD). The conversion factors vary over time because of projected changes in electricity generation sources and power plant dispatch scenarios. DOE used average U.S. conversion factors in the ANOPR because the utility impact analysis that is used to determine marginal conversion factors appropriate to efficiency standards for beverage vending machines occurs in the NOPR stage of the analysis.

To estimate NPV, DOE calculated the net impact each year as the difference between total operating cost savings (including electricity, repair, and maintenance cost savings) and increases in total installed costs (including MSP, sales taxes, distribution channel markups, and installation costs). DOE calculated the NPV of each TSL over the life of the equipment using three steps. First, DOE determined the difference between the equipment costs under the TSL and the base case to calculate the net equipment cost increase resulting from the TSL. Second, DOE determined the difference between the base case operating costs and the TSL operating costs to calculate the net operating cost savings from the TSL. Third, DOE determined the difference between the net operating cost savings and the net equipment cost increase to calculate the net savings (or expense) for each year. DOE then discounted the annual net savings (or expenses) for beverage vending machines purchased on or after 2012 to the reference year 2009, and summed the discounted values to determine the NPV of a TSL. An NPV greater than zero shows net savings (*i.e.,* the TSL would reduce overall customer expenditures relative to the base case in present value terms). An NPV less than zero (*i.e.,* negative value) indicates that the TSL would result in a net increase in customer expenditures in present value terms.

H. Life-Cycle Cost Subgroup Analysis

In analyzing the potential impact of new or amended standards on commercial customers, DOE evaluates the impact on identifiable groups (*i.e.,* subgroups) of customers, such as different types of businesses that may be disproportionately affected by an energy conservation standard. The subgroup used to perform this evaluation was manufacturing and/or industrial facilities that purchase their own vending machines. This customer subgroup is likely to include owners of high-cost vending machines because they have the highest capital costs and face the lowest electricity prices of any customer subgroup. These two conditions make it likely that this subgroup will have the lowest life-cycle cost savings of any major customer group.

The Joint Comment suggested that DOE focus its customer subgroup analysis on life-cycle costs rather than first-cost impacts. (Joint Comment, No. 34 at p. 6) DOE agrees with the Joint Comment and will continue in this rulemaking to focus the customer LCC subgroup analysis on examination of the life-cycle cost impacts. There will likely be first-cost increases with higher standard levels but also increased energy savings over the lifetime of the equipment. By examining LCC, DOE considers both impacts simultaneously for the designated subgroup in the LCC subgroup analysis, just as it does for the entire customer base in the LCC analysis.

DOE determined the impact on this beverage vending machine customer subgroup using the LCC spreadsheet model. DOE conducted the LCC and PBP analyses for beverage vending machine customers. The standard LCC and PBP analyses (described in section IV.E) include various types of businesses that own and use beverage vending machines. The LCC spreadsheet model allows for the identification of one or more subgroups of businesses, which can then be analyzed by sampling only each subgroup. The results of DOE's LCC subgroup analysis are summarized in section V.B.1.b and described in detail in chapter 12 of the TSD.

I. Manufacturer Impact Analysis

1. Overview

DOE performed an MIA to estimate the financial impact of energy conservation standards on beverage vending machine manufacturers, and to calculate the impact of such standards on domestic manufacturing employment and capacity. The MIA has both quantitative and qualitative aspects. The quantitative part of the MIA primarily relies on the GRIM, an industry-cash-flow model customized for this rulemaking. The GRIM inputs are data characterizing the industry cost structure, shipments, and revenues. The key output is the INPV. Different sets of assumptions (scenarios) will produce different results. The qualitative part of the MIA addresses factors such as equipment characteristics, characteristics of particular firms, and market and equipment trends, as well as an assessment of the impacts of standards on manufacturer subgroups. The complete MIA is outlined in chapter 13 of the TSD.

DOE conducted the MIA in three phases. Phase 1, Industry Profile, consisted of preparing an industry characterization. Phase 2, Industry Cash Flow Analysis, focused on the industry as a whole. In this phase, DOE used the GRIM to prepare an industry cash-flow analysis. DOE used publicly available information developed in Phase 1 to adapt the GRIM structure to analyze refrigerated beverage vending machine equipment energy conservation standards. In Phase 3, Subgroup Impact Analysis, DOE interviewed manufacturers representing the majority of domestic refrigerated beverage vending machine equipment sales. During these interviews, DOE discussed engineering, manufacturing, procurement, and financial topics specific to each company, and also obtained each manufacturer's view of the industry as a whole. The interviews provided valuable information DOE used to evaluate the impacts of energy conservation standards on manufacturer cash flows, manufacturing capacities, and employment levels.

a. Phase 1, Industry Profile

In Phase 1 of the MIA, DOE prepared a profile of the refrigerated beverage vending machine equipment industry based on the market and technology assessment prepared for this rulemaking. Before initiating the detailed impact studies, DOE collected information on the present and past structure and market characteristics of the refrigerated beverage vending machine equipment industry. DOE collected such information as market share, equipment shipments, markups, and cost structure for various manufacturers. The industry profile includes further detail on the overall market, equipment characteristics, estimated manufacturer market shares, the financial situation of manufacturers, and trends in the number of firms of refrigerated beverage vending machine equipment industry.

The industry profile included a top-down cost analysis of refrigerated beverage vending machine equipment manufacturers that DOE used to derive equipment cost and preliminary financial inputs for the GRIM (*e.g.,* revenues; material, labor, overhead, and depreciation expenses; selling, general, and administrative expenses (SG&A); and research and development (R&D) expenses). DOE also used public information to further calibrate its initial characterization of the industry, including U.S. Securities and Exchange Commission (SEC) 10–K reports, Standard & Poor's (S&P) stock reports, and corporate annual reports.

b. Phase 2, Industry Cash-Flow Analysis

Phase 2 of the MIA focused on the financial impacts of potential energy conservation standards on the industry as a whole. DOE used the GRIM to calculate the financial impacts of energy conservation standards on manufacturers. In Phase 2, DOE used the GRIM to perform a preliminary industry cash-flow analysis. In performing this analysis, DOE used the financial values determined during Phase 1 and the shipment scenarios used in the NIA analysis.

c. Phase 3, Subgroup Impact Analysis

Using average cost assumptions to develop an industry cash-flow estimate does not adequately assess differential impacts among manufacturer subgroups. For example, small manufacturers, niche players, or manufacturers exhibiting a cost structure that largely differs from the industry average could be more negatively affected. DOE used the results of the industry characterization analysis (in Phase 1) to group manufacturers that exhibit similar characteristics.

DOE established two subgroups for the MIA corresponding to large and small business manufacturers of beverage vending machines. For the beverage vending machine manufacturing industry, small businesses, as defined by the Small Business Administration (SBA), are manufacturing enterprises with 500 or fewer employees. Based on identification of these two subgroups, DOE prepared one interview guide with questions related to beverage vending machine manufacturing for large and small manufacturers. DOE used the interview guide to tailor the GRIM to address unique financial characteristics of manufacturers of the industry. DOE interviewed companies from each subgroup, including subsidiaries and independent firms and public and private corporations. The purpose of the interviews was to develop an understanding of how manufacturer impacts vary by TSL. During the course of the MIA, DOE interviewed manufacturers representing the vast majority of domestic beverage vending machine sales. Many of these same companies also participated in interviews for the engineering analysis. However, the MIA interviews broadened the discussion from primarily technology-related issues to include business-related topics. One objective was to obtain feedback from industry on the assumptions used in the GRIM and to isolate key issues and concerns. See chapter 13 of the TSD for details.

2. Discussion of Comments

In the ANOPR, DOE reported that manufacturers claimed higher energy conservation standards could deter some customers from buying higher margin units with more features. 73 FR 34130. The Joint Comment disagreed with this claim, stating that manufacturers have many options besides energy use to differentiate products. All these features have value to customers because they help sell more product or cut operating costs. (Joint Comment, No. 34 at pp. 6–7)

For the ANOPR, DOE reported some of the preliminary concerns manufacturers voiced during the initial engineering interviews. For the NOPR, DOE interviewed manufacturers and major customers and conducted market research to understand profitability in the beverage vending machine industry. DOE learned that the vast majority of equipment produced by manufacturers meets the same efficiency levels. In addition, the energy consumption of most equipment sold in the beverage vending machine industry is set by the specifications of the major purchasers of the equipment. Based on manufacturer interviews and the information found in the MIA, manufacturers design their equipment to meet this requirement of the large purchasers, but rarely exceed it. Because efficiency does not vary and the product designs are determined mainly by the major purchasers of the equipment, manufacturers typically do not earn a higher margin for additional features. Annual shipments are mainly determined by contracts with the major customers to replace a portion of retiring equipment. Additional features are unlikely to stimulate additional demand, especially if these features add costs to the purchaser or manufacturer. Due to split incentives, manufacturers may not earn a higher margin for equipment that reduces operating costs for the end-user, since these benefits are not directly conferred on the purchaser.

The Joint Comment stated that DOE provided an estimate for the life cycle of a beverage vending machine production line during the ANOPR. The Joint Comment also stated that the low end of this range is shorter than the time frame from the beginning of this rulemaking to the possible effective date of the standard. Thus, a manufacturer that chooses to anticipate a standard can reduce or eliminate standards-induced capital conversion costs. The commenters believe that DOE should not view capital conversion costs as a result of the regulation, but as a result of some manufacturers' failure to plan for standards. While manufacturers cannot know precise standards levels, the ANOPR analysis provides a very strong indication that standards at or near level 7 should be expected. (Joint Comment, No. 34 at p. 7)

In the ANOPR, DOE stated that a beverage vending machine production line has a life cycle of approximately 5 to 10 years in the absence of standards. 73 FR 34130. However, manufacturers would not be able to reduce or eliminate standards-induced capital conversion costs because a 5-year production line life cycle is shorter than the time frame between the initiation of this rulemaking and the possible effective date. In the GRIM, DOE incorporates annual research and development costs and the capital expenditures manufacturers would undertake regardless of standards. The INPV reported for the beverage vending machine industry incorporates the impacts due to new energy conservation standards. DOE separates recurring research and development and capital expenditures that occur regardless of energy conservation standards from equipment and capital conversion costs. Capital and equipment conversion costs capture the additional costs that manufacturers will face due to standards and are necessary to accurately calculate the impacts standards have on INPV. To minimize the costs that may be required to convert production lines to produce higher efficiency equipment, manufacturers will usually wait until standards are published. Manufacturers will not know the stringency of this standard until the publication of the final rule, which is scheduled for August 8, 2009. Finally, the energy conservation standard for this rulemaking applies to all equipment manufactured on or after 3 years of the publication of the final rule (42 U.S.C. 6295(v)(3)). This allows manufacturers 3 years after the publication date of the energy conservation standard levels to make any changes to production lines that would be required to comply with the new energy conservation standard. Since this preparation time is less than the lower end of the estimated beverage vending machine production line life cycle, DOE assumes that one-time capital conversion costs can be attributed to the new energy conservation standard level.

The Joint Comment questioned the assertion that stringent standards could cause production to be moved outside the United States. The Joint Comment noted that sourcing decisions are sensitive to the costs of production and product distribution, and not to the energy efficiency of the unit being produced (Joint Comment, No. 34 at p. 7).

DOE agrees that sourcing decisions are sensitive to the costs of production and product distribution. However, since the efficiency of equipment sold can directly affect production costs, DOE believes that the level of the new energy conservation standard could affect sourcing decisions. However, as noted in the Joint Comment, sourcing decisions are based on several factors, including many outside the scope of this rulemaking (*e.g.,* product distribution costs). Consequently, DOE does not speculate how standards will affect sourcing decisions.

3. Government Regulatory Impact Model Analysis

The GRIM analysis uses a standard annual cash-flow analysis that incorporates manufacturer selling prices, manufacturing production costs, shipments, and industry financial information as inputs. The analysis models changes in costs, distribution of shipments, investments, and associated margins that would result from new or amended regulatory conditions (in this case, standard levels). The GRIM spreadsheet uses a number of inputs to arrive at a series of annual cash flows, beginning with the base year of the analysis (2008) and continuing to 2042. DOE calculated INPVs by summing the stream of annual discounted cash flows during this period.

DOE used the GRIM to calculate cash flows using standard accounting principles and compare changes in INPV between a base case and various TSLs (the standards cases). Essentially, the difference in INPV between the base case and a standards case represents the financial impact of energy conservation standards on manufacturers. DOE collected this information from a number of sources, including publicly available data and interviews with manufacturers. See chapter 13 of the TSD for details.

4. Manufacturer Interviews

As part of the MIA, DOE discussed potential impacts of new energy conservation standards with manufacturers responsible for more than 65 percent of the beverage vending machines on the market. These interviews were in addition to those DOE conducted as part of the engineering analysis. DOE used the interviews to evaluate the impacts of new energy conservation standards on manufacturer cash flows, manufacturing capacities, and employment levels. Key issues that the manufacturers identified for DOE to consider in developing energy conservation standards are discussed in chapter 13 of the TSD.

5. Government Regulatory Impact Model Key Inputs and Scenarios

a. Base Case Shipments Forecast

The GRIM estimates manufacturer revenues based on unit shipment forecasts and the distribution by equipment class and efficiency. Changes in the efficiency mix at each standard level are a key driver of manufacturer finances. Consequently, DOE is seeking comment on the shipments forecast (section VI*I.E.*2). For this analysis, the GRIM used the NES shipments forecasts from 2008 to 2042. Total shipments forecasted by the NES for the base case in 2012 are shown in Table IV–12 and further discussed in this section of today's notice and chapter 10 of the TSD. Using the equipment class shipment assumptions from the NES, the GRIM maintains total industry shipments consisting of 55 percent Class A equipment and 45 percent Class B equipment throughout the analysis period.

TABLE IV–12-TOTAL NES–FORECASTED SHIPMENTS IN 2012

[Number of Units]

Equipment class	Total industry shipments by equipment class
Class A	49,500
Class B	40,500

In the shipments analysis, DOE also estimated the distribution of efficiencies in the base case for beverage vending machines (chapter 10 of the TSD). Table IV–13 and Table IV–14 show examples of the distribution of efficiencies in the base case for a Class A medium-size and a Class B medium-size beverage vending machine.

TABLE IV–13—GRIM DISTRIBUTION OF SHIPMENTS IN THE BASE CASE FOR CLASS A MEDIUM-SIZED BEVERAGE VENDING MACHINES

TSL *kWh/day*	Baseline 6.10	TSL 1 5.27	TSL 2 4.75	TSL 3 4.25	TSL 4 3.95	TSL 5 3.73	TSL 6 3.58	TSL 7 3.25
Distribution of shipments percent	10	90	0	0	0	0	0	0

TABLE IV–14—GRIM DISTRIBUTION OF SHIPMENTS IN THE BASE CASE FOR CLASS B MEDIUM-SIZED BEVERAGE VENDING MACHINES

TSL *kWh/day*	Baseline 4.96	TSL 1 4.62	TSL 2 4.31	TSL 3 4.31	TSL 4 4.28	TSL 5 3.78	TSL 6 3.69
Distribution of Shipments percent	10	0	90	0	0	0	0

b. Standards Case Shipments Forecast

For each standards case, DOE assumed that shipments at efficiencies below the projected standard levels were most likely to roll up to those efficiency levels in response to an energy conservation standard. This scenario assumes that demand for high-efficiency equipment is a function of its price without regard to the standard level. See chapter 13 of the TSD for additional details.

c. Manufacturing Production Costs

DOE derived manufacturing production costs (MPCs) from manufacturing selling prices found in the engineering analysis. Using data from the U.S. Census Bureau to develop an industry cost structure, DOE disaggregated the financial components that comprise manufacturing selling price (production costs, SG&A, R&D, and profit). By summing the labor, overhead, materials, and depreciation portions of the manufacturing selling price, DOE estimated the manufacturing production costs for the analyzed equipment. Further discussion of how DOE calculated other GRIM financial inputs from publicly available information is found in chapter 13 of the TSD.

d. Manufacturing Markup Scenarios

To understand how baseline and more efficient equipment are differentiated, DOE reviewed manufacturer catalogs and information gathered by manufacturers. In the base case, DOE used the manufacturer selling prices from the engineering analysis. For the analysis, DOE considered different manufacturer markup scenarios for beverage vending machines. Scenarios were used to bound the range of expected equipment prices following new energy conservation standards. For each equipment class, DOE used the markup scenarios that best characterized the prevailing markup conditions and captured the range of market responses that could result from new energy conservation standards. DOE learned from interviews with manufacturers that the majority only offer one equipment line for each product class that meets the same efficiency level. Similar efficiency levels and the small number of product offerings in each product class generally mean that there is no difference in markup used to differentiate baseline equipment from premium equipment.

For the MIA, DOE considered two distinct markup scenarios: (1) The preservation-of-gross-margin-percentage scenario, and (2) the preservation-of-operating-profit scenario. Under the ''preservation-of-gross-margin-percentage'' scenario, DOE applied a single, uniform ''gross margin percentage'' markup across all efficiency levels. This scenario implies that as production cost increases with efficiency, the absolute dollar markup will increase. For this scenario, DOE used a markup that yielded the same manufacturer selling prices found in the engineering analysis. The implicit assumption behind the ''preservation-of-operating profit'' scenario is that the industry can only maintain its operating profit (earnings before interest and taxes) from the baseline after implementation of the standard (2012). The industry impacts occur in this scenario when manufacturers expand their capital base and production costs to make more expensive equipment, but the operating profit does not change from current conditions. DOE implemented this markup scenario in the GRIM by setting the non-production cost markups at each TSL to yield approximately the same operating profit in both the base case and the standard case in the year after standard implementation (2012).

e. Equipment and Capital Conversion Costs

Energy conservation standards typically cause manufacturers to incur one-time conversion costs to bring their production facilities and product designs into compliance. For the purpose of the MIA, DOE classified these conversion costs into two major groups: (1) Equipment conversion costs, and (2) capital conversion costs. Equipment conversion costs are one-time investments in research, development, testing, and marketing, focused on making equipment designs comply with the new energy conservation standard. Capital conversion costs are one-time investments in property, plant, and equipment to adapt or change existing production facilities so that new equipment designs can be fabricated and assembled.

DOE assessed the R&D expenditures manufacturers would be required to make at each TSL. DOE obtained financial information through manufacturer interviews and aggregated the results to mask any proprietary or confidential information from any one manufacturer. DOE considered a number of manufacturer responses for beverage vending machines at each TSL. DOE estimated the total equipment conversion costs by gathering manufacturer responses, then weighting these responses by market share.

DOE also evaluated the level of capital conversion expenditures manufacturers would incur to comply with energy conservation standards. DOE used the manufacturer interviews to gather data on the level of capital investment required at each TSL. Manufacturers explained how different TSLs affected their ability to use existing plants, tooling, and equipment. From the interviews, DOE was able to estimate what portion of existing manufacturing assets would need to be replaced or reconfigured, and what additional manufacturing assets would be required to manufacture the higher-efficiency products.

The investment figures used in the GRIM can be found in section V.B.2 of today's notice. For additional information on the estimated product conversion and capital conversion costs, see chapter 13 of the TSD.

J. Utility Impact Analysis

The utility impact analysis estimates the effects of reduced energy consumption resulting from improved equipment efficiency on the utility industry. This utility analysis compares forecast results for a case comparable to the *AEO2008* reference case and forecasts for policy cases incorporating each of the beverage vending machine TSLs.

NPCC asked whether the utility impact analysis computes a national capital cost savings because of the change in new utility capacity from each standard level (NPCC, No. 29 at p. 196). DOE does compute the impact on total gigawatts (GW) of generation capacity in its utility impact analysis, but does not monetize changes in capital costs for building power plants.

DOE analyzed the effects of proposed standards on electric utility industry generation capacity and fuel consumption using a variant of EIA's NEMS. The NEMS–BT is run similarly to the *AEO2008* NEMS, except that beverage vending machine energy usage is reduced by the amount of energy (by fuel type) saved because of the TSLs. DOE obtained the inputs of the NES from the NES spreadsheet model. For the final rule, DOE intends to report utility analysis results using a version of NEMS–BT based on the *AEO2009* NEMS.

DOE conducted the utility analysis as policy deviations from the *AEO2008,* applying the same basic set of assumptions. In the utility analysis, DOE reported the changes in installed capacity and generation by fuel type that result for each TSL, as well as changes in end-use electricity sales. Chapter 14 of the NOPR TSD provides details of the utility analysis methods and results.

K. Employment Impact Analysis

Employment impact is one factor DOE considers in selecting a standard. Employment impacts include direct and indirect impacts. Direct employment impacts are any changes in the number of employees for beverage vending machine manufacturers, their suppliers, and related service firms. Indirect impacts are those changes of employment in the larger economy that occur because of the shift in expenditures and capital investment caused by the purchase and operation of more efficient beverage vending machines. The MIA in this rulemaking addresses only the direct employment impacts on manufacturers of beverage vending machines. Chapter 15 of the TSD describes other, primarily indirect, employment impacts.

Indirect employment impacts from beverage vending machine standards consist of the net jobs created or eliminated in the national economy, other than in the manufacturing sector being regulated, as a consequence of (1) Reduced spending by end users on electricity (offset to some degree by the increased spending on maintenance and repair), (2) reduced spending on new energy supply by the utility industry, (3) increased spending on the purchase price of new beverage vending machines, and (4) the effects of those three factors throughout the economy. DOE expects the net monetary savings from standards to be redirected to other forms of economic activity. DOE also expects these shifts in spending and economic activity to affect the demand for labor.

In developing this notice of proposed rulemaking, DOE estimated indirect national employment impacts using an input/output model of the U.S. economy, called ImSET (Impact of Sector Energy Technologies) developed by DOE's Building Technologies Program. ImSET is a personal-computer-based, economic analysis model that characterizes the interconnections among 188 sectors of the economy as national input/output structural matrices using data from the U.S. Department of Commerce's 1997 Benchmark U.S. input-output table. The ImSET model estimates changes in employment, industry output, and wage income in the overall U.S. economy resulting from changes in expenditures in various sectors of the economy. DOE estimated changes in expenditures using the NES spreadsheet. ImSET then estimated the net national indirect employment impacts of beverage vending machine efficiency standards on employment by sector.

The ImSET input/output model suggests that the proposed beverage vending machine efficiency standards could increase the net demand for labor in the economy and the gains would most likely be very small relative to total national employment. DOE therefore concludes that the proposed beverage vending machine standards are not likely to produce employment benefits that are sufficient to fully offset any adverse impacts on employment in the beverage vending machine industry. For more details on the employment impact analysis and its results, see chapter 15 of the TSD and section V.B.3.c of this notice.

L. Environmental Assessment

DOE has prepared a draft environmental assessment (EA) pursuant to the National Environmental Policy Act and the requirements under 42 U.S.C. 6295(o)(2)(B)(i)(VI) and 6316(a) to determine the environmental impacts of the standards being established in today's final rule. Specifically, DOE estimated the reduction in total emissions of CO_2 and NO_X using the NEMS–BT computer model. DOE calculated a range of estimates for reduction in Hg emissions using current power sector emission rates. The EA does not include the estimated reduction in power sector impacts of sulfur dioxide (SO_2), because DOE has determined that any such reduction resulting from an energy conservation standard would not affect the overall level of SO_2 emissions in the United States due to the presence of national caps on SO_2 emissions. These topics are addressed further below; see chapter 16 of the TSD for additional detail.

The NEMS–BT is run similarly to the *AEO2008* NEMS, except the beverage vending machine energy use is reduced by the amount of energy saved (by fuel type) due to the trial standard levels. The inputs of national energy savings come from the NIA analysis. For the EA, the output is the forecasted physical emissions. The net benefit of the standard is the difference between emissions estimated by NEMS–BT and the *AEO2008* reference case. The NEMS–BT tracks CO_2 and NO_X emissions using a detailed module that provides broad coverage of all sectors and includes interactive effects.

Sulfur Dioxide (SO_2)

The Clean Air Act Amendments of 1990 set an emissions cap on SO_2 for all power generation. Attaining this target is flexible among generators and is enforced through emissions allowances and tradable permits. In other words, with or without a standard, total cumulative SO_2 emissions will always be at or near the ceiling, while there may be some timing differences among yearly forecasts. Thus, it is unlikely that there will be reduced overall SO_2 emissions from standards as long as the emissions ceilings are enforced. Although there may be no actual reduction in SO_2 emissions, there still may be an economic benefit from reduced demand for SO_2 emission allowances. Electricity savings decrease the generation of SO_2 emissions from power production, which can lessen the need to purchase SO_2 emissions allowance credits, and thereby decrease the costs of complying with regulatory caps on emissions.

NO_X

NO_X emissions from 28 eastern States and the District of Columbia (D.C.) are limited under the Clean Air Interstate Rule (CAIR), published in the **Federal Register** on May 12, 2005. 70 FR 25162 (May 12, 2005). Although the rule has been remanded to EPA by the D.C. Circuit, it will remain in effect until it is replaced by a rule consistent with the Court's opinion in North Carolina v. EPA. Because all States covered by CAIR opted to reduce NO_X emissions through participation in cap-and-trade programs for electric generating units, emissions from these sources are capped across the CAIR region. As with the SO_2 emissions cap, energy conservation standards are not likely to have a physical effect on NO_X emissions in those States. However, the standards proposed in today's NOPR might have produced an environmentally related economic impact in the form of lower prices for emissions allowance credits if they were large enough. DOE believes that such standards would not produce such an impact because the estimated reduction in NO_X emissions or the corresponding increase in available allowance credits in States covered by the CAIR cap would be too small to affect allowance prices for NO_X.

In contrast, new or amended energy conservation standards would reduce NO_X emissions in those 22 States that are not affected by the CAIR, and these emissions could be estimated from NEMS–BT. As a result, DOE used the NEMS–BT to forecast emission reductions from the beverage vending machine standards that are considered in today's NOPR.

Though currently in effect, CAIR has been the subject of significant litigation. CAIR was vacated by the U.S. Court of Appeals for the District of Columbia Circuit (D.C. Circuit) in its July 11, 2008, decision in *North Carolina* v. *Environmental Protection Agency.*[34] However, on December 23, 2008, the D.C. Circuit decided to allow the CAIR to remain in effect until it is replaced by a rule consistent with the court's earlier opinion.[35]

Mercury (HG)

Similar to SO_2 and NO_X, future emissions of Hg would have been subject to emissions caps under the Clean Air Mercury Rule (CAMR). The CAMR would have permanently capped emissions of mercury for new and existing coal-fired plants in all States by 2010, but was vacated by the D.C. Circuit in its February 8, 2008, decision in *New Jersey* v. *Environmental Protection Agency.*[36] DOE typically uses the NEMS–BT model to calculate emissions from the electrical generation sector; however, the 2008 NEMS–BT model is not suitable for assessing mercury emissions in the absence of a CAMR cap. Thus, DOE used a range of Hg emissions rates (in tons of Hg per energy per TWh produced) based on the *AEO2008.* Because the high end of the range of Hg emissions rates attributable to electricity generation are from coal-fired power plants, DOE based that emissions rate on the tons of mercury emitted per TWh of coal-generated electricity. DOE's low estimate assumed that future standards would displace electrical generation from natural gas-fired powered power plants. The low end of the range of Hg emissions rates is zero because natural gas-fired powered power plants have virtually no Hg emissions associated with their operations. To estimate the reduction in mercury emissions, DOE multiplied the emissions rates by the reduction in electricity generation associated with the standards proposed in today's NOPR.

Refrigerant Leaks

DOE received one comment regarding the treatment of refrigerant leaks during beverage vending machine production and end-use in which DOE was asked how it would analyze this issue in the environmental assessment. (EEI, No. 37 at p. 4) In response, DOE notes that it has no reliable information on the rates of refrigerant leaks during the production of and during operational life of beverage vending machines, and consequently did not conduct a quantitative analysis of environmental impacts from refrigerant leaks. DOE does not anticipate a significant change in shipments for beverage vending machines, significant changes in refrigerant use by the beverage vending machine manufacturers, or significant changes in refrigerant leakage rates as a result of new energy conservation standards. DOE does not have any information indicating that refrigerant leakage rates would vary by energy efficiency level.

M. Monetizing Carbon Dioxide and Other Emissions Impacts

DOE also calculated the possible monetary benefit of CO_2, NO_X, and Hg

[34] 531 F.3d 896 (D.C. Cir. 2008).

[35] *North Carolina* v. *EPA,* 550 F.3d 1176 (D.C. Cir. 2008) (remand of vacatur).

[36] *New Jersey* v. *EPA,* 517 F.3d 574 (D.C. Cir. 2008).

reductions. Cumulative monetary benefits were determined using discount rates of 3 and 7 percent. DOE monetized reductions in CO_2 emissions due to the standards proposed in this NOPR based on a range of monetary values drawn from studies that attempt to estimate the present value of the marginal economic benefits (based on the avoided marginal social costs of carbon) likely to result from reducing greenhouse gas emissions. The marginal social cost of carbon is an estimate of the monetary value to society of the environmental damages of CO_2 emissions. This concept is used rather than compliance costs because CO_2 is not regulated. Several parties provided comments on the economic valuation of CO_2 for the NOPR.

On the treatment of emissions, Earthjustice made the following four statements:

(1) DOE cannot rationally weigh the economic benefit of reduced emissions unless it actually calculates the economic dimension of those emissions reductions. (Earthjustice, No. 38 at p. 2)

(2) DOE must evaluate the impact of vending machine standards on NO_X through a two-pronged approach, calculating both the effect on allowance prices under the NO_X SIP Call rule, where applicable, and the monetary value of avoided NO_X emissions. (Earthjustice, No. 38 at p. 3)

(3) Once DOE calculates the projected reductions in mercury emission, it must assign an appropriate economic value to those emissions. (Earthjustice, No. 38 at p. 3)

(4) Excluding CO_2 emissions reduction benefits from DOE's NPV analysis on the basis of uncertainty about their precise measure would be arbitrary and capricious. (Earthjustice, No. 38 at p. 4)

In addition, NRDC advocated that DOE monetize the value of CO_2 emissions and take that into account in the LCC analysis, using a price for carbon emissions based on EIA's analysis of the Lieberman-Warner bill. (NRDC, Public Meeting Transcript, No. 29 at p. 107)

In response to the ANOPR comments on monetization of emissions and how that is included in the DOE analyses, DOE notes that neither EPCA nor NEPA requires that the economic value of emissions reduction be incorporated in the LCC or NPV analysis of energy savings. Unlike energy savings, the economic value of the emissions reductions discussed by commenters is not priced in the marketplace. DOE has chosen to report these benefits separately from the net benefits of energy savings. A summary of the monetary results is shown in section V.B.6 of this notice. DOE will consider both values when weighing the benefits and burdens of standards.

With respect to NO_X, the proposed standards might have produced an environmentally related economic impact in the form of lower prices for emissions allowance credits if they were large enough. However, DOE believes that in the present case, such standards would not produce even an environmentally related economic impact in the form of lower prices for emissions allowance credits because the estimated reduction in NO_X emissions or the corresponding allowance credits in States covered by the CAIR cap would be too small to affect allowance prices for NO_X under the CAIR.

V. Analytical Results

A. Trial Standard Levels

DOE analyzed seven energy consumption levels for Class A equipment and six energy consumption levels for Class B equipment in the LCC and NIA analyses. For the NOPR, DOE determined that each of these levels should be presented as a possible TSL and correspondingly identified seven TSLs for Class A and six TSLs for Class B equipment. For each equipment class, the range of TSLs selected includes the energy consumption level providing the maximum NES level for the class, the level providing the maximum NES while providing a positive NPV, the level providing the maximum NPV, and the level approximately equivalent to ENERGY STAR Tier 2. Many of the higher levels selected correspond to equipment designs that incorporate specific noteworthy technologies that can provide energy savings benefits. For Class A, DOE also included two intermediate efficiency levels to fill in significant energy consumption gaps between the levels identified above the ENERGY STAR Tier 2 equivalent level. For Class A equipment, the ENERGY STAR Tier 2 equivalent TSL level, TSL 1, allows for the highest energy consumption. For Class B, DOE included one trial standard level with energy consumption higher than that provided by ENERGY STAR Tier 2.

For the ANOPR, DOE proposed four candidate standard levels for each equipment class based on the levels that provided maximum energy savings, maximum efficiency level with positive LCC savings, maximum LCC savings, and the highest efficiency level with a payback of less than 3 years.

DOE preserved energy consumption levels from the ANOPR that met the same economic criteria in the NOPR, but also included the Tier 2 equivalency level and several additional TSLs. These additional levels either provide additional intermediate efficiency levels or include specific noteworthy technologies examined in the engineering analysis. Table V–1 and Table V–2 show the TSL levels DOE selected for the equipment classes and sizes analyzed. For Class A equipment, TSL 7 is the max-tech level for each equipment class. TSL 6 is the maximum efficiency level with a positive NPV at the 7-percent discount rate, achieved by incorporating an electronically commutated motor (ECM) condenser fan. TSL 5 is the efficiency level with the maximum NPV and maximum LCC savings, achieved by using an advanced refrigerant condenser design. TSL 4 is the level that first incorporated LED lighting as a design feature in the engineering analysis. TSL 3 and TSL 2 were intermediate efficiency levels chosen to bridge the gap between TSL 4, and the ENERGY STAR Tier 2 equivalent level, TSL 1.

For Class B equipment, TSL 6 is the max-tech level for each equipment size. TSL 5 is the level that first incorporated LED lighting as a design option in the engineering analysis. TSL 4 is the next highest efficiency level including incorporation of an ECM condenser fan motor. TSL 3 was achieved by using an advanced refrigerant condenser design. This TSL provided an NPV value of essentially 0, with total capital expenditures for new equipment balanced by total operating cost savings over the NIA analysis period, based on a 7-percent discount rate. TSL 2 is the ENERGY STAR Tier 2 level for Class B equipment. This TSL provided the maximum LCC savings and maximum NPV savings at a 7-percent discount rate. TSL 1, which provided an energy consumption level approximately 4 percent higher than TSL 2, was also included in the analysis. TSL 1 represented the first level incorporating an evaporator fan driven by an ECM in the engineering analysis.

As determined in the ANOPR, DOE chose to characterize the proposed TSL levels in terms of proposed equations that establish a maximum daily energy consumption (MDEC) limit through a linear equation of the following form:

$$MDEC = A \times V + B$$

Where:

A is expressed in terms of kWh/day/ft^3 of measured volume,

V is the measured refrigerated volume (ft^3) calculated for the equipment, and

B is an offset factor expressed in kWh/day.

Coefficients A and B are uniquely derived for each equipment class based on a linear equation passing between the daily energy consumption values for equipment of different refrigerated volumes. For the development of the A and B coefficients, DOE used the energy consumption values shown in Table V–1 and Table V–2 for the medium and large equipment sizes within each class of beverage vending machine. DOE did not use the small equipment sizes in each class because information from the ANOPR indicated that there are no significant shipments of this equipment size. However, DOE seeks input from interested parties on whether the proposed linear equation used to describe the maximum daily energy consumption standards should be based on medium and large equipment (using two points); small, medium, and large equipment (three points); or some other possible weighting strategy. Results for using two points and three points are described in more details in chapter 9 of the TSD.

Chapter 9 of the TSD explains the methodology DOE used for selecting TSLs and developing the equations shown in Table V–3.

TABLE V–1—TRIAL STANDARD LEVELS FOR CLASS A EQUIPMENT EXPRESSED IN TERMS OF DAILY ENERGY CONSUMPTION

Size	Test metric	Trial standard level in order of efficiency							
		Baseline	TSL 1	TSL 2	TSL 3	TSL 4	TSL 5	TSL 6	TSL 7
Engineering level		1	5	*n/a	*n/a	6	7	9	11
Small	kWh/day	6.1	5.27	4.75	4.25	3.95	3.73	3.58	3.25
Medium	kWh/day	6.53	5.51	5.25	4.75	4.19	3.95	3.79	3.43
Large	kWh/day	6.75	6.21	5.75	5.25	4.89	4.60	4.41	3.94

*Not applicable. These levels established as intermediate points along the engineering cost curves.

TABLE V–2—TRIAL STANDARD LEVELS FOR CLASS B EQUIPMENT EXPRESSED IN TERMS OF DAILY ENERGY CONSUMPTION

Size	Test metric	Trial standard level in order of efficiency						
		Baseline	TSL 1	TSL 2	TSL 3	TSL 4	TSL 5	TSL 6
Engineering level		1	2	4	4	5	6	7
Small	kWh/day	4.96	4.62	4.31	4.31	4.28	3.78	3.69
Medium	kWh/day	5.56	5.2	4.99	4.76	4.72	4.22	4.12
Large	kWh/day	5.85	5.48	5.33	5.07	5.03	4.52	4.41

TABLE V–3—TRIAL STANDARD LEVELS EXPRESSED IN TERMS OF EQUATIONS AND COEFFICIENTS FOR EACH EQUIPMENT CLASS

Trial standard level	Test metric	Class A	Class B
Baseline	kWh/day	MDEC = 0.019 × V + 6.09	MDEC = 0.068 × V + 4.07.
TSL 1	kWh/day	MDEC = 0.062 × V + 4.12	MDEC = 0.066 × V + 3.76.
TSL 2	kWh/day	MDEC = 0.044 × V + 4.26	MDEC = 0.080 × V + 3.24.
TSL 3	kWh/day	MDEC = 0.044 × V + 3.76	MDEC = 0.073 × V + 3.16.
TSL 4	kWh/day	MDEC = 0.062 × V + 2.80	MDEC = 0.073 × V + 3.12.
TSL 5	kWh/day	MDEC = 0.058 × V + 2.66	MDEC = 0.070 × V + 2.68.
TSL 6	kWh/day	MDEC = 0.055 × V + 2.56	MDEC = 0.068 × V + 2.63.
TSL 7	kWh/day	MDEC = 0.045 × V + 2.42	n/a*.

*Not applicable. There is no TSL 7 for Class B machines.

B. Economic Impacts on Commercial Customers

1. Economic Impacts on Commercial Customers

a. Life-Cycle Cost and Payback Period

To evaluate the economic impact of the TSLs on customers, DOE conducted an LCC analysis for each TSL. More efficient beverage vending machines are expected to affect customers in two ways: annual operating expense is expected to decrease and purchase price is expected to increase. DOE analyzed the net effect by calculating the LCC. Inputs used for calculating the LCC include total installed costs (*i.e.,* equipment price plus installation costs), annual energy savings, average electricity costs by customer, energy price trends, repair costs, maintenance costs, equipment lifetime, and discount rates.

DOE's LCC and PBP analyses provided five outputs for each TSL that are reported in Table V–4 through Table V–6 for Class A equipment. The first three outputs are the percentages of standard-compliant machine purchases that would result in (1) A net LCC increase, (2) no impact, or (3) a net LCC savings for the customer. DOE used the estimated distribution of shipments by efficiency level for each equipment class to determine the affected customers. The fourth output is the average net LCC savings from standard-compliant equipment. The fifth output is the average PBP for the customer investment in standard-compliant equipment. The PBP is the number of years it would take for the customer to recover, through energy savings, the increased costs of higher efficiency equipment compared to baseline efficiency equipment.

TABLE V–4—SUMMARY LCC AND PBP RESULTS FOR CLASS A–LARGE–IN

	Trial Standard Level						
	1	2	3	4	5	6	7
Equipment with Net LCC Increase *%*	0	0	0	0	0	7	100
Equipment with No Change in LCC *%*	90	0	0	0	0	0	0
Equipment with Net LCC Savings *%*	10	100	100	100	100	93	0
Mean LCC Savings *$*	91	145	204	246	272	271	(1,419)
Mean Payback Period *years*	2.1	2.9	3.2	3.3	3.5	3.9	74.0

Note: Numbers in parentheses indicate negative values.

TABLE V–5—SUMMARY LCC AND PBP RESULTS FOR CLASS A–MEDIUM–IN

	Trial Standard Level						
	1	2	3	4	5	6	7
Equipment with Net LCC Increase *%*	0	0	0	0	0	0	100
Equipment with No Change in LCC *%)*	90	0	0	0	0	0	0
Equipment with Net LCC Savings *%*	10	100	100	100	100	100	0
Mean LCC Savings *$*	175	223	258	327	339	331	(1,119)
Mean Payback Period *years*	2.0	1.9	2.8	3.0	3.3	3.7	59.2

Note: Numbers in parentheses indicate negative values.

TABLE V–6—SUMMARY LCC AND PBP RESULTS FOR CLASS A–SMALL–IN

	Trial standard level						
	1	2	3	4	5	6	7
Equipment with Net LCC Increase *%*	0	0	0	0	0	7	100
Equipment with No Change in LCC *%*	90	0	0	0	0	0	0
Equipment with Net LCC Savings *%*	10	100	100	100	100	93	0
Mean LCC Savings *$*	141	197	251	284	297	290	(1,090)
Mean Payback Period *years*	2.0	2.7	3.1	3.2	3.5	3.9	69.7

Note: Numbers in parentheses indicate negative values.

For the Class A equipment, there are positive net LCC savings on average through TSL 6. Only 10 percent of all equipment purchased is expected to achieve a net LCC savings at the first TSL level, since about 90 percent of the equipment on the market in 2012 is expected to meet that standard. LCC savings consistently peak at TSL 5, but for between 93 percent and 100 percent of purchasers, Class A equipment is projected to achieve LCC savings even at TSL 6. Simple average PBPs are projected to be less than 3 years for all Class A equipment through TSL 2. PBPs are less than 4 years through TSL 6.

DOE's LCC and PBP analyses provided the same five outputs for each TSL for Class B equipment. These outputs are reported in Table V–7 through Table V–9.

TABLE V–7—SUMMARY LCC AND PBP RESULTS FOR CLASS B–LARGE

	Trial standard level					
	1	2	3	4	5	6
Equipment with Net LCC Increase *%*	0	9	19	27	100	100
Equipment with No Change in LCC *%*	90	0	0	0	0	0
Equipment with Net LCC Savings *%*	10	91	81	73	0	0
Mean LCC Savings *$*	48	53	51	42	(515)	(2,352)
Mean Payback Period *years*	3.0	4.1	5.8	6.6	74.0	100.0

Note: Numbers in parentheses indicate negative values.

TABLE V–8—SUMMARY LCC AND PBP RESULTS FOR CLASS B—MEDIUM

	Trial standard level					
	1	2	3	4	5	6
Equipment with Net LCC Increase *%*	0	11	21	33	100	100
Equipment with No Change in LCC *%*	90	0	0	0	0	0
Equipment with Net LCC Savings *%*	10	89	79	67	0	0
Mean LCC Savings *$*	46	57	48	38	(528)	(2,170)

TABLE V–8—SUMMARY LCC AND PBP RESULTS FOR CLASS B—MEDIUM—Continued

	Trial standard level					
	1	2	3	4	5	6
Mean Payback Period *years*	3.1	4.1	6.1	6.9	76.9	100.0

Note: Numbers in parentheses indicate negative values.

TABLE V–9—SUMMARY LCC AND PBP RESULTS FOR CLASS B—SMALL

	Trial standard level					
	1	2	3	4	5	6
Equipment with Net LCC Increase *%*	1	39	39	47	100	100
Equipment with No Change in LCC *%*	90	0	0	0	0	0
Equipment with Net LCC Savings *%*	10	61	61	53	0	0
Mean LCC Savings *$*	39	26	26	13	(582)	(2,070)
Mean Payback Period *years*	3.5	7.5	7.5	9.1	86.9	100.0

Note: Numbers in parentheses indicate negative values.

For Class B equipment, there are positive net LCC savings on average through TSL 4. Only 10 percent of all equipment purchased is expected to achieve a net LCC savings at the first TSL level, since about 90 percent of the equipment on the market in 2012 is expected to meet that standard. LCC savings consistently peak at TSL 3, but for 53 percent to 74 percent of purchasers, Class B equipment is projected to achieve LCC savings at TSL 5. Simple average PBPs are projected to be about 3 years for large and medium size Class B equipment at TSL 1. PBPs are about 4 years for large and medium size Class B equipment through TSL 2.

b. Life-Cycle Cost Subgroup Analysis

Using the LCC spreadsheet model, DOE estimated the impact of the TSLs on the following customer subgroup: Manufacturing facilities that have purchased their own beverage vending machines. This is the largest component of the 5 percent of site owners who also own their own vending machines, and comprises about 2 percent of all beverage vending machines. About 95 percent are owned by bottlers and vendors. The manufacturing facilities subgroup was analyzed because, in addition to being the largest independent block of owners, it had among the highest financing costs (based on weighted average cost of capital) and faced the lowest energy costs of any customer group. The group was therefore expected to have the least LCC savings and longest PBP of any identifiable customer group.

DOE estimated the LCC and PBP for the manufacturing facilities subgroup. Table V–10 shows the mean LCC savings for equipment that meets the proposed energy conservation standards for the manufacturing facilities subgroup, and Table V–11 shows the mean PBP (in years) for this subgroup. More detailed discussion on the LCC subgroup analysis and results can be found in chapter 12 of the TSD.

TABLE V–10—MEAN LIFE-CYCLE COST SAVINGS FOR REFRIGERATED BEVERAGE VENDING MACHINE EQUIPMENT PURCHASED BY THE MANUFACTURING FACILITIES LCC SUBGROUP (2008$)

Equipment Class	Size	TSL 1	TSL 2	TSL 3	TSL 4	TSL5	TSL6	TSL 7
A	S	$94	$123	$150	$166	$168	$153	−$1,210
A	M	118	152	160	197	197	181	−1,256
A	L	60	89	121	144	153	142	−1,537
B	S	22	−6	−6	−19	−623	−2,072	NA
B	M	27	28	9	−2	−579	−2,183	NA
B	L	29	27	13	2	−567	−2,361	NA

TABLE V–11 MEAN PAYBACK PERIOD FOR REFRIGERATED BEVERAGE VENDING MACHINE EQUIPMENT PURCHASED BY THE MANUFACTURING FACILITIES LCC SUBGROUP (YEARS)

Equipment Class	Size	TSL 1	TSL 2	TSL 3	TSL 4	TSL 5	TSL 6	TSL 7
A	S	2.4	3.4	3.8	4.0	4.3	4.8	81.0
A	M	2.4	2.3	3.5	3.7	4.1	4.6	74.1
A	L	2.6	3.5	3.9	4.1	4.4	4.9	84.2
B	S	4.4	10.0	10.0	12.4	95.8	100.0	NA
B	M	3.9	5.2	7.9	9.1	88.7	100.0	NA
B	L	3.7	5.1	7.4	8.6	86.1	100.0	NA

For beverage vending machines, the LCC and PBP impacts for manufacturing facilities that own their own beverage vending machines are less than those of all customers. Because they face lower energy costs, the lower value of energy savings lengthens the period over which the original investment is paid back and also reduces operating cost savings over the lifetime of more efficient beverage vending machines. In addition, because they face higher financing costs, these sites have a relatively high opportunity cost for investment, so the value of future electricity savings from higher efficiency equipment is further reduced. Even so, for this subgroup of Class A machines, LCC is still positive for all but the TSL 8 level. PBP is lengthened by about a year, but is still less than 4 years at TSL 1 and less than 5 years at TSL.

2. Economic Impacts on Manufacturers

To assess the lower end of the range of potential impacts for the beverage vending machine industry, DOE considered the preservation-of-gross-margin-percentage scenario. This scenario represents the lower end of the range of industry profitability because it assumes that manufacturers are able to pass through increased production costs to their customers. However, manufacturers indicated during interviews that market conditions usually do not allow them to fully pass costs to their customers.

To assess the higher end of the range of potential impacts for the beverage vending machine industry, DOE considered the preservation-of-operating-profit scenario. The preservation-of-operating-profit scenario models manufacturer concerns about the overcapacity of the industry and the inability to set the prices they charge their customers. In this scenario, manufacturers spend the necessary investments required to convert their facilities to produce standards-compliant equipment. Despite this effort, operating profit does not change in absolute dollars and decreases as a percentage of revenue.

a. Class A Beverage Vending Machine Equipment

Table V–12 and Table V–13 show the MIA results for each TSL using both scenarios described above for Class A beverage vending machines.

TABLE V–12—MANUFACTURER IMPACT ANALYSIS FOR CLASS A BEVERAGE VENDING MACHINE EQUIPMENT UNDER THE PRESERVATION OF GROSS MARGIN PERCENTAGE MARKUP SCENARIO

Preservation of Gross Margin Percentage Markup Scenario

Metric	Units	Base case	Trial standard level						
			1	2	3	4	5	6	7
INPV	2008$ millions	35.3	35.3	35.1	33.4	33.2	26.5	22.9	26.8
Change in INPV	2008$ millions		0.0	(0.2)	(1.9)	(2.1)	(8.8)	(12.4)	(8.3)
	%		0.08	−0.65	−5.47	−5.86	−24.95	−35.09	−23.67
Equipment Conversion Costs.	2008$ millions		0.0	0.6	0.6	1.2	2.9	3.5	3.5
Capital Conversion Costs	2008$ millions		0.0	0.0	2.2	2.2	9.1	13.0	14.1
Total Investment Required	2008$ millions		0.0	0.6	2.8	3.4	11.9	16.4	17.6

Note: Numbers in parentheses indicate negative values.

TABLE V–13—MANUFACTURER IMPACT ANALYSIS FOR CLASS A BEVERAGE VENDING MACHINE EQUIPMENT UNDER THE PRESERVATION OF OPERATING PROFIT MARKUP SCENARIO

Preservation of Gross Margin Percentage Markup Scenario

Metric	Units	Base case	Trial Standard Level						
			1	2	3	4	5	6	7
INPV	2008$ millions	35.3	35.3	34.9	32.7	32.2	25.4	21.6	14.1
Change in INPV	2008$ millions		(0.0)	(0.4)	(2.6)	(3.1)	(9.9)	(13.7)	(20.9)
	%		−0.04	−1.04	−7.45	−8.83	−28.14	−38.89	−59.74
Equipment Conversion Costs.	2008$ millions		0.0	0.6	0.6	1.2	2.9	3.5	3.5
Capital Conversion Costs	2008$ millions		0.0	0.0	2.2	2.2	9.1	13.0	14.1
Total Investment Required	2008$ millions		0.0	0.6	2.8	3.4	11.9	16.4	17.6

Note: Numbers in parentheses indicate negative values.

DOE estimates that there are no significant impacts on INPV for Class A equipment to meet TSL 1. The vast majority of equipment for sale today meets TSL 1. Therefore, DOE expects there will be no equipment or capital conversion costs and that industry revenue and production costs will not be significantly negatively affected.

At TSL 2, DOE estimated the impacts in INPV for Class A equipment to range from approximately −$0.2 million to −$0.4 million, a change in INPV of −0.65 percent to −1.04 percent. At this level, the industry cash flow decreases by approximately 6.5 percent, to $2.12 million, compared to the base case value of $2.27 million in the year leading up to the standards. At TSL 2, manufacturers will have to make some component switches to comply with the standard. However, most manufacturers will not have to make significant alterations to their production process and will only require minimal conversion costs. Though standards will increase the manufacturing production costs, the incremental cost is not substantially larger than most equipment sold today, resulting in minimal impacts on industry value.

At TSL 3, DOE estimated the impacts on INPV for Class A equipment to range from approximately −$1.9 million to −$2.6 million, a change in INPV of −5.47 percent to −7.45 percent. At this level, the industry cash flow decreases by approximately 46 percent, to $1.23 million, compared to the base case value of $2.27 million in the year leading up to the standards. At TSL 3, manufacturers will have to make additional component switches and minor changes to their production lines, resulting in minimal equipment and capital conversion costs. Standards increase production costs, but these additional costs are not enough to severely affect INPV even if the dollar value of operating profit remains unchanged.

At TSL 4, DOE estimated the impacts on INPV for Class A equipment to range from −$2.1 million to −$3.1 million, a change in INPV of approximately −5.86 percent to −8.83 percent. At this level, the industry cash flow decreases by approximately 52.4 percent to $1.08 million, compared to the base case value of $2.27 million in the year leading up to the standards. At TSL 4, certain manufacturers have to make major changes to their production lines, while others will only have to make minor component changes to their existing production lines to comply with the standard. As a result, DOE believes TSL 4 may have differential impacts among manufacturers. The most significant change that must be implemented at this TSL is replacing fluorescent lighting with LEDs. If profitability remains at pre-standard then the impacts on INPV are worse.

At TSL 5, DOE estimated the impacts on INPV for Class A equipment to range from −$8.8 million to −$9.9 million, a change in INPV of approximately −24.95 percent to −28.14 percent. At this level, the industry cash flow decreases by approximately 191.9 percent to −$2.09 million, compared to the base case value of $2.27 million in the year leading up to the standards. At TSL 5, certain manufacturers have to completely redesign all their existing equipment, while others only have to make costly changes to their existing production lines to comply with the standard. Therefore, DOE believes TSL 5 has differential impacts among manufacturers. Depending on the pathway to meet TSL 5, manufacturers may have to alter their existing equipment cabinet designs, which would greatly increase conversion costs. These costly equipment and capital conversion costs are the most significant driver of INPV. In addition, the higher manufacturing costs of standards-compliant equipment could reduce profitability.

At TSL 6, DOE estimated the impacts on INPV for Class A equipment to range from −$12.4 million to −$13.7 million, a change in INPV of approximately −35.09 percent to −38.89 percent. DOE seeks comment on the magnitude of this estimated decline in INPV. Also, at TSL 6, the industry cash flow decreases by approximately 267.0 percent to −$3.79 million, compared to the base case value of $2.27 million in the year leading up to the standards. In addition, manufacturers have to redesign all their existing equipment and make capital investments in their production lines to comply with the standard. Manufacturers will have to make additional alterations to the existing equipment cabinet designs. In addition, the equipment changes necessary to meet TSL 6 are more complex, which increases the engineering and capital resources that must be employed. The production costs of equipment that meets TSL 6 are higher than at TSL 5. The cost to manufacture standards-compliant equipment could have a greater impact on profitability if the dollar value of operating profit remains unchanged. However, at TSL 5, the costly equipment and capital conversion costs are a more significant driver of INPV because the revenues from the higher incremental prices do not offset the greater conversion expenditures even if operating profit increases under standards. At TSL 6, DOE believes there are no differential impacts among manufacturers.

At TSL 7 (max-tech), DOE estimated the impacts on INPV for Class A to range from −$8.3 million to −$20.9 million, a change in INPV of approximately −23.67 percent to −59.74 percent. At this level, the industry cash flow decreases by approximately 287.9 percent to −$4.27 million, compared to the base case value of $2.27 million in the year leading up to the standards. Similar to TSL 6, TSL 7 involves additional and more complex changes to equipment cabinet designs. These additional changes increase equipment and capital conversion costs. However, the substantial increases in production costs to manufacture standard-compliant equipment is also a significant driver of INPV. If profitability does not increase with the substantially higher manufacturing costs, then the impact on INPV is much larger.

b. Class B Beverage Vending Machine Equipment

Table V–14 and Table V–15 show the MIA results for Class B beverage vending machines at each TSL using the preservation-of-gross-margin-percentage and preservation-of-operating-profit scenarios described above.

TABLE V–14—MANUFACTURER IMPACT ANALYSIS FOR CLASS B BEVERAGE VENDING MACHINE EQUIPMENT UNDER THE PRESERVATION OF GROSS MARGIN PERCENTAGE MARKUP SCENARIO

Preservation of gross margin percentage markup scenario								
	Units	Base case	Trial standard level					
			1	2	3	4	5	6
INPV	2008$ millions	22.1	22.1	22.1	21.3	20.9	12.4	11.0
Change in INPV	2008$ millions		0.0	0.0	(0.8)	(1.3)	(9.7)	(11.2)
	%		0.04	0.07	−3.71	−5.71	−44.01	−50.38
Equipment Conversion Costs	2008$ millions		0.0	0.0	1.7	2.6	3.5	6.9
Capital Conversion Costs	2008$ millions		0.0	0.0	0.0	0.0	11.0	14.7
Total Investment Required	2008$ millions		0.0	0.0	1.7	2.6	14.5	21.6

Note: Numbers in parentheses indicate negative values.

TABLE V–15—MANUFACTURER IMPACT ANALYSIS FOR CLASS B BEVERAGE VENDING MACHINE EQUIPMENT UNDER THE PRESERVATION OF OPERATING PROFIT MARKUP SCENARIO

Preservation of gross margin percentage markup scenario								
	Units	Base case	Trial standard level					
			1	2	3	4	5	6
INPV	2008$ millions	22.1	22.1	22.1	21.2	20.8	8.8	(1.3)

TABLE V–15—MANUFACTURER IMPACT ANALYSIS FOR CLASS B BEVERAGE VENDING MACHINE EQUIPMENT UNDER THE PRESERVATION OF OPERATING PROFIT MARKUP SCENARIO—Continued

Preservation of gross margin percentage markup scenario

	Units	Base case	Trial standard level					
			1	2	3	4	5	6
Change in INPV	2008$ millions		(0.0)	(0.0)	(0.9)	(1.3)	(13.4)	(23.4)
	%		−0.05	−0.10	−4.17	−6.07	−60.33	−105.79
Equipment Conversion Costs	2008$ millions		0.0	0.0	1.7	2.6	3.5	6.9
Capital Conversion Costs	2008$ millions		0.0	0.0	0.0	0.0	11.0	14.7
Total Investment Required	2008$ millions		0.0	0.0	1.7	2.6	14.5	21.6

Note: Numbers in parentheses indicate negative values.

DOE estimates that there are no significant impacts on INPV for Class B equipment at TSL 1 or TSL 2. The vast majority of equipment for sale today meets these TSLs. Therefore, DOE expects there will be no equipment or capital conversion costs and that industry revenues and production costs will not be significantly negatively affected at TSL 1 or TSL 2.

At TSL 3, DOE estimated the impacts in INPV for Class B equipment to range from approximately −$0.8 million to −$0.9 million, a change in INPV of −3.71 percent to −4.17 percent. At this level, the industry cash flow decreases by approximately 30.9 percent, to $.98 million, compared to the base case value of $1.42 million in the year leading up to the standards. At TSL 3, manufacturers will have to make some component switches to comply with the standard. However, most manufacturers will not have to significantly alter their production process. In addition, these minor design changes will not raise the production costs beyond the cost of most equipment sold today, resulting in minimal impacts on industry value.

At TSL 4, DOE estimated the impacts on INPV for Class B equipment to range from −$1.3 million to −$1.3 million, a change in INPV of approximately −5.71 percent to −6.07 percent. At this level, the industry cash flow decreases by approximately 46.3 percent to $.76 million, compared to the base case value of $1.42 million in the year leading up to the standards. At TSL 4, manufacturers will have to make additional component switches, resulting in minimal equipment conversion costs. Standards increase production costs, but the cost increases are not enough to severely affect INPV if profitability remains the same as it was before standards.

At TSL 5, DOE estimated the impacts on INPV for Class B equipment to range from −$9.7 million to −$13.4 million, a change in INPV of approximately −44.01 percent to −60.33 percent. At this level, the industry cash flow decreases by approximately 371.9 percent to −$3.87 million, compared to the base case value of $1.42 million in the year leading up to the standards. At TSL 5, manufacturers have to redesign all their existing equipment and make capital investments in their production lines to comply with the standard. In addition, the equipment designs necessary to meet TSL 5 are more complex, which increases the engineering and capital resources that must be employed. Finally, the production costs of equipment that meets TSL 5 are higher. The cost to manufacture standards-compliant equipment could have a greater impact on the industry if operating profit does not increase with production costs.

At TSL 6 (max-tech), DOE estimated the impacts on INPV for Class B to range from −$11.2 million to −$23.4 million, a change in INPV of approximately −50.38 percent to −105.79 percent. At this level, the industry cash flow decreases by approximately 549.7 percent to −$6.40 million, compared to the base case value of $1.42 million in the year leading up to the standards. Similar to TSL 5, TSL 6 involves more complex changes to existing cabinet designs. These additional changes increase the equipment and capital conversion costs. However, the substantial increase in cost of manufacturer standards-compliant equipment at this TSL is also a significant driver of INPV. If profitability does not increase with the substantially higher manufacturing costs, then the impact on INPV is much larger.

c. Cumulative Regulatory Burden

While any one regulation may not impose a significant burden on manufacturers, the combined effects of several regulations may have serious consequences for some manufacturers, groups of manufacturers, or an entire industry. Assessing the impact of a single regulation may overlook this cumulative regulatory burden.

DOE recognizes that each regulation can significantly affect manufacturers' financial operations. Multiple regulations affecting the same manufacturer can quickly reduce manufacturers' profits and possibly cause manufacturers to exit from the market. However, DOE could not identify any other DOE regulations that would affect the manufacturers of beverage vending machines or their parent companies. DOE requested information about the cumulative regulatory burden during manufacturer interviews. In general, manufacturers were not greatly concerned about other Federal, State, or international regulations. The requirements of their major customers have a greater impact on their business than any of these other regulations. For further information about the cumulative regulatory burden impacts, see chapter 13 of the TSD.

d. Impacts on Employment

DOE used the GRIM to assess the impacts of energy conservation standards on beverage vending machine industry employment. DOE used statistical data from the U.S. Census Bureau's 2006 Annual Survey of Manufacturers, the results of the engineering analysis, and interviews with manufacturers to estimate the inputs necessary to calculate industry-wide labor expenditures and employment levels.[37]

The vast majority of beverage vending machines are manufactured in the United States. Based on results of the GRIM, DOE expects that there would be slightly positive direct employment impacts among domestic beverage vending machine manufacturers for TSL 1 through TSL 6 for Class A equipment and TSL 1 through TSL 5 for Class B equipment. The GRIM estimates that employment would increase by fewer than 20 employees for Class A

[37] Results of the U.S. Census Bureau's 2007 Annual Survey of Manufacturers are not yet available.

equipment at TSL 1 through TSL 6 and fewer than 42 employees for Class B equipment at TSL 1 though TSL 5. The employment impacts at the max-tech levels for both equipment classes are positive. The employment impacts are more positive at the max-tech levels because more labor is required and the production costs of the most efficient equipment greatly increase. The employment impacts calculated in the GRIM are shown in Table V–29 and Table V–30 in section V.C.

The results calculated in the GRIM do not account for the possible relocation of domestic jobs to lower-labor-cost countries, which may occur independently of new standards or may be influenced by the level of investments new standards require. Manufacturers stated that although there are no current plans to relocate production facilities, higher TSLs would increase pressure to cut costs, which could result in relocation. In addition, standards could increase pressure to consolidate within the industry due to the low profitability and existing excess capacity. DOE requests comment on whether or not the proposed standard risks industry consolidation. Because the labor impacts in the GRIM do not take relocation or consolidation into account, the labor impacts would be different if manufacturers chose to relocate to lower cost countries or if manufacturers consolidated. Chapter 13 of the TSD further discusses how the employment impacts are calculated and shows the projected changes in employment levels by TSL.

The conclusions in this section are independent of any conclusions regarding employment impacts from the broader U.S. economy estimated in the employment impact analysis. Those impacts are documented in chapter 15 of the accompanying TSD.

e. Impacts on Manufacturing Capacity

According to the majority of beverage vending machine manufacturers, new energy conservation standards will not affect manufacturers' production capacity. Within the last decade, annual shipments of beverage vending machines have decreased almost three-fold. Due to the decline in shipments, it is likely that any of the major manufacturers has the capacity to meet most of the recent market demand. Consequently, the industry has the capacity to make many times more units than are currently sold each year. Thus, DOE believes manufacturers will be able to maintain manufacturing capacity levels and continue to meet market demand under new energy conservation standards.

f. Impacts on Subgroups of Manufacturers

As discussed above, using average cost assumptions to develop an industry cash-flow estimate is not adequate for assessing differential impacts among manufacturer subgroups. Small manufacturers, niche equipment manufacturers, and manufacturers exhibiting a cost structure that differs largely from the industry average could be affected differently. DOE used the results of the industry characterization to group manufacturers exhibiting similar characteristics.

DOE evaluated the impact of new energy conservation standards on small manufacturers as defined by the SBA. During DOE's interviews, small business manufacturers suggested that the impacts of standards would not differ from impacts on larger companies. For a discussion of the impacts on small manufacturers, see chapter 13 of the TSD.

3. National Impact Analysis

a. Amount and Significance of Energy Savings

Because the pattern and strategies for improving the energy performance of beverage vending machines is somewhat different between Class A and Class B equipment, energy savings are reported separately for each class of equipment by TSL. The national energy savings were between 0.001 and 0.107 quads, depending on the TSL and equipment class, an amount of energy savings that DOE considers significant. There is clear and convincing evidence that each TSL that is more stringent than the baseline efficiency level would result in significantly more energy savings, ranging from 0.001 quads to 0.107 quads beyond that achieved in ENERGY STAR Tier 1 equipment.

To estimate the energy savings through 2042 due to new energy conservation standards, DOE compared the energy consumption of beverage vending machines under the base case to energy consumption under a new standard. The energy consumption calculated in the NIA is source energy, taking into account energy losses in the generation and transmission of electricity as discussed in section IV.J.

DOE tentatively determined the amount of energy savings at each of the seven TSLs being considered for Class A equipment and six TSLs for Class B equipment, then analyzed and aggregated the results across the three sizes for each equipment class.

Table V–16 shows the forecasted aggregate national energy savings of Class A equipment at each TSL. The table also shows the magnitude of the estimated energy savings if the savings are discounted at the 7-percent and 3-percent real discount rates. Each TSL considered in this rulemaking would result in significant energy savings, and the amount of savings increases with higher energy conservation standards (chapter 11 of the TSD). DOE reports both undiscounted and discounted values of energy savings. Each TSL analyzed results in additional energy savings, ranging from an estimated 0.004 quads to 0.107 quads for TSLs 1 through 7 (undiscounted).

TABLE V–16—SUMMARY OF CUMULATIVE NATIONAL ENERGY SAVINGS FOR CLASS A EQUIPMENT

(Energy Savings for Units Sold from 2012 to 2042)

Trial standard level	Primary National Energy Savings (quads)		
	Undiscounted	3% Discounted	7% Discounted
1	0.004	0.002	0.001
2	0.019	0.011	0.006
3	0.043	0.025	0.013
4	0.068	0.038	0.020
5	0.080	0.045	0.024
6	0.088	0.050	0.026
7	0.107	0.060	0.031

In Table V–17, DOE reports both undiscounted and discounted values of energy savings for Class B equipment. Each higher TSL analyzed results in additional energy savings, ranging from an estimated 0.001 quads to 0.035 quads for TSLs 1 through 6 (undiscounted).

TABLE V–17—SUMMARY OF CUMULATIVE NATIONAL ENERGY SAVINGS FOR CLASS B EQUIPMENT

(Energy Savings for Units Sold from 2012 to 2042)

Trial standard level	Primary National Energy Savings (quads)		
	Undiscounted	3% Discounted	7% Discounted
1	0.001	0.001	0.000
2	0.002	0.001	0.001
3	0.010	0.006	0.003
4	0.012	0.007	0.003
5	0.031	0.018	0.009
6	0.035	0.020	0.010

b. Net Present Value

The NPV analysis is a measure of the cumulative benefit or cost of standards to the Nation. In accordance with the Office of Management and Budget's (OMB) guidelines on regulatory analysis (OMB Circular A–4, section E, September 17, 2003), DOE calculated an estimated NPV using both a 7-percent and 3-percent real discount rate. The 7-percent rate is an estimate of the average before-tax rate of return to private capital in the U.S. economy. This rate reflects the returns to real estate and small business capital as well as corporate capital. DOE used this discount rate to approximate the opportunity cost of capital in the private sector, since recent OMB analysis has found the average rate of return to capital to be near this rate. In addition, DOE used the 3-percent discount rate to capture the potential effects of standards on private consumption (*e.g.,* through higher prices for equipment and purchase of reduced amounts of energy). This rate represents the rate at which society discounts future consumption flows to their present value. This rate can be approximated by the real rate of return on long-term Government debt (*e.g.,* the yield on Treasury notes minus the annual rate of change in the Consumer Price Index), which has averaged about 3 percent on a pre-tax basis for the last 30 years.

Table V–18 shows the estimated cumulative NPV for beverage vending machines resulting from the sum of the NPV calculated for the Class A equipment class. Table V–19 assumes the *AEO2009* reference case forecast for electricity prices. At a 7-percent discount rate, TSLs 1 through 6 show positive cumulative NPVs. The highest NPV is provided by TSL 5 at $0.108 billion. TSL 6 provided $0.105 billion. TSL 7 showed an NPV at −$0.719 billion, the result of negative NPV observed in all sizes of this equipment class.

TABLE V–18—SUMMARY OF CUMULATIVE NET PRESENT VALUE FOR CLASS A EQUIPMENT (*AEO2009* REFERENCE CASE)

Trial standard level	NPV* *billion 2008$*	
	7% Discount rate	3% Discount rate
1	0.009	0.020
2	0.038	0.084
3	0.062	0.149
4	0.098	0.235
5	0.108	0.263
6	0.105	0.265
7	(0.719)	(1.210)

Note: Numbers in parentheses indicate negative NPV (*i.e.,* net cost).

At a 3-percent discount rate, all but TSL 7 showed a positive NPV, with the highest NPV provided at TSL 6 (*i.e.,* $0.265 billion). TSL 5 provided a near equivalent NPV at $0.263 billion. TSL 7 provided an NPV of −$1.210 billion. DOE estimates that all Class A equipment at TSL 7 has negative NPVs at a 3-percent discount rate.

Table V–19 shows the estimated cumulative NPV for beverage vending machines resulting from the sum of the NPV calculated for Class B equipment. This table assumes the *AEO2009* reference case forecast for electricity prices. At a 7-percent discount rate, TSLs 1 through 4 show positive cumulative NPVs. The highest NPV is provided by TSL 2 at $0.003 billion. TSL 3 provided zero NPV. TSL 5 and TSL 6 show a negative NPV. TSL 5 has a −$0.256 billion NPV, the result of negative NPV observed in all sizes of Class B equipment.

TABLE V–19—SUMMARY OF CUMULATIVE NET PRESENT VALUE FOR CLASS B EQUIPMENT (*AEO2009* REFERENCE CASE)

Trial standard level	NPV *billion 2008$*	
	7% Discount rate	3% Discount rate
1	0.002	0.005
2	0.003	0.007
3	0.000	0.008
4	(0.004)	0.001
5	(0.256)	(0.442)
6	(1.013)	(1.822)

Note: Numbers in parentheses indicate negative NPV (*i.e.,* net cost).

At a 3-percent discount rate, TSLs 1 through 4 showed a positive NPV, with the highest NPV provided at TSL 3 ($0.008 billion). TSL 2 provided a near equivalent NPV at $0.007 billion. TSL 5 provided an NPV of −$0.442 billion. DOE estimated that all Class B equipment sizes at TSL 5 have negative NPVs at a 3-percent discount rate.

In addition to the reference case, DOE examined the NPV under the *AEO2009* high-growth and low-growth electricity price forecasts. The results of this examination can be found in chapter 11 of the TSD.

c. Impacts on Employment

Besides the direct impacts on manufacturing employment discussed in section V.B.2.d, DOE develops general estimates of the indirect employment impacts of proposed standards on the economy. As discussed above, DOE expects energy conservation standards for beverage vending machines to reduce energy bills for commercial customers, and the resulting net savings to be redirected to other forms of economic activity. DOE also realizes that these shifts in spending and economic activity by vending machine operators and site owners could affect the demand for labor. The impact comes in a variety of businesses not directly involved in the decision to make, operate, or pay the utility bills for beverage vending machines. The economic impact is ''indirect.'' To estimate these indirect economic effects, DOE used an input/output model of the U.S. economy using U.S. Department of Commerce, Bureau of Economic Analysis (BEA) and Bureau of Labor Statistics (BLS) data (as described in section IV.K; see chapter 15 of the TSD for details).

In this input/output model, the spending of the money saved on utility bills when more efficient vending machines are deployed is centered in economic sectors that create more jobs than are lost in electric utilities when spending is shifted from electricity to other products and services. Thus, the proposed beverage vending machine energy conservation standards are likely to slightly increase the net demand for labor in the economy. However, the net increase in jobs is so small that it would be imperceptible in national labor statistics and might be offset by other, unanticipated effects on employment. Neither the BLS data nor the input/output model used by DOE includes the quality of jobs. As shown in Table V–20 and Table V–21, DOE estimates that net indirect employment impacts from a proposed beverage vending machine standard are likely to be very small.

TABLE V–20—NET NATIONAL CHANGE IN INDIRECT EMPLOYMENT FROM CLASS A EQUIPMENT: JOBS IN 2012 TO 2042

Trial standard level	Net national change in jobs			
	2012	2022	2032	2042
1	0	10	13	14
2	3	50	57	64
3	5	113	132	146
4	9	173	203	226
5	9	204	239	265
6	9	223	262	292
7	(61)	220	267	304

TABLE V–21—NET NATIONAL CHANGE IN INDIRECT EMPLOYMENT FROM CLASS B EQUIPMENT: JOBS IN 2012 TO 2042

Trial standard level	Net national change in jobs			
	2012	2022	2032	2042
1	0	3	4	4
2	0	5	5	6
3	0	24	29	33
4	0	28	34	38
5	(19)	66	80	90
6	(78)	39	56	68
7	NA	NA	NA	NA

Note: Numbers in parentheses indicate negative values.

4. Impact on Utility or Performance of Equipment

In performing the engineering analysis, DOE considers design options that would not lessen the utility or performance of the individual classes of equipment (42 U.S.C. 6295(o)(2)(B)(i)(IV) and 6316(e)(1)). As presented in the screening analysis (chapter 4 of the TSD), DOE eliminates design options that reduce the utility of the equipment from consideration. For this notice, DOE tentatively concluded that none of the efficiency levels proposed for beverage vending machines reduce the utility or performance of the equipment.

5. Impact of Any Lessening of Competition

EPCA directs DOE to consider any lessening of competition likely to result from standards. It directs the Attorney General to determine in writing the impact, if any, of any lessening of competition likely to result from a proposed standard (42 U.S.C. 6295(o)(2)(B)(i)(V) and 6316(e)(1)). To assist the Attorney General in making such a determination, DOE provided the Department of Justice (DOJ) with copies of this notice and the TSD for review. During MIA interviews, domestic manufacturers indicated that foreign manufacturers have not entered the beverage vending machine market for the past several years. Manufacturers also stated that little or no consolidation has occurred among beverage vending machine manufacturers in recent years. Manufacturers indicated that the competitive nature of the industry has created pressure to consolidate, but that new energy conservation standards should not put any one manufacturer at a competitive disadvantage. Manufacturers have also stated that there has been some consolidation among bottlers in the industry. DOE believes that these trends will continue in this market regardless of the proposed standard levels chosen.

DOE does not believe that standards would result in domestic firms moving their production facilities outside the United States. The vast majority of beverage vending machines are manufactured in the United States and, during interviews, manufacturers in general indicated they would modify their existing facilities to comply with energy conservation standards.

6. Need of the Nation To Conserve Energy

Improving the energy efficiency of beverage vending machines, where economically justified, would likely improve the security of the Nation's energy system by reducing overall demand for energy, thus reducing the Nation's reliance on foreign sources of energy. Reduced demand would also likely improve the reliability of the electricity system, particularly during peak-load periods.

Energy savings from higher standards for beverage vending machines would also produce environmental benefits in the form of reduced emissions of air pollutants and greenhouse gases associated with energy production. Table V–22 provides DOE's estimate of cumulative CO_2, NO_x, and Hg emissions reductions that would result from the TSLs considered in this rulemaking for both Class A and Class B equipment. The expected energy savings from the proposed standards for beverage vending machines may also reduce the cost of maintaining nationwide emissions standards and constraints. In the draft EA (found in chapter 16 of the TSD accompanying this notice), DOE reports estimated annual changes in CO_2, NO_x, and Hg emissions attributable to each TSL.

TABLE V–22—CUMULATIVE CO_2 AND OTHER EMISSIONS REDUCTIONS (CUMULATIVE REDUCTIONS FOR PRODUCTS SOLD FROM 2012 TO 2042)

	Trial standard levels for Class A						
	TSL 1	TSL 2	TSL 3	TSL 4	TSL 5	TSL 6	TSL 7
Emissions Reductions							
CO_2 (Mt)	0.23	1.01	2.27	3.56	4.19	4.61	5.59
NO_x (kt)	0.03	0.14	0.31	0.48	0.57	0.62	0.75
Hg (tons)							
Low	0	0	0	0	0	0	0
High	0.004	0.017	0.038	0.059	0.069	0.076	0.093

	Trial standard levels for Class B					
	TSL 1	TSL 2	TSL 3	TSL 4	TSL 5	TSL 6
Emissions Reductions						
CO_2 (Mt)	0.07	0.11	0.53	0.61	1.64	1.83
NO_x (kt)	0.01	0.01	0.07	0.08	0.22	0.25
Hg (tons)						
Low	0	0	0	0	0	0
High	0.001	0.002	0.009	0.010	0.027	0.030

Mt = million metric tons
kt = thousand tons
Note: Negative values indicate emission increases. Detail may not sum to total due to rounding.

As noted in section IV.L, DOE does not report SO_2 emissions reductions from power plants because reductions from an energy conservation standard would not affect the overall level of U.S. SO_2 emissions due to emissions caps.

NO_x emissions are currently subject to emissions caps under the Clean Air Interstate Rule (CAIR) published in the **Federal Register** on May 12, 2005. 70 FR 25162 (May 12, 2005). The CAIR caps emissions in 28 eastern States and the District of Columbia (DC) (collectively ''States''). As with the SO_2 emissions cap, energy conservation standards are not likely to have a physical effect on NO_x emissions in those States. However, the standards proposed in today's NOPR might have produced an environmentally related economic impact in the form of lower prices for emissions allowance credits if they were large enough. DOE believes that such standards would not produce such an impact because the estimated reduction in NO_x emissions or the corresponding increase in available allowance credits in States covered by the CAIR cap would be too small to affect allowance prices for NO_x.

In contrast, new or amended energy conservation standards would reduce NO_x emissions in those 22 States that are not affected by the CAIR, and these emissions could be estimated from NEMS–BT. As a result, DOE used the NEMS–BT to forecast emission reductions from the beverage machine standards that are considered in today's NOPR.

Though currently in effect, CAIR has been the subject of significant litigation. CAIR was vacated by the U.S. Court of Appeals for the District of Columbia Circuit (D.C. Circuit) in its July 11, 2008, decision in *North Carolina* v. *Environmental Protection Agency*.[38] However, on December 23, 2008, the D.C. Circuit decided to allow the CAIR to remain in effect until it is replaced by a rule consistent with the court's earlier opinion.[39]

DOE established a range of Hg emission rates to estimate the Hg emissions that could be reduced through standards. DOE's low estimate assumed that future standards would displace electrical generation only from natural gas-fired power plants, thereby resulting in an effective emission rate of zero. (Under this scenario, coal-fired power plant generation would remain unaffected.) The low-end emission rate is zero because natural gas-fired power plants have virtually zero Hg emissions associated with their operation.

DOE's high estimate, which assumed that standards would displace only coal-fired power plants, was based on a nationwide mercury emission rate from *AEO2008*. (Under this scenario, gas-fired power plant generation would remain unaffected.) Because power plant emission rates are a function of local regulation, scrubbers, and the mercury content of coal, it is extremely difficult to identify a precise high-end emission rate. Therefore, the most reasonable estimate is based on the assumption that all displaced coal generation would have been emitting at the average emission rate for coal generation as specified by *AEO2008*. As noted previously, because virtually all mercury emitted from electricity generation is from coal-fired power plants, DOE based the emission rate on the tons of mercury emitted per TWh of coal-generated electricity. Based on the emission rate for 2006, DOE derived a high-end emission rate of 0.0255 tons per TWh. To estimate the reduction in mercury emissions, DOE multiplied the emission rate by the reduction in coal-generated electricity due to the standards considered in the utility impact analysis. These changes in Hg emissions are extremely small, ranging from 0 to 0.02 percent of the national base-case emissions forecast by NEMS–BT, depending on the TSL.

DOE has considered the possible monetary value of the benefits likely to result from the CO_2 emission reductions associated with standards. To put the potential monetary benefits from reduced CO_2 emissions into a form that would likely be most useful to decision makers and interested parties, DOE used the same methods it used to calculate the net present value of consumer cost savings. DOE converted the estimated yearly reductions in CO_2 emissions into monetary values, which were then discounted over the life of the affected equipment to the present using both 3-percent and 7-percent discount rates.

DOE previously proposed using the range $0 to $20 per ton for the year 2007 in 2007$. 73 FR 62034, 62110 (Oct. 17, 2008). These estimates were based on a previous analysis that used a range of no benefit to an average benefit value reported by the Intergovernmental Panel on Climate Change (IPCC). DOE derived the IPCC estimate used as the upper bound value from an estimate of the mean value of worldwide impacts due to climate change and not just the effects likely to occur within the United States. This previous analysis assumed that the appropriate value should be restricted to a representation of those costs and benefits likely to be experienced in the United States. DOE expects that such domestic values would be lower than comparable global values; however, there currently are no consensus estimates for the U.S. benefits likely to result from CO_2 emission reductions. Because U.S.-specific estimates were unavailable and DOE did not receive any additional information that would help narrow the proposed range of domestic benefits, DOE used the global mean value as an upper bound U.S. value.

The Department of Energy, together with other Federal agencies, is reviewing various methodologies for estimating the monetary value of reductions in CO_2 and other greenhouse gas emissions. This review will consider the comments on this subject that are part of the public record for this and other rulemakings, as well as other methodological assumptions and issues, such as whether the appropriate values should represent domestic U.S. or global benefits (and costs). Given the complexity of the many issues involved, this review is ongoing. However, consistent with DOE's legal obligations, and taking into account the uncertainty involved with this particular issue, DOE has included in the proposed rulemaking the values and analyses previously conducted.

Given the uncertainty surrounding estimates of the social cost of carbon, DOE previously concluded that relying on any single estimate may be inadvisable because that estimate will depend on many assumptions. Working Group II's contribution to the ''Fourth Assessment Report'' of the IPCC notes the following:

> The large ranges of SCC are due in the large part to differences in assumptions regarding climate sensitivity, response lags, the treatment of risk and equity, economic and non-economic impacts, the inclusion of potentially catastrophic losses, and discount rates.[40]

Because of this uncertainty, DOE previously used the SCC value from Tol (2005), which was presented in the IPCC's ''Fourth Assessment Report'' and provided a comprehensive meta-analysis of estimates for the value of SCC. Tol released an update of his 2005 meta-analysis in September 2007 that reported an increase in the mean estimate of SCC from $43 to $71 per ton carbon. Although the Tol study was updated in 2007, the IPCC has not adopted the update. As a result, DOE previously decided to continue to rely on the study cited by the IPCC. DOE notes that the conclusions of Tol in 2007 are similar to the conclusions of Tol in 2005. In 2007, Tol continues to indicate that there is no consensus regarding the monetary value of reducing CO_2 emissions by 1 ton. The broad range of values in both Tol studies are the result of significant differences in the methodologies used in

[38] 531 F.3d 896 (D.C. Cir. 2008).

[39] *North Carolina* v. *EPA*, 550 F.3d 1176 (D.C. Cir. 2008) (remand of vacatur).

[40] ''Climate Change 2007—Impacts, Adaptation and Vulnerability.'' Contribution of Working Group II to the ''Fourth Assessment Report'' of the IPCC, 17. Available at *http://www.ipcc.ch/ipccreports/ar4-wg2.htm* (last accessed Aug. 7, 2008).

the studies Tol summarized. According to Tol, all of the studies have shortcomings, largely because the subject is inherently complex and uncertain and requires broad multidisciplinary knowledge. Thus, it was not certain that the values reported in Tol in 2007 are more accurate or representative than the values reported in Tol in 2005.

For today's NOPR, DOE used the range of values based on the values presented in Tol (2005) as proposed. Additionally, DOE applied an annual growth rate of 2.4 percent to the value of SCC, as suggested by the IPCC Working Group II (2007, p. 822). This growth rate is based on estimated increases in damage from future emissions that published studies have reported. Because the values in Tol (2005) were presented in 1995$, DOE calculated more current values, assigning a range for SCC of $0 to $20 (2007$) per ton of CO_2 emissions.

The upper bound of the range DOE used is based on Tol (2005), which reviewed 103 estimates of SCC from 28 published studies. Tol concluded that when only peer-reviewed studies published in recognized journals are considered, ''climate change impacts may be very uncertain but [it] is unlikely that the marginal damage costs of carbon dioxide emissions exceed $50 per ton carbon [comparable to a 2007 value of $20 per ton carbon dioxide when expressed in 2007 U.S. dollars with a 2.4 percent growth rate].''

In setting a lower bound, DOE's analysis agreed with the IPCC Working Group II (2007) report that ''significant warming across the globe and the locations of significant observed changes in many systems consistent with warming is very unlikely to be due solely to natural variability of temperatures or natural variability of the systems'' (p. 9), and thus tentatively concluded that a global value of zero for the SCC cannot be justified. However, DOE concludes that it is reasonable to allow for the possibility that the SCC for the United States may be quite low. In fact, some of the studies examined by Tol (2005) reported negative values for the SCC. DOE assumes that it is most appropriate to use U.S. benefit values rather than world benefit values in its analysis, and U.S. values will likely be lower than global values.

Table V–23 and Table V–24 present the resulting estimates of the potential range of NPV benefits associated with reducing CO_2 emissions for both Class A and Class B equipment based on the range of values used by DOE for this proposed rule.

TABLE V–23—ESTIMATES OF SAVINGS FROM CO_2 EMISSIONS REDUCTIONS AT ALL TSLS AT A SEVEN-PERCENT DISCOUNT RATE AND THREE-PERCENT DISCOUNT RATE FOR CLASS A EQUIPMENT

TSL	Estimated cumulative CO_2 emission reductions *Mt*	Value of estimated CO_2 emission reductions at 7% discount rate *million 2007$*	Value of estimated CO_2 emission reductions at 3% discount rate *million 2007$*
1	0.23	0–2.2	0–4.3
2	1.01	0–9.7	0–18.9
3	2.27	0–21.9	0–42.5
4	3.56	0–34.3	0–66.6
5	4.19	0–40.4	0–78.5
6	4.61	0–44.5	0–86.4
7	5.59	0–53.9	0–104.7

TABLE V–24—ESTIMATES OF SAVINGS FROM CO_2 EMISSIONS REDUCTIONS AT ALL TSLS AT A SEVEN-PERCENT DISCOUNT RATE AND THREE-PERCENT DISCOUNT RATE FOR CLASS B EQUIPMENT

TSL	Estimated cumulative CO_2 emission reductions *Mt*	Value of estimated CO_2 emission reductions at 7% discount rate *million 2007$*	Value of estimated CO_2 emission reductions at 3% discount rate *million 2007$*
1	0.07	0–0.7	0–1.3
2	0.11	0–1.0	0–2
3	0.53	0–5.1	0–10
4	0.61	0–5.9	0–11.4
5	1.64	0–15.8	0–30.8
6	1.83	0–17.6	0–34.2

The Department is well aware that scientific and economic knowledge about the contribution of CO_2 and other greenhouse gas emissions (GHG) to changes in the future global climate and the potential resulting damages to the world economy continues to evolve rapidly. Thus, any value placed in this rulemaking on reducing CO_2 emissions is subject to likely change. DOE recognizes the importance of continuing to monitor current research on the potential economic damages resulting from climate change, and of periodically updating estimates of the value of reducing CO_2 emissions to reflect continuing advances in scientific and economic knowledge about the nature and extent of climate change and the threat it poses to world economic development. Further, DOE recognizes the interest and expertise of other federal agencies, particularly the Environmental Protection Agency and the Department of Transportation, in the issue of valuing the reductions in climate damages that are likely to result from those agencies' own efforts to reduce GHG emissions. DOE will continue to work closely with those and other federal agencies in the development and review of the economic values of reducing GHG emissions.

DOE also investigated the potential monetary benefit of reduced SO_2, NO_X, and Hg emissions from the TSLs it considered. As previously stated, DOE's initial analysis assumed the presence of nationwide emission caps on SO_2 and Hg, and caps on NO_X emissions in the 28 States covered by the CAIR. In the presence of these caps, DOE concluded that no physical reductions in power sector emissions would occur, but that the standards could put downward pressure on the prices of emissions allowances in cap-and-trade markets. Estimating this effect is very difficult because of factors such as credit banking, which can change the trajectory of prices. DOE has concluded that the effect from energy conservation standards on SO_2 allowance prices is likely to be negligible based on runs of the NEMS–BT model. See chapter 16 of the TSD accompanying this notice for further details.

Because the courts have decided to allow the CAIR rule to remain in effect, projected annual NO_X allowances from NEMS–BT are relevant. As noted above, standards would not produce an economic impact in the form of lower prices for emissions allowance credits in the 28 eastern States and D.C. covered by the CAIR cap. New or amended energy conservation standards would reduce NO_X emissions in those 22 States that are not affected by the CAIR. For the area of the United States not covered by the CAIR, DOE estimated the monetized value of NO_X emissions reductions resulting from each of the TSLs considered for today's NOPR based on environmental damage estimates from the literature. Available estimates suggest a very wide range of monetary values for NO_X emissions, ranging from $370 per ton to $3,800 per ton of NO_X from stationary sources, measured in 2001$ (equivalent to a range of $432 per ton to $4,441 per ton in 2007$).[41]

To estimate the monetary value of Hg emission reductions resulting from the TSLs considered for today's NOPR, DOE utilized a range of monetary values per ton of emissions and a range of physical emission reductions for Hg. Similar to SO_2 and NO_X, future emissions of Hg would have been subject to emissions caps under the Clean Air Mercury Rule (CAMR). The CAMR would have permanently capped emissions of mercury for new and existing coal-fired plants in all States by 2010, but was vacated by the D.C. Circuit in its February 8, 2008, decision in *New Jersey* v. *Environmental Protection Agency*.[42] DOE typically uses the NEMS–BT model to calculate emissions from the electrical generation sector; however, the 2008 NEMS–BT model is not suitable for assessing mercury emissions in the absence of a CAMR cap. Thus, DOE used a range of Hg emissions rates (in tons of Hg per energy per TWh produced) based on the *AEO2008.* Because the high end of the range of Hg emissions rates attributable to electricity generation are from coal-fired power plants, DOE based that emissions rate on the tons of mercury emitted per TWh of coal-generated electricity. DOE's low estimate assumed that future standards would displace electrical generation from natural gas powered power plants. The low end of the range of Hg emissions rates is zero because natural gas powered power plants have virtually no Hg emissions associated with their operations. To estimate the reduction in mercury emissions, DOE multiplied the emissions rates by the reduction in electricity generation associated with the standards proposed in today's NOPR.

DOE estimated the national monetized values per ton based on environmental damage estimates from the literature. DOE conducted research for today's NOPR and determined that the impact of mercury emissions from power plants on humans is considered highly uncertain. However, DOE identified two estimates of the environmental damage of mercury based on two estimates of the adverse impact of childhood exposure to methyl mercury on IQ for American children, and subsequent loss of lifetime economic productivity resulting from these IQ losses. The high-end estimate is based on an estimate of the current aggregate cost of the loss of IQ in American children that results from exposure to mercury of U.S. power plant origin ($1.3 billion per year in year 2000$), which works out to $32.6 million per ton emitted per year (2007$).[43] The low-end estimate is $0.66 million per ton emitted (in 2004$) or $0.739 million per ton in 2007$. DOE derived this estimate from a published evaluation of mercury control using different methods and assumptions from the first study, but also based on the present value of the lifetime earnings of children exposed.[44] Tables V–25 through Table V–28 present the resulting estimates of the potential range of present value benefits associated with reducing national NO_X and Hg emissions for Class A and B equipment.

TABLE V–25—ESTIMATES OF SAVINGS FROM REDUCING NO_X AND HG EMISSIONS AT ALL TSLS AT A SEVEN-PERCENT DISCOUNT RATE FOR CLASS A EQUIPMENT

TSL	Estimated cumulative NO_X emission reductions *kt*	Value of estimated NO_X emission reductions *thousand 2007$*	Estimated cumulative Hg emission reductions *tons*	Value of estimated Hg emission reductions *thousand 2007$*
1	0.03	5–50	0–0.004	0–44
2	0.14	21–221	0–0.017	0–196
3	0.31	48–497	0–0.038	0–441
4	0.48	76–778	0–0.059	0–690
5	0.57	89–918	0–0.069	0–814
6	0.62	98–1010	0–0.076	0–896
7	0.75	119–1224	0–0.093	0–1086

[41] OMB, Office of Information and Regulatory Affairs, ''2006 Report to Congress on the Costs and Benefits of Federal Regulations and Unfunded Mandates on State, Local, and Tribal Entities,'' Washington, DC (2006).

[42] *New Jersey* v. *EPA,* 517 F.3d 574 (D.C. Cir. 2008).

[43] Trasande, L., et al., ''Applying Cost Analyses to Drive Policy that Protects Children,'' 1076 Ann. N.Y. Acad. Sci. 911 (2006).

[44] Ted Gayer and Robert Hahn, ''Designing Environmental Policy: Lessons from the Regulation of Mercury Emissions,'' Regulatory Analysis 05–01, AEI–Brookings Joint Center for Regulatory Studies, Washington, DC (2004). A version of this paper was published in the *Journal of Regulatory Economics* in 2006. The estimate was derived by back-calculating the annual benefits per ton from the net present value of benefits reported in the study.

TABLE V–26—ESTIMATES OF SAVINGS FROM REDUCING NO_X AND HG EMISSIONS AT ALL TSLS AT A SEVEN-PERCENT DISCOUNT RATE FOR CLASS B EQUIPMENT

TSL	Estimated cumulative NO_X emission reductions *kt*	Value of estimated NO_X emission reductions *thousand 2007$*	Estimated cumulative Hg emission reductions *tons*	Value of estimated Hg emission reductions *thousand 2007$*
1	0.01	2–16	0–0.001	0–14
2	0.01	2–23	0–0.002	0–21
3	0.07	11–116	0–0.009	0–103
4	0.08	13–133	0–0.010	0–118
5	0.22	35–359	0–0.027	0–319
6	0.25	39–400	0–0.030	0–355

TABLE V–27—ESTIMATES OF SAVINGS FROM REDUCING NO_X AND HG EMISSIONS AT ALL TSLS AT A THREE-PERCENT DISCOUNT RATE FOR CLASS A EQUIPMENT

TSL	Estimated cumulative NO_X emission reductions *kt*	Value of estimated NO_X emission reductions *thousand 2007$*	Estimated cumulative Hg emission reductions *tons*	Value of estimated Hg emission reductions *thousand 2007$*
1	0.03	8–85	0–0.004	0–76
2	0.14	37–377	0–0.017	0–338
3	0.31	83–849	0–0.038	0–761
4	0.48	129–1330	0–0.059	0–1192
5	0.57	153–1568	0–0.069	0–1405
6	0.62	168–1726	0–0.076	0–1547
7	0.75	203–2092	0–0.093	0–1874

TABLE V–28—ESTIMATES OF SAVINGS FROM REDUCING NO_X AND HG EMISSIONS AT ALL TSLS AT A THREE-PERCENT DISCOUNT RATE FOR CLASS B EQUIPMENT

TSL	Estimated cumulative NO_X emission reductions *kt*	Value of estimated NO_X emission reductions *thousand 2007$*	Estimated cumulative Hg emission reductions *tons*	Value of estimated Hg emission reductions *thousand 2007$*
1	0.01	3–27	0–0.001	0–24
2	0.01	4–40	0–0.002	0–36
3	0.07	19–199	0–0.009	0–178
4	0.08	22–227	0–0.010	0–204
5	0.22	60–614	0–0.027	0–550
6	0.25	67–684	0–0.030	0–613

7. Other Factors

EPCA allows the Secretary of Energy, in determining whether a standard is economically justified, to consider any other factors that the Secretary deems to be relevant. (42 U.S.C. 6295(o)(2)(B)(i)(VII) and 6316(e)(1)) DOE identified no factors other than those already considered above for analysis.

C. Proposed Standard

EPCA specifies that any new or amended energy conservation standard for any type (or class) of covered equipment shall be designed to achieve the maximum improvement in energy efficiency that the Secretary determines is technologically feasible and economically justified. (42 U.S.C. 6295(o)(2)(A) and 6316(e)(1)) In determining whether a standard is economically justified, the Secretary must determine whether the benefits of the standard exceed its burdens. (42 U.S.C. 6295(o)(2)(B)(i) and 6316(e)(1)) The new or amended standard must ''result in significant conservation of energy.'' (42 U.S.C. 6295(o)(3)(B) and 6316(e)(1))

DOE developed trial standard levels independently for Class A and Class B beverage vending machines. DOE considered 7 TSLs for Class A and 6 TSLs for Class B. In selecting the proposed energy conservation standards for both classes of beverage vending machines for consideration in today's notice of proposed rulemaking, DOE started by examining the maximum technologically feasible levels, and determined whether those levels were economically justified. Upon finding the maximum technologically feasible levels not to be justified, DOE analyzed the next lower TSL to determine whether that level was economically justified. DOE repeated this procedure until it identified a TSL that was economically justified.

To aid the reader as DOE discusses the benefits and/or burdens of each TSL, Table V–29 and Table V–30 present summaries of quantitative analysis results for each TSL for Class A equipment and Class B equipment, respectively, based on the assumptions and methodology discussed above. These tables present the results or, in some cases, a range of results, for each TSL. The range of values reported in these tables for industry impacts represents the results for the different markup scenarios that DOE used to estimate manufacturer impacts.

1. Class A Equipment

TABLE V–29—SUMMARY OF RESULTS FOR CLASS A EQUIPMENT BASED UPON THE *AEO2009* REFERENCE CASE ENERGY PRICE FORECAST*

	TSL 1	TSL 2	TSL 3	TSL 4	TSL 5	TSL 6	TSL 7
Primary Energy Saved *quads*	0.004	0.019	0.043	0.068	0.080	0.088	0.107
7% Discount Rate	0.001	0.006	0.013	0.020	0.024	0.026	0.031
3% Discount Rate	0.002	0.011	0.025	0.038	0.045	0.050	0.060
Generation Capacity Reduction *GW***	0.002	0.009	0.020	0.031	0.037	0.041	0.049
NPV *2008$ billion:*							
7% Discount Rate	0.009	0.038	0.062	0.098	0.108	0.105	(0.719)
3% Discount Rate	0.020	0.084	0.149	0.235	0.263	0.265	(1.210)
Industry Impacts:							
Industry NPV *2008$ million*	0	(0.2)–(0.4)	(1.9)–(2.6)	(2.1)–(3.1)	(8.8)–(9.9)	(12.4)–(13.7)	(8.3)–(20.9)
Industry NPV *% change*	0.1	(0.6)–(1.0)	(5.5)–(7.4)	(5.9)–(8.8)	(25.0)–(28.1)	(35.1)–(38.9)	(23.7)–(59.7)
Cumulative Emissions Impacts†:							
CO_2 Reductions *Mt*	0.23	1.01	2.27	3.56	4.19	4.61	5.59
Value of CO_2 Reductions at 7% Discount Rate *million 2007$*	0–2.2	0–9.7	0–21.9	0–34.3	0–40.4	0–44.5	0–53.9
Value of CO_2 Reductions at 3% Discount Rate *million 2007$*	0–4.3	0–18.9	0–42.5	0–66.6	0–78.5	0–86.4	0–104.7
NO_X Reductions *kt*	0.03	0.14	0.31	0.48	0.57	0.62	0.75
Value of NO_X Reductions at 7% Discount Rate *thousand 2007$*	5–50	21–221	48–497	76–778	89–918	98–1010	119–1224
Value of NO_X Reductions at 3% Discount Rate *thousand 2007$*	8–85	37–377	83–849	129–1330	153–1568	168–1726	203–2092
Hg Reductions *tons*	0–0.004	0–0.017	0–0.038	0–0.059	0–0.069	0–0.076	0–0.093
Value of Hg Reductions at 7% Discount Rate *thousand 2007$*	0–44	0–196	0–441	0–690	0–814	0–896	0–1086
Value of Hg Reductions at 3% Discount Rate *thousand 2007$*	0–76	0–338	0–761	0–1192	0–1405	0–1547	0–1874
Life-Cycle Cost:.							
Net Savings *%*	10	100	100	100	100	100	98
Net Increase *%*	0	0	0	0	0	2	100
No Change *%*	90	0	0	0	0	0	0
Mean LCC Savings *2008$*	154	204	245	307	322	316	(1,194)
Mean PBP *years*	2.0	2.1	2.9	3.1	3.4	3.8	62.9
Direct Domestic Employment Impacts (2012) *jobs*	0	2	8	12	15	19	133
Indirect Employment Impacts (2042) *jobs*	14	64	146	226	265	292	304

* Parentheses indicate negative (−) values. For LCCs, a negative value means an increase in LCC by the amount indicated.
** Change in installed generation capacity by the year 2042 based on *AEO2009* Reference Case.
† CO_2 emissions impacts include physical reductions at power plants. NO_X emissions impacts include physical reductions at power plants as well as production of emissions allowance credits where NO_X emissions are subject to emissions caps.

First, DOE considered TSL 7, the most efficient level for Class A beverage vending machines. TSL 7 would save an estimated 0.107 quads of energy through 2042, an amount DOE considers significant. Discounted at 7 percent, the projected energy savings through 2042 would be 0.031 quads. For the Nation as a whole, DOE projects that TSL 7 would result in a net decrease of $719 million in NPV, using a discount rate of 7 percent. The emissions reductions at TSL 7 are 5.59 Mt of CO_2, up to 0.75 kt of NO_X, and up to 0.093 tons of Hg. These reductions have a value of up to $53.9 million for CO_2, $1.2 million for NO_X, and $1.1 million for Hg, at a discount rate of 7 percent. DOE also estimates that at TSL 7, total electric generating capacity in 2042 will decrease compared to the base case by 0.049 GW.

At TSL 7, DOE projects that the average Class A beverage vending machine customer will experience an increase in LCC of $1,194 compared to the baseline. At TSL 7, DOE estimates the fraction of customers experiencing LCC increases will be 100 percent. The mean PBP for the average Class A beverage vending machine customer at TSL 7 compared to the baseline level is projected to be 62.9 years.

At higher TSLs, manufacturers have a more difficult time maintaining current operating profit levels with larger increases in manufacturing production costs, as standards increase recurring operating costs like capital expenditures, purchased materials, and carrying inventory. Therefore, it is more likely that the higher end of the range of impacts will be reached at TSL 7 (*i.e.,* a drop of 59.7 percent in INPV). Manufacturers expressed great concern about high capital and equipment conversion costs necessary to convert production into standards-compliant equipment. At TSL 7, there is the risk of very large negative impacts on the industry if manufacturers' operating profits levels are reduced. See section IV.I for additional manufacturer concerns.

After carefully considering the analysis and weighing the benefits and burdens of TSL 7, DOE finds that the benefits to the Nation of TSL 7 (*i.e.,* energy savings and emissions reductions (including environmental and monetary benefits)) do not outweigh the burdens (*i.e.,* a decrease of $719 million in NPV and a decrease of 59.7 percent in INPV). Because the burdens of TSL 7 outweigh the benefits, TSL 7 is not economically justified. Therefore, DOE proposes to reject TSL 7 for Class A equipment.

DOE then considered TSL 6, which provides for Class A equipment the maximum efficiency level that the analysis showed to have positive NPV to the Nation. TSL 6 would likely save an estimated 0.088 quads of energy through 2042, an amount DOE considers significant. Discounted at 7 percent, the projected energy savings through 2042 would be 0.026 quads. For the Nation as a whole, DOE projects that TSL 6 would result in a net increase of $105 million in NPV, using a discount rate of 7 percent. The estimated emissions reductions at TSL 6 are 4.61 Mt of CO_2, up to 0.62 kt of NO_x, and up to 0.076 tons of Hg. These reductions have a value of up to $44.5 million for CO_2, $1.0 million for NO_x, and $896,000 for Hg, at a discount rate of 7 percent. Total electric generating capacity in 2042 is estimated to decrease compared to the base case by 0.041 GW under TSL 6.

At TSL 6, DOE projects that the average beverage vending machine customer will experience a reduction in LCC of $316 compared to the baseline. The mean PBP for the average beverage vending machine customer at TSL 6 is projected to be 3.8 years compared to the purchase of baseline equipment.

As is the case with TSL 7, DOE believes the majority of manufacturers would need to completely redesign all Class A equipment offered for sale. Therefore, DOE expects beverage vending machine manufacturers would have some difficulty maintaining current operating profit levels with higher production costs. Similar to TSL 7, it is more likely that the higher end of the range of impacts would be reached at TSL 6 (*i.e.,* a decrease of 38.9 percent in INPV). However, compared to the baseline, Class A equipment showed significant positive LCC savings on a national average basis and customers did not experience an increase in LCC with a standard at TSL 6 compared with purchasing baseline equipment. The PBP calculated for Class A equipment was lower than the life of the equipment.

After carefully considering the analysis and weighing the benefits and burdens of TSL 6, DOE proposes that for Class A equipment, TSL 6 represents the maximum improvement in energy efficiency that is technologically feasible and economically justified. TSL 6 is technologically feasible because the technologies required to achieve these levels are already in existence. TSL 6 is economically justified because the benefits to the Nation (*i.e.,* increased energy savings of 0.088 quads, emissions reductions including environmental and monetary benefits of, for example, 4.61 Mt of carbon dioxide emissions reduction with an associated value of up to $44.5 million at a discount rate of 7 percent, and an increase of $105 million in NPV) outweigh the costs (*i.e.,* a decrease of 38.9 percent in INPV). There is also the added benefit in terms of a reduction in total electrical generating capacity in 2042 compared to the base case of 0.041 GW under the TSL 6 scenario.

Therefore, DOE proposes TSL 6 as the energy conservation standard for Class A beverage vending machines in this NOPR. DOE seeks comment and further data or information on the magnitude of the estimated decline in INPV at TSL 6, and what impact this level could have on industry parties, including small businesses. DOE also requests comment on whether the energy savings and related benefits of TSL 6 outweigh the costs, including potential manufacturer impacts. DOE is particularly interested in receiving comments, views, and further data or information from interested parties concerning: (1) Why the private market has not been able to capture the energy benefits proposed in TSL 6; (2) whether and to what extent parties estimate they will be able to transfer costs of implementing TSL 6 on to consumers; (3) whether and to what extent parties estimate distributional chain intermediaries (such as wholesalers or bottlers) will be able to absorb TSL 6 implementation costs and in turn transfer these costs to on-site consumers, who ultimately benefit from the energy gains associated with the proposed standard.

2. Class B Equipment

TABLE V–30—SUMMARY OF RESULTS FOR CLASS B EQUIPMENT BASED ON THE AEO2009 REFERENCE CASE ENERGY PRICE FORECAST*

	TSL 1	TSL 2	TSL 3	TSL 4	TSL 5	TSL 6
Primary Energy Saved (quads)	0.001	0.002	0.010	0.012	0.031	0.035
7% Discount Rate	0.000	0.001	0.003	0.003	0.009	0.010
3% Discount Rate	0.001	0.001	0.006	0.007	0.018	0.020
Generation Capacity Reduction (GW)**	0.001	0.001	0.005	0.005	0.014	0.016
NPV (2008$ billion):						
7% Discount Rate	0.002	0.003	0.000	(0.004)	(0.256)	(1.013)
3% Discount Rate	0.005	0.007	0.008	0.001	(0.442)	(1.822)
Industry Impacts						
Industry NPV (2008$ million)	0	0	(0.8)–(0.9)	(1.3)–(1.3)	(9.7)–(13.4)	(11.2)–(23.4)
Industry NPV (% Change)	0–(0.1)	0.1–(0.1)	(3.7)–(4.2)	(5.7)–(6.1)	(44.0)–(60.3)	(50.4)–(105.8)
Cumulative Emissions Impacts†:						
CO_2 Reductions (Mt)	0.07	0.11	0.53	0.61	1.64	1.83
Value of CO_2 reductions at 7% discount rate (million 2007$)	0–0.7	0–1	0–5.1	0–5.9	0–15.8	0–17.6
Value of CO_2 reductions at 3% discount rate (million 2007$)	0–1.3	0–2	0–10	0–11.4	0–30.8	0–34.2
NO_X Reductions (kt)	0.01	0.01	0.07	0.08	0.22	0.25
Value of NO_X reductions at 7% discount rate (thousand 2007$)	2–16	2–23	11–116	13–133	35–359	39–400
Value of NO_X reductions at 3% discount rate (thousand 2007$)	3–27	4–40	19–199	22–227	60–614	67–684
Hg Reductions (t)	0–0.001	0–0.002	0–0.009	0–0.010	0–0.027	0–0.030
Value of Hg reductions at 7% discount rate (thousand 2007$)	0–14	0–21	0–103	0–118	0–319	0–355
Value of Hg reductions at 3% discount rate (thousand 2007$)	0–24	0–36	0–178	0–204	0–550	0–613
Life-Cycle Cost						
Net Savings (%)	10	100	90	80	69	0
Net Increase (%)	0	11	21	32	100	100
No Change (%)	90	0	0	0	0	0
Mean LCC Savings (2008$)	47	56	49	39	(525)	(2216)

TABLE V–30—SUMMARY OF RESULTS FOR CLASS B EQUIPMENT BASED ON THE AEO2009 REFERENCE CASE ENERGY PRICE FORECAST*—Continued

	TSL 1	TSL 2	TSL 3	TSL 4	TSL 5	TSL 6
Mean PBP (years)	3.1	4.1	6.0	6.9	76.2	100
Direct Domestic Employment Impacts (2012) (jobs)	0	0	3	4	41	134
Indirect Employment Impacts (2042) (jobs)	4	6	33	38	90	68

* Parentheses indicate negative (−) values. For LCCs, a negative value means an increase in LCC by the amount indicated.
** Change in installed generation capacity by the year 2042 based on *AEO2008* Reference Case.
† CO_2 emissions impacts include physical reductions at power plants. NO_X emissions impacts include physical reductions at power plants as well as production of emissions allowance credits where NO_X emissions are subject to emissions caps.

First, DOE considered TSL 6, the most efficient level for Class B beverage vending machines. TSL 6 would likely save an estimated 0.035 quads of energy through 2042, an amount DOE considers significant. Discounted at 7 percent, the projected energy savings through 2042 would be 0.01 quads. For the Nation as a whole, DOE projects that TSL 6 would result in a net decrease of $1.013 billion in NPV, using a discount rate of 7 percent. The emissions reductions at TSL 6 are 1.83 Mt of CO_2, up to 0.25 kt of NO_X, and up to 0.03 tons of Hg. These reductions have a value of up to $17.6 million for CO_2, $400,000 for NO_X, and $355,000 for Hg, at a discount rate of 7 percent. DOE also estimates that at TSL 6, total electric generating capacity in 2042 will decrease compared to the base case by 0.016 GW.

At TSL 6, DOE projects that for the average customer, the LCC of Class B beverage vending machines will increase by $2,216 compared to the baseline. At TSL 6, DOE estimates the fraction of customers experiencing LCC increases will be 100 percent. The mean PBP for the average Class B beverage vending machine customer at TSL 6 compared to the baseline level is projected to be 100 years.

At higher TSLs, manufacturers have a more difficult time maintaining operating profit with large increases in production costs. Therefore, it is more likely that the higher end of the range of impacts would be reached at TSL 6 (*i.e.,* a decrease of 105.8 percent in INPV). At TSL 6, there is the risk of very large negative impacts on the industry if manufacturers' operating profit levels are reduced.

After carefully considering the analysis and weighing the benefits and burdens of TSL 6, DOE finds that the benefits to the Nation of TSL 6 (*i.e.,* energy savings and emissions reductions including environmental and monetary benefits) do not outweigh the burdens (*i.e.,* a decrease of $1.013 billion in NPV, a decrease of 105.8 percent in INPV, and an economic burden on customers). Therefore, DOE proposes that the burdens of TSL 6 outweigh the benefits and TSL 6 is not economically justified. Therefore, DOE proposes to reject TSL 6 for Class B equipment.

TSL 5 offers the maximum efficiency levels for Class B equipment that provide positive NPV to the Nation. TSL 5 would likely save an estimated 0.031 quads of energy through 2042, an amount DOE considers significant. Discounted at 7 percent, the projected energy savings through 2042 would be 0.009 quads. For the Nation as a whole, DOE projects that TSL 5 would result in a net decrease of $256 million in NPV, using a discount rate of 7 percent. The estimated emissions reductions at TSL 5 are 1.64 Mt of CO_2, up to 0.22 kt of NO_X, and up to 0.027 tons of Hg. These reductions have a value of up to $15.8 million for CO_2, $359,000 for NO_X, and $319,000 for Hg at a discount rate of 7 percent. Total electric generating capacity in 2042 is estimated to decrease compared to the base case by 0.014 GW at TSL 5.

At TSL 5, DOE projects that the average Class B beverage vending machine customers will experience an increase in LCC of $525 compared to the baseline. The mean PBP for the average Class B beverage vending machine customer at TSL 5 is projected to be 76.2 years compared to the purchase of baseline equipment.

As with TSL 6, DOE believes the majority of manufacturers would need to completely redesign all Class B equipment offered for sale at TSL 5. Therefore, DOE expects that manufacturers will have difficulty maintaining operating profit with larger MPC increases. Similar to TSL 6, manufacturers expect the higher end of the range of impacts to be reached at TSL 5 (*i.e.,* a decrease of 60.3 percent in INPV).

After carefully considering the analysis and evaluating the benefits and burdens of TSL 5, DOE finds that the benefits to the Nation of TSL 5 (*i.e.,* energy savings and emissions reductions, including environmental and monetary benefits) do not outweigh the burdens (*i.e.,* a decrease of $256 million in NPV and a decrease of 60.3 percent in INPV, as well as the economic burden on customers). Therefore, DOE proposes that the burdens of TSL 5 outweigh the benefits and TSL 5 is not economically justified. Therefore, DOE proposes to reject TSL 5 for Class B equipment.

TSL 4 would likely save an estimated 0.012 quads of energy through 2042, an amount DOE considers significant. Discounted at 7 percent, the projected energy savings through 2042 would be 0.003 quads. For the Nation as a whole, DOE projects that TSL 4 would result in a net decrease of $4 million in NPV, using a discount rate of 7 percent. However, using a 3-percent discount rate, DOE projects that TSL 4 would result in a net increase of $1 million in NPV. The estimated emissions reductions at TSL 4 are 0.61 Mt of CO_2, up to 0.08 kt of NO_X, and up to 0.01 tons of Hg. Based on previously developed estimates, these reductions could have a value of up to $5.9 million for CO_2, $133,000 for NO_X, and $118,000 for Hg at a discount rate of 7 percent. Total electric generating capacity in 2042 is estimated to decrease compared to the base case by 0.005 GW at TSL 4.

At TSL 4, DOE projects that the average Class B beverage vending machine customer will experience a reduction in LCC of $39 compared to the baseline. The mean PBP for the average Class B beverage vending machine customer at TSL 4 is projected to be 6.9 years compared to the purchase of baseline equipment.

At TSL 4, DOE believes manufacturers would need to redesign most existing Class B equipment offered for sale. Therefore, DOE expects that manufacturers will have difficulty maintaining operating profit with high increases in production costs. Similar to TSL 5, it is more likely that the higher end of the range of impacts would be reached at TSL 4 (*i.e.,* a decrease of 6.1 percent in INPV). However, compared to the baseline, Class B equipment showed significant positive LCC savings on a national average and customers did not experience an increase in LCC at TSL 4. The PBP calculated for Class B equipment was less than the lifetime of the equipment.

After carefully considering the analysis and evaluating the benefits and burdens of TSL 4, DOE finds that the benefits to the Nation of TSL 4 (*i.e.,* energy savings and emissions reductions, including environmental and monetary benefits) do not outweigh the burdens (*i.e.,* a decrease of $4 million in NPV and a decrease of up to 6.1 percent in INPV). DOE proposes that the burdens of TSL 4 outweigh the benefits and TSL 4 is not economically justified. Therefore, DOE proposes to reject TSL 4 for Class B equipment.

TSL 3 would likely save an estimated 0.010 quads of energy through 2042, an amount DOE considers significant. Discounted at 7 percent, the projected energy savings through 2042 would be 0.003 quads. For the Nation as a whole, DOE projects that TSL 3 would result in no change in NPV (less than $0.5 million) using a discount rate of 7 percent. However, using a 3-percent discount rate, DOE projects that TSL 3 would result in a net increase of $8 million in NPV. The estimated emissions reductions at TSL 3 are 0.53 Mt of CO_2, up to 0.07 kt of NO_X, and up to 0.009 tons of Hg. Based on previously developed estimates, these reductions could have a value of up to $5.1 million for CO_2, $116,000 for NO_X, and $103,000 for Hg at a discount rate of 7 percent. Total electric generating capacity in 2042 is estimated to decrease compared to the base case by 0.005 GW at TSL 3.

At TSL 3, DOE projects that the average Class B beverage vending machine customer will experience a reduction in LCC of $49 compared to the baseline. The mean PBP for the average Class B beverage vending machine customer at TSL 3 is projected to be 6.0 years compared to the purchase of baseline equipment.

At TSL 3, DOE believes manufacturers would have to make some component switches to comply with the standard, but most manufacturers will not have to significantly alter their production process. These minor design changes would not raise the production costs beyond the cost of most equipment sold today, resulting in minimal impacts on industry value. Compared to the baseline, Class B equipment showed significant positive LCC savings on a national average and customers did not experience an increase in LCC at TSL 3. The PBP calculated for Class B equipment was less than the lifetime of the equipment.

After carefully considering the analysis and weighing the benefits and burdens of TSL 3, DOE proposes that for Class B equipment, TSL 3 represents the maximum improvement in energy efficiency that is technologically feasible and economically justified. TSL 3 is technologically feasible because the technologies required to achieve these levels are already in existence. TSL 3 is economically justified because the benefits to the Nation (*i.e.,* an increase of $8 million in NPV using a 3-percent discount rate, energy savings, and emissions reductions, including the estimated monetary value of certain environmental benefits) outweigh the costs (*i.e.,* a decrease of 4.2 percent in INPV). Therefore, DOE is proposing TSL 3 as the energy conservation standard for Class B beverage vending machines in this NOPR.

For the reasons discussed above, DOE also requests comments on whether it should adopt a different TSL for Class B beverage vending machines.

VI. Procedural Issues and Regulatory Review

A. Review Under Executive Order 12866

Today's proposal has been determined to be a significant regulatory action under Executive Order 12866, ''Regulatory Planning and Review.'' 58 FR 51735 (October 4, 1993). Accordingly, this proposed rule was subject to review by OMB under the Executive Order. However, DOE has also determined that today's regulatory action is not an ''economically significant'' action under section 3(f)(1) of the Executive Order

Executive Order 12866 requires that each agency identify in writing the specific market failure or other problem that warrants new agency action, as well as assess the significance of that problem to determine whether any new regulation is necessary. Executive Order 12866, § 1(b)(1).

In the ANOPR for this rulemaking, DOE requested feedback and data on a number of issues related to Executive Order 12866 and the existence of a market failure in the beverage vending machine industry. In the ANOPR, DOE sought (1) Data on the efficiency levels of existing beverage vending machines in use by owner (*i.e.,* site owner or machine operator), electricity price, equipment class (Class A or Class B machines) and installation type (*i.e.,* indoors or outdoors); (2) comment on the availability of energy efficiency information to end users and the extent to which the information leads to informed choices, specifically given how such equipment is purchased; (3) detailed data on the distribution of energy efficiency levels for both the new site owner and equipment operator markets; (4) data on and suggestions for the existence and extent of potential market failures to complete an assessment of the significance of these failures and, thus, the net benefits of regulation; and (5) comments on the weight that should be given to ''external'' benefits resulting from improved energy efficiency of beverage vending machines that are not captured by the users of such equipment. These benefits include both environmental and energy security-related externalities that are not reflected in energy prices, such as reduced emissions of greenhouse gases and reduced use of natural gas and oil for electricity generation.

DOE prepared a regulatory impact analysis (RIA) for this rulemaking, which is contained in the TSD. The RIA is subject to review by the Office of Information and Regulatory Affairs (OIRA) in the OMB. The RIA consists of (1) A statement of the problem addressed by this regulation and the mandate for Government action, (2) a description and analysis of policy alternatives to this regulation, (3) a qualitative review of the potential impacts of the alternatives, and (4) the national economic impacts of the proposed standard.

The RIA assesses the effects of feasible policy alternatives to beverage vending machine standards and provides a comparison of the impacts of the alternatives. DOE evaluated the alternatives in terms of their ability to achieve significant energy savings at reasonable cost, and compared them to the effectiveness of the proposed rule. DOE analyzed these alternatives qualitatively with reference to the particular market dynamics of the beverage vending industry.

DOE identified the following major policy alternatives for achieving increased beverage vending machine energy efficiency:

- No new regulatory action
- Financial incentives, including tax credits and rebates
- Revisions to voluntary energy efficiency targets (*e.g.,* ENERGY STAR program criteria)
- Early replacement
- Bulk government purchases
- Prescriptive standards that would mandate design requirements (*e.g.,* lighting and refrigeration controls)

DOE qualitatively evaluated each alternative's ability to achieve significant energy savings at reasonable cost and compared it to the effectiveness of the proposed rule. The following paragraphs discuss each policy alternative. (See chapter 17 of the TSD, Regulatory Impact Analysis, for further details.)

No new regulatory action. The case in which no regulatory action is taken for beverage vending machines constitutes the base case (or no action) scenario. By definition, no new regulatory action yields zero energy savings and a net present value of zero dollars.

Tax credits, rebates, and other financial incentives. DOE considered the impact of various financial incentives at both the ENERGY STAR Tier 2 level and higher efficiency levels, and examined the likelihood of an increase in customers purchasing high-efficiency equipment due to these financial incentives.

In considering the impact of financial incentives, DOE reviewed existing rebate programs for beverage vending machines. The majority are utility-sponsored rebate programs that provide incentives for incorporating lighting and temperature controllers. Also, similar rebates for other technologies (*e.g.,* ECM motors for evaporator fans) are provided in other industries, such as in the food sales industry for commercial refrigerated display cases, and could theoretically be adapted for beverage vending machines. However, utility rebate programs are aimed at the site of installation and not at the purchasers of the machines (as most of the controllers covered by the rebate are add-on devices), and utility rebates are only provided for reducing electricity at sites served by the utility. Because beverage vending machines purchased by large-scale bottlers may not remain on a given site, tracking the location of rebated equipment could be an issue for utilities. Also, because most utility rebate programs are not aimed at purchasers, these programs do not provide incentives for large bottlers to choose high-efficiency equipment.

Besides utility-sponsored rebate programs, other possibilities for programs include national manufacturer rebates, purchaser rebates, or tax incentives. Typically, these programs are advocated as a means to encourage households or organizations that are sensitive to the first cost of equipment to purchase or manufacture more costly efficient equipment that ultimately has a favorable payoff either to the purchaser, to society, or both. The incentive can be given to the buyer of the equipment, the rate payer, or the manufacturer, depending on which method is considered to be most administratively effective. However, the nature of the beverage vending machine industry and market makes this approach largely ineffective. At least 75 percent of beverage vending machines are purchased by two companies (Coca-Cola and PepsiCo) and their affiliated bottlers and distributors. In the ANOPR public meeting, PepsiCo stated that all beverage vending machines purchased by the company are required to meet ENERGY STAR Tier 2 levels. (PepsiCo, Public Meeting Transcript, No. 29 at p. 149) Coca-Cola stated that by 2010, the beverage vending machines purchased by the company would use half as much energy as they do now, which would meet at least ENERGY STAR Tier 1 levels. 73 FR 34104. These companies purchase ENERGY STAR equipment despite the first-cost increase because it improves their public image, which results in higher sales in the long run. (Coca-Cola, Public Meeting Transcript, No. 29 at pp. 154–56) Direct compensation for the energy savings is not assured but comes only through a negotiation with the site. Because the driving economic force for these companies is product sales, not equipment purchases, lowering the purchase price of equipment would make no significant difference in market behavior, and the program would simply transfer the amount of tax credit or rebate to the rebated entity without having induced extra purchases of efficient beverage vending machines. Regarding the use of rebates or other incentives beyond Tier 2 efficiency levels, it is not clear how the buying policy of Coca-Cola and PepsiCo would be influenced by tax credits or rebates. However, the companies are large enough to successfully finance the higher costs of beverage vending machines more efficient than Tier 2 with or without tax credits or rebates.

While rebates or tax credits may affect small purchasers, their influence over the market for beverage vending machines is marginal. In addition, because of the existing market dynamics, a significant portion of any economic incentive paid for the purchase of Tier 2 efficiency equipment could be free riders, those that would purchase Tier 2 equipment absent incentives. This is particularly true of rebates paid to manufacturers. Rebates to purchasers would have to be limited to small volumes of purchases by individual rebatees and target non-bottler, site-owned equipment. Tax credits to purchasers face similar issues. Currently, no national manufacturer rebates, purchaser rebates, or tax incentives are available for enhancement of beverage vending machine efficiency.

DOE sees value in the continued use of rebates for lighting and temperature controller technologies even under the standards proposed in this notice of proposed rulemaking. Because the impact of these technologies is not captured in the DOE test procedure for beverage vending machines, employing these technologies in the field will continue to provide reductions in energy consumption beyond those that can be achieved by the standards proposed for beverage vending machines. The reductions will continue to accrue at the site of installation; therefore, these rebates, primarily for the purchase of aftermarket controller equipment, should continue to be provided to the installation site directly.

Revisions to voluntary energy efficiency targets (e.g., ENERGY STAR). ENERGY STAR currently has two levels of efficiency targets: Tier 1 and Tier 2. The current program appears to have been effective at inducing large-scale adoption of ENERGY STAR Tier 1 equipment. Furthermore, the beverage vending industry expects that ENERGY STAR will be highly effective in securing purchases of Tier 2 equipment due to the favorable response of the two purchasers who essentially define the market, Coca-Cola and PepsiCo. While it is possible that voluntary programs for equipment more efficient than Tier 2 would also be effective, DOE lacks a quantitative basis to determine how effective such a program might be. As noted previously, broader economic and social considerations are in play than simple economic return to the equipment purchaser. DOE lacks the data necessary to quantitatively project the degree to which such voluntary programs for more expensive, higher efficiency equipment would modify the market.

Bulk Government purchases and early replacement incentive programs: DOE also considered, but did not analyze, the potential of bulk Government purchases and early replacement incentive programs as alternatives to the proposed standards. Bulk purchases would have very limited impact on improving the overall market efficiency of beverage vending machines because they are a small part of the total market and the volume of high-efficiency equipment purchases that the Federal Government might make directly (versus equipment installed by bottlers at Federal Government sites). In the case of replacement incentives, several policy options exist to promote early replacement, including a direct national program of customer incentives, incentives paid to utilities to promote an early replacement program, market promotions through equipment manufacturers, and replacement of

Federally owned equipment. In considering early replacements, DOE estimates that the energy savings realized through a one-time early replacement of existing stock equipment does not result in energy savings commensurate to the cost to administer the program. Consequently, DOE did not analyze this option in detail.

Prescriptive standards that would mandate design requirements (e.g., lighting and refrigeration controls). EPCA provides that standards regulating the energy use of certain equipment may be design standards, which require specific features in the design of the equipment; or performance standards, which describe a required level of equipment performance (*e.g.,* maximum kWh/year energy consumption) and provide a manufacturer with discretion in determining how best to meet that performance level. (42 U.S.C. 6291(6)) However, EPCA does not include beverage vending machines in the list of equipment for which a design requirement is acceptable. (42 U.S.C. 6291(6)(B), 6292(a)) Furthermore, EPCA specifically requires DOE to base its test procedure for this equipment on ANSI/ASHRAE Standard 32.1–2004, ''Methods of Testing for Rating Vending Machines for Bottled, Canned or Other Sealed Beverages.'' (42 U.S.C. 6293(b)(15)) The test methods in ANSI/ASHRAE Standard 32.1–2004 consist of means to measure energy consumption.

For these reasons, DOE does not intend to develop design requirements for this equipment. Instead, DOE intends to develop standards that allow a maximum level of energy use for each beverage vending machine, and manufacturers could meet these standards with their own choice of design methods.

Performance standards. The difficulty in using these non-regulatory alternatives must be gauged against the more direct benefits calculated for the performance standards DOE is proposing in this NOPR. Based on its qualitative review, DOE is not confident that any of the alternatives it examined would save as much energy as today's proposed rule, and the financial incentives in particular may engender significant free ridership issues. Also, several of the alternatives would require new enabling legislation, since authority to carry out those alternatives does not exist.

B. Review Under the Regulatory Flexibility Act/Initial Regulatory Flexibility Analysis

The Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*) requires preparation of an initial regulatory flexibility analysis (IRFA) for any rule that by law must be proposed for public comment, unless the agency certifies that the rule, if promulgated, will not have a significant economic impact on a substantial number of small entities. As required by Executive Order 13272, ''Proper Consideration of Small Entities in Agency Rulemaking'' 67 FR 53461 (August 16, 2002), DOE published procedures and policies on February 19, 2003, to ensure that the potential impacts of its rules on small entities are properly considered during the rulemaking process. 68 FR 7990. DOE has made its procedures and policies available on the Office of General Counsel's Web site, *http://www.gc.doe.gov.*

For the beverage vending machine manufacturing industry, small businesses, as defined by the SBA, are manufacturing enterprises with 500 or fewer employees. DOE used the small business size standards published on August 28, 2008, as amended, by the SBA to determine whether any small entities would be required to comply with the rule. (61 FR 3286 and codified at 13 CFR Part 121.) The size standards are listed by North American Industry Classification System (NAICS) code and industry description. Beverage vending machine manufacturing is classified under NAICS 333311.

The beverage vending machine industry is characterized by both large and small manufacturers that service a wide range of customers, including large bottlers and direct end-users. Almost all beverage vending machines sold in the United States are manufactured domestically. Three major companies supply roughly 90 percent of all equipment sales. Most of the sales for these companies are made to a few major bottlers. One of the major manufacturers with significant market share is considered a small business. The remaining 10 percent of industry shipments is believed to be supplied by five manufacturers. All of these companies that do not supply the major bottlers are considered to be small businesses.

Before issuing this notice of proposed rulemaking, DOE, through its contractor, contacted all identified small business manufacturers. These manufacturers were provided a questionnaire seeking information to better understand the impacts of the proposed standards on small businesses and how these impacts differ between large and small manufacturers. The small business interview questionnaire is a condensed version of the manufacturer interview guide described in the manufacturer impact analysis, chapter 13 of the TSD, and includes the following questions:

• Are you aware of the US Department of Energy's (DOE's) ongoing rulemaking to establish national minimum energy conservation standards for refrigerated beverage vending machines? [45] Would you like to be added to DOE's e-mail database for updates relating to this rulemaking?

• We are assessing the impacts of a potential energy conservation standard on small businesses. Is your company a small business (defined as less than 500 employees by the US Small Business Administration (SBA), including all subsidiaries and parent companies, and employees in all countries where you operate)?

• What are the key issues for your company regarding energy conservation standards for refrigerated beverage vending machines and this rulemaking?

• DOE would like to understand the small-business beverage vending machine industry in general and your company in particular. Could you please provide information on the following:

• Is your company a domestic or international company?

• What types of refrigerated beverage vending machines do you manufacture? Do you manufacture Class A or Class B refrigerated beverage vending machines, or both? [46] [47] What sizes of refrigerated beverage vending machines do you manufacture, measured in vendible capacity and/or refrigerated volume? Could you provide energy efficiency figures for those identified models? Does your equipment meet ENERGY STAR Tier I, Tier II, or any level above those energy efficiency levels? [48] [49]

• Do you manufacture equipment other than refrigerated beverage vending machines? Do you manufacture any niche or specialty type refrigerated beverage vending machines that do not easily fall in the categories from the previous question?

[45] For information on DOE's efficiency standards rulemaking for beverage vending machines, visit the following Web site: *http://www1.eere.energy.gov/buildings/appliance_standards/commercial/beverage_machines.html.*

[46] ''Class A'' refers to a beverage vending machine that cools the entire internal volume. Class A machines are also referred to as ''fully-cooled'' machines.

[47] ''Class B'' refers to any beverage vending machine not considered to be Class A. Class B machines are often ''zone-cooled'' machines, in that they typically cool only a fraction of the volume of the machine.

[48] Tier I: Energy Consumption ≤0.55 [8.66 + (0.009 × Vendible Capacity)].

[49] Tier II: Energy Consumption ≤0.45 [8.66 + (0.009 × Vendible Capacity)].

• What are the types of customers you serve in the refrigerated beverage vending machine market?

• Would a new energy conservation standard for refrigerated beverage vending machines (whereby all your competitors are also required to meet the same minimum level of energy consumption for their machines) cause any burdens on your business? If so, please explain. Please consider costs such as new designs, capital investment, prototype testing, and marketing that might be required.

• DOE would like to understand your company's employment impacts as a result of standards. Would your company consider relocating manufacturing to outside the United States as a result of new energy conservation standards? If not, would standards cause your domestic employment level to change (increase or decrease)?

• Are there any reasons that a small business such as yours might be at a disadvantage relative to a larger business under mandatory energy conservation standards? Please consider such factors as technical expertise, access to capital, bulk purchasing power for materials, etc. If so, would you be willing to participate in a full manufacturer interview where DOE will request detailed information about your business and possible impacts due to energy conservation standards?

DOE reviewed the standard levels considered in this notice of proposed rulemaking under the provisions of the Regulatory Flexibility Act and the procedures and policies published on February 19, 2003. Based on this review, DOE has prepared an IRFA for this rulemaking. The IRFA describes potential impacts on small businesses associated with beverage vending machine design and manufacturing.

The potential impacts on beverage vending machine manufacturers are discussed in the following sections of this IRFA. DOE has transmitted a copy of this IRFA to the Chief Counsel for Advocacy of the Small Business Administration for review.

1. Reasons for the Proposed Rule

Part A of subchapter III (42 U.S.C. 6291–6309) provides for the Energy Conservation Program for Consumer Products Other Than Automobiles.[50] The amendments to EPCA contained in the Energy Policy Act of 2005 (EPACT 2005), Public Law 109–58, include new or amended energy conservation standards and test procedures for some of these products, and direct DOE to undertake rulemakings to promulgate such requirements. In particular, section 135(c)(4) of EPACT 2005 amends EPCA to direct DOE to prescribe energy conservation standards for beverage vending machines (42 U.S.C. 6295(v)). Hence, DOE is proposing energy conservation standards for refrigerated bottle or canned beverage vending machines.[51]

2. Objectives of and Legal Basis for the Proposed Rule

EPCA provides that any new or amended standard for beverage vending machines must be designed to achieve the maximum improvement in energy efficiency that is technologically feasible and economically justified (42 U.S.C. 6295(o)(2)(A) and (v)). EPCA precludes DOE from adopting any standard that would not result in significant conservation of energy (42 U.S.C. 6295(o)(3)(B) and (v)). Moreover, DOE may not prescribe a standard for certain equipment if no test procedure has been established for that equipment, or if DOE determines by rule that the standard is not technologically feasible or economically justified and will not result in significant conservation of energy (42 U.S.C. 6295(o)(3)(A)(B) and (v)). To determine whether economic justification exists, DOE reviews comments received and conducts analysis to determine whether the economic benefits of the proposed standard exceed the burdens to the greatest extent practicable, taking into consideration seven factors set forth in 42 U.S.C. 6295(o)(2)(B) and (v). (See section II.B of this preamble.)

EPCA also states that the Secretary may not prescribe an amended or new standard if interested parties have established by a preponderance of the evidence that the standard is likely to result in the unavailability in the United States of any equipment type (or class) with performance characteristics (including reliability), features, sizes, capacities, and volumes that are substantially the same as those generally available in the United States (42 U.S.C. 6295 (o)(4) and (v)). Further information concerning the background of this rulemaking is provided in chapter 1 of the TSD.

3. Description and Estimated Number of Small Entities Regulated

To establish a list of small beverage vending machine manufacturers, DOE examined publicly available data and contacted manufacturers to determine if they meet the SBA's definition of a small manufacturing facility and if their manufacturing facilities are located within the United States. Based on this analysis, DOE confirmed that there are six small manufacturers of beverage vending machines.

One of these six small manufacturers is one of the top three major manufacturers, who supply roughly 90 percent of all equipment sales. The full line of products offered by this small manufacturer and the remaining two major manufacturers, which are considered large businesses, are covered under this rulemaking (i.e., equipment that dispenses refrigerated bottled or canned beverages). The remaining five small manufacturers comprise approximately 10 percent of industry shipments for covered equipment. See chapter 3 of the TSD for further details on the beverage vending machine market. In its examination of the beverage vending machine industry, DOE has determined that these small business manufactures with small market shares differ significantly from the large manufacturers. The primary difference between these small business manufacturers and the large business manufacturers is that these five small business manufacturers produce a wide variety of specialty and niche equipment that are not covered under this rulemaking. The specialty and niche equipment that these small manufacturers produce include machines that dispense a wide range of items including snacks, heated drinks, electronic goods, DVDs, bowling supplies, and medical products. Furthermore, unlike the major manufacturers, these small business manufacturers do not sell equipment to the major bottlers because they do not produce covered equipment in the necessary volumes. Instead, these manufacturers rely on providing customized equipment in much smaller volumes.

Requests for interviews were delivered electronically to the six manufacturers that met the small business criteria. DOE received

[50] This part was originally titled Part B; however, it was redesignated Part A, after Part B of Title III was repealed by Public Law 109–58. Similarly, Part C, *Certain Industrial Equipment,* was redesignated Part A–1.

[51] Because of its placement in Part A of Title III of EPCA, the rulemaking for beverage vending machine energy conservation standards is bound by the requirements of 42 U.S.C. 6295. However, since beverage vending machines are commercial equipment, DOE intends to place the new requirements for beverage vending machines in Title 10 of the Code of Federal Regulations (CFR), Part 431 (''Energy Efficiency Program for Certain Commercial and Industrial Equipment''), which is consistent with DOE's previous action to incorporate the EPACT 2005 requirements for commercial equipment. The location of the provisions within the CFR does not affect either their substance or applicable procedure, so DOE is placing them in the appropriate CFR part based on their nature or type.

responses from fewer than half and conducted an on-site interview with only one. In the questionnaire and during the interview, DOE requested information that would determine if there are differential impacts on small manufacturers that may result from new energy conservation standards. See chapter 13 of the TSD for further discussion about the methodology DOE used in its analysis of manufacturer impacts to include small manufacturers.

4. Description and Estimate of Compliance Requirements

Potential impacts on manufacturers include impacts associated with beverage vending machine design and manufacturing. The level of research and development needed to meet energy conservation standards increases with more stringent standards. As mentioned previously, DOE examined the level of impacts that small manufacturers would incur by identifying small business manufacturers and, through its contractor, sending them a short questionnaire seeking information to better understand the impacts of the proposed standard that are unique to small manufacturers. Since not all of the small business manufacturers responded to the questionnaire, it is difficult to specifically quantify how the impacts of the proposed standards differ between large and small manufacturers. However, DOE found that, for the small business manufacturer with a major market share, the impacts of the proposed standard would not differ greatly from those of its larger competitors, and, for the remaining small business manufacturers, the impacts would not be significant.

Small Business Manufacturer With a Major Market Share

The small business manufacturer that has a major market share in covered equipment will not be disproportionately disadvantaged by the proposed standard. It has a large shipment volume as a major supplier to the large bottlers and its access to capital is nearly identical to its larger competitors. Its large shipment volume allows it to distribute the added cost of compliance across its products, similar to the large manufacturers. Correspondingly, it echoed the large manufacturers' concerns about new energy conservation standards, including conversion costs needed to meet standards, meeting customer needs, and current market conditions. DOE found no significant differences in the R&D emphasis or marketing strategies between this small business manufacturer with a major market share and large manufacturers. As a result, DOE does not believe the impacts of the proposed standard will be significantly different for the small business manufacturer with a large market share when compared to those expected for the large business manufacturers.

Small Business Manufacturers With Small Market Shares

DOE does not expect the small businesses with small market shares to be compromised by the proposed energy conservation standard. DOE estimates that only approximately 40 percent of their offered vending equipment is covered by the proposed standard. The majority of equipment offered is specialty or niche equipment. As a result, the primary source of revenue for these small manufacturers comes from supplying a market underserved by the major manufacturers of covered equipment. Any cost disadvantage experienced by these small manufacturers as a result of the proposed standard can be balanced by the relatively larger profit margins achievable by charging premium prices for niche equipment. As a result, DOE believes the proposed standard will not affect the competitive position of the small business manufacturers with small market shares in covered equipment.

To estimate a portion of the differential impacts of the proposed standard on the small manufacturers with small market shares, DOE compared their cost of compliance for testing and certifying covered equipment with that of the major manufacturers (the two large and one small business manufacturers that account for 90 percent of industry shipments). Manufacturers must test the energy performance of each basic model it manufacturers in order to determine compliance with energy conservation standards and testing requirements. Therefore, DOE examined the number of basic models available from each manufacturer to determine an estimate for the differential in overall compliance costs. The number of basic models attributed to each manufacturer is based on an examination of the different models advertised by each. DOE estimates the cost of testing a piece of covered equipment to be approximately $2,000. A typical major manufacturer has approximately 23 basic models, approximately 85 percent of which are covered and would require separate standards compliance certifications. Therefore, DOE estimates that a typical major manufacturer will incur approximately $44,013 in annual costs for standards compliance certifications. DOE estimates that a typical small manufacturer with small market share has approximately 27 basic models, 44 percent of which are covered and would require separate standards compliance certifications. DOE estimates that a typical small manufacturer will incur approximately $14,380 in annual costs for standards compliance certifications. According to this comparison, the cost of certification for a small manufacturer with small market share is significantly lower than that of a major manufacturer.

As stated above, DOE expects that there will be some differential impacts associated with beverage vending machine design and manufacturing on small manufacturers. DOE requests comments on how small business manufacturers will be affected due to new energy conversation standards. Specifically, DOE requests comments on the compliance costs and other impacts to small manufacturers that do not supply the high-volume customers of beverage vending machines.

5. Duplication, Overlap, and Conflict With Other Rules and Regulations

DOE is not aware of any rules or regulations that duplicate, overlap, or conflict with the rule being considered today.

6. Significant Alternatives to the Rule

The primary alternatives to the proposed rule considered by DOE are the other TSLs besides the ones being proposed today, TSL 6 for Class A and TSL 3 for Class B. As discussed in section VI.B subsection 6, DOE expects that the differential impact on small beverage vending machine manufacturers would be less severe in moving from TSL 5 to proposed TSL 6 for Class A than it would be in moving from TSL 6 to TSL 7. For Class B machines, DOE expects that the differential impact on small beverage vending machine manufacturers would be less significant in moving from TSL 2 to proposed TSL 3 than it would be in moving from TSL 4 to TSL 5. While lower TSLs (*i.e.*, TSLs 1–5 for Class A and TSLs 1 and 2 for Class B) would have less impact on all manufacturers affected by this rulemaking, including the small manufacturers, these TSLs do not meet the statutory requirement that DOE implement the standard that is designed to achieve the maximum improvement in energy efficiency that is technologically feasible and economically justified.

In addition, the TSD includes a regulatory impact analysis (RIA) (chapter 17 of the TSD), which discusses the following policy alternatives: (1) No new regulatory action, (2) financial incentives including rebates or tax credits, (3) revisions to voluntary energy efficiency targets such as ENERGY STAR program criteria, (4) bulk government purchases, (5) early replacement incentive programs, and (6) prescriptive standards that would mandate design requirements (*e.g.,* lighting and refrigeration controls). DOE does not intend to consider these alternatives further because they are either not feasible to implement, or not expected to result in energy savings as large as those that would be achieved by the standard levels under consideration.

Section 603(c) of the RFA lists the following as alternatives that agencies should consider in an IRFA: (1) Establishment of different compliance or reporting requirements for small entities or timetables that take into account the resources available to small entities, (2) clarification, consolidation, or simplification of compliance and reporting requirements for small entities, (3) use of performance rather than design standards, and (4) exemption for certain small entities from coverage of the rule, in whole or in part.[52]

For alternatives (1) and (2) above, testing and reporting of certification and compliance with the proposed energy conservation standards are expected to be a relatively minor component of compliance compared with manufacturers' other actions to meet the standard. In addition, as explained further in the discussion of alternative (4), DOE is not authorized to delay the setting of the standard past August 9, 2009, and the standard must apply to products manufactured 3 years after the date of publication of the final rule. (42 U.S.C. 6295(v)(2) and (3). Therefore, DOE cannot establish different energy standards or a different timetable for small entities, as contemplated by alternative (1). The proposed rule is a performance standard rather than a prescriptive standard, so alternative (3) is not applicable to the proposed rule.

Alternative (4) considers exemptions for small entities in whole or in part. The authority granted to DOE to promulgate the proposed rule under the Energy Policy Act of 2005 (EPACT 2005) does not allow for exemptions in whole or in part. EPACT 2005 amended the Energy Policy and Conservation Act by adding new subsections 325(v)(2), (3) and (4), which direct the Secretary of Energy to issue, by rule, energy conservation standards for refrigerated bottled or canned beverage vending machines. (42 U.S.C. 6295(v) (1), (2), and (3))[53] The proposed standards apply *to all beverage vending machines manufactured 3 years after publication of the final rule establishing the energy conservation standards and offered for sale in the United States* (42 U.S.C. 6295(v)(4)) [emphasis added].[54] However, a manufacturer can petition DOE's Office of Hearing and Appeals (OHA) for exception relief from the energy conservation standard pursuant to OHA's authority under section 504 of the DOE Organization Act (42 U.S.C. 7194), as implemented at subpart B of 10 CFR part 1003. OHA grants such relief on a case-by-case basis if it determines that a manufacturer has demonstrated that meeting the standard would cause hardship, inequity, or unfair distributions of burdens.

Chapter 13 of the TSD contains additional information about the impact of this rulemaking on manufacturers. As mentioned above, the other policy alternatives are described in section VI.A of the preamble and in the Regulatory Impact Analysis (chapter 17 of the TSD). Since the impacts of these policy alternatives are less than the impacts described above for TSL 6 for Class A and TSL 3 for Class B, DOE expects that the impacts on small manufacturers of these alternatives would also be less than the impacts described above for the proposed standard levels. DOE requests comment on the impacts on small manufacturers for these and any other possible alternatives to the proposed rule. DOE will consider any comments received regarding impacts on small manufacturers for all the alternatives identified, including those in the RIA, for the final rule.

C. Review Under the Paperwork Reduction Act

This rulemaking will impose no new information or record keeping requirements. Accordingly, OMB clearance is not required under the Paperwork Reduction Act. (44 U.S.C. 3501 *et seq.*)

D. Review Under the National Environmental Policy Act

DOE is preparing a draft environmental assessment of the impacts of the potential standards. The assessment will include an examination of the potential effects of emission reductions likely to result from the rule in the context of global climate change as well as other types of environmental impacts. DOE anticipates completing a Finding of No Significant Impact (FONSI) before publishing the final rule on beverage vending machines, pursuant to the National Environmental Policy Act of 1969 (NEPA) (42 U.S.C. 4321 *et seq.*), the regulations of the Council on Environmental Quality (40 CFR parts 1500–1508), and DOE's regulations for compliance with the NEPA (10 CFR part 1021). The draft EA can be found in chapter 16 of the TSD.

E. Review Under Executive Order 13132

Executive Order 13132, ''Federalism,'' 64 FR 43255 (August 4, 1999) imposes certain requirements on agencies formulating and implementing policies or regulations that preempt State law or have federalism implications. Agencies are required to examine the constitutional and statutory authority supporting any action that would limit the policymaking discretion of the States and carefully assess the necessity for such actions. The Executive Order also requires agencies to have an accountable process to ensure meaningful and timely input by State and local officials in the development of regulatory policies that have federalism implications. On March 14, 2000, DOE published a statement of policy describing the intergovernmental consultation process it will follow in the development of such regulations. (65 FR 13735.) DOE has examined today's proposed rule and has determined that it would not have a substantial direct effect on the States, on the relationship between the Federal Government and the States, or on the distribution of power and responsibilities among the various levels of government. EPCA governs and prescribes Federal preemption of State regulations on energy conservation for the equipment that is the subject of today's proposed rule. Specifically, EPCA provides that States are preempted from adopting new standards once DOE publishes a final rule. Once the final rule takes effect, State standards that were in effect at the time of the publication of the final rule are preempted. (42 U.S.C. 6295(ii)) States can petition DOE for waiver from such preemption to the extent, and based on criteria, set forth in EPCA. (42 U.S.C. 6297(d) and 6316(b)(2)(D)) No further action is required by Executive Order 13132.

F. Review Under Executive Order 12988

With respect to the review of existing regulations and the promulgation of new regulations, section 3(a) of Executive Order 12988, ''Civil Justice Reform,'' 61 FR 4729 (February 7, 1996), imposes on Executive agencies the

[52] *Id.* at 36.

[53] Note that the relevant statutory provisions were renumbered pursuant to section 316(d)(1) of EISA, Public Law 110–140.

[54] This provision was redesignated by EISA, section 316(d)(1), as 42 U.S.C. 6295(v)(3).

general duty to adhere to the following requirements: (1) Eliminate drafting errors and ambiguity, (2) write regulations to minimize litigation, and (3) provide a clear legal standard for affected conduct rather than a general standard and promote simplification and burden reduction. With regard to the review required by section 3(a), section 3(b) of Executive Order 12988 specifically requires that Executive agencies make every reasonable effort to ensure that the regulation (1) clearly specifies the preemptive effect, if any; (2) clearly specifies any effect on existing Federal law or regulation; (3) provides a clear legal standard for affected conduct while promoting simplification and burden reduction; (4) specifies the retroactive effect, if any; (5) adequately defines key terms; and (6) addresses other important issues affecting clarity and general draftsmanship under any guidelines issued by the Attorney General. Section 3(c) of Executive Order 12988 requires Executive agencies to review regulations in light of applicable standards in section 3(a) and section 3(b) to determine whether they are met or it is unreasonable to meet one or more of them. DOE has completed the required review and determined that this proposed rule meets the relevant standards of Executive Order 12988 to the extent permitted by law.

G. Review Under the Unfunded Mandates Reform Act of 1995

Title II of the Unfunded Mandates Reform Act of 1995 (Pub. L. 104–4) (UMRA), requires each Federal agency to assess the effects of Federal regulatory actions on State, local and Tribal governments and the private sector. For a proposed regulatory action likely to result in a rule that may cause the expenditure by State, local, and Tribal governments, in the aggregate, or by the private sector of $100 million or more in any one year (adjusted annually for inflation), section 202 of UMRA requires a Federal agency to publish a written statement that estimates the resulting costs, benefits, and other effects on the national economy. (2 U.S.C. 1532(a), (b)). UMRA also requires a Federal agency to develop an effective process to permit timely input by elected officers of State, local, and Tribal governments on a proposed ''significant intergovernmental mandate,'' and requires an agency plan for giving notice and opportunity for timely input to potentially affected small governments before establishing any requirements that might significantly or uniquely affect small governments. On March 18, 1997, DOE published a statement of policy on its process for intergovernmental consultation under UMRA, (62 FR 12820) (also available at *http://www.gc.doe.gov*). Today's proposed rule does not impose expenditures of $100 million or more on the private sector. It does not contain a Federal intergovernmental mandate.

Section 202 of UMRA authorizes an agency to respond to the content requirements of UMRA in any other statement or analysis that accompanies the proposed rule. 2 U.S.C. 1532(c). The content requirements of section 202(b) of UMRA relevant to a private sector mandate substantially overlap the economic analysis requirements that apply under section 325(o) of EPCA and Executive Order 12866. The Supplementary Information section of this notice of proposed rulemaking and the Regulatory Impact Analysis section of the TSD respond to those requirements.

Under section 205 of UMRA, DOE is obligated to identify and consider a reasonable number of regulatory alternatives before promulgating a rule for which a written statement under section 202 is required. DOE is required to select from those alternatives the most cost-effective and least burdensome alternative that achieves the objectives of the rule unless DOE publishes an explanation for doing otherwise or the selection of such an alternative is inconsistent with law. As required by sections 325(o), 345(a) and 342(c)(4)(A) of EPCA (42 U.S.C. 6295(o), 6316(a) and 6313(c)(4)(A)), today's proposed rule would establish energy conservation standards for beverage vending machines that are designed to achieve the maximum improvement in energy efficiency that DOE has determined to be both technologically feasible and economically justified. A full discussion of the alternatives considered by DOE is presented in the Regulatory Impact Analysis in the TSD.

H. Review Under the Treasury and General Government Appropriations Act, 1999

Section 654 of the Treasury and General Government Appropriations Act, 1999 (Pub. L. 105–277) requires Federal agencies to issue a Family Policymaking Assessment for any proposed rule that may affect family well-being. This proposed rule would not have any impact on the autonomy or integrity of the family as an institution. Accordingly, DOE has concluded that it is not necessary to prepare a Family Policymaking Assessment.

I. Review Under Executive Order 12630

DOE has determined, under Executive Order 12630, Governmental Actions and Interference with Constitutionally Protected Property Rights, 53 FR 8859 (March 18, 1988), that this regulation would not result in any takings that might require compensation under the Fifth Amendment to the U.S. Constitution.

J. Review Under the Treasury and General Government Appropriations Act, 2001

The Treasury and General Government Appropriations Act, 2001 (44 U.S.C. 3516 note) provides for agencies to review most disseminations of information to the public under guidelines established by each agency pursuant to general guidelines issued by OMB. The OMB's guidelines were published at 67 FR 8452 (February 22, 2002), and DOE's guidelines were published at 67 FR 62446 (October 7, 2002). DOE has reviewed today's notice under the OMB and DOE guidelines and has concluded that it is consistent with applicable policies in those guidelines.

K. Review Under Executive Order 13211

Executive Order 13211, ''Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use,'' 66 FR 28355 (May 22, 2001) requires Federal agencies to prepare and submit to OMB a Statement of Energy Effects for any proposed significant energy action. A ''significant energy action'' is defined as any action by an agency that promulgated or is expected to lead to promulgation of a final rule, and that (1) Is a significant regulatory action under Executive Order 12866, or any successor order; and (2) is likely to have a significant adverse effect on the supply, distribution, or use of energy; or (3) is designated by the Administrator of OIRA as a significant energy action. For any proposed significant energy action, the agency must give a detailed statement of any adverse effects on energy supply, distribution, or use should the proposal be implemented, and of reasonable alternatives to the action and their expected benefits on energy supply, distribution, and use.

Today's regulatory action would not have a significant adverse effect on the supply, distribution, or use of energy and, therefore, is not a significant energy action. Accordingly, DOE has not prepared a Statement of Energy Effects.

L. Review Under the Information Quality Bulletin for Peer Review

On December 16, 2004, OMB, in consultation with the Office of Science and Technology (OSTP), issued its Final Information Quality Bulletin for Peer Review (Bulletin). 70 FR 2664, (January 14, 2005) The Bulletin establishes that certain scientific information shall be peer reviewed by qualified specialists before it is disseminated by the Federal Government, including influential scientific information related to agency regulatory actions. The purpose of the bulletin is to enhance the quality and credibility of the Government's scientific information. Under the Bulletin, the energy conservation standards rulemakings analyses are ''influential scientific information.'' The Bulletin defines ''influential scientific information'' as ''scientific information the agency reasonably can determine will have, or does have, a clear and substantial impact on important public policies or private sector decisions.'' 70 FR 2667 (January 14, 2005)

In response to OMB's Bulletin, DOE conducted a formal peer review of the energy conservation standards development process and analyses and has prepared a Peer Review Report pertaining to the energy conservation standards rulemaking analyses. The Energy Conservation Standards Rulemaking Peer Review Report dated February 2007 has been disseminated and is available at *http://www.eere.energy.gov/buildings/appliance_standards/peer_review.html.*

VII. Public Participation

A. Attendance at Public Meeting

The time, date and location of the public meeting are provided in the **DATES** and **ADDRESSES** sections at the beginning of this document. To attend the public meeting, please notify Ms. Brenda Edwards at (202) 586–2945. As explained in the **ADDRESSES** section, foreign nationals visiting DOE headquarters are subject to advance security screening procedures. Any foreign national wishing to participate in the meeting should advise DOE of this fact as soon as possible by contacting Ms. Brenda Edwards to initiate the necessary procedures.

B. Procedure for Submitting Requests To Speak

Any person who has an interest in today's notice, or who is a representative of a group or class of persons that has an interest in these issues, may request an opportunity to make an oral presentation. Please hand-deliver requests to speak to the address shown under the heading ''*Hand Delivery/Courier''* in the **ADDRESSES** section of this NOPR, between 9 a.m. and 4 p.m., Monday through Friday, except Federal holidays. Also, requests may be sent by mail to the address shown under the heading ''*Postal Mail''* in the **ADDRESSES** section of this NOPR, or by e-mail to *Brenda.Edwards@ee.doe.gov.*

Parties requesting to speak should briefly describe the nature of their interest in this rulemaking and provide a telephone number for contact. DOE asks parties selected to be heard to submit a copy of their statements at least two weeks before the public meeting, either in person, by postal mail, or by e-mail as described in the preceding paragraph. Please include an electronic copy of your statement on a computer diskette or compact disk when delivery is by postal mail or in person. Electronic copies must be in WordPerfect, Microsoft Word, Portable Document Format (PDF), or text (American Standard Code for Information Interchange (ASCII)) file format. At its discretion, DOE may permit any person who cannot supply an advance copy of his or her statement to participate, if that person has made alternative arrangements with the Building Technologies Program. In such situations, the request to give an oral presentation should ask for alternative arrangements.

C. Conduct of Public Meeting

DOE will designate a DOE official to preside at the public meeting and may also use a professional facilitator to aid discussion. The meeting will not be a judicial or evidentiary-type public hearing, but DOE will conduct it in accordance with 5 U.S.C. 553 and section 336 of EPCA (42 U.S.C. 6306). A court reporter will be present to record and transcribe the proceedings. DOE reserves the right to schedule the order of presentations and to establish the procedures governing the conduct of the public meeting. After the public meeting, interested parties may submit further comments about the proceedings, and any other aspect of the proposed rulemaking, until the end of the comment period.

The public meeting will be conducted in an informal, conference style. DOE will present summaries of comments received before the public meeting, allow time for presentations by participants, and encourage all interested parties to share their views on issues affecting this rulemaking. Each participant will be allowed to make a prepared general statement (within time limits determined by DOE) before discussion of a particular topic. DOE will permit other participants to comment briefly on any general statements.

At the end of all prepared statements on a topic, DOE will permit participants to clarify their statements briefly and comment on statements made by others. Participants should be prepared to answer questions by DOE and by other participants concerning these issues. DOE representatives may also ask questions of participants concerning other matters relevant to the proposed rulemaking. The official conducting the public meeting will accept additional comments or questions from those attending, as time permits. The presiding official will announce any further procedural rules or modification of the above procedures that may be needed for proper conduct of the public meeting.

DOE will include the entire record of this proposed rulemaking, including the transcript from the public meeting, in the docket for this rulemaking. For access to the docket to read the transcript, visit the U.S. Department of Energy, Resource Room of the Building Technologies Program, 950 L'Enfant Plaza, SW., 6th Floor, Washington, DC, 20024, (202) 586–2945, between 9 a.m. and 4 p.m., Monday through Friday, except Federal holidays. Please call Ms. Brenda Edwards at the above telephone number for additional information regarding visiting the Resource Room. Any person may purchase a copy of the transcript from the transcribing reporter.

D. Submission of Comments

DOE will accept comments, data, and information regarding all aspects of this NOPR before or after the public meeting, but no later than the date provided at the beginning of this notice of proposed rulemaking. Please submit comments, data, and information electronically to the following e-mail address: *beveragevending.rulemaking@ee.doe.gov.* Submit electronic comments in WordPerfect, Microsoft Word, PDF, or ASCII file format and avoid the use of special characters or any form of encryption. Comments in electronic format should be identified by the docket number EERE–2006–STD–0125 and/or RIN 1904–AB58, and whenever possible carry the electronic signature of the author. Absent an electronic signature, comments submitted electronically must be followed and authenticated by submitting a signed original paper document. No faxes will be accepted.

Under 10 CFR 1004.11, any person submitting information that he or she believes to be confidential and exempt by law from public disclosure should submit two copies: One copy of the document including all the information believed to be confidential, and one copy of the document with the information believed to be confidential deleted. DOE will make its own determination about the confidential status of the information and treat it according to its determination.

Factors of interest to DOE when evaluating requests to treat submitted information as confidential include (1) A description of the items, (2) whether and why such items are customarily treated as confidential within the industry, (3) whether the information is generally known by or available from other sources, (4) whether the information has previously been made available to others without obligation concerning its confidentiality, (5) an explanation of the competitive injury to the submitting person which would result from public disclosure, (6) when such information might lose its confidential character due to the passage of time, and (7) why disclosure of the information would be contrary to the interest.

VIII. Approval of the Office of the Secretary

The Secretary of Energy has approved publication of this proposed rule.

List of Subjects in 10 CFR Part 431

Administrative practice and procedure, Confidential business information, Energy conservation.

Issued in Washington, DC, on May 22, 2009.

Steven G. Chalk,

Principal Deputy Assistant Secretary, Energy Efficiency and Renewable Energy.

For the reasons set forth in the preamble, DOE proposes to amend Chapter II of Title 10, Code of Federal Regulations, Part 431 to read as set forth below.

PART 431—ENERGY EFFICIENCY PROGRAM FOR CERTAIN COMMERCIAL AND INDUSTRIAL EQUIPMENT

1. The authority citation for part 431 continues to read as follows:

Authority: 42 U.S.C. 6291–6317.

2. In § 431.292 add, in alphabetical order, new definitions for ''bottled or canned beverage'', ''Class A'', ''Class B'', and ''V'' to read as follows:

§ 431.292 Definitions concerning refrigerated bottled or canned beverage vending machines.

* * * * *

Bottled or canned beverage means a beverage in a sealed container.

Class A means a refrigerated bottled or canned beverage vending machine that is fully cooled.

Class B means any refrigerated bottled or canned beverage vending machine not considered to be Class A.

* * * * *

V means the refrigerated volume (ft^3) of the refrigerated bottled or canned beverage vending machine, as measured by AHAM HRF–1–2004 (incorporated by reference, see § 431.293).

3. Section 431.293 is revised to read as follows:

§ 431.293 Materials incorporated by reference.

(a) *General.* DOE incorporates by reference the following standards into subpart Q of part 431. The material listed has been approved for incorporation by reference by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Any subsequent amendment to a standard by the standard-setting organization will not affect the DOE regulations unless and until amended by DOE. Material is incorporated as it exists on the date of the approval and a notice of any change in the material will be published in the **Federal Register**. All approved material is available for inspection at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202–741–6030 or visit *http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.* This material is also available for inspection at U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Program, 6th Floor, 950 L'Enfant Plaza, SW., Washington, DC 20024, 202–586–2945, or visit *http://www.eere.energy.gov/buildings/appliance_standards.* Standards can be obtained from the sources listed below.

(b) *ANSI.* American National Standards Institute, 25 W. 43rd Street, 4th Floor, New York, NY 10036, 212–642–4900, or visit *http://www.ansi.org.*

(1) ANSI/AHAM HRF–1–2004, Energy, Performance and Capacity of Household Refrigerators, Refrigerator-Freezers and Freezers, approved July 7, 2004, IBR approved for § 431.294.

(2) ANSI/ASHRAE Standard 32.1–2004, Methods of Testing for Rating Vending Machines for Bottled, Canned, and Other Sealed Beverages, approved December 2, 2004, IBR approved for § 431.294.

4. In subpart Q, add an undesignated center heading and § 431.296 to read as follows:

Energy Conservation Standards

§ 431.296 Energy conservation standards and their effective dates.

Each refrigerated bottled or canned beverage vending machine manufactured on or after 3 years from the date of publication of the final rule, shall have a daily energy consumption (in kilowatt hours per day) that does not exceed the following:

Equipment class	Maximum daily energy consumption *kilowatt hours per day*
Class A	$0.055 \times V + 2.56$
Class B	$0.073 \times V + 3.16$

[FR Doc. E9–12410 Filed 5–26–09; 4:15 pm]

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