

Plans for Developing Energy Conservation Standards for Battery Chargers and External Power Supplies

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LIST OF ACRONYMS

AC	alternating current
AEO	Annual Energy Outlook
ANOPR	advance notice of proposed rulemaking
BC	battery charger
BT	Building Technologies Program
CEA	Consumer Electronics Association
CFR	Code of Federal Regulations
CO ₂	carbon dioxide
CSL	candidate standard level
DC	direct current
DOE	U.S. Department of Energy
DOJ	U.S. Department of Justice
EERE	Office of Energy Efficiency and Renewable Energy
EIA	Energy Information Administration
EPA	U.S. Environmental Protection Agency
EPACT 2005	Energy Policy Act of 2005
EPCA	Energy Policy and Conservation Act of 1975
EPS	external power supply
GRIM	Government Regulatory Impact Model
ImSET	Impact of Sector Energy Technologies
LCC	life-cycle cost
NEMS	National Energy Modeling System
NES	national energy savings
NOPR	notice of proposed rulemaking
NO _x	nitrogen oxides
NPV	net present value
OMB	U.S. Office of Management and Budget
RIA	regulatory impact analysis
SO ₂	sulfur dioxide
TSD	technical support document
TSL	trial standard level

1. INTRODUCTION

The U.S. Department of Energy (DOE) Residential Appliances and Commercial Equipment Standards Program of the Office of Energy Efficiency and Renewable Energy's (EERE's) Building Technologies Program (BT) develops and promulgates test procedures and energy conservation standards for consumer appliances and commercial equipment. On August 8, 2005, the Energy Policy Act of 2005 (Pub. L. 109-58; EPACT 2005), amended section 325 of the Energy Policy and Conservation Act (42 U.S.C. 6291 *et seq.*; EPCA), in part, by adding a new subsection 325(u) that directs DOE to establish a test procedure, hold a scoping workshop and conduct a determination analysis of energy conservation standards for battery chargers (BCs) and external power supplies (EPSs). (42 U.S.C. 6295(u))

This document, "Plans for Developing Energy Conservation Standards for Battery Chargers and External Power Supplies" is associated with DOE's work preparing for the scoping workshop and determining whether to develop energy conservation standards for BCs and EPSs. This document is published in conjunction with DOE's "The Current and Future Market for Battery Chargers and External Power Supplies."¹ Together, these two documents represent the Framework Document for these products and present the steps the DOE will follow in conducting the determination analysis, its plans for developing energy conservation standards (should there be a positive determination), and DOE's initial understanding of the current and future market for these products. DOE has embedded issues for stakeholder comment throughout the text of both documents, and included a summary list of the issues in the

¹ Available for download in PDF format from DOE's homepage for BCs and EPSs:
http://www.eere.energy.gov/buildings/appliance_standards/residential/battery_external.html

appendices to both documents. Stakeholders are encouraged to review both documents and provide comment on these issues and any others that are of concern.

Section 325(u)(1)(D) of EPCA directs DOE to hold a scoping workshop by February 8, 2007, to discuss and receive comments on plans for developing energy conservation standards for battery chargers and external power supplies. (42 U.S.C. 6295(u)(1)(D)) DOE prepared this document to facilitate discussion and comment on plans for developing energy conservation standards.

1.1 The Energy Policy Act of 2005 and DOE's Report to Congress

EPACT 2005 amended EPCA to add a new subsection 325(u) directing DOE to conduct certain activities on BCs and EPSs. Subsection (u) is reproduced here for convenience, and then is discussed in detail in the following text, indicating how DOE is addressing or handling each of these requirements. The schedule which DOE is following pertaining to these products was published in the Report to Congress² on January 31, 2006. An excerpt of relevant portions of the Report to Congress also appears in this section.

² Energy Conservation Standards Activities - Submitted Pursuant to Section 141 of the Energy Policy Act of 2005 and to the Conference Report (109-275) to the FY 2006 Energy and Water Development Appropriations Act. U.S. Department of Energy, January 2006.
http://www.eere.energy.gov/buildings/appliance_standards/pdfs/congressional_report_013106.pdf

Sec. 325 ENERGY CONSERVATION STANDARDS

(u) BATTERY CHARGER AND EXTERNAL POWER SUPPLY ELECTRIC ENERGY CONSUMPTION. —

(1)(A) Not later than 18 months after the date of enactment of this subsection, the Secretary shall, after providing notice and an opportunity for comment, prescribe, by rule, definitions and test procedures for the power use of battery chargers and external power supplies.

(B) In establishing the test procedures under sub paragraph (A), the Secretary shall—

(i) consider existing definitions and test procedures used for measuring energy consumption in standby mode and other modes; and

(ii) assess the current and projected future market for battery chargers and external power supplies.

(C) The assessment under subparagraph (B)(ii) shall include—

(i) estimates of the significance of potential energy savings from technical improvements to battery chargers and external power supplies; and

(ii) suggested product classes for energy conservation standards.

(D) Not later than 18 months after the date of enactment of this subsection, the Secretary shall hold a scoping workshop to discuss and receive comments on plans for developing energy conservation standards for energy use for battery chargers and external power supplies.

(E)(i) Not later than 3 years after the date of enactment of this subsection, the Secretary shall issue a final rule that determines whether energy conservation standards shall be issued for battery chargers and external power supplies or classes of battery chargers and external power supplies.

(ii) For each product class, any energy conservation standards issued under clause (i) shall be set at the lowest level of energy use that—

(I) meets the criteria and procedures of subsections (o), (p), (q), (r), (s), and (t); and

(II) would result in significant overall annual energy savings, considering standby mode and other operating modes.

(2) In determining under section 323 whether test procedures and energy conservation standards under this section should be revised with respect to covered products that are major sources of standby mode energy consumption, the Secretary shall consider whether to incorporate standby mode into the test procedures and energy conservation standards, taking into account standby mode power consumption compared to overall product energy consumption.

(3) The Secretary shall not propose an energy conservation standard under this section, unless the Secretary has issued applicable test procedures for each product under section 323.

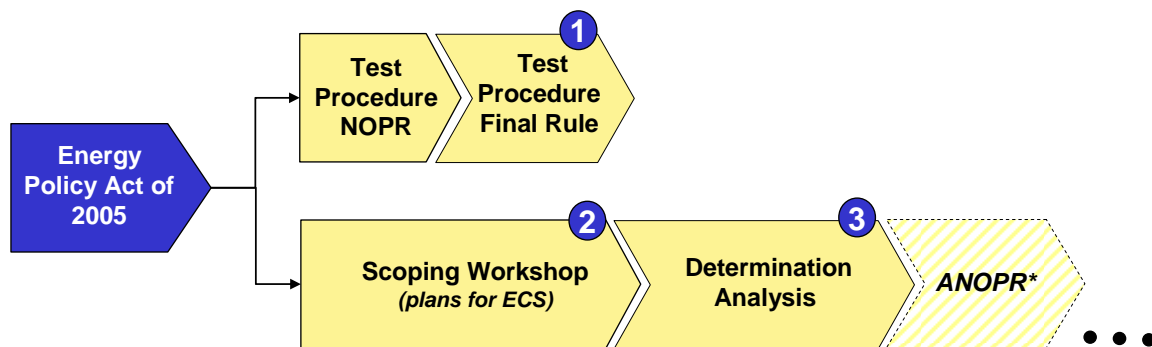
(4) Any energy conservation standard issued under this subsection shall be applicable to products manufactured or imported beginning on the date that is 3 years after the date of issuance.

(5) The Secretary and the Administrator [of the EPA] shall collaborate and develop programs (including programs under section 324A and other voluntary industry agreements or codes of conduct) that are designed to reduce standby mode energy use.

In general terms, EPCA contains three immediate tasks for DOE – 1) develop a test procedure and definitions for BCs and EPSs; 2) hold a scoping workshop (i.e., public meeting) to discuss plans for developing energy conservation standards; and 3) determine whether energy conservation standards are warranted for BCs and EPSs. If the Secretary of Energy were to make a positive determination for one or both products, DOE would initiate an energy conservation standards rulemaking to determine what, if any, technologically feasible and economically justified efficiency level(s) are appropriate. If an energy conservation standards rulemaking is conducted, provisions outlined in paragraphs (u)(1)(E)(ii) and (u)(2) through (u)(4) would apply to the rulemaking analysis. Included in these provisions, is a requirement under EPCA 325(u)(E)(ii)(I) that DOE “meet the criteria and procedures of [EPCA 325] subsections (o), (p), (q), (r), (s), and (t).” (42 U.S.C. 6295(u)(E)(ii)(I)) These requirements specifically include subsection (o), which was also amended by section 135(c)(3) of EPACT 2005 to read: “(5) The Secretary may set more than 1 energy conservation standard for products that serve more than 1 major function by setting 1 energy conservation standard for each major function.” (42 U.S.C. 6295(o)(5))

The diagram below is an illustration of the three main tasks assigned to DOE for BCs and EPSs. Due to the fact that both the test procedure and scoping workshop requirements were

scheduled for an 18-month timeframe, DOE envisions these two tasks as parallel activities. The determination analysis is depicted as following from the scoping workshop because DOE anticipates receiving stakeholder comment during and following the scoping workshop which will contribute to DOE’s determination analysis. Finally, a labeled “ANOPR” was added to the diagram with a dotted border to depict that an energy conservation standard rulemaking process would follow the determination analysis, if there were a positive determination for one or both products.



*An energy conservation standard rulemaking would only occur if the Secretary makes a positive determination.

Figure 1.1 Flow diagram depicting immediate requirements of EPACT 2005

DOE provided a schedule in its Report to Congress for the test procedure, determination analysis, and possible energy conservation standards rulemaking (contingent on a positive determination). The table below reproduces the portion of a table from the Report that pertains to BCs and EPSs.

Table 1.1 Excerpt from DOE’s Report to Congress on Battery Chargers and External Power Supplies

Rulemaking Team	Rule Type	Product(s)	EPACT 2005, Backlog, Other	Approx. Rule Initiation Date	Final Action Date
Battery Chargers and External Power Supplies Team	Determination Analysis	Battery Chargers and External Power Supplies	EPACT 2005	NA	August 2008
	Standards	Battery Chargers and External Power Supplies (Contingent on Determination)	EPACT 2005	FY2008, Q4	August 2011
	Test Procedure	Battery Chargers and External Power Supplies	EPACT 2005	NA	February 2007

For the test procedure, DOE published a notice of proposed rulemaking on July 25, 2006. 71 FR 42178. DOE received comment, reviewed and responded to those comments, and published a final rule on December 8, 2006. 71 FR 71340. For detailed information on DOE’s proposal and final rule, please see the relevant sections of those two Federal Register notices.

For the determination analysis, DOE is anticipating completing this work by August 2008. If that analysis results in a positive determination, then an energy conservation standards rulemaking process would be initiated, and would be conducted over a three-year period, ending in August 2011. That three-year period is not specified in section 325(u), but is the timeframe under which DOE is now scheduling and completing its standards rulemakings.

The remainder of this introductory section discusses each of these three main tasks for BCs and EPSs that are required by EPCA. The applicable provisions and sections of the statute associated with each of these tasks are discussed, along with an explanation of DOE’s interpretation and actions to be taken or already taken.

1.1.1 Development of a Test Procedure for Battery Chargers and External Power Supplies

Section 325(u)(1)(A) of EPCA reads:

Not later than 18 months after the date of enactment of this subsection, the Secretary shall, after providing notice and an opportunity for comment, prescribe, by rule, definitions and test procedures for the power use of battery chargers and external power supplies.

(42 U.S.C. 6295(u)(1)(A)) In this paragraph, DOE is directed to develop, publish for public comment, and publish a final rule on definitions and test procedures measuring the energy consumption of BCs and EPSs. This final rule is due 18 months after enactment of EPACT 2005, which is February 8, 2007.

DOE published definitions and test procedures for BCs and EPSs (and other products) in a final rule published on December 8, 2006. 71 FR 71340. In the Final Rule, DOE adopts the definitions provided in EPACT 2005 for BCs and EPSs. These definitions are discussed in detail in section 1.2 below. DOE also incorporates by reference two ENERGY STAR test procedures, one for BCs and one for EPSs. Incorporation of the ENERGY STAR test procedures is consistent with sections 325(u)(1)(B)(i), which instruct that “In establishing the test procedures under sub paragraph (A), the Secretary shall— (i) consider existing definitions and test procedures used for measuring energy consumption in standby mode and other modes[.]”. (42 U.S.C. 6295 (u)(1)(B)(1)) DOE determined that the existing ENERGY STAR test procedures for BCs and EPSs adequately measure energy consumption in standby mode and other modes for

both products. However, the ENERGY STAR test procedure for BCs does not contain a method by which to measure active mode, so DOE reserved a section in the CFR for active mode and intends to revisit this issue at a later date. More detail on the test procedure can be found in section 1.3.

When establishing test procedures, EPCA directs DOE in section 325(u)(1)(B)(ii) to “assess the current and projected future market for battery chargers and external power supplies.” (42 U.S.C. 6295(u)(1)(B)(ii)) DOE has not traditionally conducted market analysis when developing a test procedure for a given product, because the test procedure is designed to measure the energy consumption or efficiency of a product, irrespective of shipments or market trends for that product. Market trend forecasts are normally conducted as part of a determination analysis or energy conservation standards process. For a determination or energy conservation standard, it's important to know how the market is changing over time, or what new technological innovations are being developed which could affect energy consumption. These factors impact the overall energy savings potential of the product, and therefore would impact a determination or energy conservation standards rulemaking process. DOE interpreted the instruction in this paragraph to apply to the scoping workshop, which is a precursor to the determination analysis. As discussed in Section 3, DOE's initial assessment of the current and projected future market can be found in the aforementioned document published concurrently with this one, “*The Current and Projected Future Market for Battery Chargers and External Power Supplies.*”

1.1.2 Scoping Workshop and Plans for Developing Energy Conservation Standards

DOE will hold a scoping workshop to discuss plans for developing energy conservation standards. This statutory requirement appears in subsection 325(u)(1)(D) of EPCA, which reads,

Not later than 18 months after the date of enactment of this subsection, the Secretary shall hold a scoping workshop to discuss and receive comments on plans for developing energy conservation standards for energy use for battery chargers and external power supplies.

(42 U.S.C. 6295 (u)(1)(D)) This document, published in conjunction with a Federal Register notice announcing the scoping workshop (i.e., public meeting), represents DOE's plans for developing energy conservation standards for these products.

DOE is providing plans for developing energy conservation standards in two parts. In the first part, those analyses that are common to both a determination analysis (which DOE is conducting) and an energy conservation standard (which is contingent on a positive determination) are identified as such, and are discussed in sections 3 through 10 of this document. Second, those analyses that would only be conducted in developing an energy conservation standard are discussed in sections 11 through 16 of this document. Because these analyses are contingent on a positive determination, DOE will only conduct these analyses for a product (BCs and/or EPSs), if the Secretary determines that a standards evaluation for that

product is warranted. Please see section 2 for more information on the determination and the contingent standard.

As discussed in the previous section, DOE conducted a market assessment as part of the scoping workshop instead. Also, as discussed above, EPCA 325(u)(1)(B)(ii) requires that DOE “assess the current and projected future market for battery chargers and external power supplies.” (42 U.S.C. 6295(u)(1)(B)) EPCA continues in 325(u)(1)(C) requiring that:

The assessment under subparagraph (B)(ii) shall include - (i) estimates of the significance of potential energy savings from technical improvements to battery chargers and external power supplies; and (ii) suggested product classes for energy conservation standards.

(42 U.S.C. 6295(u)(1)(C)) To comply with this requirement DOE prepared a report entitled “*The Current and Projected Future Market for Battery Chargers and External Power Supplies.*” That report contains three main parts—a market assessment, a technology assessment and suggested product classes. It was published on DOE’s website concurrently with this document and the Federal Register notice announcing the scoping workshop. The report is available (in PDF format) at DOE’s homepage for BCs and EPSs: http://www.eere.energy.gov/buildings/appliance_standards/residential/battery_external.html.

DOE encourages stakeholders to review the market analysis report, as it contains initial findings and asks for comment on various issues and concerns. Particular issues on which DOE

seeks comment are listed both in the text of the body of the report as well as in an appendix to that report.

1.1.3 Determination Analysis for Battery Chargers and External Power Supplies

Section 325(u)(1)(E)(i) of EPCA reads “(E)(i) Not later than 3 years after the date of enactment of this subsection, the Secretary shall issue a final rule that determines whether energy conservation standards shall be issued for battery chargers and external power supplies or classes of battery chargers and external power supplies.” This section of the statute gives clear guidance to DOE to study these two products and determine whether energy conservation standards would appear to be technologically feasible, economically justified and would result in significant energy savings. Some of the work conducted to prepare for the scoping workshop, particularly the market assessment and technology assessment, will contribute to DOE’s determination analysis.

Section 2 of this document discusses the analytical components of a determination analysis and identifies which of those are common to an energy conservation standards analysis (which would only be conducted if the determination were positive for BCs and/or EPSs). Some specific detail on the analytical work DOE is planning to conduct as part of its evaluation of these two products can be found in sections 3 through 10 of this report. Although this document addresses both BCs and EPSs, DOE will conduct separate analyses for each of these products, including an engineering analysis, a life-cycle cost (LCC) and payback period analysis, and a national impact analysis to determine whether energy conservation standards are technologically feasible, economically justified, and would result in significant energy savings. DOE recognizes

that it may be possible to have a positive determination on one product and a negative determination on the other. If this is the case, DOE would conduct an energy conservation standards rulemaking for the product that had a positive determination, but not the other. DOE reserves the right to revisit its determination at any time in the future, should market conditions change, and energy conservation standards appear to be technologically feasible, economically justified and would result in significant energy savings.

1.2 Definitions of Battery Charger and External Power Supply

Section 135(a)(3) of EPACT 2005 amends section 321 of EPCA by adding section 321(32), which defines the term “battery charger” as a “device that charges batteries for consumer products, including battery chargers embedded in other consumer products.” (42 U.S.C. 6291 (32)) Section 135(a)(3) of EPACT 2005 also amends section 321 of EPCA by adding section 321(36), which defines the term “external power supply” as “an external power supply circuit that is used to convert household electric current into DC [direct current] or lower-voltage AC [alternating current] to operate a consumer product.” (42 U.S.C. 6291 (36)) DOE adopted these two definitions into Title 10 of the Code of Federal Regulations, Part 430 (10 CFR Part 430) in a Federal Register notice published on December 8, 2006. 71 FR 71365-71366.

While the EPCA definitions provide some clarity as to which devices should be classified as a BC and which should be classified as an EPS, DOE recognizes that there are some consumer products (e.g., laptop computers, video cameras, etc.) that incorporate both a BC and an EPS under the scope of the EPCA definitions. In these cases, DOE will have to determine whether

these consumer products will be subject to two standards or whether a single standard can be applied with criteria developed to provide clear guidance as to whether the consumer product is classified as a BC or an EPS. In addition, under EPACT 2005 DOE was also granted authority to establish two standards for one product that serves two major functions. Some power conversion devices perform two major functions (i.e., those functions of a BC and those of an EPS), and therefore the devices could be classified as both a BC and an EPS. For these products, DOE will have to determine whether these consumer products should be subject to two standards (i.e., one standard for each major function) or whether a single standard can be applied with criteria developed to provide clear guidance as to whether the consumer product is classified as a BC or an EPS. DOE is actively soliciting stakeholder comment on the issue of multiple standards for some consumer products. This issue is discussed in detail in section 4 of *The Current and Projected Future Market for Battery Chargers and External Power Supplies*.

1.3 Summary of DOE's Proposed Test Procedures

Section 325(u)(1)(B) of EPCA directs the Secretary, in establishing test procedures for BCs and EPSs, “to consider existing definitions and test procedures used for measuring the energy consumption in standby mode and other modes.” (42 U.S.C. 6295(u)(1)(B)(i)) As discussed earlier in this document, DOE adopted the EPCA definitions and ENERGY STAR test procedures for BCs and EPSs in its final rule notice published on December 8, 2006. 71 FR 71340. In this rulemaking process, DOE stated that it elected to address BCs and EPSs separately because (1) the nature and operation of these products is different; (2) they have separate and discrete utilities to the consumer; (3) the Environmental Protection Agency (EPA) developed separate ENERGY STAR test procedures and program requirements for these

products; and (4) several stakeholders participating in the development of the EPA's ENERGY STAR program called for separate treatment of these products. 71 FR 42190.

For BCs, DOE adopted sections 4 and 5 of the ENERGY STAR “Test Methodology for Determining the Energy Performance of Battery Charging Systems,” December 2005. DOE determined that this ENERGY STAR test method provided sufficient detail, tolerances, and a test protocol to measure the energy consumption of BCs, as required under section 325(u)(1)(A) of EPCA. (42 U.S.C. 6295(u)(1)(A)) Additionally, DOE also believes that this test procedure has a reasonable degree of industry support, based on comments submitted to the EPA, as well as the public comment process that EPA and its contractors engaged in while developing the ENERGY STAR test procedure. Copies of these stakeholder comments can be found on the EPA’s website.³ In the final rule, DOE noted that the December 2005 ENERGY STAR test procedure for battery charging systems does not include a module for measuring energy consumed during active mode (i.e., when the battery is charging). DOE therefore added and reserved a section in the CFR for active mode energy consumption measurement. DOE intends to continue working cooperatively with stakeholders to evaluate test procedures for BCs in active mode.

In the adopted ENERGY STAR test procedure, the BC and battery are evaluated together as a system to determine the amount of energy that is passed from the mains (i.e., household wall-outlet) to the consumer product via the BC and battery, as shown in Figure 1.2.

³ EPA’s website documenting the development of the ENERGY STAR battery charging systems specification and test procedure, including stakeholder comments:
http://www.energystar.gov/index.cfm?c=new_specs.batterychargerdevelopment

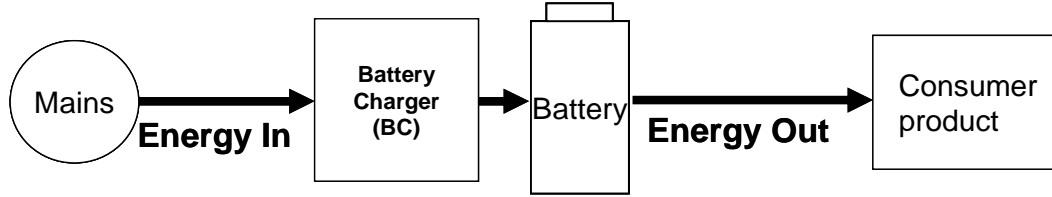


Figure 1.2 Energy Transfer in a Battery Charging System

The BC test procedure measures the sum of the power consumed by the BC in battery maintenance mode and standby mode⁴ over specified time periods. This measured power consumption, called the accumulated nonactive energy, or E_a , is normalized by the battery energy, E_b , in watt-hours, produced by the battery at a constant current of $0.2C$ ⁵ from maximum voltage to cut-off voltage. Energy input and output are combined into an efficiency metric called the “nonactive energy ratio”, E_R :

$$E_R = \frac{E_a}{E_b} \qquad \text{Eq. 1-1}$$

where E_a is the energy consumed, in watt-hours, by a BC during 36 hours in maintenance mode followed by 12 hours in no-load mode (see Figure 1.3). For a given battery voltage, the nonactive energy ratio gives a relative measure of the efficiency of a battery charging system.

⁴ Standby mode means the mode of operation when the battery charger is connected to the main electricity supply and the battery is not connected to the charger.

⁵ The term “ $0.2C$ ” describes the rate at which a battery is discharged. It represents the capacity obtained from a new battery subjected to a constant-current discharge at room temperature. For example, draining a battery at $1C$ means to drain the capacity of a new battery completely in one hour.

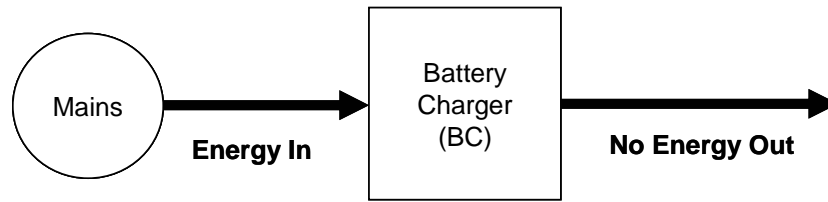


Figure 1.3. Energy Transfer in a Battery Charger Operating in No-load Mode

For external power supplies, DOE adopted sections 4 and 5 of the ENERGY STAR “Test Method for Calculating the Energy Efficiency of Single-Voltage External Ac-Dc and Ac-Ac Power Supplies (August 11, 2004).” DOE determined that this test procedure provides sufficient detail, tolerances, and test protocols to measure the energy consumption of external power supplies required under section 325(u) of EPCA. (42 U.S.C. 6295(u)) DOE also believes that this test procedure has a reasonable degree of industry support, based on comments submitted to the EPA and the public comment process that EPA engaged in while developing these test methods. The paragraphs below briefly summarize the methodology followed in the EPS test procedure.

In the EPS test procedure, efficiency is measured in active mode and the power consumption is measured in no-load mode. For active mode, the test procedure records the efficiency of the power supply at four loading conditions (i.e., 25 percent, 50 percent, 75 percent, and 100 percent of maximum rated output power) and calculates the simple average efficiency. For no-load mode, the power consumption of the device is measured when there is no load connected to the output of the device.

To conduct the active-mode test measurements, the EPS is attached to a test load with a variable resistance, as shown in Figure 1.4.

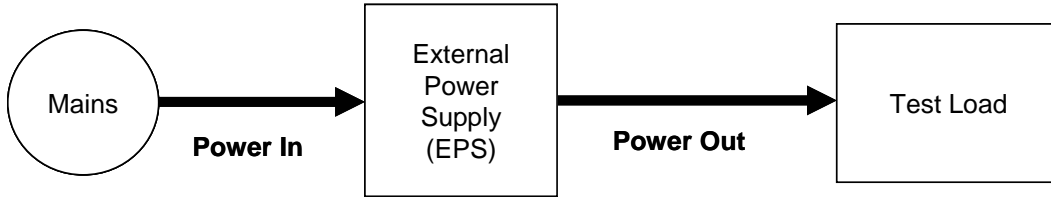


Figure 1.4. Energy Transfer in an External Power Supply Under Test

The load resistance is adjusted so that the current going to the load is 25 percent, 50 percent, 75 percent, and 100 percent of maximum rated output current. At each loading condition, the efficiency, $\eta_{\text{Load_Condition}}$, is determined by:

$$\eta_{\text{Load_Condition}} = \frac{P_{\text{Load_Condition_Out}}}{P_{\text{Load_Condition_In}}} \quad \text{Eq. 1-2}$$

where “Load_Condition” is 25 percent, 50 percent, 75 percent, or 100 percent. The efficiencies of the EPS under all four load conditions determine the average efficiency, η_{Average} :

$$\eta_{\text{Average}} = \frac{\eta_{25\%} + \eta_{50\%} + \eta_{75\%} + \eta_{100\%}}{4} \quad \text{Eq. 1-3}$$

The measurement of no-load mode power consumption is the power consumed by the EPS when it is connected to the mains (i.e., household wall-outlet) and nothing is connected to the output, as shown in Figure 1.5.

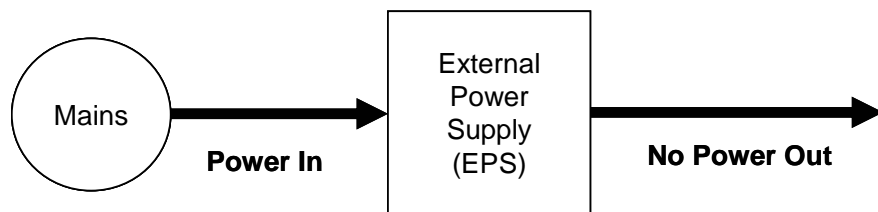


Figure 1.5 Power Transfer of an External Power Supply Operating in No-load Mode

For detailed information on the test procedures, stakeholders are encouraged to review the notice of proposed rulemaking published on July 25, 2006 (71 FR 42178), the Final Rule published on December 8, 2006 (71 FR 71340) and sections of the two ENERGY STAR test procedures that were incorporated by reference.

Information regarding the test procedure rulemaking is maintained on the DOE Website at:

http://www.eere.energy.gov/buildings/appliance_standards/residential/battery_external.html.

Issue Boxes: While DOE invites comments from stakeholders on all aspects of the material presented in this document, there are several issues in particular on which DOE seeks comment and that are identified in issue boxes such as this one. These issue boxes are used to highlight certain issues and ask pertinent questions on the approaches that DOE intends to follow in conducting the analyses applicable to the determination analysis, and potential standards rulemaking. These comment boxes are numbered according to the order of appearance and are listed together in Appendix C. Additional issues for stakeholder comment on the determination analysis are also identified in the companion document published with this document, “*The Current and Future Market for Battery Chargers and External Power Supplies.*”

2. RULEMAKING ANALYSES

DOE will conduct a determination analysis rulemaking for BCs and EPSs. If the Secretary makes a positive determination that energy conservation standards are warranted for one or both of these products, DOE will initiate a rulemaking process to determine which, if any, energy conservation standards would be technologically feasible, economically justified, and would result in significant energy savings.

DOE's determination and the possible establishment of energy conservation standards are two separate actions; however they share some analytical components. In other words, some of the analysis that DOE will prepare in making its determination could be used for the energy conservation standard, should that determination be positive. More specifically, a determination analysis and an analysis for development of energy conservation standards both include a market and technology assessment, screening analysis, engineering analysis, energy-use and end-use load characterization, markups for equipment price determination, life-cycle cost and payback period analysis, shipments analysis and national impact analysis. However, only an energy conservation standard analysis includes a life-cycle cost sub-group analysis, manufacturer impact analysis, utility impact analysis, net national employment impact analysis, environmental assessment and regulatory impact analysis. Thus, for DOE's on-going determination analysis, analytical work will focus on the analyses relevant to a determination. If the Secretary makes a positive determination for one or both products, then DOE will review and revise these eight analyses, and conduct the additional six analyses, during the energy conservation standards rulemaking process.

For the eight analyses that are common to both a determination analysis and energy conservation standard, while they have the same general purpose, they do not represent the same degree of analytical rigor. For example, a determination analysis considers just one candidate standard level on which the Secretary would make a decision whether to proceed with energy conservation standards. In the standards analysis, DOE typically considers multiple levels, sometimes as many as six candidate standard levels, to evaluate the cost-effectiveness and technical feasibility of small, incremental improvements in efficiency as well as significant increases, such as the maximum technologically feasible level. Additionally, an LCC spreadsheet for a determination will typically look at a few average cases while the LCC spreadsheet of a standards rulemaking typically incorporates a Monte Carlo analysis, looking at thousands of customers to get a more robust picture of the national impacts.

2.1 Components of a Determination Analysis Rulemaking

Figure 2.1 summarizes the analytical components of a determination analysis rulemaking process. Each analysis (represented by the boxes with dark numbers) has a set of key inputs, which are data and information required for the analysis. The numbers correspond to the section numbers where these analyses are typically found. The “approaches” column are the methods that could be used to obtain inputs for those analyses, for example, some key inputs exist in public databases, while others could be collected from stakeholders or experts with special knowledge. The DOE analytical team supporting the rulemaking may also develop key inputs for the analyses. The results of each analysis are key outputs, which feed directly into the rulemaking. The lines and arrows indicate the flow of information between the various analyses.

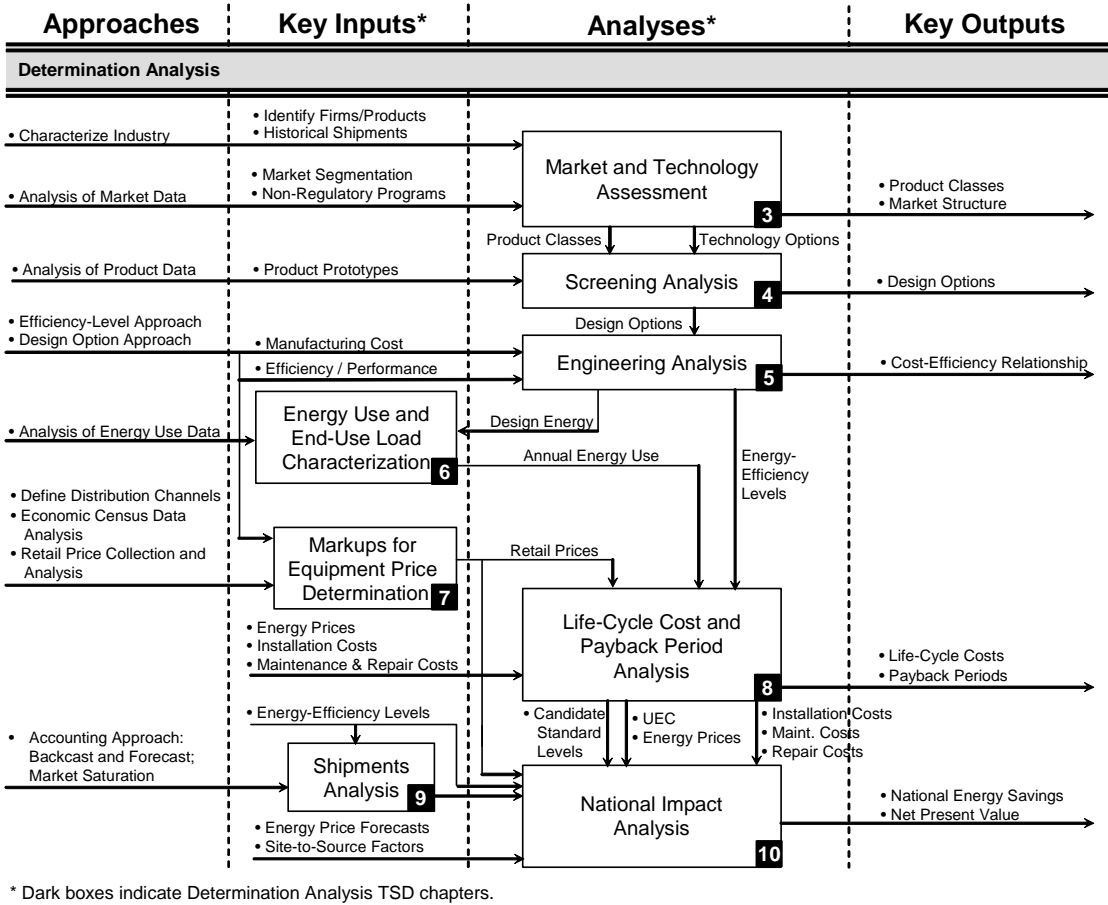


Figure 2.1. Flow Diagram of the Components of a Determination Analysis

2.2 Analyses for an Energy Conservation Standards Rulemaking

Figure 2.2 summarizes the analytical components of an energy conservation standards-setting process. The analyses are presented in the third column. Each analysis has a set of key inputs, which are data and information required for the analysis. The “approaches” are the methods that could be used to obtain key inputs. For example, some key inputs exist in public databases, while others could be collected from stakeholders or experts with special knowledge.

The project team supporting the rulemaking would also develop key inputs. The results of each analysis are key outputs, which feed directly into the rulemaking. The lines and arrows indicate the flow of information between the various analyses.

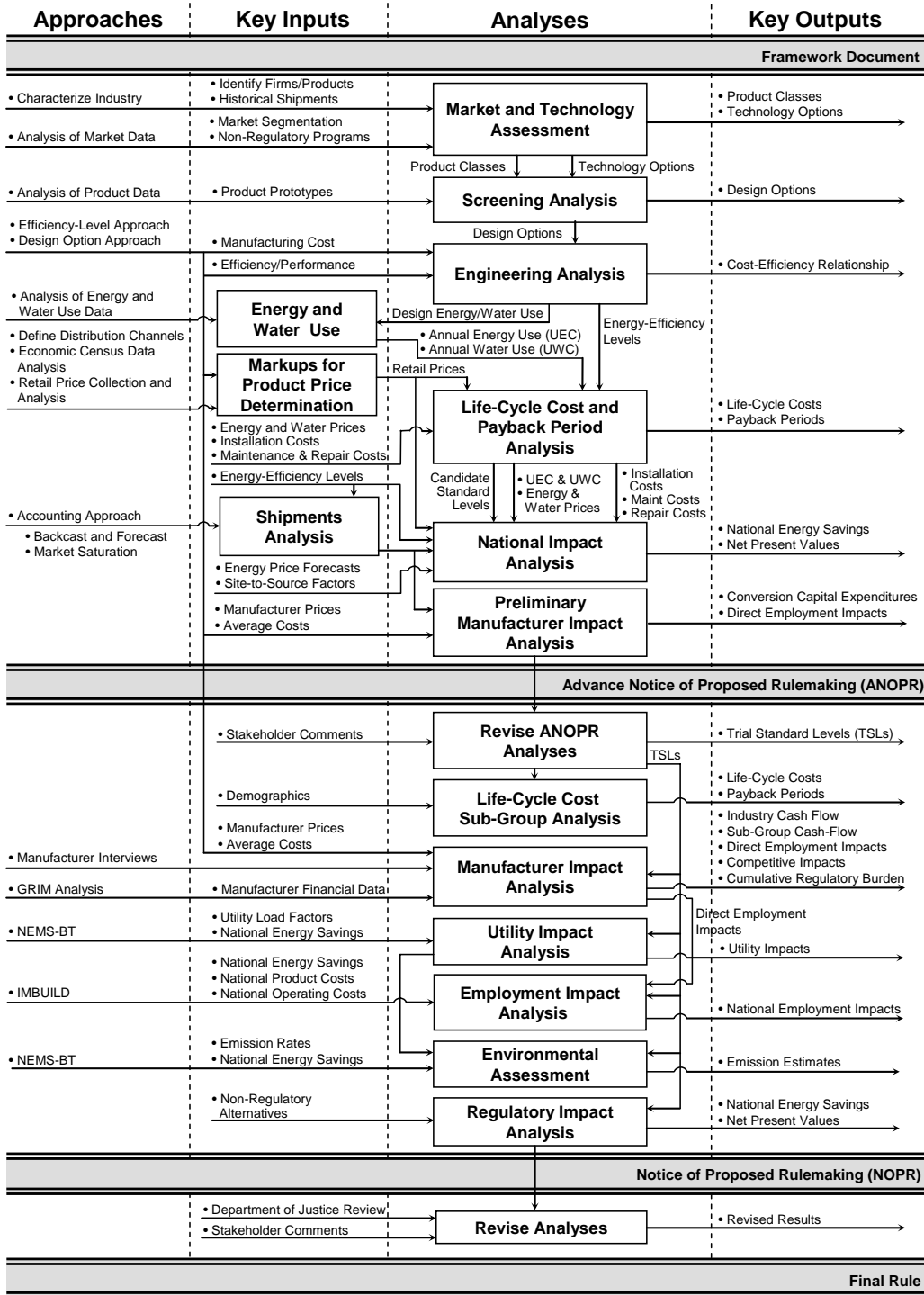


Figure 2.2 Flow Diagram of Analyses for an Energy Conservation Standard Rulemaking

2.2.1 Energy Conservation Standards Rulemaking Steps and Stakeholder Participation

This section provides further detail on DOE's process for an energy conservation standards rulemaking process. When DOE evaluates new or amended standards for "covered products" under EPCA, it must consider seven statutory factors, to the greatest extent practicable, considering the following factors:

- 1) The economic impact of the standard on the manufacturers and consumers of the affected product(s);
- 2) The savings in operating costs throughout the estimated average life of the product(s) compared to any increases in the initial cost or maintenance expense;
- 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 product(s) 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. (42 U.S.C. 6295(o)(2)(B)(i))

Additional statutory requirements for prescribing new or amended standards are set forth in section 325(o). (42 U.S.C. 6295(o))

The process for developing energy conservation standards involves analysis, public notice, and consultation with interested parties. Such parties, collectively referred to as stakeholders, include manufacturers, consumers, energy conservation and environmental protection advocates, State and Federal agencies, and any other groups or individuals with an interest in energy conservation standards and test procedures. DOE considers stakeholder participation to be a very important part of the rulemaking process. DOE actively encourages the participation and interaction of all stakeholders during the comment period of each rulemaking stage. The broad array of stakeholders who provide comments promotes a balanced discussion of critical information required to conduct the standards rulemaking, beginning with the public comment on the Framework Document and continuing during subsequent comment periods.

In conducting the test procedure and energy conservation standards rulemakings, DOE involves stakeholders through a variety of means, including public notifications (i.e., Federal Register notices). The standards rulemaking process generally involves three public notices, which are published in the Federal Register. The first of the rulemaking notices is an advance notice of proposed rulemaking (ANOPR) (see section 2.2.2). The ANOPR is designed to publicly vet the models and tools that will be used in the rulemaking, and to facilitate public participation before the proposed-rule stage. The second notice is a notice of proposed rulemaking (NOPR) (see section 2.2.3), which presents a discussion of comments received in response to the ANOPR; analysis of the impacts of standards on consumers, manufacturers, and the Nation; DOE's weighting of the impacts; and the proposed standards. The third notice is the final rule (see section 2.2.4), which presents a discussion of comments received in response to the NOPR, the revised analysis of the impacts of standards, DOE's weighting of the impacts, the

standards adopted by DOE and the basis for such standards, and the effective dates of the standards.

2.2.2 Advance Notice of Proposed Rulemaking

As part of its initial rulemaking activity, DOE typically identifies product design options or efficiency levels that it will analyze in detail, and those it should eliminate from further consideration. This process includes a market and technology assessment (see Section 3) and a screening analysis (see Section 4). These activities include consultations with stakeholders and independent technical experts who can assist with identifying the key issues and design options to be considered by DOE in the rulemaking. This Framework Document, the public meeting, and the opportunity for comment on this Framework Document are all intended to initiate dialogue with stakeholders and provide an opportunity for comment and input into the structure and analytical approach proposed for any energy conservation standards rulemaking.

At the ANOPR stage, in addition to the market and technology assessment and screening analysis, the other principal analyses that DOE presents include the engineering analysis (see Section 5), the consumer LCC impact and payback period results (see Section 8), the national energy savings (NES) and consumer net present value (NPV) results (see Section 10), and a preliminary manufacturer impact analysis (see Section 12).

The ANOPR analysis includes candidate standard efficiency levels (CSLs) to facilitate the stakeholder review of the spreadsheet models that underpin the analyses presented. Stakeholder comments on the models are used to refine the CSLs for the NOPR stage of the

rulemaking analyses, where DOE proposes trial efficiency standard levels for comment. In the ANOPR stage, DOE's range of CSLs for analysis includes the maximum improvement in energy efficiency that is technologically feasible and the efficiency level that corresponds to the minimum LCC point. DOE generally considers efficiency levels or design options that span the full range of technologically achievable efficiencies.

Relative to a baseline model (see section 3.4), the range of levels analyzed typically includes:

- The highest energy efficiency level or lowest energy-consumption level that is technologically feasible (the “max tech” level);
- The level with the lowest LCC; and
- Levels that incorporate noteworthy technologies or fill in large gaps between efficiency levels of other levels considered.

DOE makes available for review on its website, at http://www.eere.energy.gov/buildings/appliance_standards/, the spreadsheet tools and results of the ANOPR analysis, and considers any comments received. When DOE publishes the ANOPR, it also makes available a technical support document (TSD) that contains details of the analyses performed to date. Following publication of the ANOPR, DOE provides a 75-day public comment period and holds a public meeting during the 75-day comment period. Throughout this rulemaking stage, DOE encourages stakeholders to develop joint recommendations for particular energy conservation standards levels.

2.2.3 Notice of Proposed Rulemaking

DOE begins the NOPR stage by reviewing and considering all the comments received after the publication of the ANOPR. This may result in revisions or refinements to the ANOPR analyses, including the engineering analysis and LCC analysis. DOE also conducts additional economic impact analyses that generally include a consumer LCC sub-group analysis (see Section 11), a complete manufacturer impact analysis (see Section 12), a utility impact analysis (see Section 13), an employment impact analysis (see Section 14), an environmental assessment (see Section 15), and a regulatory impact analysis (RIA) (see Section 16).

This analytical process ends with the selection of proposed energy conservation levels that are presented in the NOPR. DOE selects the proposed standard levels from the trial standard levels (TSLs) analyzed during the NOPR phase of the rulemaking. The NOPR documents the evaluation and selection of the proposed standard level(s), if any.

For each product class, DOE identifies the maximum technology (max tech) efficiency level. If DOE proposes a level lower than the max tech efficiency level, the reasons for eliminating higher levels beginning with the highest level considered will be explained. DOE presents the analysis results in the NOPR and the analysis details in an accompanying TSD.

DOE considers many factors in selecting proposed standards, as described above in section 2.2.1. These factors and criteria are contained in EPCA and take into consideration the benefits, costs, and impacts of energy conservation standards. In addition, DOE encourages

stakeholders to develop joint recommendations for standard levels. DOE carefully considers such recommendations in its decision process.

When DOE publishes the NOPR, it provides the U.S. Department of Justice (DOJ) with a copy of the NOPR and TSD, and solicits feedback on the impact of the proposed standard level on competition. The DOJ reviews these standard levels in light of any lessening of competition that is likely to result from the imposition of standards. DOE considers the determination on the impacts of the proposed standard on competition in preparing the final rule. The NOPR is followed by a 75-day public comment period that includes one public meeting. (42 U.S.C. 6295)

2.2.4 Final Rule

DOE may revise its analyses after considering public comments on the NOPR. In response to public comments, DOE reviews the engineering and economic impact analyses and proposed standards and considers modifications where necessary.

After the publication of the NOPR, DOE conducts a thorough review of all analyses performed and of the TSLs. Final revisions to the analyses and TSLs are made as appropriate.

Before the final rule is issued, DOE considers DOJ comments on the NOPR relating to the impacts of the proposed standard levels on competition to determine if changes to these standard levels are needed.

The standards rulemaking concludes with the publication of the Final Rule. DOE selects the final standard levels based on the complete record of the standards rulemaking. The Final Rule promulgates the final standard levels and their effective date and explains the basis for their selection. The final rule is accompanied by a final TSD.

3. MARKET AND TECHNOLOGY ASSESSMENT

The market and technology assessment represents DOE's understanding of the market, the structure and function of BC and EPS, potential energy saving technologies and product classes. The market and technology assessment is used throughout the analyses that support the determination and, if there is a positive determination, the energy conservation standard rulemaking. The initial assessment of the market and technology typically provide important inputs for developing product classes and identifying technology design options to improve product energy efficiency.

For BC and EPS, DOE has explicit statutory requirements to conduct a market assessment and propose product classes. As noted in section 1.1 of this document, section 325 (u)(1)(B)(ii) directs DOE to "assess the current and projected future market for battery chargers and external power supplies." (42 U.S.C. 6295(u)(1)(B)(ii)) Section 325(u) further directs DOE to include "suggested product classes for energy conservation standards" in this assessment. (42 U.S.C. 6295(u)(1)(C)(ii))

DOE has begun developing its initial market and technology assessment in order to meet the requirements of section 325. Stakeholders are invited to review and comment on DOE's current understanding of the BC and EPS market and technology described in "*The Current and Projected Future Market for Battery Chargers and External Power Supplies*" document published on DOE's website for this rulemaking.

Issue 1. DOE invites input on its initial assessment and analysis of the BC and EPS markets and technology. Specific invitations for comment on DOE’s initial findings and understanding of the market can be found in “*The Current and Projected Future Market for Battery Chargers and External Power Supplies.*”

3.1 Market Assessment

In the market assessment, Section 2 of “*The Current and Projected Future Market for Battery Chargers and External Power Supplies,*” DOE characterized both qualitatively and quantitatively the structure of the markets for BC and EPS to the extent possible using available data. It identified key market actors; mapped distribution channels, estimated market shares and trends, and identified and described regulatory and non-regulatory initiatives likely to impact the efficiency of BC and EPS. Data gathered for the market assessment will be used in the determination analyses, particularly in the shipments analysis, which is in turn a key input for the national impact analysis.

DOE is making its preliminary market assessment available to increase the probability that critical stakeholder input is obtained early in the rulemaking process before the bulk of the analysis is underway and to ensure the greatest speed and accuracy. DOE intends to revise and expand the market assessment in the coming months and publish its complete market assessment in conjunction with the Secretary’s determination notice for these products.

In developing this preliminary market assessment, DOE applied the ENERGY STAR definition differentiating between a BC and an EPS. This approach is applied to the consumer products discussed in this section of the report to facilitate stakeholder review and discussion. DOE may review and revise this interpretation of how products are classified as either a BC or an EPS, or whether products either incorporating or serving both a BC and an EPS function should be subject to two standards. For detail on this issue, stakeholders are encouraged to review section 4 of *“The Current and Projected Future Market for Battery Chargers and External Power Supplies.”*

3.2 Technology Assessment

In the technology assessment, Section 3 of *“The Current and Projected Future Market for Battery Chargers and External Power Supplies,”* DOE describes the differences between the underlying technology of a battery charger and external power supply. The section discusses the different applications for BC and EPS, examines from a systems level the various EPS functions, and discusses critical components such as the raw supply and regulator circuit. The section also presents potential technological and design improvements to enhance the energy efficiency of BC and EPS. For each, efficiency is inherently tied to their modes of usage and the efficiency improvement opportunities available in each mode. For EPS, the greatest potential efficiency increase is found by improving the quality of the EPS parts with the greatest losses. The quality of parts is also a key aspect of BC efficiency improvements; however, the largest increases in BC efficiency may in fact be available from reducing energy consumption when the BC is in maintenance mode, delivering little or no power to the battery.

DOE is making its preliminary technology assessment available to increase the probability that critical stakeholder input is obtained early in the rulemaking process before the bulk of the analysis is underway and to ensure the greatest speed and accuracy. DOE intends to continue developing and expanding the technology assessment, as new data and information becomes available. A final version of the technology assessment will be published in conjunction with the Secretary's determination notice for these products.

3.3 Product Classes

Section 325(u)(1)(C)(ii) requires that for BCs and EPSs, DOE provide “(ii) suggested product classes for energy conservation standards.” (42 U.S.C. 6295 (u)(1)(c)(ii)) DOE is complying with this requirement in Section 4 of the report titled “*The Current and Projected Future Market for Battery Chargers and External Power Supplies.*” A brief discussion of DOE's approach is provided here, and stakeholders are encouraged to review the draft proposal presented in Section 4 of the other report, and provide comment to DOE.

DOE divides covered products into classes by (a) the type of energy used; and (b) the capacity of the product or any other performance-related feature that justifies different standard levels, such as features affecting consumer utility. (42 U.S.C. 6295(q)) For BCs and EPSs, the type of energy used in all designs and models is electricity, so the first criterion is not a differentiating characteristic. The second criterion, encompassing capacity or any other performance-related features, does apply, and there are characteristics DOE is taking into consideration in its draft proposal for product classes of these products.

There are several capacity- and performance-related features of battery chargers that could be used to classify products, including the charging method it employs (continuous charging vs. terminating charging), the voltage of the battery or batteries it is intended to charge, and/or the battery chemistry. Similarly, there are several capacity- and performance-related features of external power supplies that could be used to classify products, including rated output power, voltage regulation, output current (i.e., AC or DC), power factor correction and/or output voltage. Finally, there are some power conversion devices which have a differentiating feature in that they serve two major functions – both charging a battery and operating a consumer product (e.g., laptop computer power supplies). For these devices, which (in conjunction with the end-use consumer product) represent both a battery charger and an external power supply, DOE may create a separate product class to acknowledge the fact that these devices are performing two major functions and could not be optimized to perform each function (i.e., BC or EPS) individually. Stakeholders are invited to comment on this issue in Chapter 4 of “*The Current and Projected Future Market for Battery Chargers and External Power Supplies.*”

3.4 Baseline Models

Once DOE defines product classes, it will select baseline models as reference points against which DOE can measure changes resulting from energy conservation standards. The baseline model represents the characteristics of equipment in a given product class and encompasses commonly available products with features and performance characteristics such as wattage, voltage, and chemistry. Typically, the baseline model would be a model that just meets current required energy conservation standards. If no existing standards apply to a product, as is

the case with battery chargers and external power supplies, DOE will select baseline models that are typical of what is sold in the market today.

The baseline models are used to conduct the engineering analysis and the LCC and payback-period analyses. To determine energy savings and changes in manufacturer selling price, DOE will compare each of the more efficient battery chargers or external power supplies (i.e., those designs that incorporate the design options to improve efficiency) with the baseline model.

Issue 2. DOE invites stakeholders to recommend baseline models from each of the product classes that would constitute good representative units for analysis.

4. SCREENING ANALYSIS

The purpose of the screening analysis is to eliminate technology design options that would not be considered in any rulemaking for BCs and EPSs. DOE eliminates technology options according to four criteria, as noted below.

A screening analysis is both part of a determination analysis and an energy conservation standards rulemaking. So, even though DOE is still determining whether to evaluate BCs and EPSs for energy conservation standards, DOE will be developing a screening analysis as part of the EPACT 2005-mandated determination analysis.

Through its own research and in consultation with interested parties, DOE will develop a list of technology options for consideration. Initially, either the candidate design options or best available technologies will encompass all those technologies that may be technologically feasible. Following development of this initial list of technology options, DOE will review each technology option or best available technology based on the following four criteria, as addressed in sections 4(a)(4) and 5(b) of the Process Rule (Appendix A to Subpart C of 10 CFR Part 430):

1. Technological feasibility. Design options that are not incorporated in commercially available products or in working prototypes will not be considered further.
2. Practicability to manufacture, install and service. If it is determined that mass production of a design option or reliable installation and servicing of a design option could not be achieved on the scale necessary to serve the relevant market by the time

of the effective date of the energy conservation standard, then that design option will not be considered further.

3. Impacts on product utility to consumers. If a design option is determined to have significant adverse impact on the utility of the product to significant subgroups of consumers, or result in the unavailability of any covered product with performance characteristics (including reliability), features, size, capacities, and volumes that are substantially the same as products generally available in the United States at the time, it will not be considered further.
4. Safety of technologies. If it is determined that a design option will have significant adverse impacts on health or safety, it will not be considered further.

The reasons for eliminating any technology options during the screening analysis will be fully documented and published for stakeholder review and comment as part of the ANOPR.

5. ENGINEERING ANALYSIS

After conducting the screening analysis, DOE performs an engineering analysis based on the remaining design options that improve the efficiency of BCs and EPSs. This section provides an overview of the engineering analysis (section 5.1), discusses DOE's proposed approach (section 5.2), and addresses manufacturer prices (section 5.3), proprietary designs (section 5.4), and regulatory burdens that might affect the engineering analysis (section 5.5).

An engineering analysis is part of both a determination analysis and an energy conservation standards rulemaking. So, even though DOE is still determining whether to evaluate BCs and EPSs for energy conservation standards, DOE will be developing an engineering analysis as part of the EPACT 2005-mandated determination analysis.

5.1 Engineering Analysis Overview

The purpose of the engineering analysis is to determine the relationship between the manufacturers's selling price and the energy efficiency of BCs and EPSs. In determining the price-efficiency relationship, DOE will estimate the increase in the manufacturer selling price associated with technological changes that increase the efficiency of the baseline models. DOE will develop cost estimates for the engineering analysis (which it will also use in the manufacturer impact analysis in Section 12) from detailed data on the incremental costs of material, labor, and overhead. DOE will develop separate engineering analyses for each of the baseline models (see Section 3). DOE intends to develop industry-average, cost-efficiency relationships for these products based primarily on manufacturer-supplied data. If needed, DOE may supplement this analysis with its own cost estimates of specific design options.

Therefore, DOE seeks design, efficiency, and cost information to develop a detailed understanding of the cost of improving the efficiency of the various baseline-model BCs and EPSs. In addition, DOE must identify the model with the highest efficiency that is technologically feasible within each product class (i.e., the max-tech model).

Issue 3. For each product class, DOE welcomes information on design options and incremental manufacturing costs for several efficiency levels above the baseline, one of which would be max tech. Detailed information on the product performance and the incremental manufacturing costs (e.g., material costs,^f labor costs,^g overhead costs (excluding depreciation), building conversion capital expenditures, tooling/equipment conversion capital expenditures, research and development (R&D) expenses, and marketing expenses) would be welcome.

^f Material costs are the costs of raw materials, including scrap, that can be traced to final or end products. Direct material costs do not include indirect material costs, which are attributed to supplies that may be used in the production process but are not assigned to final products (e.g., lubricating oil for production machinery).

^g Labor costs include the earnings of workers who assemble parts into a finished good or operate machines in the production process. Direct labor includes the fringe benefits of direct laborers such as group health care, as well as overtime pay. Direct labor does not include indirect labor, which is defined as the earnings of employees who do not work directly in assembling a product such as supervisors, janitors, stockroom personnel, inspectors, and forklift operators.

5.2 Engineering Analysis Approach

For the engineering analysis, DOE will examine aggregated incremental increases in the manufacturer production cost at specified efficiency levels. In support of this analysis, DOE intends to collect incremental cost data from manufacturers. The cost data would represent the average incremental production cost to improve the efficiency of a baseline model. DOE will supplement the manufacturer-provided cost data with its own cost estimates of particular design options. DOE intends to develop design-option cost estimates via consultation with industry experts and industry representatives and/or further review of any available cost and performance information. Thereafter, DOE will use the cost data that it collected for the engineering analysis and apply it to the manufacturer impact analysis (see Section 12). If possible, DOE would then aggregate the cost numbers by weighting each individual data point by company-level sales volumes for each product class.

To be useful in the manufacturer impact analysis, manufacturer-cost information should reflect any variability in baseline models, design strategies, and cost structures that exist among manufacturers. If necessary, DOE will qualify any aggregated cost-efficiency data. Information obtained through follow-up with manufacturers would assist this effort. These confidential interviews will provide a deeper understanding of the various combinations of technologies used to increase device efficiency, and their associated manufacturing costs.^h

DOE will estimate the contribution of the depreciation of conversion-capital expenditures to the incremental overhead. During the interviews with manufacturers, DOE intends to gather

^h Information provided by a stakeholder that the stakeholder believes to be confidential must be submitted according to 10 CFR 1004.11.

information about the capital expenditures needed to increase the efficiency of the baseline models to various efficiency levels (i.e., conversion expenditures by efficiency). Also, DOE will gather information about the depreciation method(s) used to expense the conversion expenditures. DOE will maintain the confidentiality of proprietary data in accordance with 10 CFR 1004.11, while allowing the public to examine the cost and design assumptions that underlie the cost-efficiency estimates.

Issue 4. DOE welcomes comments on the above-described approach to determining the relationship between manufacturer selling price and device efficiency. Stakeholders are invited to provide data to support their comments where appropriate.

5.3 Manufacturer Prices

DOE plans to apply markups to convert manufacturer production costs to manufacturer selling prices. DOE intends to estimate manufacturer markups from publicly available financial information (e.g., Securities and Exchange Commission 10-K reports).

Issue 5. DOE welcomes comments on the markup approach proposed for developing estimates of manufacturer selling prices.

5.4 Proprietary Designs

DOE will consider in its engineering and economic analyses all design options that are commercially available or present in a working prototype, including proprietary designs. DOE will consider a proprietary design in the subsequent analyses only if it is not a unique path to a given product efficiency level. If the proprietary design is the only approach available to achieve a given efficiency level, then DOE would reject the efficiency level (that can only be achieved by a proprietary design) from further analysis. Furthermore, DOE is sensitive to manufacturers' concerns regarding proprietary designs, and will make provisions to maintain the confidentiality of any proprietary data submitted by a manufacturer in accordance with 10 CFR 1004.11. This information will provide input to the competitive impacts assessment and other economic analyses.

Issue 6. DOE welcomes comments as to whether there are proprietary designs that DOE should be aware of for BCs or EPSs under consideration by this rulemaking.
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5.5 Outside Regulatory Changes Affecting the Engineering Analysis

In conducting an engineering analysis, DOE must consider the effects of regulatory changes outside DOE's energy conservation standards rulemaking process which could impact the manufacturers of the covered equipment. Some of these changes could also affect the efficiency or energy consumption of the covered products. DOE will attempt to identify all such outside engineering issues that could impact the engineering analysis. The consideration of these

issues is closely related to the cumulative regulatory burden assessment that DOE will carry out as part of the manufacturer impact analysis.

Issue 7. DOE welcomes comments as to whether there are outside issues that DOE should consider in its analysis of BCs and EPSs and the impact of such issues. Stakeholders are invited to provide data to support their comments where appropriate.

6. ENERGY-USE AND END-USE LOAD CHARACTERIZATION

The purpose of the energy-use and end-use load characterization is to identify the way in which products are used by consumers, and thereby determine the energy-savings potential of energy efficiency improvements. For the products in this rulemaking, this analysis will focus on how consumers use BCs and EPSs with the consumer products they operate. An energy-use and end-use load characterization is part of both a determination analysis and an energy conservation standards rulemaking. DOE will begin developing this analysis as part of the determination analysis.

The energy-use and end-use load characterization analysis, which is an input to the LCC assessment and the national impact analysis, is intended to capture and represent the typical energy consumption under real world conditions. This use profile enables DOE to conduct a calculation to determine the LCC and the payback period of more efficient technologies relative to the baseline product.

DOE seeks to identify and obtain detailed data on the typical applications and end-use profiles for BCs and EPSs considered in this rulemaking. If the range of energy use determined for each product is large enough, DOE will conduct a sensitivity analysis to determine how high and low estimates of energy use might impact the economic feasibility of any energy conservation standard.

Issue 8. DOE welcomes recommendations on sources of data that would provide end-use operating profiles for BCs and EPSs covered under this rulemaking.
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7. MARKUPS FOR EQUIPMENT PRICE DETERMINATION

This analysis is part of both a determination analysis and an energy conservation standards rulemaking. DOE will begin developing markups for equipment price determination as part of the determination analysis.

DOE uses manufacturer-to-consumer markups to convert the manufacturer selling-price estimates from the engineering analysis to consumer prices. DOE then uses these markups in the LCC analysis, consumer payback period analysis, and national impact analysis. Retail prices are needed for the baseline efficiency level and all other efficiency levels under consideration. DOE will obtain these retail prices by applying manufacturer-to-consumer markups to manufacturer selling-price estimates. To validate these markups, DOE will attempt to collect data on existing prices in the market either by purchasing large data sets or by downloading data from distributor websites.

Before it can develop markups, DOE must identify distribution channels (i.e., how a BC or an EPS is distributed from the manufacturer to the consumer). Once it establishes proper distribution channels for each of the product types, DOE will rely on economic census data from the U.S. Census Bureau, as well as input from industry and subject matter experts, to develop an understanding of the markups applied as the product moves from the manufacturer to the consumer. To the extent possible, DOE also will use collected retail-price data to determine overall manufacturer-to-consumer markups.

This analysis will generate retail prices based on the marked-up manufacturing prices from the engineering analysis. Because DOE expects to generate a range of price estimates, it plans to describe new retail prices within a range of uncertainty. If the range of retail prices for each product is large enough, DOE will conduct a sensitivity analysis to determine how high and low estimates of retail price might impact the economic feasibility of any potential amended energy conservation standard.

Issue 9. DOE welcomes comments on the distribution channels for BCs and EPSs, the key stakeholders in those distribution channels, the typical markups applied by those stakeholders, and the overall markup from manufacturer selling price to retail shelf.

8. LIFE-CYCLE COST AND PAYBACK PERIOD ANALYSIS

The effects of increased energy conservation standards on consumers include a change in operating expense (usually decreased) and a change in purchase price (usually increased). In carrying out rulemakings for other products, DOE has analyzed the net effect on consumers by calculating the LCC and payback period analyses using the engineering performance data (Section 5), the energy-use and end-use load characterization data (Section 6), and the equipment retail prices (Section 7). Inputs to the LCC calculation include the installed cost to the consumer (purchase price plus installation cost), operating expenses (energy expenses, and, if applicable, repair costs, and maintenance costs), the lifetime of the product or other defined period of analysis, and a discount rate.

An LCC analysis is part of both a determination analysis and an energy conservation standards rulemaking. DOE will begin developing an LCC analysis as part of the determination analysis.

For the determination, DOE will conduct the LCC analysis using inputs that reflect conditions in the field for product retail price and life, energy costs, energy use, and discount rates. If DOE determines that there is significant variability in any of the above inputs, it will conduct sensitivity analyses to determine how the LCC and payback period are impacted by high and low estimates for each of the inputs. For any sensitivity analyses that it conducts, DOE will account for correlations that may exist between inputs (e.g., energy use may be correlated to energy prices). A detailed impact calculation on subgroups of consumers would only be

conducted as part of an energy conservation standards rulemaking, and would be conducted after the ANOPR (see Section 11).

Based on the results of the LCC analysis, DOE would select CSLs for the ANOPR analysis. The range of CSLs typically will include the product efficiency level with the lowest LCC, the highest efficiency level that is technologically feasible, and other levels DOE has not yet determined.

For the NOPR, DOE would carefully review all of the comments it received on the ANOPR LCC analysis, make any necessary revisions to the analysis, and evaluate additional parameters not included in the ANOPR analysis, if necessary.

For BCs and EPSs, DOE needs to determine input values for several variables. The following sections discuss the methodologies DOE plans to use to develop energy prices, discount rates, and product lifetimes.

8.1 Energy Prices

For consumers of BCs and EPSs, DOE will review residential energy price data from the Energy Information Administration (EIA) as a means for establishing electricity prices. If the EIA data demonstrate a large variability in electricity prices, DOE will conduct a sensitivity analysis to determine how high and low electricity price estimates might impact the economic feasibility of any amended energy conservation standards. DOE will use projections of national-average energy prices for residential consumers to estimate future energy prices in its LCC

analysis. DOE will use EIA's Annual Energy Outlook (AEO) as the principal source of projections for future electricity prices.

Issue 10. DOE welcomes input on the proposed methodology for estimating current and future electricity prices.
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8.2 Life-Cycle Cost Discount Rates

The calculation of consumer LCC requires the use of an appropriate discount rate. For residential consumers, DOE plans to use the same approach that it relied on to develop discount rates for its rulemaking on residential furnaces and boilers—i.e., derive the discount rates from estimates of the interest or “finance cost” to purchase residential products. By applying financial theory, the finance cost of raising funds to purchase residential products can be interpreted as (1) the financial cost of any debt incurred to purchase residential products, principally interest charges on debt, or (2) the opportunity cost of any equity used to purchase residential products, principally interest earnings on household equity. Household equity is represented by holdings in assets such as stocks and bonds, as well as the return on homeowner equity. DOE would obtain much of the data required to determine the cost of debt and equity from the Federal Reserve Board's triennial Survey of Consumer Finance, 2004.

DOE will publish the discount rates and associated documentation on the derivation of these discount rates at the time of the ANOPR publication. Stakeholders will be invited to

comment specifically on the issue of consumer discount rates during the ANOPR comment period.

Issue 10. DOE welcomes input on the proposed approaches for estimating discount rates for consumers of BCs and EPSs covered under this rulemaking.

8.3 Product Lifetimes

DOE will use information from catalogues and various literature sources, as well as input from manufacturers and other stakeholders, to establish product lifetimes for use in the LCC and subsequent analyses.

Based on consideration of the comments received for the ANOPR, DOE will make necessary changes to the analysis. These changes will be reflected in the documentation of the NOPR.

Issue 11. DOE welcomes comments on appropriate product lifetimes for BCs and EPSs.

9. SHIPMENTS ANALYSIS

Shipment forecasts are required in order to calculate the national impacts of energy conservation standards on energy, net present value (NPV), and future manufacturer cash flows. DOE plans to develop shipment forecasts based on an analysis of key market drivers for the covered products. Principal among these drivers is demand for the consumer products that use BCs and EPSs.

A shipments analysis is part of both a determination analysis and an energy-conservation standards rulemaking. DOE will begin developing a shipments analysis as part of the determination analysis.

9.1 Base-Case Forecast

To evaluate the various impacts of standards, DOE must develop a base-case forecast against which to compare forecasts for higher efficiency levels. The base-case forecast is designed to depict what would happen to energy consumption and energy costs over time if DOE does not adopt new or amended energy conservation standards for the products covered under this rulemaking. In determining the base-case forecast, DOE will consider historical shipments, the mix of product efficiencies sold, and how that mix might change over time. For these purposes, DOE needs data on historical product shipments and the market shares of the different efficiency levels offered in each product class.

DOE proposes to use shipment forecasts published by the Darnell Group, and end-use product sales data published by the Consumer Electronics Association (CEA), as the initial

points of reference for evaluating and projecting shipment volumes for each product class. DOE will use these data to create a forecast of shipment volumes by product class.

Also, DOE hopes to collect market-share efficiency data (i.e., data on the distribution of product shipments), if applicable, for each product class. DOE recognizes that this information may be difficult to collect and, therefore, may consider other methods for estimating the efficiency distribution in the market. For instance, if market-share efficiency data are not available, DOE may develop, as a proxy, efficiency distributions based on available BC and EPS test data and input from industry, technical experts, or other sources. DOE then will combine shipment forecasts with market-share efficiency data or efficiency distributions for each product class to create the base-case shipments forecast.

9.2 Accounting Methodology

DOE proposes to determine annual shipments in the base case by accounting for trends in the markets for consumer electronics. In broad terms, there are four factors that will contribute to changes over time in the demand for BCs and EPSs:

1. Changing demand for products in existing consumer product categories – driven by changes in preferences, level of affluence, and population size;
2. Convergence of consumer product categories – such as when mobile phones are combined with PDAs. As a result of convergence, some consumers may have fewer devices than they would otherwise, thus reducing the demand for BCs or EPSs;

3. Emergence of new consumer product categories – a critical factor, given the rapid pace of change in the consumer electronics market; and
4. Shifts between methods for supplying power to consumer products – internal power supplies, external power supplies, primary batteries, rechargeable batteries, USB systems, and others. This would include development of new power supply technology, such as fuel-cell energy systems.ⁱ

In assessing the contributions of the four factors, DOE will review industry literature, conduct a patent search, and discuss market trends with manufacturers, as well as marketing and technical experts, knowledgeable in this technology.

Issue 12. DOE welcomes comments on, and any information concerning, the four factors described above for projecting over time annual shipments of BCs and EPSs.

9.3 Standards Impacts on Product Shipments

For each set of standards analyzed, DOE will develop one set of shipment forecasts for BCs and a separate set of shipment forecasts for EPSs. These standards-case forecasts will be used to evaluate the impacts of standards on shipments of BCs and EPSs. Standards-case forecasts are derived using the same data sets as base-case forecasts. However, because the

ⁱ Fuel cells are expected to be developed in a very small form-factors, such that they can be used in conjunction with portable electronic devices. Consumers would “recharge” their products by adding additional electrolytic fluid to the fuel cell rather than plugging the device into charger.

standards-case forecasts take into account the increase in purchase price and the decrease in the consumer's cost of operating the more efficient product caused by standards, standards-case shipment forecasts typically deviate from those for the base case. The size of the difference between two forecasts depends on the estimated purchase-price-increase, as well as the operating-cost savings from the standard.

In addition, for products considered in this rulemaking, DOE will take into consideration substitute products that may become more popular under various standards scenarios. For example, if DOE sets a standard for EPSs but not for BCs, there might be a migration in some product categories away from models that use EPSs and toward those that use BCs. Because the purchase price tends to have a larger impact than operating cost on equipment purchase decisions, standards-case forecasts typically do show an elasticity of demand, manifested as a drop in shipments relative to the base case.

Market-pull programs, such as the ENERGY STAR program and consumer rebate programs, that encourage the purchase of more efficient products, and market-push programs, such as manufacturer tax credits, that encourage the production of more efficient products, also affect standards-case forecasts. When such programs exist, DOE considers their impacts on both standards-case and base-case forecasts.

Issue 13. DOE welcomes comments on how standards for BCs or EPSs might impact BC and EPS shipments. DOE also invites input on the expected impacts of market-pull programs that promote the adoption of more efficient BCs or EPSs.

Issue 14. DOE welcomes input on BC and EPS shipments forecasts. See issues 28 and 29 in the *Current and Projected Future Markets* document for related invitations for comment.

10. NATIONAL IMPACT ANALYSIS

Methods for estimating the LCC savings and payback period for individual consumers were discussed earlier in Section 8. Section 10 discusses DOE's assessment of the aggregate impacts at the national level. Measures of impact to be reported include the NPV of total consumer LCC and NES.

A national impact analysis is part of both a determination analysis and an energy conservation standards rulemaking. DOE will begin developing a national impact analysis as part of the determination analysis.

10.1 Inputs to Forecasts

Analyzing impacts of Federal energy conservation standards requires a comparison of projected United States energy consumption with, and without, new or amended energy conservation standards. The forecasts contain projections of unit energy consumption of new BCs and EPSs, annual equipment shipments, and the price of purchased equipment. Approaches to determining unit energy consumption are described in Section 6, methods for deriving base-case shipment forecasts are discussed in Section 9, and approaches to determining retail prices for products are described in Section 7.

10.2 Calculation of Energy Savings

DOE intends to calculate national energy consumption for each year beginning with the expected effective date of the standards. It will calculate national electricity consumption for the

base case and each standard level analyzed. DOE plans to perform this calculation through the use of a spreadsheet model that effectively multiplies annual shipment forecasts by unit energy savings, thereby accounting for the stock of products affected by standards.

In response to comments by stakeholders who asked for a simple, transparent model, DOE developed NES spreadsheet models for its standards rulemakings starting in 1996. DOE's NES spreadsheet model will provide reasonable, stand-alone forecasts of NES and NPV both for BCs and EPSs.

In other rulemakings, DOE has prepared NES spreadsheet models to project energy savings and to demonstrate how improvements in energy efficiency can be accounted for over time. Similar models will be developed for BCs and EPSs.

Issue 15. DOE welcomes comments on the NES spreadsheet models used for estimating national impacts of energy conservation standards.
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10.3 Net Present Value

DOE calculates the national NPV of the energy conservation standards in conjunction with the NES. It calculates annual energy expenditures from annual energy consumption by incorporating forecasted energy prices. DOE calculates annual equipment expenditures by multiplying the price-per-unit times the forecasted shipments. The difference between a base-case and a standards-case scenario typically contributes to an NES offset against increased expenditures on more efficient BCs and EPSs. The difference each year between energy bill

savings and increased equipment expenditures is the net savings (if positive) or net costs (if negative). DOE discounts these annual values to the present time and sums them to give an NPV. According to U.S. Office of Management and Budget (OMB) requirements, DOE will conduct two NPV calculations: one using a real discount rate of three percent and the other using a real discount rate of seven percent (OMB, Circular A-4: Regulatory Analysis, 2003). Based on consideration of the comments received for the ANOPR, DOE will make any necessary changes to the analysis and CSLs.

11. LIFE-CYCLE COST SUBGROUP ANALYSIS

A life-cycle cost subgroup analysis is only part of an energy conservation standards rulemaking; therefore this analysis would only be conducted if DOE decides to evaluate BC and/or EPS for energy conservation standards.

This section describes how DOE analyzes consumer impacts by dividing consumers into subgroups and accounting for variations in key inputs to the LCC analysis. A consumer subgroup comprises a subset of the population that is likely, for one reason or another, to be impacted disproportionately by new or revised energy conservation standards. The purpose of a subgroup analysis is to determine the extent of this disproportional impact. DOE will work with stakeholders early in the rulemaking process to identify any subgroups for this consideration, should DOE determine to proceed with a standards rulemaking. However, it will not analyze the consumer subgroups until the NOPR stage of the analysis.

In comparing potential impacts on the different consumer subgroups, DOE will evaluate variations in regional electricity prices, variations in use profiles, and variations in installation costs that might affect the NPV of an energy conservation standard for certain consumer subgroups. To the extent possible, DOE may obtain estimates of the variability in each input variable and consider this variability in its calculation of consumer impacts. It will discuss with stakeholders the variability in each input variable and likely sources of information.

12. MANUFACTURER IMPACT ANALYSIS

A manufacturer impact analysis is only part of an energy conservation standards rulemaking; therefore, this analysis would only be conducted if DOE decides to evaluate BCs and/or EPSs for energy conservation standards.

The analysis of impacts on manufacturers is intended to provide DOE with an assessment of the potential impacts of energy conservation standards on manufacturers of BCs and EPSs. DOE will conduct a separate manufacturer impact analysis for each of the product types covered under this rulemaking should DOE determine to proceed with a standards rulemaking. In addition to financial impacts, a wide range of quantitative and qualitative effects may occur following adoption of a standard that may require changes to the manufacturing practices for these products. DOE would identify these effects through interviews with manufacturers and other experts.

12.1 Sources of Information for the Manufacturer Impact Analysis

Many of the analyses described earlier provide important information that DOE uses as inputs for the manufacturer impact analysis. Such information includes financial parameters developed in the market assessment (section 3.1), manufacturing costs and prices from the engineering analysis (sections 5.2 and 5.3), retail price forecasts (Section 7), and shipments forecasts (Section 9). DOE supplements this information with information gathered during manufacturer interviews. The interview process plays a key role in the manufacturer impact analysis, since it provides an opportunity for interested parties to express their views on important issues.

DOE would conduct detailed interviews with manufacturers to gain insight into the range of potential impacts from standards. During the interviews, DOE would take note of information on the possible impacts on manufacturing costs, equipment prices, sales, direct employment, capital assets, and industry competitiveness. Both qualitative and quantitative information is valuable. DOE would schedule interviews well in advance to provide every opportunity for key individuals to be available.

DOE would ask interview participants to identify all confidential information provided in writing or verbally. It would consider the information gathered, as appropriate, in the energy conservation standard decision-making process. DOE also would ask participants to identify any information that they wish to have included in the public record, but that they do not want to have associated with their interview. DOE would incorporate this information into the public record, but would report it without attribution.

DOE would collate the interview results and prepare a summary of the major issues and outcomes. This summary would become part of the TSD for this rulemaking.

12.2 Industry Cash Flow Analysis

The industry cash flow analysis relies primarily on the Government Regulatory Impact Model (GRIM). DOE uses GRIM to analyze the financial impacts of more stringent energy conservation standards on the industry that produces the products covered by the standard.

The GRIM analysis uses a number of factors—annual expected revenues; manufacturer costs, such as costs of goods sold; selling, general, and administrative costs; taxes; and capital expenditures (both ordinary capital expenditures and those related to standards)—to arrive at a series of annual cash flows beginning from the announcement of the new energy conservation standard and continuing for several years after its implementation. DOE compares the results against base-case projections that involve no new standards. The financial impact of new standards is then the difference between the two sets of discounted annual cash flows. Other performance metrics, such as return on invested capital, also are available from GRIM.

DOE would gather this information from two primary sources: the analyses conducted to this point, and interviews with manufacturers and other stakeholders. Information gathered from previous analyses would include financial parameters, manufacturing costs, price forecasts, and shipments forecasts. Interviews with manufacturers and other stakeholders would be essential in supplementing this information.

12.3 Manufacturer Subgroup Analysis

It is possible that the use of average industry cost values would not adequately assess differential impacts among subgroups of BC and EPS manufacturers. DOE recognizes that smaller manufacturers, niche players, and manufacturers exhibiting a cost structure that differs largely from the industry average may be impacted differently by the imposition of energy conservation standards. Ideally, DOE would consider the impact on every firm individually. In highly concentrated industries, this may be possible. In industries having numerous participants,

however, DOE would use the results of the market and technology assessment to group manufacturers into subgroups, as appropriate.

12.4 Competitive Impacts Assessment

Section 325(o)(2)(B)(i)(V) directs DOE to consider any lessening of competition that is likely to result from an imposition of standards. (42 U.S.C. 6295(o)(2)(B)(i)(V)) Further, EPCA directs the Attorney General to determine in writing, the impacts, if any, of any lessening of competition. (42 U.S.C. 6295(o)(2)(B)(ii)) DOE would make a determined effort to gather firm-specific financial information and impacts. DOE would then report the aggregated impact of the standard on manufacturers. The competitive analysis would focus on assessing the impacts to smaller, yet significant, manufacturers. DOE would provide the Attorney General with a copy of the NOPR for consideration in his evaluation of the impact of energy conservation standards on the lessening of competition. DOE would base the assessment on manufacturing cost data and on information collected from interviews with manufacturers. The manufacturer interviews would focus on gathering information that would help in assessing asymmetrical cost increases to some manufacturers, increased proportion of fixed costs potentially increasing business risks, and potential barriers to market entry (e.g., proprietary technologies).

12.5 Cumulative Regulatory Burden

DOE is aware that other regulations may apply to products covered under this rulemaking, as well as to other equipment produced by the same manufacturers of products covered under this rulemaking. Multiple regulations may result in a cumulative regulatory burden on these manufacturers. DOE would seek to limit the overlapping effects on

manufacturers of DOE standards and other regulatory actions affecting the types of covered product.

13. UTILITY IMPACT ANALYSIS

A utility impact analysis is only part of an energy conservation standards rulemaking; therefore, this analysis would only be conducted if DOE decides to evaluate BCs and/or EPSs for energy conservation standards.

To perform the utility impact analysis, which would include an analysis of the electric utility industry, DOE plans to use a variant of the EIA's National Energy Modeling System (NEMS), called NEMS-BT (BT is DOE's Building Technologies Program). The NEMS is a large, multi-sector partial-equilibrium model of the U.S. energy sector, used primarily for the purpose of preparing the AEO. The NEMS-BT produces a widely recognized reference-case forecast for the United States through 2030, which is available in the public domain. Outputs of the utility analysis can parallel results that appear in the latest AEO, with some additions. Typical outputs include forecasts of sales, price, and avoided capacity. DOE plans on conducting the utility impact analysis as a scenario departing from the latest AEO reference case. In other words, the energy-savings impacts from amended energy conservation standards would be modeled using NEMS-BT to generate forecasts that deviate from the AEO reference case.

14. EMPLOYMENT IMPACT ANALYSIS

An employment impact analysis is only part of an energy conservation standards rulemaking; therefore, this analysis would only be conducted if DOE decides to evaluate BCs and/or EPSs for energy conservation standards.

The imposition of standards can impact employment both directly and indirectly. Direct employment impacts are changes in the number of employees at the factories that produce the covered BC and EPS products, along with any affiliated distribution and service companies. DOE would evaluate direct employment impacts in the manufacturer impact analysis, as described in Section 12. Indirect employment impacts may result from expenditures shifting between goods (the substitution effect) and changes in income and overall expenditure levels (the income effect) that occur due to the imposition of standards. The combined direct and indirect employment impacts would be investigated in the employment impact analysis using DOE's "Impact of Sector Energy Technologies" (ImSET) model. The ImSET model was developed for DOE's Office of Planning, Budget, and Analysis, and estimates the employment and income effects of energy-saving technologies in buildings, industry, and transportation. In comparison with simple economic multiplier approaches, ImSET allows for more complete and automated analysis of the economic impacts of energy-efficiency investments.

15. ENVIRONMENTAL ASSESSMENT

An environmental assessment is only part of an energy conservation standards rulemaking; therefore, this analysis would only be conducted if DOE decides to evaluate BCs and/or EPSs for energy conservation standards.

The primary environmental effects of energy conservation standards for BCs and EPSs are likely to be reduced emissions resulting from reduced electricity consumption. An environmental analysis would track the impact of possible standards on three types of energy-related emissions: carbon dioxide (CO₂), oxides of nitrogen (NO_x), and sulfur dioxide (SO₂). DOE intends to base these calculations on the NEMS-BT modeling work proposed for the utility impact analysis. This approach has the advantage of examining the marginal impact of standards for BCs and EPSs on the utility generation mix and the subsequent environmental emissions.

Carbon emissions are tracked in NEMS-BT by a detailed module that produces robust results because of its broad coverage of all sectors and inclusion of interactive effects. The NEMS-BT also includes a module for SO₂-allowance trading and delivers a forecast of SO₂-allowance prices. It is important to note that simulation of SO₂ trading tends to imply that the physical effects of emissions would be zero. However, there is an SO₂ benefit from energy-conservation standards in the form of a lower emission permit price and, if big enough to be calculable by NEMS, this value can be reported. The NEMS-BT also has an algorithm for estimating NO_x emissions from power generation.

16. REGULATORY IMPACT ANALYSIS

The RIA is only part of an energy-conservation standards rulemaking; therefore, this analysis would only be conducted if DOE decides to evaluate BCs and/or EPSs for energy-conservation standards.

Under section 12 of appendix A to subpart C of the Process Rule, DOE is committed to exploring non-regulatory alternatives to mandatory standards. 10 CFR 430 subpart C appendix A. In the NOPR stage, DOE would prepare an RIA pursuant to Executive Order (E.O.) 12866, “Regulatory Planning and Review,” 58 FR 51735 (October 4, 1993). The RIA would be subject to review by the Office of Information and Regulatory Affairs at OMB. The RIA would address the potential for non-regulatory approaches to supplant or augment energy conservation standards to improve the efficiency of BCs and EPSs in the market.

DOE recognizes that voluntary or other non-regulatory efforts by manufacturers, utilities, and other interested parties can result in substantial efficiency improvements. DOE intends to consider the likely effects of non-regulatory initiatives on energy use, consumer utility, and LCC. DOE will take into account the actual impacts of any such initiatives to date, but would also consider information presented regarding the impacts that any existing initiative might have in the future.

APPENDIX A. RELEVANT SECTIONS OF EPCA

This appendix provides a copy of the current requirements for battery chargers and external power supplies set forth under section 135(c)(4) of EPACT 2005 that amends section 325 of EPCA to add section 325(u), 42 U.S.C. 6295(u). This Framework Document and associated scoping workshop address these requirements under subsection 325(u)(1)(D) of EPCA, 42 U.S.C 6295(u)(1)(D).

Sec. 325 ENERGY CONSERVATION STANDARDS FOR ADDITIONAL PRODUCTS

(u) BATTERY CHARGER AND EXTERNAL POWER SUPPLY ELECTRIC ENERGY CONSUMPTION. —

(1)(A) Not later than 18 months after the date of enactment of this subsection, the Secretary shall, after providing notice and an opportunity for comment, prescribe, by rule, definitions and test procedures for the power use of battery chargers and external power supplies.

(B) In establishing the test procedures under sub paragraph (A), the Secretary shall—

(i) consider existing definitions and test procedures used for measuring energy consumption in standby mode and other modes; and

(ii) assess the current and projected future market for battery chargers and external power supplies.

(C) The assessment under subparagraph (B)(ii) shall include—

(i) estimates of the significance of potential energy savings from technical improvements to battery chargers and external power supplies; and

(ii) suggested product classes for energy conservation standards.

(D) Not later than 18 months after the date of enactment of this subsection, the Secretary shall hold a scoping workshop to discuss and receive comments on plans for developing energy conservation standards for energy use for battery chargers and external power supplies.

(E)(i) Not later than 3 years after the date of enactment of this subsection, the Secretary shall issue a final rule that determines whether energy conservation standards shall be issued for battery chargers and external power supplies or classes of battery chargers and external power supplies.

(ii) For each product class, any energy conservation standards issued under clause (i) shall be set at the lowest level of energy use that—

(I) meets the criteria and procedures of sub- sections (o), (p), (q), (r), (s), and (t); and

(II) would result in significant overall annual energy savings, considering standby mode and other operating modes.

(2) In determining under section 323 whether test procedures and energy conservation standards under this section should be revised with respect to covered products that are major sources of standby mode energy consumption, the Secretary shall consider whether to incorporate standby mode into the test procedures and energy conservation standards, taking into account standby mode power consumption compared to overall product energy consumption.

(3) The Secretary shall not propose an energy conservation standard under this section, unless the Secretary has issued applicable test procedures for each product under section 323.

(4) Any energy conservation standard issued under this subsection shall be applicable to products manufactured or imported beginning on the date that is 3 years after the date of issuance.

(5) The Secretary and the Administrator shall collaborate and develop programs (including programs under section 324A and other voluntary industry agreements or codes of conduct) that are designed to reduce standby mode energy use.

Sections of EPCA 325 (42 USC 6295) referenced in section 135(u)(1)(E)(ii)(I) of EPACT are as follows:

(o) Criteria for prescribing new or amended standards

(1) The Secretary may not prescribe any amended standard which increases the maximum allowable energy use, or, in the case of showerheads, faucets, water closets, or urinals, water use, or decreases the minimum required energy efficiency, of a covered product.

(2)

(A) Any new or amended energy conservation standard prescribed by the Secretary under this section for any type (or class) of covered product shall be designed to achieve the maximum improvement in energy efficiency, or, in the

case of showerheads, faucets, water closets, or urinals, water efficiency, which the Secretary determines is technologically feasible and economically justified.

(B)

(i) In determining whether a standard is economically justified, the Secretary shall, after receiving views and comments furnished with respect to the proposed standard, determine whether the benefits of the standard exceed its burdens by, to the greatest extent practicable, considering—

(I) the economic impact of the standard on the manufacturers and on the consumers of the products subject to such standard;

(II) the savings in operating costs throughout the estimated average life of the covered product in the type (or class) compared to any increase in the price of, or in the initial charges for, or maintenance expenses of, the covered products which are likely to result from the imposition of the standard;

(III) the total projected amount of energy, or as applicable, water, savings likely to result directly from the imposition of the standard;

(IV) any lessening of the utility or the performance of the covered products likely to result from the imposition of the standard;

(V) 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;

(VI) the need for national energy and water conservation; and

(VII) other factors the Secretary considers relevant.

(ii) For purposes of clause (i)(V), the Attorney General shall make a determination of the impact, if any, of any lessening of competition likely to result from such standard and shall transmit such determination, not later than 60 days after the publication of a proposed rule prescribing or amending an energy conservation standard, in writing to the Secretary, together with an analysis of the nature and extent of such impact. Any such determination and analysis shall be published by the Secretary in the Federal Register.

(iii) 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 applicable test procedure, there shall be a rebuttable presumption that such standard level is economically justified. A determination by the Secretary that such criterion is not met shall not be taken into consideration in the Secretary's determination of whether a standard is economically justified.

(3) The Secretary may not prescribe an amended or new standard under this section for a type (or class) of covered product if—

(A) for products other than dishwashers, clothes washers, clothes dryers, and kitchen ranges and ovens, a test procedure has not been prescribed pursuant to section [6293](#) of this title with respect to that type (or class) of product; or

(B) the Secretary determines, by rule, that the establishment of such standard will not result in significant conservation of energy or, in the case of showerheads, faucets, water closets, or urinals, water, or that the establishment of such standard is not technologically feasible or economically justified.

For purposes of section [6297](#) of this title, a determination under subparagraph (B) with respect to any type (or class) of covered products shall have the same effect as would a standard prescribed for such type (or class).

(4) The Secretary may not prescribe an amended or new standard under this section if the Secretary finds (and publishes such finding) that interested persons have established by a preponderance of the evidence that the standard is likely to result in the unavailability in the United States in any covered product type (or class) of performance characteristics (including reliability), features, sizes, capacities, and volumes that are substantially the same as those generally available in the United States at the time of the Secretary's finding. The failure of some types (or classes) to meet this criterion shall not affect the Secretary's determination of whether to prescribe a standard for other types (or classes).

(5) The Secretary may set more than 1 energy conservation standard for products that serve more than 1 major function by setting 1 energy conservation standard for each major function.

(p) Procedure for prescribing new or amended standards

Any new or amended energy conservation standard shall be prescribed in accordance with the following procedure:

(1) The Secretary—

(A) shall publish an advance notice of proposed rulemaking which specifies the type (or class) of covered products to which the rule may apply;

(B) shall invite interested persons to submit, within 60 days after the date of publication of such advance notice, written presentations of data, views, and arguments in response to such notice; and

(C) may identify proposed or amended standards that may be prescribed.

(2) A proposed rule which prescribes an amended or new energy conservation standard or prescribes no amendment or no new standard for a type (or class) of covered products shall be published in the Federal Register. In prescribing any such proposed rule with respect to a standard, the Secretary shall determine the maximum improvement in energy efficiency or maximum reduction in energy use that is technologically feasible for each type (or class) of covered products. If such standard is not designed to achieve such efficiency or use, the Secretary shall state in the proposed rule the reasons therefor [sic].

(3) After the publication of such proposed rulemaking, the Secretary shall, in accordance with section [6306](#) of this title, afford interested persons an opportunity, during a period of not less than 60 days, to present oral and written comments (including an opportunity to question those who make such presentations, as provided in such section) on matters relating to such proposed rule, including—

(A) whether the standard to be prescribed is economically justified (taking into account those factors which the Secretary must consider under subsection (o)(2) of this section) or will result in the effects described in subsection (o)(4) of this section;

(B) whether the standard will achieve the maximum improvement in energy efficiency which is technologically feasible;

(C) if the standard will not achieve such improvement, whether the reasons for not achieving such improvement are adequate; and

(D) whether such rule should prescribe a level of energy use or efficiency which is higher or lower than that which would otherwise apply in the case of any group of products within the type (or class) that will be subject to such standard.

(4) A final rule prescribing an amended or new energy conservation standard or prescribing no amended or new standard for a type (or class) of covered products shall be published as soon as is practicable, but not less than 90 days, after publication of the proposed rule in the Federal Register.

(q) Special rule for certain types or classes of products

(1) A rule prescribing an energy conservation standard for a type (or class) of covered products shall specify a level of energy use or efficiency higher or lower than that which applies (or would apply) for such type (or class) for any group of covered products which have the same function or intended use, if the Secretary determines that covered products within such group—

(A) consume a different kind of energy from that consumed by other covered products within such type (or class); or

(B) have a capacity or other performance-related feature which other products within such type (or class) do not have and such feature justifies a higher or lower standard from that which applies (or will apply) to other products within such type (or class).

In making a determination under this paragraph concerning whether a performance-related feature justifies the establishment of a higher or lower standard, the Secretary shall consider such factors as the utility to the consumer of such a feature, and such other factors as the Secretary deems appropriate.

(2) Any rule prescribing a higher or lower level of energy use or efficiency under paragraph (1) shall include an explanation of the basis on which such higher or lower level was established.

(r) Inclusion in standards of test procedures and other requirements

Any new or amended energy conservation standard prescribed under this section shall include, where applicable, test procedures prescribed in accordance with section [6293](#) of this title and may include any requirement which the Secretary determines is necessary to assure that each covered product to which such standard applies meets the required minimum level of energy efficiency or maximum quantity of energy use specified in such standard.

(s) Determination of compliance with standards

Compliance with, and performance under, the energy conservation standards (except for design standards authorized by this part) established in, or prescribed under, this section shall be determined using the test procedures and corresponding compliance criteria prescribed under section [6293](#) of this title.

(t) Small manufacturer exemption

(1) Subject to paragraph (2), the Secretary may, on application of any manufacturer, exempt such manufacturer from all or part of the requirements of any energy conservation standard established in or prescribed under this section for any period

not longer than the 24-month period beginning on the date such rule becomes effective, if the Secretary finds that the annual gross revenues of such manufacturer from all its operations (including the manufacture and sale of covered products) does not exceed \$8,000,000 for the 12-month period preceding the date of the application. In making such finding with respect to any manufacturer, the Secretary shall take into account the annual gross revenues of any other person who controls, is controlled by, or is under common control with, such manufacturer.

(2) The Secretary may not exercise the authority granted under paragraph (1) with respect to any type (or class) of covered product subject to an energy conservation standard under this section unless the Secretary makes a finding, after obtaining the written views of the Attorney General, that a failure to allow an exemption under paragraph (1) would likely result in a lessening of competition.

APPENDIX B. DEFINITIONS OF BATTERY CHARGERS AND EXTERNAL POWER SUPPLIES

This appendix provides a copy of the statutory definitions for the terms "battery charger" and "external power supply," as set forth under section 135(a)(3) of EPACT 2005 that amends section 321 of EPCA, 42 U.S.C. 6291, to add subsections (32) and (36), which are covered under this rulemaking. The statutory definition of the term "consumer product" is also reproduced below for convenience.

Sec. 321(32): The term 'battery charger' means a device that charges batteries for consumer products, including battery chargers embedded in other consumer products. (42 U.S.C. 6291(32))

Sec. 321(36): The term 'external power supply' means an external power supply circuit that is used to convert household electric current into DC current or lower-voltage AC current to operate a consumer product. (42 U.S.C. 6291(36))

Sec. 321(1): The term "consumer product" means any article (other than an automobile, as defined in section 32901(a)(3) of title 49) of a type-- (A) which in operation consumes, or is designed to consume, energy or, with respect to showerheads, faucets, water closets, and urinals, water; and (B) which, to any significant extent, is distributed in commerce for personal use or consumption by individuals; without regard to whether such article of such type is in fact distributed in commerce for personal use or consumption by an individual, except that such term

includes fluorescent lamp ballasts, general service fluorescent lamps, incandescent reflector lamps, showerheads, faucets, water closets, and urinals distributed in commerce for personal or commercial use or consumption. (42 U.S.C. 6291(1))

APPENDIX C. ISSUES FOR COMMENT

While DOE invites comments on all aspects of the material presented in this document, there are several issues in particular on which DOE seeks comment. These issues can be found set off in comment boxes throughout the document and are listed together here. The issues highlight certain issues and ask pertinent questions on the approaches that DOE intends to follow in conducting the analyses applicable to the determination process, and potentially a standards rulemaking.

- Issue 1. DOE invites input on its initial assessment and analysis of the BC and EPS markets and technology. Specific invitations for comment on DOE’s initial findings and understanding of the market can be found in “*The Current and Projected Future Market for Battery Chargers and External Power Supplies.*” 3-2
- Issue 2. DOE invites stakeholders to recommend baseline models from each of the product classes that would constitute good representative units for analysis. 3-6
- Issue 3. For each product class, DOE welcomes information on design options and incremental manufacturing costs for several efficiency levels above the baseline, one of which would be max tech. Detailed information on the product performance and the incremental manufacturing costs (e.g., material costs, labor costs, overhead costs (excluding depreciation), building conversion capital expenditures, tooling/equipment conversion capital expenditures, research and development (R&D) expenses, and marketing expenses) would be welcome. 5-2

Issue 4. DOE welcomes comments on the above-described approach to determining the relationship between manufacturer selling price and device efficiency. Stakeholders are invited to provide data to support their comments where appropriate..... 5-4

Issue 5. DOE welcomes comments on the markup approach proposed for developing estimates of manufacturer selling prices..... 5-4

Issue 6. DOE welcomes comments as to whether there are proprietary designs that DOE should be aware of for BCs or EPSs under consideration by this rulemaking..... 5-5

Issue 7. DOE welcomes comments as to whether there are outside issues that DOE should consider in its analysis of BCs and EPSs and the impact of such issues. Stakeholders are invited to provide data to support their comments where appropriate..... 5-6

Issue 8. DOE welcomes recommendations on sources of data that would provide end-use operating profiles for BCs and EPSs covered under this rulemaking..... 6-1

Issue 9. DOE welcomes comments on the distribution channels for BCs and EPSs, the key stakeholders in those distribution channels, the typical markups applied by those stakeholders, and the overall markup from manufacturer selling price to retail shelf..... 7-2

Issue 10. DOE welcomes input on the proposed methodology for estimating current and future electricity prices.....**Error! Bookmark not defined.**

Issue 11. DOE welcomes input on the proposed approaches for estimating discount rates for consumers of BCs and EPSs covered under this rulemaking. 8-4

Issue 12. DOE welcomes comments on appropriate product lifetimes for BCs and EPSs. 8-4

Issue 13. DOE welcomes comments on, and any information concerning, the four factors described above for projecting over time annual shipments of BCs and EPSs. 9-3

Issue 14. DOE welcomes comments on how standards for BCs or EPSs might impact BC and EPS shipments. DOE also invites input on the expected impacts of market-pull programs that promote the adoption of more efficient BCs or EPSs. 9-4

Issue 15. DOE welcomes input on BC and EPS shipments forecasts. See issues 28 and 29 in the *Current and Projected Future Markets* document for related invitations for comment..... 9-5

Issue 16. DOE welcomes comments on the NES spreadsheet models used for estimating national impacts of energy conservation standards. 10-2

Additional issues for stakeholder review and comment can be found in the separate report entitled “The Current and Projected Future Market for Battery Chargers and External Power Supplies”, which can be downloaded (in a PDF format) from DOE’s homepage for BCs and EPSs:

http://www.eere.energy.gov/buildings/appliance_standards/residential/battery_external.html