Rules and Regulations

Federal Register

Vol. 86, No. 203

Monday, October 25, 2021

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DEPARTMENT OF ENERGY

10 CFR Part 431

[EERE–2017–BT–STD–0016]

RIN 1904–AD89

Energy Conservation Program: Energy Conservation Standards for Metal Halide Lamp Fixtures

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

ACTION: Final determination.

SUMMARY: The Energy Policy and Conservation Act, as amended (''EPCA''), prescribes energy conservation standards for various consumer products and certain commercial and industrial equipment, including metal halide lamp fixtures (''MHLFs''). EPCA also requires the U.S. Department of Energy (''DOE'') to periodically determine whether more-stringent, standards would be technologically feasible and economically justified, and would result in significant energy savings. In this final determination, DOE has determined that the energy conservation standards for MHLFs do not need to be amended because they are not economically justified.

DATES: The effective date of this final determination is November 24, 2021.

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

The docket web page can be found at *www1.eere.energy.gov/buildings/appliance_standards/standards.aspx?productid=14.* The docket web page contains instructions on how to access all documents, including public comments, in the docket.

For further information on how to review the docket, contact the Appliance and Equipment Standards Program staff at (202) 287–1445 or by email: *ApplianceStandardsQuestions@ee.doe.gov.*

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SUPPLEMENTARY INFORMATION:

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I. Synopsis of the Final Determination

Title III, Part B [1] of the Energy Policy and Conservation Act, as amended ("EPCA"),[2] established the Energy Conservation Program for Consumer Products Other Than Automobiles. (42 U.S.C. 6291–6309) These products include metal halide lamp fixtures ("MHLFs"), the subject of this final determination.

EPCA established initial standards for MHLFs. (42 U.S.C. 6295(hh)(1)(A)) EPCA directed the U.S. Department of Energy ("DOE") to conduct a review of the statutory standards to determine whether they should be amended, and a subsequent review to determine if the standards then in effect should be amended. (42 U.S.C. 6295(hh)(2) and (3)) DOE conducted the first review of MHLF energy conservation standards and published a final rule amending standards on February 10, 2014. 79 FR 7746.[3] DOE is issuing this final determination pursuant to the EPCA requirement that DOE conduct a second review of MHLF energy conservation standards. (42 U.S.C. 6295(hh)(3)(A))

DOE analyzed MHLFs subject to standards specified in 10 CFR 431.326(c). DOE first analyzed the technological feasibility of more efficient MHLFs. For those MHLFs for which DOE determined higher standards to be technologically feasible, DOE estimated energy savings that could result from potential energy conservation standards by conducting a national impacts analysis ("NIA"). DOE evaluated whether higher standards would be cost effective by conducting life-cycle cost ("LCC") and payback period ("PBP") analyses, and estimated the net present value ("NPV") of the total costs and benefits experienced by consumers.

Based on the results of these analyses, summarized in section V of this document, DOE has determined that current standards for metal halide lamp fixtures do not need to be amended because more stringent standards would not be cost-effective (and by extension, would not be economically justified).

II. Introduction

The following section briefly discusses the statutory authority underlying this final determination, as well as some of the relevant historical background related to the establishment of standards for MHLFs.

A. Authority

EPCA authorizes DOE to regulate the energy efficiency of a number of consumer products and certain industrial equipment. Title III, Part B of EPCA established the Energy Conservation Program for Consumer Products Other Than Automobiles. These products include MHLFs, the subject of this document. (42 U.S.C. 6292(a)(19)) EPCA, as amended by the Energy Independence and Security Act of 2007 (Pub. L. 110–140, EISA 2007), prescribed energy conservation standards for this equipment. (42 U.S.C. 6295(hh)(1)) EPCA directed DOE to conduct two rulemaking cycles to determine whether to amend these standards. (42 U.S.C. 6295(hh)(2)(A) and (3)(A)) DOE published a final rule amending the standards on February 10, 2014 ("2014 MHLF final rule"). 79 FR 7746. Under 42 U.S.C. 6295(hh)(3)(A), the agency must conduct a second review to determine whether current standards should be amended and publish a final rule. This second MHLF standards rulemaking was initiated on July 1, 2019 through the publication of a request for information ("RFI") document in the **Federal Register**. 84 FR 31232 ("July 2019 RFI"). On August 5, 2020, DOE published a notice of proposed determination ("NOPD") regarding energy conservation standards for MHLFs. 85 FR 47472 ("August 2020 NOPD").

The energy conservation program under EPCA consists essentially of four parts: (1) Testing, (2) labeling, (3) the establishment of Federal energy conservation standards, and (4) certification and enforcement procedures. Relevant provisions of EPCA specifically include definitions (42 U.S.C. 6291), test procedures (42 U.S.C. 6293), labeling provisions (42 U.S.C. 6294), energy conservation standards (42 U.S.C. 6295), and the authority to require information and reports from manufacturers (42 U.S.C. 6296).

Federal energy efficiency requirements for covered products established under EPCA generally supersede State laws and regulations concerning energy conservation testing, labeling, and standards. (42 U.S.C. 6297(a)–(c)) DOE may, however, grant waivers of Federal preemption in limited instances for particular State laws or regulations, in accordance with the procedures and other provisions set forth under EPCA. (*See* 42 U.S.C. 6297(d))

Subject to certain criteria and conditions, DOE is required to develop test procedures to measure the energy efficiency, energy use, or estimated annual operating cost of each covered product. (42 U.S.C. 6295(o)(3)(A) and 42 U.S.C. 6295(r)) Manufacturers of covered products must use the prescribed DOE test procedure as the basis for certifying to DOE that their products comply with the applicable energy conservation standards adopted under EPCA and when making representations to the public regarding the energy use or efficiency of those products. (42 U.S.C. 6293(c) and 6295(s)) Similarly, DOE must use these test procedures to determine whether the products comply with standards adopted pursuant to EPCA. (42 U.S.C. 6295(s)) The DOE test procedures for MHLF appear at 10 CFR 431.324.

In making a determination that the standards do not need to be amended, DOE must evaluate under the criteria of 42 U.S.C. 6295(n)(2) whether amended standards (1) will result in significant conservation of energy, (2) are technologically feasible, and (3) are cost effective as described under 42 U.S.C. 6295(o)(2)(B)(i)(II). (42 U.S.C. 6295(m)(1)(A) and 42 U.S.C. 6295(n)(2)) Under 42 U.S.C. 6295(o)(2)(B)(i)(II), an evaluation of cost effectiveness requires DOE to consider 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.

DOE is publishing this document to satisfy EPCA's requirement under 42 U.S.C. 6295(hh)(3)(A) to complete a second rulemaking for MHLFs and to satisfy the 6-year lookback provision at 42 U.S.C. 6295(m)(1).

B. Background

1. Current Standards

In the 2014 MHLF final rule, DOE prescribed the current energy conservation standards for MHLFs manufactured on or after February 10, 2017. 79 FR 7746. These standards are set forth in DOE's regulations at 10 CFR 431.326 and are specified in Table II.1.

[1] For editorial reasons, upon codification in the U.S. Code, Part B was redesignated Part A.

[2] All references to EPCA in this document refer to the statute as amended through the Energy Act of 2020, Public Law 116–260 (Dec. 27, 2020).

[3] DOE notes that because of the codification of the MHLF provisions in 42 U.S.C. 6295, MHLF energy conservation standards and the associated test procedures are subject to the requirements of the consumer products provisions of Part B of Title III of EPCA. However, because MHLFs are generally considered to be commercial equipment, DOE established the requirements for MHLFs in 10 CFR part 431 ("Energy Efficiency Program for Certain Commercial and Industrial Equipment") for ease of reference. DOE notes that the location of the provisions within the CFR does not affect either the substance or applicable procedure for MHLFs. Based upon their placement into 10 CFR part 431, MHLFs are referred to as "equipment" throughout this document, although covered by the consumer product provisions of EPCA.

TABLE II.1—CURRENT ENERGY CONSERVATION STANDARDS FOR MHLFS

Designed to be operated with lamps of the following rated lamp wattage	Tested input voltage *	Minimum standard equation * (%)
≥50W and ≤100W	480 V	(1 / (1 + 1.24 × P^(−0.351))) − 0.020.**
≥50W and ≤100W	All others	1 / (1 + 1.24 × P^(−0.351)).
>100W and <150W †	480 V	(1 / (1 + 1.24 × P^(−0.351))) − 0.020.
>100W and <150W †	All others	1 / (1 + 1.24 × P^(−0.351)).
≥150W ‡ and ≤250W	480 V	0.880.
≥150W ‡ and ≤250W	All others	For ≥150W and ≤200W: 0.880. For >200W and ≤250W: 1 / (1 + 0.876 × P^(−0.351)).
>250W and ≤500W	480 V	For >250W and <265W: 0.880. For ≥265W and ≤500W: (1 / (1 + 0.876 × P^(−0.351))) − 0.010.
>250W and ≤500W	All others	1 / (1 + 0.876 × P^(−0.351)).
>500W and ≤1,000W	480 V	>500W and ≤750W: 0.900. >750W and ≤1,000W: 0.000104 × P + 0.822. For >500W and ≤1,000W: may not utilize a probe-start ballast.
>500W and ≤1,000W	All others	For >500W and ≤750W: 0.910. For >750W and ≤1,000W: 0.000104 × P + 0.832. For >500W and ≤1,000W: may not utilize a probe-start ballast.

* Tested input voltage is specified in 10 CFR 431.324.

** P is defined as the rated wattage of the lamp the fixture is designed to operate.

† Includes 150 watt (''W'') fixtures specified in paragraph (b)(3) of 10 CFR 431.326, that are fixtures rated only for 150W lamps; rated for use in wet locations, as specified by the National Fire Protection Association (''NFPA'') 70, section 410.4(A); and containing a ballast that is rated to operate at ambient air temperatures above 50 °C, as specified by Underwriters Laboratory (''UL'') 1029.

‡ Excludes 150W fixtures specified in paragraph (b)(3) of 10 CFR 431.326, that are fixtures rated only for 150W lamps; rated for use in wet locations, as specified by the NFPA 70, section 410.4(A); and containing a ballast that is rated to operate at ambient air temperatures above 50 °C, as specified by UL 1029.

2. History of Standards Rulemaking for MHLFs

As described in section II.A, EPCA, as amended by Public Law 110–140, EISA 2007, prescribed energy conservation standards for MHLFs. (42 U.S.C. 6295(hh)(1)) EPCA directed DOE to conduct two rulemaking cycles to determine whether to amend these standards. (42 U.S.C. 6295(hh)(2)(A) and (3)(A)) DOE completed the first of these rulemaking cycles in 2014 by adopting amended performance standards for MHLFs manufactured on or after February 10, 2017. 79 FR 7746. The current energy conservation standards are located in 10 CFR part 431. See 10 CFR 431.326 (detailing the applicable energy conservation standards for different classes of MHLFs). The currently applicable DOE test procedures for MHLFs appear at 10 CFR 431.324. Under 42 U.S.C. 6295(hh)(3)(A), the agency is instructed to conduct a second review of its energy conservation standards for MHLFs and publish a final rule to determine whether to amend those standards. DOE initiated the second MHLF standards rulemaking by publishing the July 2019 RFI and subsequently, DOE published the August 2020 NOPD to support this rulemaking requirement. 84 FR 31232; 85 FR 47472.

DOE received five comments in response to the August 2020 NOPD from the interested parties listed in Table II.2

TABLE II.2—AUGUST 2020 NOPD WRITTEN COMMENTS

Commenter(s)	Reference in this final determination	Commenter type
National Electrical Manufacturers Association *	NEMA	Trade Association.
Signify	Signify	Manufacturer.
California Investor-Owned Utilities (Pacific Gas and Electric Company [PG&E], San Diego Gas and Electric [SDG&E], and Southern California Edison [SCE]).	CA IOUs	Utility Association.
Anonymous	Anonymous	Private Citizen.

* Submitted two separate comments.

A parenthetical reference at the end of a comment quotation or paraphrase provides the location of the item in the public record.[4]

[4] The parenthetical reference provides a reference for information located in the docket of DOE's rulemaking to develop energy conservation standards for MHLFs. (Docket No. EERE–2017–BT–STD–0016–0007, which is maintained at *www.regulations.gov*). The references are arranged as follows: (commenter name, comment docket ID number at page of that document).

III. General Discussion

DOE developed this final determination after considering oral and written comments, data, and information from interested parties that represent a variety of interests.

A. Product Classes and Scope of Coverage

When evaluating and establishing energy conservation standards, DOE divides covered products into product classes by the type of energy used or by capacity or other performance-related features that justify differing standards. In making a determination whether a performance-related feature justifies a different standard, DOE must consider such factors as the utility of the feature to the consumer and other factors DOE determines are appropriate. (42 U.S.C. 6295(q)) This final determination covers metal halide lamp fixtures defined as light fixtures for general lighting application designed to be operated with a metal halide lamp and a ballast for a metal halide lamp. 42 U.S.C. 6291(64); 10 CFR 431.322. The scope of coverage is discussed in further detail in section IV.B.1 of this document.

B. Test Procedure

EPCA sets forth generally applicable criteria and procedures for DOE's adoption and amendment of test procedures. (42 U.S.C. 6293) Manufacturers of covered products must use these test procedures to certify to DOE that their product complies with energy conservation standards and to quantify the efficiency of their product. DOE's current energy conservation standards for MHLFs are expressed in terms of the efficiency of the ballast contained within the fixture. (10 CFR 431.326)

DOE established an active mode and standby mode power test method for MHLFs in a final rule published on March 9, 2010. 75 FR 10950. The current test procedure for MHLFs appears in 10 CFR 431.324 and specifies the ballast efficiency calculation as lamp output power divided by the ballast input power. DOE has since published an RFI to initiate a data collection process to consider whether to amend DOE's test procedure for MHLFs. 83 FR 24680 (May 30, 2018). On July 14, 2021, DOE published a notice of proposed rulemaking to amend DOE's test procedures for MHLFs (''July 2021 NOPR''). 86 FR 37069.

C. Technological Feasibility

1. General

In each energy conservation standards rulemaking, DOE conducts a screening analysis based on information gathered on all current technology options and prototype designs that could improve the efficiency of the products or equipment that are the subject of the rulemaking. As the first step in such an analysis, DOE develops a list of technology options for consideration in consultation with manufacturers, design engineers, and other interested parties. DOE then determines which of those means for improving efficiency are technologically feasible. Section 6(c)(1) of 10 CFR part 430, subpart C, appendix A (the ''Process Rule''). DOE considers technologies incorporated in commercially available products or in working prototypes to be technologically feasible. Sections 6(c)(3)(i) and 7(b)(1) of the Process Rule.

After DOE has determined that particular technology options are technologically feasible, it further evaluates each technology option in light of the following additional screening criteria: (1) Practicability to manufacture, install, and service; (2) adverse impacts on product utility or availability; (3) adverse impacts on health or safety and (4) unique-pathway proprietary technologies. Sections 6(c)(3)(ii)–(v) and 7(b)(2)–(5) of the Process Rule. Additionally, it is DOE policy not to include in its analysis any proprietary technology that is a unique pathway to achieving a certain efficiency level (''EL''). Section IV.B.5 of this document discusses the results of the screening analysis for MHLFs, particularly the designs DOE considered, those it screened out, and those that are the basis for the standards considered in this rulemaking. For further details on the screening analysis for this rulemaking, see chapter 4 of the final determination technical support document (''TSD'').[5]

2. Maximum Technologically Feasible Levels

When DOE proposes to adopt an amended standard for a type or class of covered product, it must determine the maximum improvement in energy efficiency or maximum reduction in energy use that is technologically feasible for such a product. (42 U.S.C. 6295(p)(1)) Accordingly, in the engineering analysis, DOE determined the maximum technologically feasible (''max-tech'') improvements in energy efficiency for MHLFs using the design parameters for the most efficient products available on the market or in working prototypes. The max-tech levels that DOE determined for this rulemaking are described in section IV.C.4 and in chapter 5 of the final determination TSD.

D. Energy Savings

1. Determination of Savings

For each trial standard level (''TSL''), DOE projected energy savings from application of the TSL to MHLFs purchased in the 30-year period that begins in the first full year of compliance with the potential standards (2025–2054).[6] The savings are measured over the entire lifetime of MHLFs purchased in the 30-year analysis period. DOE quantified the energy savings attributable to each TSL as the difference in energy consumption between each standards case and the no-new-standards case. The no-new-standards case represents a projection of energy consumption that reflects how the market for a product would likely evolve in the absence of energy conservation standards.

DOE used its NIA spreadsheet models to estimate national energy savings (''NES'') from potential amended standards for MHLFs. The NIA spreadsheet model (described in section V.B.2 of this document) calculates energy savings in terms of site energy, which is the energy directly consumed by products at the locations where they are used. For electricity, DOE reports national energy savings in terms of primary energy savings, which is the savings in the energy that is used to generate and transmit the site electricity. For natural gas, the primary energy savings are considered to be equal to the site energy savings. DOE also calculates NES in terms of full-fuel-cycle (''FFC'') energy savings. The FFC metric includes the energy consumed in extracting, processing, and transporting primary fuels (*i.e.,* coal, natural gas, petroleum fuels), and thus presents a more complete picture of the impacts of energy conservation standards.[7] DOE's approach is based on the calculation of an FFC multiplier for each of the energy types used by covered products or equipment. For more information on FFC energy savings, see section IV.H.1 of this document.

2. Significance of Savings

To adopt any new or amended standards for a covered MHLFs, DOE must determine that such action would result in significant energy savings. (42 U.S.C. 6295(o)(3)(B)) Although the term ''significant'' is not defined in the EPCA, the U.S. Court of Appeals, for the District of Columbia Circuit in *Natural Resources Defense Council* v. *Herrington,* 768 F.2d 1355, 1373 (D.C. Cir. 1985), opined that Congress intended ''significant'' energy savings in the context of EPCA to be savings that were not ''genuinely trivial.''

Historically, DOE did not provide specific guidance or a numerical threshold for determining what constitutes significant conservation of energy. Instead, DOE determined on a case-by-case basis whether a particular rulemaking would result in significant conservation of energy. In a final rule published February 14, 2020, DOE adopted a numerical threshold for significant conservation of energy. 85 FR 8626, 8670. Specifically, the threshold requires that an energy conservation standard result in a 0.30

[5] The final determination technical support document for this notice can be found at *www.regulations.gov/docket/EERE-;2017-BT-STD-0016.*

[6] DOE also presents a sensitivity analysis that considers impacts for products shipped in a 9-year period.

[7] The FFC metric is discussed in DOE's statement of policy and notice of policy amendment. 76 FR 51282 (Aug. 18, 2011), as amended at 77 FR 49701 (Aug. 17, 2012).

quad reduction in site energy use over a 30-year analysis period or a 10-percent reduction in site energy use over that same period. *Id.*

E. Economic Justification

1. Specific Criteria

EPCA provides seven factors to be evaluated in determining whether a potential energy conservation standard is economically justified. (42 U.S.C. 6295(o)(2)(B)(i)(I)–(VII)) The following sections discuss how DOE has addressed each of those seven factors in this final determination.

a. Economic Impact on Manufacturers and Consumers

In determining the impacts of potential amended standards on manufacturers, DOE conducts a manufacturer impact analysis (''MIA''). DOE first uses an annual cash-flow approach to determine the quantitative impacts. This step includes both a short-term assessment—based on the cost and capital requirements during the period between when a regulation is issued and when entities must comply with the regulation—and a long-term assessment over a 30-year period. The industry-wide impacts analyzed include (1) industry net present value, which values the industry on the basis of expected future cash flows; (2) cash flows by year; (3) changes in revenue and income; and (4) other measures of impact, as appropriate. Second, DOE analyzes and reports the impacts on different types of manufacturers, including impacts on small manufacturers. Third, DOE considers the impact of standards on domestic manufacturer employment and manufacturing capacity, as well as the potential for standards to result in plant closures and loss of capital investment. Finally, DOE takes into account cumulative impacts of various DOE regulations and other regulatory requirements on manufacturers.

For individual consumers, measures of economic impact include the changes in LCC and PBP associated with new or amended standards. These measures are discussed further in the following section. For consumers in the aggregate, DOE also calculates the national net present value of the consumer costs and benefits expected to result from particular standards. DOE also evaluates the impacts of potential standards on identifiable subgroups of consumers that may be affected disproportionately by a standard.

As discussed further in section V.C of this document, DOE has concluded amended standards for MHLFs would not be cost-effective (and by extension, would not be economically justified) for the potential standard levels evaluated based on the PBP and LCC analysis. Therefore, DOE did not conduct an MIA analysis or LCC subgroup analysis for this final determination.

b. Savings in Operating Costs Compared To Increase in Price (LCC and PBP)

EPCA requires DOE to consider 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 product that are likely to result from a standard. (42 U.S.C. 6295(o)(2)(B)(i)(II)) DOE conducts this comparison in its LCC and PBP analysis.

The LCC is the sum of the purchase price of a product (including its installation) and the operating cost (including energy, maintenance, and repair expenditures) discounted over the lifetime of the product. The LCC analysis requires a variety of inputs, such as product prices, product energy consumption, energy prices, maintenance and repair costs, product lifetime, and discount rates appropriate for consumers. To account for uncertainty and variability in specific inputs, such as product lifetime and discount rate, DOE uses a distribution of values, with probabilities attached to each value.

The PBP is the estimated amount of time (in years) it takes consumers to recover the increased purchase cost (including installation) of a more-efficient product through lower operating costs. DOE calculates the PBP by dividing the change in purchase cost due to a more-stringent standard by the change in annual operating cost for the year that standards are assumed to take effect.

For its LCC and PBP analysis, DOE assumes that consumers will purchase the covered products in the first year of compliance with new or amended standards. The LCC savings for the considered efficiency levels are calculated relative to the case that reflects projected market trends in the absence of new or amended standards. DOE's LCC and PBP analysis is discussed in further detail in section IV.F.

c. Energy Savings

Although significant conservation of energy is a separate statutory requirement for adopting an energy conservation standard, EPCA requires DOE, in determining the economic justification of a standard, to consider the total projected energy savings that are expected to result directly from the standard. (42 U.S.C. 6295(o)(2)(B)(i)(III)) As discussed in section IV.H, DOE uses the NIA spreadsheet models to project national energy savings.

d. Lessening of Utility or Performance of Products

In establishing product classes, and in evaluating design options and the impact of potential standard levels, DOE evaluates potential standards that would not lessen the utility or performance of the considered products. (42 U.S.C. 6295(o)(2)(B)(i)(IV)) Based on data available to DOE, the standards analyzed in this document would not reduce the utility or performance of the products under consideration in this rulemaking. DOE also determined that analyzed standards would not result in the unavailability performance characteristics of products under consideration that are generally available at the time of this rulemaking. (42 U.S.C. 6295(o)(4))

e. Impact of Any Lessening of Competition

EPCA directs DOE to consider the impact of any lessening of competition, as determined in writing by the Attorney General, that is likely to result from a standard. (42 U.S.C. 6295(o)(2)(B)(i)(V)) It also directs the Attorney General to determine the impact, if any, of any lessening of competition likely to result from a standard and to transmit such determination to the Secretary within 60 days of the publication of a proposed rule, together with an analysis of the nature and extent of the impact. (42 U.S.C. 6295(o)(2)(B)(ii)) Because DOE is not amending standards for MHLFs, DOE did not transmit a copy of its proposed determination to the Attorney General.

f. Need for National Energy Conservation

DOE also considers the need for national energy and water conservation in determining whether a new or amended standard is economically justified. (42 U.S.C. 6295(o)(2)(B)(i)(VI)) The energy savings from the adopted standards are likely to provide improvements to the security and reliability of the Nation's energy system. Reductions in the demand for electricity also may result in reduced costs for maintaining the reliability of the Nation's electricity system.

DOE maintains that environmental and public health benefits associated with the more efficient use of energy are important to take into account when considering the need for national energy conservation. Because DOE has concluded that amended standards for MHLFs would not be economically justified, DOE did not conduct a utility impact analysis or emissions analysis for this final determination.

g. Other Factors

In determining whether an energy conservation standard is economically justified, DOE may consider any other factors that the Secretary deems to be relevant. (42 U.S.C. 6295(o)(2)(B)(i)(VII)) To the extent DOE identifies any relevant information regarding economic justification that does not fit into the other categories described previously, DOE could consider such information under ''other factors.''

2. Rebuttable Presumption

As set forth in 42 U.S.C. 6295(o)(2)(B)(iii), EPCA creates a rebuttable presumption that an energy conservation standard is economically justified if the additional cost to the consumer of a product that meets the standard is less than three times the value of the first year's energy savings resulting from the standard, as calculated under the applicable DOE test procedure. DOE's LCC and PBP analyses generate values used to calculate the effect potential amended energy conservation standards would have on the payback period for consumers. These analyses include, but are not limited to, the 3-year payback period contemplated under the rebuttable-presumption test. In addition, DOE routinely conducts an economic analysis that considers the full range of impacts to consumers, manufacturers, the Nation, and the environment, as required under 42 U.S.C. 6295(o)(2)(B)(i). The results of this analysis serve as the basis for DOE's evaluation of the economic justification for a potential standard level (thereby supporting or rebutting the results of any preliminary determination of economic justification). The rebuttable presumption payback calculation is discussed in section IV.F.9 of this final determination.

IV. Methodology and Discussion of Related Comments

This section addresses the analyses DOE has performed for this rulemaking with regards to MHLFs. Separate subsections address each component of DOE's analyses and respond to comments received.

DOE used several analytical tools to estimate the impact of the standards considered in this document. The first tool is a spreadsheet that calculates the LCC savings and PBP of potential amended or new energy conservation standards. The national impacts analysis uses a second spreadsheet set that provides shipments projections and calculates national energy savings and net present value of total consumer costs and savings expected to result from potential energy conservation standards. These spreadsheet tools are available on the DOE website for this rulemaking: *www1.eere.energy.gov/buildings/appliance_standards/standards.aspx?productid=14.*

A. Overall

DOE received several comments regarding its tentative conclusion in the August 2020 NOPD to not amend standards for MHLFs. NEMA agreed with DOE's proposed determination stating that the industry would not be able to recover investments in new standards for MHLFs based on the continued decline of shipments (80 percent reduction in MHLF shipments from 2008 through 2018). (NEMA, No. 12 at p. 2) Additionally, NEMA stated that due to the rapidly declining market, attaining significant energy savings in a reasonable time did not seem possible. (NEMA, No. 12 at p. 4) Signify agreed with DOE's proposed determination that standards for MHLFs do not need to be amended. However, Signify stated that it supported standards for metal halide (''MH'') ballasts designed to operate lamps with wattages between >1,000 W and ≤2,000 W as such standards would incentivize a rational use of energy for high power MH lamp luminaire applications. (Signify, No. 13 at pp. 2, 12)

A private citizen also agreed with DOE's proposed determination, stating that shipments have declined over 90 percent in the last 10–15 years and will continue to do so. The citizen also stated that MH lamps are not used in new buildings or new outdoor lighting. The citizen recommended DOE not have to repeat this analysis in three years unless shipment increased by at least some ''X'' percent during that time. (Anonymous, No. 10, p. 1)

When expressing concerns regarding max-tech levels proposed in the August 2020 NOPD, NEMA recommended DOE publish a supplemental notice to the August 2020 NOPD rather than a final rule to avoid risking future challenges. (NEMA, No. 12 at p. 3) (See section IV.C.4 for the discussion of NEMA's comment regarding max-tech levels.) Additionally, in response to a separate rule requesting comment regarding rulemaking prioritizations, NEMA stated that if DOE were to quickly verify the decline in sale and no notable energy saving opportunities for MHLFs, a negative determination could be made and allow DOE resources to be applied elsewhere with more significant energy savings. (NEMA, No. 15 [8] at p. 4)

The CA IOUs stated that DOE's analysis was incomplete and that it should consider revising its shipments and cost data. The CA IOUs urged DOE to refrain from issuing a final determination until the adjustments to the data have been made and shared with stakeholders. (CA IOUs, No. 14, pp. 2–3) (See section IV.C.6 for discussion of the CA IOU's comments on prices and section IV.G for shipments.)

Concerns raised in comments received on the August 2020 NOPD are addressed in this document and do not result in major changes to the analysis. Hence, DOE is not publishing supplemental notice to the August 2020 NOPD. In this final determination DOE is not amending current standards for MHLFs because more stringent standards would not be cost-effective (and by extension, would not be economically justified). DOE made this determination by conducting an analysis of covered MHLFs including those containing MH ballasts designed to operate lamps with wattages between >1,000 W and ≤2,000 W. As noted in section II.A, DOE is completing this final determination as directed by EPCA to conduct a secondary rulemaking for MHLFs.

B. Market and Technology Assessment

DOE conducted a market and technology assessment in support of this final determination. DOE develops information in the market and technology assessment that provides an overall picture of the market for the products concerned, including the purpose of the products, the industry structure, manufacturers, market characteristics, and technologies used in the products. This activity includes both quantitative and qualitative assessments, based primarily on publicly-available information. The subjects addressed in the market and technology assessment for this rulemaking include (1) a determination of the scope of the rulemaking and product classes, (2) manufacturers and

[8] This comment was received in response to a Request for Comment on the prioritization of rulemakings pursuant to the Department's updated and modernized rulemaking methodology titled, ''Procedures, Interpretations, and Policies for Consideration of New or Revised Energy Conservation Standards and Test Procedures for Consumer Products and Commercial/Industrial Equipment'' (Process Rule), Docket ID: EERE–2020–BT–STD–004, available at *www.regulations.gov/document/EERE-2020-BT-STD-0004-0001.*

industry structure, (3) existing efficiency programs, (4) shipments information, (5) market and industry trends, and (6) technologies or design options that could improve the energy efficiency of MHLFs. The key findings of DOE's market assessment are summarized in the following sections. See chapter 3 of the final determination TSD for further discussion of the market and technology assessment.

1. Scope of Coverage

MHLF is defined as a light fixture for general lighting application designed to be operated with a metal halide lamp and a ballast for a metal halide lamp. 42 U.S.C. 6291(64); 10 CFR 431.322. Any equipment meeting the definition of MHLF is included in DOE's scope of coverage, though all equipment within the scope of coverage may not be subject to standards.

Signify stated that it appreciated the clarification in the August 2020 NOPD that DOE has does not have authority to evaluate amended standards for metal halide ballasts sold outside of MHLFs as this is a frequent question asked by its customers. (Signify, No. 13 at p. 13)

2. Test Procedure

The current test procedure for MHLFs appears in 10 CFR 431.324 and specifies the ballast efficiency calculation as lamp output power divided by the ballast input power. With regards to the max-tech levels in the August 2020 NOPD, Signify questioned the certification data for any ballast operating a MH lamp at a frequency higher than 400 hertz (''Hz''). Signify stated that the current DOE test procedure references ANSI C82.6–2015(R2020) [9] which excludes from scope ballasts that operate at higher than 400 Hz for high-intensity discharge (''HID'') lamps. Therefore, energy efficiencies for ballasts operating at frequencies higher than 400 Hz may have been reported to DOE in error. Signify explained that a test setup specific to high-frequency ballasts is needed as these ballasts are more susceptible to high-frequency parasitic elements among wires and means of interconnections and require the appropriate power supply impedance to prevent the injection of high-frequency voltage components. Hence, Signify suggested that DOE not adopt the max-tech efficiency levels for electronic ballasts until the test method is amended to include accurate measurements of high-frequency electronic MH lamp ballasts. (Signify, No. 13 at pp. 9–10)

The 2015 version and the 2015(R2020) [10] version of ANSI C82.6 do state that their procedures apply to low-frequency ballasts (*i.e.,* ballasts that operate at less than 400 Hz). DOE's current test procedure for MHLFs references the 2005 version of ANSI C82.6 which does not explicitly exclude certain ballasts. In 2017, ANSI published ANSI C82.17–2017, ''High Frequency (HF) Electronic Ballasts for Metal Halide Lamps,'' which addressed HF electronic metal halide ballasts with sinusoidal lamp operating current frequencies above 40 kilohertz. ANSI C82.17–2017 also states in section 5.1 that ''all measurements necessary to determine compliance with the ballast performance requirements of this standard shall be made in accordance with ANSI C82.6.'' In the July 2021 NOPR DOE tentatively determined that based on its initial review, the specifications, and instructions in ANSI C82.6 cover the necessary methodology, while being general enough to be used as a guide for taking measurements for HF electronic ballasts. 86 FR 37069, 37078.

3. Equipment Classes

When evaluating and establishing energy conservation standards, DOE may divide covered products into product classes by the type of energy used, or by capacity or other performance-related features that justify a different standard. (42 U.S.C. 6295(q)) In making a determination whether capacity or another performance-related feature justifies a different standard, DOE must consider such factors as the utility of the feature to the consumer and other factors DOE deems appropriate. (*Id.*)

In the August 2020 NOPD, DOE reviewed metal halide lamp fixtures and the ballasts contained within them to identify performance-related features that could potentially justify a separate equipment class. DOE proposed to maintain the current equipment classes which are based on input voltage, rated lamp wattage, and designation for indoor versus outdoor application. 85 FR 47472, 47482–47483. DOE received no comments on this topic and maintains the current equipment classes in this final determination.

The equipment classes considered in this final determination are shown in Table IV.1.

TABLE IV.1—EQUIPMENT CLASSES

Designed to be operated with lamps of the following rated lamp wattage	Indoor/outdoor	Input voltage type ‡
≥50 W and ≤100 W	Indoor	Tested at 480 V.
≥50 W and ≤100 W	Indoor	All others.
≥50 W and ≤100 W	Outdoor	Tested at 480 V.
≥50 W and ≤100 W	Outdoor	All others.
>100 W and <150 W *	Indoor	Tested at 480 V.
>100 W and <150 W *	Indoor	All others.
>100 W and <150 W *	Outdoor	Tested at 480 V.
>100 W and <150 W *	Outdoor	All others.
≥150 W ** and ≤250 W	Indoor	Tested at 480 V.
≥150 W ** and ≤250 W	Indoor	All others.
≥150 W ** and ≤250 W	Outdoor	Tested at 480 V.
≥150 W ** and ≤250 W	Outdoor	All others.
>250 W and ≤500 W	Indoor	Tested at 480 V.
>250 W and ≤500 W	Indoor	All others.
>250 W and ≤500 W	Outdoor	Tested at 480 V.
>250 W and ≤500 W	Outdoor	All others.
>500 W and ≤1,000 W	Indoor	Tested at 480 V.
>500 W and ≤1,000 W	Indoor	All others.

[9] American National Standards Institute. *American National Standard for Lamp ballasts—Ballasts for High-Intensity Discharge Lamps—Methods of Measurement.* Approved March 20, 2020.

[10] There are no differences between the 2015(R2020) and 2015 versions of ANSI C82.6. The 2015(R2020) version is reaffirmation of the 2015 version.

TABLE IV.1—EQUIPMENT CLASSES—Continued

Designed to be operated with lamps of the following rated lamp wattage	Indoor/outdoor	Input voltage type ‡
>500 W and ≤1,000 W	Outdoor	Tested at 480 V.
>500 W and ≤1,000 W	Outdoor	All others.
>1,000 W and ≤2,000 W	Indoor	Tested at 480 V.
>1,000 W and ≤2,000 W	Indoor	All others.
>1,000 W and ≤2,000 W	Outdoor	Tested at 480 V.
>1,000 W and ≤2,000 W	Outdoor	All others.

* Includes 150 W MHLFs initially exempted by EISA 2007, which are MHLFs rated only for 150 W lamps; rated for use in wet locations, as specified by the NFPA 70–2002, section 410.4(A);); and containing a ballast that is rated to operate at ambient air temperatures above 50 °C, as specified by UL 1029–2007.

** Excludes 150 W MHLFs initially exempted by EISA 2007, which are MHLFs rated only for 150 W lamps; rated for use in wet locations, as specified by the NFPA 70–2002, section 410.4(A);); and containing a ballast that is rated to operate at ambient air temperatures above 50 °C, as specified by UL 1029–2007.

‡ Input voltage for testing would be specified by the test procedures. Ballasts rated to operate lamps less than 150 W would be tested at 120 V, and ballasts rated to operate lamps ≥150 W would be tested at 277 V. Ballasts not designed to operate at either of these voltages would be tested at the highest voltage the ballast is designed to operate.

4. Technology Options

In the technology assessment, DOE identifies technology options that would be expected to improve the efficiency of MHLFs, as measured by the DOE test procedure. The energy conservation standard requirements and DOE test procedure for MHLFs are based on the efficiency of the MH ballast contained within the fixture. Hence DOE identified technology options that would improve the efficiency of MH ballasts. To develop a list of technology options, DOE reviewed manufacturer catalogs, recent trade publications and technical journals, and consulted with technical experts.

A complete list of technology options DOE considered in the August 2020 NOPD appears in Table IV.2. 85 FR 47472, 47484. DOE did not receive comments on technology options considered in the August 2020 NOPD and therefore continues to consider them in this final determination. See chapter 3 of final determination TSD for further information.

TABLE IV.2—TECHNOLOGY OPTIONS

Ballast type	Design option	Description
Magnetic	Improved Core Steel:	
	Grain-Oriented Silicon Steel	Use a higher grade of electrical steel, including grain-oriented silicon steel, to lower core losses.
	Amorphous Steel	Create the core of the inductor from laminated sheets of amorphous steel insulated from each other.
	Improved Steel Laminations	Add steel laminations to lower core losses by using thinner laminations.
	Copper Wiring	Use copper wiring in place of aluminum wiring to lower resistive losses.
	Improved Windings	Use of optimized-gauge copper wire; multiple, smaller coils; shape-optimized coils to reduce winding losses.
	Electronic Ballast	Replace magnetic ballasts with electronic ballasts.
Electronic	Improved Components:	
	Magnetics	Improved Windings: Use of optimized-gauge copper wire; multiple, smaller coils; shape-optimized coils; litz wire to reduce winding losses.
	Diodes	Use diodes with lower losses.
	Capacitors	Use capacitors with a lower effective series resistance and output capacitance.
	Transistors	Use transistors with lower drain-to-source resistance.
	Improved Circuit Design:	
	Integrated Circuits	Substitute discrete components with an integrated circuit.

5. Screening Analysis

DOE uses the following five screening criteria to determine which technology options are suitable for further consideration in an energy conservation standards rulemaking:

(1) *Technological feasibility.* Technologies that are not incorporated in commercial products or in working prototypes will not be considered further.

(2) *Practicability to manufacture, install, and service.* If it is determined that mass production and reliable installation and servicing of a technology in commercial products could not be achieved on the scale necessary to serve the relevant market at the time of the projected compliance date of the standard, then that technology will not be considered further.

(3) *Impacts on product utility or product availability.* If it is determined that a technology would have significant adverse impact on the utility of the product to significant subgroups of consumers or would result in the unavailability of any covered product type with performance characteristics (including reliability), features, sizes, 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) *Adverse impacts on health or safety.* If it is determined that a technology would have significant adverse impacts on health or safety, it will not be considered further.

(5) *Unique-Pathway Proprietary Technologies.* If a design option utilizes proprietary technology that represents a unique pathway to achieving a given efficiency level, that technology will not be considered further due to the potential for monopolistic concerns.

Sections 6(c)(3) and 7(b) of the Process Rule.

In sum, if DOE determines that a technology, or a combination of technologies, fails to meet one or more of the listed five criteria, it will be excluded from further consideration in the engineering analysis. The reasons for eliminating any technology are discussed in the following sections.

DOE evaluated of each the technology options against the screening analysis criteria and determined whether it should be excluded (''screened out'') based on the screening criteria. DOE did not receive comments on technology options screened out in the August 2020 NOPD and therefore screened out the same technology options in this final determination.

a. Screened-Out Technologies

For magnetic ballasts, DOE screened out the technology option of using laminated sheets of amorphous steel. DOE determined that using amorphous steel could have adverse impacts on consumer utility because increasing the size and weight of the ballast may limit the places a customer could use the ballast. 85 FR 47472, 47484.

b. Remaining Technologies

DOE concludes that all of the other identified technologies listed in section IV.B.4 met all five screening criteria to be examined further as design options in DOE's final determination. In summary, DOE did not screen out the following technology options:

- Magnetic Ballasts
  - Improved Core Steel
  - Copper Wiring
  - Improved Steel Laminations
  - Improved Windings
  - Electronic Ballast
- Electronic Ballasts
  - Improved Components
  - Improved Circuit Design

85 FR 47472, 47485.

DOE determined that these technology options are technologically feasible because they are being used or have previously been used in commercially-available products or working prototypes. DOE also finds that all of the remaining technology options meet the other screening criteria (*i.e.,* practicable to manufacture, install, and service; do not result in adverse impacts on consumer utility, product availability, health, or safety; and do not utilize proprietary technology). For additional details, see chapter 4 of the final determination TSD.

C. Engineering Analysis

In the engineering analysis, DOE develops cost-efficiency relationships characterizing the incremental costs of achieving increased ballast efficiency. This relationship serves as the basis for cost-benefit calculations for individual consumers and the nation. The methodology for the engineering analysis consists of the following steps: (1) Selecting representative equipment classes; (2) selecting baseline metal halide ballasts; (3) identifying more efficient substitutes; (4) developing efficiency levels; and (5) scaling efficiency levels to non-representative equipment classes. The details of the engineering analysis are discussed in chapter 5 of the final determination TSD.

1. Representative Equipment Classes

DOE selects certain equipment classes as ''representative'' to focus its analysis. DOE chooses equipment classes as representative primarily because of their high market volumes and/or unique characteristics. DOE established 24 equipment classes based on input voltage, rated lamp wattage, and indoor/outdoor designation. DOE did not directly analyze the equipment classes containing only fixtures with ballasts tested at 480 V due to low shipment volumes. DOE selected all other equipment classes as representative, resulting in a total of 12 representative classes covering the full range of lamp wattages, as well as indoor and outdoor designations. 76 FR 47472, 47485–47486.

In the August 2020 NOPD DOE directly analyzed the equipment classes shown in gray in Table IV.3 of this document. 76 FR 47472, 47485–47486. DOE did not receive any comments on the representative product classes presented in the August 2020 NOPD. Therefore, DOE continues to analyze the representative product classes shown in gray in Table IV.3 in this final determination.

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Table IV.3 Representative Equipment Classes

Equipment Class	Indoor/Outdoor	Input Voltage Type
≥50 W and ≤100 W	Indoor	Tested at 480 V
		All others
	Outdoor	Tested at 480 V
		All others
>100 W and <150 W*	Indoor	Tested at 480 V
		All others
	Outdoor	Tested at 480 V
		All others
≥150 W and ≤250 W**	Indoor	Tested at 480 V
		All others
	Outdoor	Tested at 480 V
		All others
>250 W and ≤500 W	Indoor	Tested at 480 V
		All others
	Outdoor	Tested at 480 V
		All others
>500 W and ≤1000 W	Indoor	Tested at 480 V
		All others
	Outdoor	Tested at 480 V
		All others
>1000 W and ≤2000 W	Indoor	Tested at 480 V
		All others
	Outdoor	Tested at 480 V
		All others

*Includes 150 W fixtures initially exempted by EISA 2007, which are fixtures rated only for 150 watt lamps; rated for use in wet locations, as specified by the NFPA 70–2002, section 410.4(A); and containing a ballast that is rated to operate at ambient air temperatures above 50°C, as specified by UL 1029–2007.
**Excludes 150 W fixtures initially exempted by EISA 2007, which are fixtures rated only for 150 watt lamps; rated for use in wet locations, as specified by the NFPA 70–2002, section 410.4(A); and containing a ballast that is rated to operate at ambient air temperatures above 50°C, as specified by UL 1029–2007.

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Metal halide lamp fixtures are designed to be operated with lamps of certain rated lamp wattages and contain ballasts that can operate lamps at these wattages. To further focus the analysis, DOE selected a representative rated wattage in each equipment class. Each representative wattage was the most common wattage within each equipment class. In the August 2020 NOPD DOE found that common wattages within each equipment class were the same for outdoor and indoor fixtures. Specifically, DOE selected 70 W, 150 W, 250 W, 400 W, 1,000 W and 1,500 W as representative wattages to analyze. 85 FR 47472, 47486–47487.

DOE did not receive any comments on the representative wattages presented in the August 2020 NOPD and therefore continues to analyze the same representative wattages in this final determination. The representative wattages for each equipment class are summarized in Table IV.4 of this document. See chapter 5 of this final determination TSD for further details.

TABLE IV.4—REPRESENTATIVE WATTAGES

Representative equipment class	Representative wattage (W)
≥50 W and ≤100 W	70
>100 W and <150 W*	150
≥150 W and ≤250 W**	250
>250 W and ≤500 W	400
>500 W and ≤1,000 W	1,000
>1,000 W and ≤2,000 W	1,500

*Includes 150 W fixtures initially exempted by EISA 2007, which are fixtures rated only for 150 watt lamps; rated for use in wet locations, as specified by the NFPA 70–2002, section 410.4(A); and containing a ballast that is rated to operate at ambient air temperatures above 50 °C, as specified by UL 1029–2007.

** Excludes 150 W fixtures initially exempted by EISA 2007, which are fixtures rated only for 150 watt lamps; rated for use in wet locations, as specified by the NFPA 70–2002, section 410.4(A); and containing a ballast that is rated to operate at ambient air temperatures above 50 °C, as specified by UL 1029–2007.

2. Baseline Ballasts

For each representative equipment class, DOE selected baseline ballasts to serve as reference points against which DOE measured changes from potential amended energy conservation standards. Typically, the baseline ballast is the most common, least efficient ballast that meets existing energy conservation standards.

In the August 2020 NOPD, DOE selected as baselines the least efficient ballasts meeting standards that have common attributes for ballasts in each equipment class such as circuit type, input voltage and ballast type. DOE used the efficiency values of ballasts contained in MHLFs certified in DOE's compliance certification database to identify baseline ballasts for all equipment classes except the >1,000 W and ≤2,000 W equipment class. Because fixtures in this equipment class are not currently subject to standards, and therefore do not have DOE certification data, DOE determined baseline ballast efficiency values by using catalog data.

In the August 2020 NOPD, DOE directly analyzed the baseline ballasts shown in Table IV.5 of this document. 85 FR 47472, 47487. DOE did not receive any comments on the baseline ballasts identified in the August 2020 NOPD and therefore continues to analyze the same baseline ballasts in this final determination. See chapter 5 of this final determination TSD for further details.

TABLE IV.5—BASELINE BALLASTS

Representative equipment class	Wattage	Ballast type	Circuit type	Starting method	Input voltage	System input power	Ballast efficiency
≥50 W and ≤100 W	70	Magnetic	HX–HPF	Pulse	Quad	89.5	0.782
>100 W and <150 W*	150	Magnetic	HX–HPF	Pulse	Quad	182.0	0.824
≥150 W and ≤250 W**	250	Magnetic	CWA	Pulse	Quad	281.5	0.888
>250 W and ≤500 W	400	Magnetic	CWA	Pulse	Quad	443.0	0.903
>500 W and ≤1,000 W	1,000	Magnetic	CWA	Pulse	Quad	1,068.4	0.936
>1,000 W and ≤2,000 W	1,500	Magnetic	CWA	Probe	Quad	1,625.0	0.923

* Includes 150 W fixtures initially exempted by EISA 2007, which are fixtures rated only for 150 watt lamps; rated for use in wet locations, as specified by the NFPA 70–2002, section 410.4(A); and containing a ballast that is rated to operate at ambient air temperatures above 50 °C, as specified by UL 1029–2007.
** Excludes 150 W fixtures initially exempted by EISA 2007, which are fixtures rated only for 150 watt lamps; rated for use in wet locations, as specified by the NFPA 70–2002, section 410.4(A); and containing a ballast that is rated to operate at ambient air temperatures above 50 °C, as specified by UL 1029–2007.

3. More-Efficient Ballasts

In the August 2020 NOPD, DOE selected more-efficient ballasts as replacements for each of the baseline ballasts by considering commercially available ballasts. DOE selected more-efficient ballasts with similar attributes as the baseline ballast when possible (*e.g.,* circuit type, input voltage). As with the baseline ballasts, DOE used the ballast efficiency values from the compliance certification database to identify more efficient ballasts for all equipment classes except for the >1,000 W and ≤2,000 W equipment class which does not have certification data available. For this equipment class, DOE determined ballast efficiency values by first gathering and analyzing catalog data. DOE then tested the ballasts to verify the ballast efficiency reported by the manufacturer. For instances where the catalog data did not align with the tested data, DOE selected more-efficient ballasts based on the tested ballast efficiency. 85 FR 47472, 47487.

DOE did not receive any comments on the more-efficient ballasts selected in the August 2020 NOPD and therefore continues to analyze the same more-efficient ballasts in this final determination. In the August 2020 NOPD and chapter 5 of the NOPD TSD there were typos in some characteristics specified for the more-efficient ballasts. The system input power for the 70 W EL 2 representative unit stated as 0.814 in the August 2020 NOPD and TSD and should have been specified as 81.4. The system input power for the 250 W EL 1 representative unit stated as 276.5 in the August 2020 NOPD and TSD should have been 278.7. The system input power for the 1,500 W EL 1 representative unit stated as 1,000 W, Pulse start, with a system input power of 1063.8 and ballast efficiency of 0.94 in the August 2020 NOPD should have been a 1,500 W, Probe start with system input of 1,600.9 and ballast efficiency of 0.937. These typos have been corrected in this document and chapter 5 of this final determination TSD. The characteristics of the more-efficient representative units are summarized in Tables IV.6 through IV.11 of this document. See chapter 5 of this final determination TSD for further details.

TABLE IV.6—70 W REPRESENTATIVE UNITS

Equipment class	EL	Technology	Rated wattage	Starting method	Input voltage	System input power	Ballast efficiency
≥50 W and ≤100 W	EL1	More Efficient Magnetic	70	Pulse	Tri	88.3	0.793
	EL2	Standard Electronic	70	Pulse	Quad	81.4	0.860
	EL3	Electronic Max-tech	70	Pulse	Quad	77.7	0.901

TABLE IV.7—150 W REPRESENTATIVE UNITS

Equipment class	EL	Technology	Rated wattage	Starting method	Input voltage	System input power	Ballast efficiency
>100 W and <150 W*	EL1	More Efficient Magnetic	150	Pulse	Quad	178.6	0.84
	EL2	Standard Electronic	150	Pulse	Quad	166.7	0.9
	EL3	Electronic Max-tech	150	Pulse	Quad	162.2	0.925

* Includes 150 W fixtures initially exempted by EISA 2007, which are fixtures rated only for 150 watt lamps; rated for use in wet locations, as specified by the NFPA 70–2002, section 410.4(A); and containing a ballast that is rated to operate at ambient air temperatures above 50 °C, as specified by UL 1029–2007.

TABLE IV.8—250 W REPRESENTATIVE UNITS

Equipment class	EL	Technology	Rated wattage	Starting method	Input voltage	System input power	Ballast efficiency
≥150 W and ≤250 W*	EL1	More Efficient Magnetic	250	Pulse	Quad	278.7	0.904
	EL2	Electronic Max Tech	250	Pulse	Tri	266.2	0.939

*Excludes 150 W fixtures initially exempted by EISA 2007, which are fixtures rated only for 150 watt lamps; rated for use in wet locations, as specified by the NFPA 70–2002, section 410.4(A); and containing a ballast that is rated to operate at ambient air temperatures above 50 °C, as specified by UL 1029–2007.

TABLE IV.9—400 W REPRESENTATIVE UNITS

Equipment class	EL	Technology	Rated wattage	Starting method	Input voltage	System input power	Ballast efficiency
>250 W and ≤500 W	EL1	More Efficient Magnetic	400	Pulse	Quad	440.5	0.908
	EL2	Electronic Max Tech	400	Pulse	Tri	426.0	0.939

TABLE IV.10—1000 W REPRESENTATIVE UNITS

Equipment class	EL	Technology	Rated wattage	Starting method	Input voltage	System input power	Ballast efficiency
>500 W and ≤1,000 W	EL1	More Efficient Magnetic	1000	Pulse	Quad	1063.8	0.94

TABLE IV.11—1500 W REPRESENTATIVE UNITS

Equipment Class	EL	Technology	Rated Wattage	Starting Method	Input Voltage	System input power	Ballast efficiency
>1,000 W and ≤2,000 W	EL1	More Efficient Magnetic	1500	Probe	Quad	1600.9	0.937

4. Efficiency Levels

Based on the more-efficient ballasts selected for analysis, DOE develops ELs for the representative equipment classes. DOE defines a ''max-tech'' efficiency level to represent the maximum possible efficiency for a given product.

In the August 2020 NOPD DOE identified one magnetic EL in every equipment class. The more-efficient magnetic EL represents a magnetic ballast with a higher grade of steel compared to the baseline. DOE identified a second EL (an electronic EL) for the ≥150 W and ≤250 W and >250 W and ≤500 W equipment classes. The standard electronic level represents a ballast with standard electronic circuitry. DOE identified a third EL (a more efficient electronic EL) in the ≥50 W and ≤ 100 W and >100 W and <150 W equipment classes. The more-efficient electronic EL represents an electronic ballast with an improved circuit design and/or more efficient components compared to the standard electronic level. 85 FR 47472, 47487–47488.

DOE received several comments regarding the ELs proposed in the August 2020 NOPD.

NEMA stated that DOE had not adequately explained the basis for changing efficiency equations from the previous rulemaking. NEMA stated that the modifications to the equations resulted in efficiency levels inconsistent with DOE's intent. (NEMA, No. 12 at p. 2)

Current MHLF standards specify power-law equations for ballasts operating lamps with rated wattages ≥50 W and ≤500 W and linear equations for ballasts operating lamps with rated wattages >500 W and ≤1,000 W. Using MHLF efficiency data DOE determined that the current equation forms remain valid. DOE modified only the coefficients and exponents of the equations to best fit the MHLF efficiency data while forming one continuous equation across equipment classes, where possible. In this final determination, DOE maintains the equations put forth in the August 2020 NOPD but makes minor adjustments, detailed in the paragraphs below, to the proposed coefficients and exponents to allow the most efficient products to meet max tech.

For the ≥50 W and ≤100 W equipment class tested at voltages other than 480 V NEMA stated that EL 1 and EL 2 appeared feasible but would require stretching the technological capability. NEMA stated that EL 3 for this equipment class may be achievable but would require physical size changes that would render the product incompatible with the existing fixture form factor. NEMA stated DOE should modify EL 1 and EL 2 according to current product capabilities and eliminate EL 3 for this equipment class. (NEMA, No. 12 at p. 2) Signify stated that for the ballasts in the ≥50 W and ≤100 W tested at voltages other than 480 V equipment class the minimum efficiency requirement would increase by 0.10 at the proposed EL 3. This would require a ballast to operate a 70 W lamp at an efficiency higher than 0.90. Signify stated that a 0.90 ballast efficiency requirement would be higher than DOE's current efficiency requirement for an external power supply, a device that is simpler with less stages than an electronic ballast. Signify stated it is difficult to explain how a ballast with the same power as an external power supply would have a higher efficiency and still preserve the necessary form factor. (Signify, No. 13 at pp. 8–10)

DOE identified ballasts in DOE's compliance certification database that are in the ≥50 W and ≤100 W tested at voltages other than 480 V equipment class and meet the proposed EL 3 for this equipment class. These ballasts included models that operate 70 W lamps. Because there are products that meet the max tech level, DOE is not adjusting ELs proposed for this equipment class in this final determination.

For the >100 W and <150 W equipment classes for all voltages, NEMA stated that EL 3 was unrealistically high for ballasts tested at 480 V (88.9 percent versus the current 82 percent requirement) and as high as 90.9 percent for ballasts tested at voltages other than 480 V. NEMA stated that based on its review of DOE's compliance certification database only four products [11] between 140 W and 150 W currently met this level of efficiency. (NEMA, No. 12 at p. 2)

DOE identified ballasts in DOE's compliance certification database that are in the >100 W and <150 W tested at voltages other than 480 V equipment class and meet the proposed EL 3 for this equipment class. Because there are products that meet the max tech level, DOE is not adjusting ELs proposed for this equipment class in this final determination. However, DOE is adjusting the ELs for the >100 W and <150 W tested at 480 V equipment class (see section IV.C.5 for further details) in this final determination.

NEMA stated that for the ≥150 W and ≤250 W equipment classes for all voltages the proposed ELs for 150 to 200 W are close to those in the previous rulemaking and therefore, already screened for technological feasibility. (NEMA, No. 12 at p. 3) DOE ensured that all ELs analyzed represent commercially available products and therefore, are technologically feasible.

NEMA stated that the proposed EL 1 for ballasts operating lamps between 200 W to 250 W appears slightly lower than the current standards, which is not permissible and should be amended. (NEMA, No. 12 at p. 3)

DOE reviewed all ELs developed for this analysis to ensure that they are equal to or more stringent to the existing minimum MHLF ballast efficiency standard (*i.e.,* that backsliding is not occurring). For EL 1 for the ≥150 W and ≤250 W equipment class tested at voltages other than 480 V, DOE is modifying the equation to ensure no backsliding occurs across the entire wattage range. Specifically, in this final determination DOE is modifying the exponent in the equation from $1/(1+0.5017*P^{\wedge}(-0.26))$ to $1/(1+0.507*P^{\wedge}(-0.263))$.

NEMA also stated that for ballasts operating lamps between 200 W and 250 W, EL 2 appears technologically feasible. Additionally, NEMA stated that based on its review of DOE's compliance certification database only two products operating lamps between 200 W and 250 W, both from a single manufacturer, met EL 3, which means EL 3 is arguably infeasible. (NEMA, No. 12 at p. 3)

DOE identified ballasts in DOE's compliance certification database that are in ≥150 W and ≤250 W tested at voltages other than 480 V equipment class and meet the proposed EL 3 for this equipment class. These ballasts are from multiple manufacturers. Because there are products that meet the max tech level, DOE is not adjusting ELs (aside from EL 1 to prevent backsliding) proposed for this equipment class in this final determination. DOE addresses ELs for the ≥150 W and ≤250 W tested at 480 V equipment class in section IV.C.5.

NEMA stated that the proposed EL 1 for ballasts operating lamps between 200 W and 500 W for all voltages appears slightly lower than the current standards, which is not permissible. (NEMA, No. 12 at p. 3)

For the >250 W and ≤500 W equipment class tested at voltages other than 480 V, NEMA stated that DOE's compliance certification database does not have products meeting EL 2 and EL 3 for higher wattages indicating that they are technologically infeasible. (NEMA, No. 12 at p. 3)

DOE identified ballasts in DOE's compliance certification database that are in the >250 W and ≤500 W equipment class tested at voltages other than 480 V equipment class and meet the proposed EL 3 for this equipment class. These ballasts operate 250 W and 400 W lamps. Because there are products that meet the max tech level, DOE is not adjusting ELs proposed for this equipment class in this final determination. For EL 1 for the ≥250 W and ≤500 W equipment class tested at voltages other than 480 V, DOE is modifying the equation to ensure no backsliding occurs across the entire wattage range. Specifically, in this final determination DOE is modifying the exponent in the equation from $1/(1 + 0.5017*P^{\wedge}(-0.26))$ to $1/(1 + 0.507*P^{\wedge}(-0.263))$.

For the >500 W and ≤1,000 W equipment class, NEMA stated that the 97 percent efficiency requirement at EL 1 would eliminate nearly all currently certified products making it technologically infeasible. NEMA stated that per DOE's compliance certification database the few ballasts that reach the 93 percent efficiency level would not be able to meet 97 percent efficiency because they operate 1,000 W lamps. (NEMA, No. 12 at p. 3)

The max tech level for the >500 W and ≤1,000 W equipment class tested at voltages other than 480V is based on a 1,000 W representative unit with an efficiency of 0.94. DOE identified ballasts in DOE's compliance certification database that are in the >500 W and ≤1,000 W tested at voltages other than 480 V equipment class and meet the proposed EL 1 (max tech) for this equipment class. Because there are products that meet the max tech level, DOE is not adjusting ELs proposed for this equipment class in this final determination. DOE addresses ELs for the >500 W and ≤1,000 W tested at 480 V equipment class in section IV.C.5.

For the >1,000 W and ≤2,000 W equipment class, Signify stated DOE should set a standard but disagreed with DOE's proposed EL for this equipment class. Signify noted that, per some ballast catalogs, DOE found that ballasts operating 2,000 W lamps are less efficient than those operating 1,000 W. Signify stated that ballast efficiency decreasing as wattage increases is contradictory to ballasts in other equipment classes and it had found no documented scientific or engineering explanation to substantiate such a trend. Signify stated that research indicates that for a magnetic transformer (or magnetic ballast) energy efficiency increases with the transformer power rate. To align with this trend, Signify suggested DOE change its proposed EL 1 equation from $-0.000008*P + 0.946$ to $0.00001*P + 0.928$ for the >1,000 W and ≤2,000 W equipment class. (Signify, No. 13 at pp. 2–5)

NEMA also stated that based on its calculations DOE was proposing a 93 percent efficiency for ballasts operating lamps at 1,000 W and 92 percent efficiency for those operating lamps at 2,000 W and it was unusual for efficiency requirements to decrease as wattage increases. (NEMA, No. 12 at p. 3) NEMA also stated that the proposed levels for the >1,000 W and ≤2,000 W equipment class appear technologically feasible. However, NEMA stated that because these products are not currently subject to standards and thus have no certified products, it cannot comment in detail on potential product availability. (NEMA, No. 12 at p. 3)

In developing the equation for the >1,000 W to ≤2,000 W equipment class DOE prioritized maintaining a continuous equation across product classes. Ballasts in the >1,000 W to ≤2,000 W equipment class are not currently subject to standards and therefore are not certified in DOE's compliance certification database. Based on the limited data available, maintaining a continuous equation resulted in a slight negative slope for the efficiency level equation.

Table IV.12 summarizes the efficiency requirements and associated equations

[11] It was unclear from the comment whether NEMA was referring to four products tested at 480 V or at voltages other than 480 V.

at each EL for the representative equipment classes. See chapter 5 of this final determination TSD for further details.

TABLE IV.12—SUMMARY OF ELS FOR REPRESENTATIVE EQUIPMENT CLASSES

Equipment class	EL	Technology	Minimum efficiency equation for ballasts not tested at 480 V *
≥50 W and ≤100 W	EL1	More Efficient Magnetic	1/(1+1.16*P^(−0.345)).
	EL2	Standard Electronic	1/(1+1*P^(−0.42)).
	EL3	Electronic Max Tech	1/(1+0.4*P^(−0.3)).
>100 W and <150 W	EL1	More Efficient Magnetic	1/(1+1.16*P^(−0.345)).
	EL2	Standard Electronic	1/(1+1*P^(−0.42)).
	EL3	Electronic Max Tech	1/(1+0.4*P^(−0.3)).
≥150 W and ≤250 W **	EL1	More Efficient Magnetic	1/(1+0.507*P^(−0.263)).
	EL2	Electronic Max Tech	1/(1+0.4*P^(−0.3)).
>250 W and ≤500 W **	EL1	More Efficient Magnetic	1/(1+0.507*P^(−0.263)).
	EL2	Electronic Max Tech	1/(1+0.4*P^(−0.3)).
>500 W and ≤1,000 W	EL1	More Efficient Magnetic	0.000057*P+0.881.
>1,000 W and ≤2,000 W	EL1	More Efficient Magnetic	−0.000008*P+0.946.

* P is defined as the rated wattage of the lamp the fixture is designed to operate.
** For this equipment class the EL 2 specified in the August 2020 NOPD was the same as EL 3. For clarity, only an EL 2 is specified in this final determination.

5. Scaling to Other Equipment Classes

In the August 2020 NOPD, DOE did not directly analyze MHLFs with ballasts that would be tested at an input voltage of 480 V. DOE developed a scaling relationship to establish ELs for these equipment classes. Ballasts capable of operating at 120 V or 277 V are predominantly quad-voltage ballasts, therefore, DOE chose to compare quad-voltage ballasts with 480 V ballasts to develop a scaling factor. 85 FR 47472, 47489–47490.

Based on its review of the compliance certification database, DOE determined that the average reduction in ballast efficiency for 480 V ballasts compared to quad ballasts is greater for ballasts designed to operate lamps rated less than 150 W compared to ballasts designed to operate lamps rated greater than or equal to 150 W. DOE developed two separate scaling factors, one for the 50 W–150 W range and the second for the 150 W–1000 W range. In the August 2020 NOPD for 480 V equipment classes in the 50 W–150 W range, DOE found the average reduction in ballast efficiency to be 3.0 percent, and for those in the 150 W–1000 W range, DOE found the average reduction in ballast efficiency to be 1.0 percent. DOE applied these scaling factors to the representative equipment class EL equations to develop corresponding EL equations for ballasts tested at an input voltage of 480 V. Accordingly, for the non-representative equipment classes DOE applied a multiplier of 0.97 for equations in the 50 W–150 W range and of 0.99 for equations in the 150 W–1000 W range. 85 FR 47472, 47489–47490.

DOE received comments on the scaled ELs proposed in the August 2020 NOPD. For ≥50 W and ≤100 W equipment class tested at 480 V, NEMA stated that a valid max tech proposal for magnetic ballasts is achieved with a 2 percent reduction of EL 1. (NEMA, No. 12 at p. 2) For the >100 W and <150 W equipment class tested at 480 V, NEMA stated that based on its review of products in DOE's compliance certification database only EL 1 was technologically feasible. (NEMA, No. 12 at p. 2)

DOE reviewed the 3 percent scaling factor for the equipment classes tested at 480 V in the 50 W–150 W range proposed in the August 2020 NOPD. Specifically, DOE reexamined the efficiencies of certified products in this equipment class to ascertain the reduction in ELs for the corresponding representative equipment class that would allow products to meet max tech levels. Per this review, DOE is revising the scaling factor to result in a 12 percent reduction (*i.e.,* multiplier of 0.88) rather than a 3 percent reduction (*i.e.,* multiplier of 0.97) to allow certified products to meet the max tech level. DOE determined that this adjustment results in EL 1 and EL 2 for the 480 V 50 W–150 W equipment classes requiring a minimum efficiency less stringent than the existing minimum standard. Hence, in this analysis, for equipment classes in the 50 W–150 W range tested at 480 V to prevent backsliding DOE maintained the current standard for EL 1 and EL 2 for this analysis. For EL 3, DOE applied a 0.88 multiplier (as determined above) to the corresponding representative equipment class EL 3 to develop a scaled EL 3 for this analysis.

For the >250 W and ≤500 W equipment class tested at 480 V, NEMA stated that the 1 percent scaling factor still does not allow any products in DOE's compliance certification database to meet the proposed ELs, making them technologically infeasible. (NEMA, No. 12 at p. 3) Signify stated that the proposed EL 1 for the >500 W and ≤1,000 W equipment class tested at 480V did not seem technologically feasible. Signify stated that such an efficiency for a magnetic ballast seemed impractical, particularly when there has been no research or innovation for the product. (Signify, No. 13 at pp. 6–8)

DOE identified ballasts in DOE's compliance certification database that are in the >500 W and ≤1,000 W tested at 480 V equipment class and meet the proposed EL 1 (max tech) for this equipment class. However, DOE did determine adjustments were needed to EL 1 (max tech) for the >250 W and ≤500 W equipment class tested at 480 V to allow for certified products to meet it. Hence, DOE reviewed the 1 percent scaling factor for the equipment classes tested at 480 V in the 150 W–1,000 W range proposed in the August 2020 NOPD. 85 FR 47472, 47489–47490. Per this review, DOE is revising the scaling factor to result in a 4 percent reduction (*i.e.,* multiplier of 0.96) rather than a 1 percent reduction (*i.e.,* multiplier of 0.99) to allow certified products to meet max tech. DOE determined that this adjustment results in EL 1 and EL 2 for equipment classes in the 150 W–1,000 W range requiring a minimum efficiency less stringent than the existing minimum standard. Hence, in this analysis, for equipment classes in the 150 W–1,000 W range tested at 480 V to prevent backsliding DOE maintained the current standard for EL 1 and EL 2 for this analysis. For EL 3, DOE applied a 0.96 multiplier (as determined above) to the corresponding representative equipment class EL 3 to develop the scaled EL 3 for this analysis.

Additionally, Signify stated the ELs in the August 2020 NOPD resulted in an energy efficiency for a ballast from the >500 W and <1,000 W equipment class tested at 480 V that is higher than ballast efficiency of the equipment class with the same wattage range but tested at other voltages. Signify stated that the opposite was true for all other equipment classes. (Signify, No. 13 at p. 6) Specifically, Signify stated that to meet the proposed EL 1 a ballast operating a 1,000 W lamp tested at 480 V would require an efficiency of 0.971 while the same ballast tested at 277 V would require 0.936. Hence for the >500 W and ≤1,000 W equipment class for ballasts tested at 480 V, Signify suggested DOE not adopt the proposed EL1 and instead maintain the existing standard. (Signify, No. 13 at p. 8)

In the August 2020 NOPD DOE specified the scaled equation for EL 1 of the >500 W and ≤1,000 W equipment class tested at 480 V as 0.99*(0.0001*P+0.881). 85 FR 47472, 47489–47490. The coefficient in this equation was erroneously rounded in Table IV.13 of the August 2020 NOPD and is correctly specified in this final determination as 0.99*(0.000057*P+0.881). With this correction, ballasts in the >500 W and ≤1,000 W equipment class tested at 480 V must meet a lower minimum efficiency than the same ballasts tested at voltages other than 480 V. However, as noted above, to prevent backsliding DOE maintained current standard for EL 1 of the >500 W and ≤1,000 W equipment class tested at 480 V for this analysis.

In the August 2020 NOPD and in this final determination, for ballasts greater than 1,000 W, DOE determined the need for a scaling factor based on manufacturer catalog data. DOE determined that ballasts greater than 1,000 W do not show a difference in efficiency between 480 V and non-480 V ballasts. DOE did not apply a scaling factor to develop efficiency levels for 480 V ballasts in this equipment class, however, DOE continues to consider the 480 V and non-480 V equipment classes separately for MHLFs greater than 1,000 W for the purposes of this analysis. 85 FR 47472, 47489–47490.

Table IV.13 summarizes the efficiency requirements at each EL for the non-representative equipment classes. See chapter 5 of this final determination TSD for further details.

TABLE IV.13—SUMMARY OF ELS FOR NON-REPRESENTATIVE EQUIPMENT CLASSES

Equipment class	EL	Technology	Minimum efficiency equation for ballasts tested at 480 V *
≥50 W and ≤100 W	EL1	Improved magnetic	1/(1+1.24*P^(−0.351))−0.02.
	EL2	Standard Electronic	1/(1+1.24*P^(−0.351))−0.02.
	EL3	Electronic Max Tech	0.88/(1+0.4*P^(−0.3)).
>100 W and <150 W	EL1	Improved magnetic	1/(1+1.24*P^(−0.351))−0.02.
	EL2	Standard Electronic	1/(1+1.24*P^(−0.351))−0.02.
	EL3	Electronic Max Tech	0.88/(1+0.4*P^(−0.3)).
≥150 W and ≤250 W **	EL1	Improved magnetic	0.88.
	EL2	Electronic Max Tech	0.96/(1+0.4*P^(−0.3)).
>250 W and ≤500 W **	EL1	Improved magnetic	For >250 and <265 W: 0.880. For ≥265 W and ≤500 W: 1/(1 + 0.876 × P^(−0.351))−0.010.
	EL2	Electronic Max Tech	For >250 and <265 W: 0.880. For ≥265 W and ≤500 W: 1/(1 + 0.876 × P^(−0.351))−0.010.
>500 W and ≤1,000 W	EL1	Improved magnetic	For >500 W and ≤750 W: 0.900. For >750 W and ≤1,000 W: 0.000104 × P + 0.822.
>1,000 W and ≤2,000 W	EL1	Improved magnetic	−0.000008*P+0.946.

* P is defined as the rated wattage of the lamp the fixture is designed to operate.

** For this equipment class the EL 2 specified in the August 2020 NOPD was the same as EL 3. For clarity, only an EL 2 is specified in this final determination.

6. Manufacturer Selling Price

DOE develops manufacturer selling prices (''MSPs'') for covered equipment and applies markups to create end-user prices to use as inputs to the LCC analysis and NIA. The MSP of a MHLF comprises of the MSP of the fixture components including any necessary additional features and the MSP of the metal halide ballast contained in the fixture. For the August 2020 NOPD, DOE conducted teardown analyses on 31 commercially available MHLFs and the ballasts included in these fixtures. Using the information from these teardowns, DOE summed the direct material, labor, and overhead costs used to manufacture a MHLF or MH ballast, to calculate the manufacturing production cost (''MPC'').[12] DOE then determined the MSPs of fixture components and more-efficient MH ballasts identified for each EL. 85 FR 47472, 47490–47491.

To determine the fixture components MSPs, DOE conducted fixture teardowns to derive MPCs of empty fixtures (*i.e.,* lamp enclosure and optics). The empty fixture does not include the ballast or lamp. DOE then added the other components required by the system (including ballast and any cost adders associated with electronically ballasted systems) and applied appropriate markups to obtain a final MSP for the entire fixture. 85 FR 47472, 47490–47491.

To calculate an empty fixture price, DOE first identified the applications commonly served by the representative wattage in each equipment class based on DOE's compliance certification database. DOE selected the most popular fixture types for both indoor and outdoor applications. The representative fixture types for each equipment class selected in the August 2020 NOPD are shown in Table IV.14. 85 FR 47472, 47490.

[12] When viewed from the company-wide perspective, the sum of all material, labor, and overhead costs equals the company's sales cost, also referred to as the cost of goods sold.

TABLE IV.14—REPRESENTATIVE FIXTURE TYPES

Representative equipment class	Representative wattage	Representative fixture types	
		Indoor	Outdoor
≥50 W and ≤100 W	70 W	Downlight	Bollard, Flood, Post Top, Wallpack.
>100 W and <150 W *	150 W	Downlight	Area, Flood, Post Top, Wallpack.
≥150 W and ≤250 W **	250 W	High-Bay	Area, Flood, Post Top, Cobrahead.
>250 W and ≤500 W	400 W	High-Bay	Area, Flood, Post Top, Cobrahead.
>500 W and ≤1,000 W	1,000 W	High-Bay	Area, Flood, Sports.
>1,000 W and ≤2,000 W	1,500 W	Sports	Sports.

* Includes 150 W fixtures initially exempted by EISA 2007, which are fixtures rated only for 150 watt lamps; rated for use in wet locations, as specified by the NFPA 70–2002, section 410.4(A); and containing a ballast that is rated to operate at ambient air temperatures above 50 °C, as specified by UL 1029–2007.

** Excludes 150 W fixtures initially exempted by EISA 2007, which are fixtures rated only for 150 watt lamps; rated for use in wet locations, as specified by the NFPA 70–2002, section 410.4(A); and containing a ballast that is rated to operate at ambient air temperatures above 50 °C, as specified by UL 1029–2007.

DOE then used teardown information for 31 fixtures that spanned the representative wattages and the applications identified for each representative wattage. The MPC of the empty fixture for each representative wattage was calculated by weighting the empty fixture cost for each application by the popularity of each application. DOE determined the weightings based on the number of fixtures for each application at each representative wattage in DOE's certification database. 85 FR 47472, 47490–47491.

The empty fixture MPCs remained the same at each magnetic efficiency level but incremental costs were added when the fixture contained an electronic ballast. Specifically, in the August 2020 NOPD, DOE applied cost adders to fixtures that use electronic ballasts for (1) transient protection, (2) thermal management, and (3) 120 V auxiliary power functionality. These costs varied based on whether the fixture application was indoor, indoor industrial, or outdoor. 85 FR 47472, 47491.

In the August 2020 NOPD DOE conducted market research to determine the prices of each cost adder. DOE determined the price of voltage transient protection to be $9.03. DOE determined that the increase in the empty fixture cost to be 20 percent for adding thermal management to a fixture. DOE determined the average market price of the 120 V auxiliary tap to be $7.38. DOE added these costs to the empty fixture MPC for outdoor and indoor industrial fixtures at ELs requiring an electronic ballast. Because the auxiliary tap is needed in only 10 percent of the ballasts in indoor fixtures, DOE added $0.74 to the indoor empty fixture MPC for ELs requiring an electronic ballast. 85 FR 47472, 47491.

In the August 2020 NOPD, DOE applied a fixture manufacturer markup of 1.58 to the empty fixture MPC to determine the MSP of the fixture at each EL. DOE maintained the manufacturer markup developed in the 2014 MHLF final rule. In that rule, DOE determined the fixture manufacturer markup to be 1.58 based on financial information from manufacturers' SEC 10–K reports, as well as feedback from manufacturer interviews. 85 FR 47472, 47491.

For the August 2020 NOPD, to determine the MPCs of the metal halide ballasts identified in this analysis, DOE used data from the teardown analysis which included cost data for magnetic ballasts at the baseline in each equipment class. To determine the ballast MPC at the higher efficiency levels, DOE developed a ratio between the average retail price of ballasts at the efficiency level under consideration and ballasts at the baseline. DOE collected retail prices from electrical distributors (*e.g.,* Grainger, Graybar) as well as internet retailers to determine average retail prices for ballasts. For ELs without retail prices available, DOE used a ratio between the same efficiency levels in a different wattage class or interpolated based on efficiency and ballast MPC. 85 FR 47472, 47491.

In the August 2020 NOPD, DOE applied a ballast manufacturer markup of 1.47 to the empty fixture MPC to determine the MSP of the fixture at each EL. DOE maintained the manufacturer markup developed in the 2014 MHLF final rule. In that rule, DOE determined the ballast manufacturer markup to be 1.47 based on financial information from manufacturers' SEC 10–K reports, as well as feedback from manufacturer interviews. 79 FR 7746, 7783

The CA IOUs stated that DOE used cost assumptions for lamps, ballasts, and housing from the previous rulemaking which was conducted six years ago and did not provide empirical data to support that the assumptions were still valid given the evolving lighting market. (CA IOUs, No. 14, p. 2)

As noted, DOE developed fixture and ballast prices based on teardowns and retail price collections conducted for this analysis. Additionally, DOE conducted market research for this rulemaking to confirm the cost adder estimates used in the 2014 MHLF final rule. DOE determined that there are likely minimal changes to the financial structure of fixture or ballast manufacturers and therefore, the respective markups from the 2014 MHLF final rule remain valid.

DOE is maintaining the results of MSPs determined in the August 2020 NOPD for this final determination. The total empty fixture MSPs, replacement ballast MSPs, and fixture with ballast MSPs are detailed in chapter 5 of the final determination TSD.

D. Markups Analysis

The markups analysis develops appropriate markups (*e.g.,* manufacturer markups, retailer markups, distributor markups, contractor markups) in the distribution chain and sales taxes to convert the MSP estimates derived in the engineering analysis to consumer prices, which are then used in the LCC and PBP analysis and in the MIA. At each step in the distribution channel, companies mark up the price of the product to cover business costs and profit margin. DOE used the same distribution channels and wholesaler and contractor markups as in the August 2020 NOPD, following the 2014 MHLF final rule, for this final determination.

1. Distribution Channels

Before it could develop markups, DOE needed to identify distribution channels (*i.e.,* how the equipment is distributed from the manufacturer to the end-user) for the MHLF designs addressed in this rulemaking. In an electrical wholesaler distribution channel, DOE assumed the fixture manufacturer sells the fixture to an electrical wholesaler (*i.e.,* distributor), who in turn sells it to a contractor, who sells it to the end-user. In a contractor distribution channel, DOE assumed the fixture manufacturer sells the fixture directly to a contractor, who sells it to the end-user. In a utility distribution channel, DOE assumed the fixture manufacturer sells the fixture directly to the end-user (*i.e.,* electrical utility). Indoor fixtures are all assumed to go through the electrical wholesaler distribution channel. Outdoor fixtures are assumed to go through all three distribution channels as follows: 60 percent electrical wholesaler, 20 percent contractor, and 20 percent utility.

2. Estimation of Markups

To estimate wholesaler and utility markups, DOE used financial data from 10–K reports of publicly owned electrical wholesalers and utilities. DOE's markup analysis developed both baseline and incremental markups to transform the fixture MSP into an end-user equipment price. DOE used the baseline markups to determine the price of baseline designs. Incremental markups are coefficients that relate the change in the MSP of higher-efficiency designs to the change in the wholesaler and utility sales prices, excluding sales tax. These markups refer to higher-efficiency designs sold under market conditions with new and amended energy conservation standards.

In the August 2020 NOPD, DOE used the same wholesaler and contractor markups as the 2014 MHLF final rule and assumed a wholesaler baseline markup of 1.23 and a contractor markup of 1.13, yielding a total wholesaler distribution channel baseline markup of 1.49. The lower wholesaler incremental markup of 1.05 yields a lower total incremental markup through this distribution channel of 1.27. DOE also assumed a utility markup of 1.00 for the utility distribution channel in which the manufacturer sells a fixture directly to the end-user. DOE again assumed a contractor markup of 1.13 for the utility distribution channel in which a manufacturer sells a fixture to a contractor who in turn sells it to the end-user yielding an overall markup of 1.21 for this channel. 85 FR 47472, 47492. DOE used these same markups for this final determination analysis.

The sales tax represents state and local sales taxes applied to the end-user equipment price. DOE obtained state and local tax data from the Sales Tax Clearinghouse.[13] These data represent weighted averages that include state, county, and city rates. DOE then calculated population-weighted average tax values for each census division and large state, and then derived U.S. average tax values using a population-weighted average of the census division and large state values. For this final determination, this approach provided a national average tax rate of 7.3 percent.

3. Summary of Markups

Table IV.15 summarizes the markups at each stage in the distribution channels and the overall baseline and incremental markups, and sales taxes, for each of the three identified channels.

TABLE IV.15—SUMMARY OF FIXTURE DISTRIBUTION CHANNEL MARKUPS

	Wholesaler distribution		Utility distribution			
			Via wholesaler and contractor		Direct to end user	
	Baseline	Incremental	Baseline	Incremental	Baseline	Incremental
Electrical Wholesaler (Distributor)	1.23	1.05	N/A	N/A	N/A	N/A
Utility	N/A	N/A	1.00	1.00	1.00	1.00
Contractor or Installer	1.13	1.13	1.13	1.13	N/A	N/A
Sales Tax	1.07		1.07		1.07	
Overall	1.49	1.27	1.21	1.21	1.07	1.07

Using these markups, DOE generated fixture end-user prices for each EL it considered, assuming that each level represents a new minimum efficiency standard.

Chapter 6 of the final determination TSD provides details on DOE's development of markups for MHLFs.

E. Energy Use Analysis

The purpose of the energy use analysis is to determine the annual energy consumption of MHLFs at different efficiencies in the commercial, industrial, and outdoor stationary sectors, and to assess the energy savings potential of increased MHLF efficiency. The energy use analysis estimates the range of energy use of MHLFs in the field (*i.e.,* as they are actually used by customers). The energy use analysis provides the basis for other analyses DOE performed, particularly assessments of the energy savings and the savings in operating costs that could result from adoption of amended or new standards.

To develop annual energy use estimates, DOE multiplied the lamp-and-ballast system input power (in watts) by annual usage (in hours per year). DOE characterized representative lamp-and-ballast systems in the engineering analysis, which provided measured input power ratings. To characterize the country's average usage of fixtures for a typical year, DOE developed annual operating hour distributions by sector, using data published in the 2015 U.S. Lighting Market Characterization (''LMC'').[14] For the ≥50 W and ≤100 W to >500 W and ≤1,000 W equipment classes, DOE obtained weighted-average annual operating hours for the commercial, industrial, and outdoor stationary sectors of approximately 2,300 hours, 5,100 hours, and 5,000 hours, respectively. For the 1,500 W equipment class, DOE assigned annual operating hours of approximately 770 hours for all lamps according to the 2015 LMC estimate of 2.1 hours per day for sports field lighting, consistent with the methodology from the August 2020 NOPD analysis. 85 FR 47472, 47492.

Chapter 7 of the final determination TSD provides details on DOE's energy use analysis for MHLFs.

F. Life-Cycle Cost and Payback Period Analysis

DOE conducted LCC and PBP analyses to evaluate the economic impacts on individual customers of

[13] Sales Tax Clearinghouse, Inc. *The Sales Tax Clearinghouse.* (Last accessed June 16, 2021.) *https://thestc.com/STRates.stm.*

[14] Navigant Consulting, Inc. *2015 U.S. Lighting Market Characterization.* 2017. U.S. Department of Energy: Washington, DC. Report No. DOE/EE–1719. (Last accessed February 3, 2020.) *https://energy.gov/eere/ssl/downloads/2015-us-lighting-market-characterization.*

potential energy conservation standards for MHLFs. The effect of new or amended energy conservation standards on individual customers usually involves a reduction in operating cost and an increase in purchase cost. DOE used the following two metrics to measure customer impacts:

□ The LCC is the total customer expense of equipment over the life of that equipment, consisting of total installed cost (manufacturer selling price, distribution chain markups, sales tax, and installation costs) plus operating costs (expenses for energy use, maintenance, and repair). To compute the operating costs, DOE discounts future operating costs to the time of purchase and sums them over the lifetime of the equipment.

□ The PBP is the estimated amount of time (in years) it takes customers to recover the increased purchase cost (including installation) of a more-efficient equipment through lower operating costs. DOE calculates the PBP by dividing the change in purchase cost at higher efficiency levels by the change in annual operating cost for the year that amended or new standards are assumed to take effect.

For any given efficiency level, DOE measured the change in LCC relative to the LCC in the no-new-standards case, which reflects the estimated efficiency distribution of MHLFs in the absence of new or amended energy conservation standards. In contrast, the PBP for a given efficiency level is measured relative to the baseline equipment.

For each considered efficiency level in each equipment class, DOE calculated the LCC and PBP for a nationally representative set of building types. As stated previously, DOE developed customer samples from the 2015 LMC. For each sample customer, DOE determined the energy consumption for the MHLF and the appropriate electricity price. By developing a representative sample of building types, the analysis captured the variability in energy consumption and energy prices associated with the use of MHLFs.

Inputs to the calculation of total installed cost include the cost of the equipment—which includes MPCs, manufacturer markups, retailer and distributor markups, and sales taxes—and installation costs. Inputs to the calculation of operating expenses include annual energy consumption, energy prices and price projections, repair and maintenance costs, equipment lifetimes, and discount rates. DOE created distributions of values for operating hours, equipment lifetime, discount rates, electricity prices, and sales taxes, with probabilities attached to each value, to account for their uncertainty and variability. For example, DOE created a probability distribution of annual energy consumption in its energy use analysis, based in part on a range of annual operating hours. The operating hour distributions capture variations across building types, lighting applications, and metal halide systems for three sectors (commercial, industrial, and outdoor stationary). In contrast, fixture MSPs were specific to the representative designs evaluated in DOE's engineering analysis, and price markups were based on limited, publicly available financial data. Consequently, DOE used discrete values instead of distributions for these inputs.

The computer model DOE uses to calculate the LCC and PBP, which incorporates Crystal Ball™ (a commercially available software program), relies on a Monte Carlo simulation to incorporate uncertainty and variability into the analysis. The Monte Carlo simulations randomly sample input values from the probability distributions and MHLF user samples. The model calculated the LCC and PBP for equipment at each efficiency level for 10,000 customers per simulation run. The analytical results include a distribution of 10,000 data points showing the range of LCC savings for a given efficiency level relative to the no-new-standards case efficiency distribution. In performing an iteration of the Monte Carlo simulation for a given consumer, product efficiency is chosen based on its probability. If the chosen product efficiency is greater than or equal to the efficiency of the standard level under consideration, the LCC and PBP calculation reveals that a consumer is not impacted by the standard level. By accounting for consumers who already purchase more-efficient products, DOE avoids overstating the potential benefits from increasing product efficiency.

DOE calculated the LCC and PBP for all customers of MHLFs as if each were to purchase new equipment in the expected year of required compliance with new or amended standards. Any amended standards would apply to MHLFs manufactured three years after the date on which any new or amended standard is published. (42 U.S.C. 6295(hh)(3)(B)) At this time, DOE estimates publication of a final determination in the latter half of 2021. Therefore, for purposes of its analysis, DOE used 2025 as the first year of compliance with any amended standards for MHLFs.

Table IV.16 summarizes the approach and data DOE used to derive inputs to the LCC and PBP calculations. The subsections that follow provide further discussion. Details of the spreadsheet model, and of all the inputs to the LCC and PBP analyses, are contained in chapter 8 of the final determination TSD and its appendices.

TABLE IV.16—SUMMARY OF INPUTS AND METHODS FOR THE LCC AND PBP ANALYSIS *

Inputs	Source/method
Equipment Cost	Derived by multiplying MSPs by distribution channel markups (taken from the 2014 MHLF final rule) and sales tax.
Installation Costs	Used the same installation costs as in the 2014 MHLF final rule, but inflated to 2020$. The 2014 MHLF final rule costs were calculated using estimated labor times and applicable labor rates from "RS Means Electrical Cost Data" (2013), Sweets Electrical Cost Guide 2013, and the U.S. Bureau of Labor Statistics.
Annual Energy Use	The total annual energy use multiplied by the operating hours per year, which were determined separately for indoor and outdoor fixtures. Average number of hours based on the 2015 LMC.
Energy Prices	*Electricity:* Based on Edison Electric Institute data for 2019. *Variability:* Regional energy prices determined for 13 census divisions and large states.
Energy Price Trends	Based on *AEO 2021* price projections.
Replacement Costs	Used the same labor and material costs for lamp and ballast replacements as in the 2014 MHLF final rule, but inflated to 2020$.
Equipment Lifetime	*Ballasts:* Assumed an average of 50,000 hours for magnetic ballasts and 40,000 hours for electronic ballasts. *Fixtures:* Assumed an average of 20 years for indoor fixtures and 25 years for outdoor fixtures.

TABLE IV.16—SUMMARY OF INPUTS AND METHODS FOR THE LCC AND PBP ANALYSIS *—Continued

Inputs	Source/method
Discount Rates	Developed a distribution of discount rates for the commercial, industrial, and outdoor stationary sectors.
Compliance Date	2025.

* References for the data sources mentioned in this table are provided in the sections following the table or in chapter 8 of the final determination TSD.

1. Equipment Cost

To calculate customer equipment costs, DOE multiplied the MSPs developed in the engineering analysis by the markups described previously (along with sales taxes). DOE used different markups for baseline equipment and higher-efficiency equipment, because DOE applies an incremental markup to the increase in MSP associated with higher-efficiency equipment. See section IV.D for further details.

2. Installation Cost

Installation cost is the cost to install the fixture such as the labor, overhead, and any miscellaneous materials and parts needed. DOE used the installation costs from the 2014 MHLF final rule, but inflated to 2020$ using the GDP price deflator.[15]

3. Annual Energy Consumption

For each sampled customer, DOE determined the energy consumption for an MHLF at different efficiency levels using the approach described previously in section IV.E of this document. For this final determination, DOE based the annual energy use inputs on sectoral operating hour distributions (commercial, industrial, and outdoor stationary sectors), with the exception of a discrete value (approximately 770 hours per year) for the 1,500 W equipment class that is primarily limited to sports lighting. DOE used operating hour (and, by extension, energy use) distributions to better characterize the potential range of operating conditions faced by MHLF customers.

4. Energy Prices

Because marginal electricity price more accurately captures the incremental savings associated with a change in energy use from higher efficiency, it provides a better representation of incremental change in consumer costs than average electricity prices. Therefore, DOE applied average electricity prices for the energy use of the product purchased in the no-new-standards case, and marginal electricity prices for the incremental change in energy use associated with the other efficiency levels considered in this final determination.

DOE derived annual electricity prices in 2019 for each census division using data from the Edison Electric Institute (EEI) Typical Bills and Average Rates reports.[16] Marginal prices depend on both the change in electricity consumption and the change in monthly peak-coincident demand. DOE used the EEI data to estimate both marginal energy charges and marginal demand charges.

DOE calculated weighted-average values for average and marginal price for the 13 census divisions and large states for the commercial, industrial, and outdoor stationary sectors.

To estimate energy prices in future years, DOE multiplied the average regional energy prices by a projection of annual change in national-average commercial and industrial energy prices in the Reference case of *Annual Energy Outlook 2021 (AEO 2021).* [17] *AEO 2021* has an end year of 2050. DOE assumed regional electricity prices after 2050 are constant at their 2050 price.

5. Replacement Costs

Replacement costs include the labor and materials costs associated with replacing a ballast or lamp at the end of their lifetimes and are annualized across the years preceding and including the actual year in which equipment is replaced. The costs are taken from the 2014 MHLF final rule but inflated to 2020$ using the GDP price deflator. For the LCC and PBP analysis, the analysis period corresponds with the fixture lifetime that is assumed to be longer than that of either the lamp or the ballast. For this reason, ballast and lamp prices and labor costs associated with lamp or ballast replacements are included in the calculation of operating costs.

The CA IOUs suggested that DOE update the MHLF cost data for lamps, ballasts, and housings, rather than using the costs from the 2014 MHLF final rule. (CA IOUs, No. 14 at p. 2) DOE notes that replacement costs for ballasts come directly from this final determination engineering analysis (see section IV.C). However, DOE has continued to use the replacement lamp costs from the 2014 MHLF final rule (but inflated to 2020$). The CA IOUs acknowledged that MHLFs are a legacy lighting technology, and NEMA stated that there has been an 80 percent decline in the MHLFs market from 2008–2018. (CA IOUs, No. 14 at pp. 1–2; NEMA, No. 12 at p. 2) Given this recent substantial decline in the MHLFs market, it is unlikely that prices would have changed appreciably due to price learning since the 2014 MHLF final rule analysis was conducted. Therefore, DOE has only applied inflation to the MHLF replacement lamp prices since the 2014 MHLF final rule analysis.

6. Equipment Lifetime

DOE defined equipment lifetime as the age when a fixture, ballast, or lamp is retired from service. For fixtures in all equipment classes, DOE assumed average lifetimes for indoor and outdoor fixtures of 20 and 25 years, respectively. DOE also assumed that magnetic ballasts had a rated lifetime of 50,000 hours and electronic ballasts had a rated lifetime of 40,000 hours. DOE used manufacturer catalog data to obtain rated lifetime estimates (in hours) for lamps in each equipment class. DOE accounted for uncertainty in the fixture, ballast, and lamp lifetimes by applying Weibull survival distributions to the components' rated lifetimes. Furthermore, DOE included a residual value calculation for lamps and ballasts to account for the residual monetary value associated with the remaining life in the lamp and ballast at the end of the fixture lifetime. As stated in the 2020 NOPD, DOE based all assumptions for estimating equipment lifetime from the 2014 MHLF final rule. 85 FR 47472, 47494.

7. Discount Rates

The discount rate is the rate at which future expenditures are discounted to

[15] U.S. Bureau of Economic Analysis (BEA). *Table 1.1.9. Implicit Price Deflators for Gross Domestic Product.* U.S. Department of Commerce: Washington, DC. *www.bea.gov/iTable/.*

[16] Edison Electric Institute. *Typical Bills and Average Rates Report.* 2019. Winter 2019, Summer 2019: Washington, DC.

[17] U.S. Energy Information Administration. *Annual Energy Outlook 2021 with Projections to 2050.* 2021. Washington, DC. (Last accessed March 18, 2021.) *www.eia.gov/outlooks/aeo/.*

estimate their present value. In this final determination, DOE estimated separate discount rates for commercial, industrial, and outdoor stationary applications. DOE used discount rate data from a 2019 Lawrence Berkeley National Laboratory report.[18] The average discount rates, weighted by the shares of each rate value in the sectoral distributions, are 8.3 percent for commercial end-users, 8.8 percent for industrial end-users, and 3.2 percent for outdoor stationary end-users. For more information regarding discount rates, see chapter 8 of the final determination TSD.

8. Energy Efficiency Distribution in the No-New-Standards Case

DOE developed a no-new-standards case efficiency distribution using model count data from the compliance certification database collected on May 5, 2021. The compliance certification database does not contain models in the >1,000 W and ≤2,000 W equipment class; therefore, DOE assumed 56 percent of the market is at the baseline and 44 percent of the market is at EL 1, based on MHLF catalog data. The complete efficiency distribution for 2025 is shown in Table IV.17.

TABLE IV.17—MHLF EFFICIENCY DISTRIBUTION BY EQUIPMENT CLASS FOR 2025

Efficiency level	Equipment class *					
	≥50 W and ≤100 W (%)	>100 W and <150 W (%)	≥150 W and ≤250 W (%)	>250 W and ≤500 W (%)	>500 W and ≤1,000 W (%)	>1000 W and ≤2,000 W (%)
0	82.0	16.4	53.6	95.6	97.1	56.0
1	1.2	32.9	40.1	1.1	2.9	44.0
2	9.5	0.0	6.3	3.3		
3	7.4	50.7				

* Columns may not sum to 100% due to rounding.

See chapter 8 of the final determination TSD for further information on the derivation of the efficiency distributions.

9. Payback Period Analysis

The payback period is the amount of time it takes the consumer to recover the additional installed cost of more-efficient products, compared to baseline products, through energy cost savings. Payback periods are expressed in years. Payback periods that exceed the life of the product mean that the increased total installed cost is not recovered in reduced operating expenses.

The inputs to the PBP calculation for each efficiency level are the change in total installed cost of the product and the change in the first-year annual operating expenditures relative to the baseline. The PBP calculation uses the same inputs as the LCC analysis, except that discount rates are not needed.

As noted previously, EPCA establishes a rebuttable presumption that a standard is economically justified if the Secretary finds that the additional cost to the consumer of purchasing a product complying with an energy conservation standard level will be less than three times the value of the first year's energy savings resulting from the standard, as calculated under the applicable test procedure. (42 U.S.C. 6295(o)(2)(B)(iii)) For each considered efficiency level, DOE determined the value of the first year's energy savings by calculating the energy savings in accordance with the applicable DOE test procedure, and multiplying those savings by the average energy price projection for the year in which compliance with the amended standards would be required.

G. Shipments Analysis

DOE uses projections of annual equipment shipments to calculate the national impacts of potential amended or new energy conservation standards on energy use and NPV.[19] The shipments model takes an accounting approach, tracking market shares of each equipment class and the vintage of units in the stock. Stock accounting uses equipment shipments as inputs to estimate the age distribution of in-service equipment stocks for all years. The age distribution of in-service equipment stocks is a key input to calculations of both the NES and NPV, because operating costs for any year depend on the age distribution of the stock.

The stock turnover model calculates demand for new MHLFs based on the expected demand for replacement MHLFs and the decrease in MHLF demand due to the adoption of out-of-scope LED alternatives. The model is initialized using a time series of historical shipments data compiled from the 2014 MHLF final rule and data from NEMA. The historical shipments for 2008 from the 2014 MHLF final rule were projected to 2018 using NEMA sales indices from 2008 to 2018. 79 FR 7746, 7788–89. DOE used NEMA provided sales indices for the second quarter of 2020 for metal halide lamps to project the historical shipments forward to 2020.[20] The updated projection from the NEMA data gives a faster decline of historical shipments compared to the projection used in the MHLF NOPD. 85 FR 47472, 47495.

NEMA commented in their response to the MHLF NOPD that the market for MHLFs has continued to show a steady decline since the July 2019 RFI in favor of LED Technology. (NEMA, No. 12 at p. 2) With the diminishing shipments there is no reasonable possibility of industry recovering investments in new conservation standards of MHLFs. As in the previous rulemaking, DOE continued to assume that an increasing fraction of the MHLF market will move to out-of-scope LED alternatives over the course of the shipments analysis period. 85 FR 47472, 47495. DOE modelled the incursion of LED equipment in the form of a Bass diffusion curve.[21] The parameters for the Bass diffusion curve are based on fitting a Bass diffusion curve to market share data for general service LED lamps based on data

[18] Fujita, K.S. *Commercial, Industrial, and Institutional Discount Rate Estimation for Efficiency Standards Analysis: Sector-Level Data 1998–2018. 2019.* Lawrence Berkeley National Laboratory: Berkeley, CA. (Last accessed January 15, 2020.) *https://eta.lbl.gov/publications/commercial-industrial-institutional.*

[19] DOE uses data on manufacturer shipments as a proxy for national sales, as aggregate data on sales are lacking. In general, one would expect a close correspondence between shipments and sales.

[20] HID Lamp Sales Indices. National Electrical Manufacturing Association. *www.nema.org/analytics/Indices/view/Fourth-Quarter-2019-HID-Lamp-Indexes-Decrease-Compared-to-Previous-Quarter-and-Year.* (Last accessed on May 5, 2021.)

[21] Bass, F.M. A New Product Growth Model for Consumer Durables. *Management Science.* 1969. 15(5): pp. 215–227.

published by NEMA. This same approach was used in the final determination for general service incandescent lamps (GSILs); see chapter 9 of that final determination TSD.[22] 84 FR 71626 (December 27, 2019).

The CA IOUs commented on the MHLF NOPD that DOE's current A-Line based shipment curves approach to modelling shipments for MHLF products should be replaced by a diffusion curve based on linear fluorescent shipments. (CA IOUs, No. 14 at p. 2) However, DOE found that a Bass diffusion curve based on market share data for general service LED lamps provided a better fit to the historic MHLF shipments data from NEMA than a Bass diffusion curve based on linear fluorescent shipments, and NEMA expressed support for the shipment declines projected in the NOPD. (NEMA, No. 12 at p. 2) Additionally, the lighting power allowance from the 2019 update to ASHRAE 90.1, noted during the MHLF NOPD public meeting, suggests a rapid transition to LED technology. (EEI, Public Meeting Transcript, No. 11 at p. 47) As a result, DOE continued to base the Bass diffusion model on market share data for general service LED lamps for this final determination.

Another key input to the national impacts analysis is the distribution of MHLF shipments by EL in the no-new standards case and the standards cases. DOE apportioned the total shipments of MHLFs to each EL in the no-new-standards case using data downloaded from the compliance certification database[23] and data provided by NEMA in comments to the July 2019 RFI. (NEMA, No. 3 at pp. 11–14). Equipment listed in the CCMS database were categorized by equipment class, efficiency level, and ballast type. The counts for each category were scaled based on ballast type by the NEMA market shares for magnetic and electronic ballasts reported in 2018.

For the standards cases, DOE used a ''roll-up'' approach to estimate market share for each EL for the year that standards are assumed to become effective (2025). For each standards case, the market shares of ELs in the no-new-standards case that do not meet the standard under consideration ''roll up'' to meet the new standard level, and the market share of equipment above the standard remains unchanged.

For both the no-new-standards and standards cases, DOE assumed no efficiency trend over the analysis period. For a given case, market shares were held fixed to their 2025 distribution.

DOE typically includes the impact of price learning in its analysis. In a standard price learning model,[24] the price of a given technology is related to its cumulative production, as represented by total cumulative shipments. DOE assumed MHLFs have reached a stable price point due to the high volume of total cumulative shipments and would not undergo price learning in this final determination analysis.

H. National Impact Analysis

The NIA assesses the NES and the NPV from a national perspective of total customer costs and savings that would be expected to result from new or amended standards at specific efficiency levels.[25] DOE calculates the NES and NPV for the potential standard levels considered based on projections of annual equipment shipments, along with the annual energy consumption and total installed cost data from the energy use and LCC analyses. For the present analysis, DOE projected the energy savings, operating cost savings, equipment costs, and NPV of customer benefits over the lifetime of MHLFs sold from 2025 through 2054.

DOE evaluates the impacts of new or amended standards by comparing a case without such standards with standards-case projections. The no-new-standards case characterizes energy use and customer costs for each equipment class in the absence of new or amended energy conservation standards. DOE compares the no-new-standards case with projections characterizing the market for each equipment class if DOE adopted new or amended standards at specific energy efficiency levels (*i.e.,* the TSLs or standards cases) for that class. For the standards cases, DOE considers how a given standard would likely affect the market shares of equipment with efficiencies greater than the standard.

DOE uses a spreadsheet model to calculate the energy savings and the national customer costs and savings from each TSL. Interested parties can review DOE's analyses by changing various input quantities within the spreadsheet. The NIA spreadsheet model uses typical values (as opposed to probability distributions) as inputs.

Table IV.18 summarizes the inputs and methods DOE used for the NIA analysis for this final determination. Discussion of these inputs and methods follows the table. See chapter 10 of the final determination TSD for further details.

TABLE IV.18—SUMMARY OF INPUTS AND METHODS FOR THE NATIONAL IMPACT ANALYSIS

Inputs	Method
Shipments	Annual shipments from shipments model for each considered TSL.
First Full Year of Standard Compliance	2025.
No-new-standards Case Efficiency Trend	No trend assumed.
Standards Case Efficiency Trend	No trend assumed.
Annual Energy Consumption per Unit	Calculated for each efficiency level based on inputs from the energy use analysis.
Total Installed Cost per Unit	MHLF prices and installation costs from the LCC analysis.
Repair and Maintenance Cost per Unit	Cost to replace lamp and ballast over the lifetime of the fixture.
Residual Value per Unit	The monetary value of remaining lamp and ballast lifetime at the end of the fixture lifetime.
Electricity Prices	Estimated marginal electricity prices from the LCC analysis.
Electricity Price Trends	*AEO 2021* forecasts (to 2050) and extrapolation thereafter.
Energy Site-to-Primary and FFC Conversion	A time-series conversion factor based on *AEO 2021.*
Discount Rate	3 percent and 7 percent.
Present Year	2021.

[22] Chapter 9 of the GSIL final determination TSD is available at *www.regulations.gov/document?D=EERE-2019-BT-STD-0022-0116.*

[23] See *www.regulations.doe.gov/certification-data/products.html* (Last accessed on May 5, 2021).

[24] Taylor, M. and S.K. Fujita. *Accounting for Technological Change in Regulatory Impact Analyses: The Learning Curve Technique.* 2013. Lawrence Berkeley National Laboratory: Berkeley, CA. Report No. LBNL–6195E. (Last accessed January 7, 2020.) *https://eta.lbl.gov/publications/accounting-technological-change.*

[25] The NIA accounts for impacts in the 50 states and U.S. territories.

1. National Energy Savings

The national energy savings analysis involves a comparison of national energy consumption of the considered equipment between each potential TSL and the case with no new or amended energy conservation standards. DOE calculated the national energy consumption by multiplying the number of units (stock) of each equipment type (by vintage or age) by the unit energy consumption (also by vintage). DOE calculated annual NES based on the difference in national energy consumption for the no-new standards case and for each higher efficiency standard case. DOE estimated energy consumption and savings based on site energy and converted the electricity consumption and savings to primary energy (*i.e.,* the energy consumed by power plants to generate site electricity) using annual conversion factors derived from *AEO 2021.* Cumulative energy savings are the sum of the NES for each year over the timeframe of the analysis.

DOE generally accounts for the direct rebound effect in its NES analyses. Direct rebound reflects the idea that as appliances become more efficient, customers use more of their service because their operating cost is reduced. In the case of lighting, the rebound effect could be manifested in increased hours of use or in increased lighting density (lumens per square foot). In response to the July 2019 RFI, NEMA commented that a rebound rate of 0 is appropriate. (NEMA, No. 3 at p. 9) DOE assumed no rebound effect for MHLFs in this final determination.

In 2011, in response to the recommendations of a committee on ''Point-of-Use and Full-Fuel-Cycle Measurement Approaches to Energy Efficiency Standards'' appointed by the National Academy of Sciences, DOE announced its intention to use FFC measures of energy use and greenhouse gas and other emissions to the extent that emissions analyses are conducted. 76 FR 51281 (Aug. 18, 2011). After evaluating the approaches discussed in the August 18, 2011 notice, DOE published a statement of amended policy in which DOE explained its determination that Energy Information Administration's (EIA's) National Energy Modeling System (''NEMS'') is the most appropriate tool for its FFC analysis and its intention to use NEMS for that purpose. 77 FR 49701 (Aug. 17, 2012). NEMS is a public domain, multi-sector, partial equilibrium model of the U.S. energy sector [26] that EIA uses to prepare its *Annual Energy Outlook.* The FFC factors incorporate losses in production and delivery in the case of natural gas (including fugitive emissions) and additional energy used to produce and deliver the various fuels used by power plants. The approach used for deriving FFC measures of energy use and emissions is described in appendix 10B of the final determination TSD.

2. Net Present Value Analysis

The inputs for determining the NPV of the total costs and benefits experienced by customers are (1) total annual installed cost, (2) total annual operating costs (energy costs and repair and maintenance costs), and (3) a discount factor to calculate the present value of costs and savings. DOE calculates net savings each year as the difference between the no-new-standards case and each standards case in terms of total savings in operating costs versus total increases in installed costs. DOE calculates operating cost savings over the lifetime of equipment shipped during the analysis period.

Energy cost savings, which are part of operating cost savings, are calculated using the estimated energy savings in each year and the projected price of the appropriate form of energy. To estimate energy prices in future years, DOE multiplied the average national marginal electricity prices by the forecast of annual national-average commercial or industrial electricity price changes in the Reference case from *AEO 2021,* which has an end year of 2050. To estimate price trends after 2050, DOE used the average annual rate of change in prices from 2041 to 2050.

DOE includes the cost of replacing failed lamps and ballasts over the course of the lifetime of the fixture. DOE assumed that lamps and ballasts were replaced at their rated lifetime. When replacing a ballast, DOE assumed the lamp was also replaced at the same time, independent of the timing of the previous lamp replacement. For more details see chapter 10 of the final determination TSD.

DOE also estimates the residual monetary value remaining in the lamp and ballast at the end of the fixture lifetime and applies it as a credit to operating costs (*i.e.,* the residual value is deducted from operating costs). See chapter 10 of the final determination TSD for more details on DOE's calculation of the residual value.

In calculating the NPV, DOE multiplies the net savings in future years by a discount factor to determine their present value. For this final determination, DOE estimated the NPV of customer benefits using both a 3-percent and a 7-percent real discount rate. DOE uses these discount rates in accordance with guidance provided by the Office of Management and Budget (''OMB'') to Federal agencies on the development of regulatory analysis.[27] The discount rates for the determination of NPV are in contrast to the discount rates used in the LCC analysis, which are designed to reflect a customer's perspective. The 7-percent real value is an estimate of the average before-tax rate of return to private capital in the U.S. economy. The 3-percent real value represents the ''social rate of time preference,'' which is the rate at which society discounts future consumption flows to their present value.

V. Analytical Results and Conclusions

The following section addresses the results from DOE's analyses with respect to the considered energy conservation standards for MHLFs. It addresses the TSLs examined by DOE and the projected impacts of each of these levels. Additional details regarding DOE's analyses are contained in the final determination TSD supporting this document.

A. Trial Standard Levels

DOE analyzed the benefits and burdens of three TSLs for MHLFs. TSL 1 is composed of EL 1 for all equipment classes. TSL 2 is composed of the efficiency levels corresponding to the least efficient electronic ballast level for each equipment class, if any efficiency levels corresponding to an electronic ballast exist. TSL 3 is composed of the max-tech level for each equipment class. Table V.1 presents the TSLs and the corresponding efficiency levels that DOE has identified for potential amended energy conservation standards for MHLFs.

[26] For more information on NEMS, refer to *The National Energy Modeling System: An Overview 2009,* DOE/EIA–0581(2009), October 2009. Available at *www.eia.gov/forecasts/aeo/index.cfm.*

[27] United States Office of Management and Budget. *Circular A–4: Regulatory Analysis.* September 17, 2003. Section E. Available at *www.whitehouse.gov/omb/memoranda/m03–21.html.*

TABLE V.1—TRIAL STANDARD LEVELS FOR MHLFS

	≥50 W and ≤100 W	>100 W and <150 W	≥150 W and ≤250 W	>250 W and ≤500 W	>500 W and ≤1,000 W	>1,000 W and ≤2,000 W
TSL 0	0	0	0	0	0	0
TSL 1	1	1	1	1	1	1
TSL 2	2	2	2	2	1	1
TSL 3	3	3	2	2	1	1

B. Economic Justification and Energy Savings

1. Economic Impacts on Individual Customers

DOE analyzed the economic impacts on MHLF customers by looking at the effects that potential amended standards at each TSL would have on the LCC and PBP. These analyses are discussed in the following sections.

a. Life-Cycle Cost and Payback Period

In general, higher-efficiency products affect consumers in two ways: (1) Purchase price increases and (2) annual operating costs decrease.[28] Inputs used for calculating the LCC and PBP include total installed costs (*i.e.,* product price plus installation costs), and operating costs (*i.e.,* annual energy use, energy prices, energy price trends, and replacement costs). The LCC calculation also uses product lifetime and a discount rate. Chapter 8 of the final determination TSD provides detailed information on the LCC and PBP analyses.

Table V.2 through Table V.13 show the LCC and PBP results for the ELs and TSLs considered for each equipment class, with indoor and outdoor installations aggregated together using equipment shipments in the analysis period start year (2025). The results provided here will differ from the LCC and PBP results from the NOPD due to updated data used for this final determination. Results for each equipment class are shown in two tables. In the first table, the simple payback is measured relative to the baseline product. For ELs having a higher first year's operating cost than that of the baseline, the payback period is ''Never,'' because the additional installed cost relative to the baseline is not recouped. In the second table, impacts are measured relative to the efficiency distribution in the no-new-standards case in the compliance year (see section IV.F.8 of this document). Because some customers purchase products with higher efficiency in the no-new-standards case, the average savings are less than the difference between the average LCC of the baseline product and the average LCC at each TSL. The savings refer only to customers who are affected by a standard at a given TSL. Those who already purchase equipment with efficiency at or above a given TSL are not affected. Customers for whom the LCC increases at a given TSL experience a net cost.

TABLE V.2—AVERAGE LCC AND PBP RESULTS FOR THE ≥50 W AND ≤100 W EQUIPMENT CLASS

Efficiency level	Average costs (2020$)				Simple payback (years)	Average fixture lifetime (years)
	Installed cost	First year's operating cost	Lifetime operating cost	LCC		
0	889.82	131.20	1,731.71	2,621.53	....	24.2
1	903.12	131.14	1,729.46	2,632.58	239.0	24.2
2	935.77	131.96	1,750.88	2,686.65	Never	24.2
3	953.36	131.27	1,739.77	2,693.13	Never	24.2

Note: The results for each EL are calculated assuming that all customers use equipment at that efficiency level. The PBP is measured relative to the baseline equipment.

TABLE V.3—AVERAGE LCC SAVINGS RELATIVE TO THE NO-NEW-STANDARDS CASE FOR THE ≥50 W AND >100 W EQUIPMENT CLASS

TSL	Efficiency level	Life-cycle cost savings	
		Average LCC savings * (2020$)	Percent of consumers that experience net cost
1	1	(11.05)	82.1
2	2	(64.72)	62.0
3	3	(64.68)	72.0

* The savings represent the average LCC for affected consumers.

[28] While it is generally true that higher-efficiency equipment has lower operating costs, MHLF operating costs in this analysis also incorporate the costs of lamp and ballast replacements. Due to these replacement costs, higher operating costs can be experienced at efficiency levels above the baseline.

TABLE V.4—AVERAGE LCC AND PBP RESULTS FOR THE >100 W AND <150 W EQUIPMENT CLASS

Efficiency level	Average costs (2020$)				Simple payback (years)	Average fixture lifetime (years)
	Installed cost	First year's operating cost	Lifetime operating cost	LCC		
0	846.76	154.76	1,915.54	2,762.30	....	23.5
1	860.27	153.78	1,902.10	2,762.37	13.8	23.5
2	898.69	152.03	1,891.30	2,789.99	19.0	23.5
3	1,015.69	155.72	1,926.47	2,942.16	Never	23.5

Note: The results for each EL are calculated assuming that all customers use equipment at that efficiency level. The PBP is measured relative to the baseline equipment.

TABLE V.5—AVERAGE LCC SAVINGS RELATIVE TO THE NO-NEW-STANDARDS CASE FOR THE >100 W AND <150 W EQUIPMENT CLASS

TSL	Efficiency level	Life-cycle cost savings	
		Average LCC savings * (2020$)	Percent of consumers that experience net cost
1	1	(0.22)	10.3
2	2	(27.02)	24.1
3	3	(179.26)	46.5

* The savings represent the average LCC for affected consumers.

TABLE V.6—AVERAGE LCC AND PBP RESULTS FOR THE ≥150 W AND ≤250 W EQUIPMENT CLASS

Efficiency level	Average costs (2020$)				Simple payback (years)	Average fixture lifetime (years)
	Installed cost	First year's operating cost	Lifetime operating cost	LCC		
0	994.60	190.93	2,336.03	3,330.62	....	23.5
1	1,018.48	190.63	2,329.74	3,348.22	80.2	23.5
2	1,172.73	188.56	2,294.58	3,467.31	75.4	23.5

Note: The results for each EL are calculated assuming that all customers use equipment at that efficiency level. The PBP is measured relative to the baseline equipment.

TABLE V.7—AVERAGE LCC SAVINGS RELATIVE TO THE NO-NEW-STANDARDS CASE FOR THE ≥150 W AND >250 W EQUIPMENT CLASS

TSL	Efficiency level	Life-cycle cost savings	
		Average LCC savings * (2020$)	Percent of consumers that experience net cost
1	1	(17.56)	53.5
2	2	(129.14)	88.4
3	2	(129.14)	88.4

* The savings represent the average LCC for affected consumers.

TABLE V.8—AVERAGE LCC AND PBP RESULTS FOR THE >250 W AND ≤500 W EQUIPMENT CLASS

Efficiency level	Average costs (2020$)				Simple payback (years)	Average fixture lifetime (years)
	Installed cost	First year's operating cost	Lifetime operating cost	LCC		
0	1,121.20	249.34	3,016.36	4,137.56	....	23.5
1	1,142.97	249.17	3,011.71	4,154.69	127.3	23.5

TABLE V.8—AVERAGE LCC AND PBP RESULTS FOR THE >250 W AND ≤500 W EQUIPMENT CLASS—Continued

Efficiency level	Average costs (2020$)				Simple payback (years)	Average fixture lifetime (years)
	Installed cost	First year's operating cost	Lifetime operating cost	LCC		
2	1,378.00	258.46	3,123.86	4,501.86	Never	23.5

Note: The results for each EL are calculated assuming that all customers use equipment at that efficiency level. The PBP is measured relative to the baseline equipment.

TABLE V.9—AVERAGE LCC SAVINGS RELATIVE TO THE NO-NEW-STANDARDS CASE FOR THE >250 W AND >500 W EQUIPMENT CLASS

TSL	Efficiency level	Life-cycle cost savings	
		Average LCC savings * (2020$)	Percent of consumers that experience net cost
1	1	(17.14)	95.2
2	2	(364.34)	95.9
3	2	(364.34)	95.9

* The savings represent the average LCC for affected consumers.

TABLE V.10—AVERAGE LCC AND PBP RESULTS FOR THE >500 W AND ≤1,000 W EQUIPMENT CLASS

Efficiency level	Average costs (2020)$				Simple payback (years)	Average fixture lifetime (years)
	Installed cost	First year's operating cost	Lifetime operating cost	LCC		
0	1,396.65	582.23	7,221.65	8,618.30		23.7
1	1,429.96	581.32	7,207.07	8,637.03	36.4	23.7

Note: The results for each EL are calculated assuming that all customers use equipment at that efficiency level. The PBP is measured relative to the baseline equipment.

TABLE V.11—AVERAGE LCC SAVINGS RELATIVE TO THE NO-NEW-STANDARDS CASE FOR THE >500 W AND ≤1,000 W EQUIPMENT CLASS

TSL	Efficiency level	Life-cycle cost savings	
		Average LCC Savings * (2020$)	Percent of consumers that experience net cost
1	1	(18.72)	91.9
2	1	(18.72)	91.9
3	1	(18.72)	91.9

* The savings represent the average LCC for affected consumers.

TABLE V.12—AVERAGE LCC AND PBP RESULTS FOR THE >1,000 W AND ≤2,000 W EQUIPMENT CLASS

Efficiency level	Average costs (2020$)				Simple payback (years)	Average fixture lifetime (years)
	Installed cost	First year's operating cost	Lifetime operating cost	LCC		
0	1,489.80	188.40	2,387.30	3,877.10		23.7
1	1,522.96	186.62	2,364.56	3,887.52	18.6	23.7

Note: The results for each EL are calculated assuming that all customers use equipment at that efficiency level. The PBP is measured relative to the baseline equipment.

TABLE V.13—AVERAGE LCC SAVINGS RELATIVE TO THE NO-NEW-STANDARDS CASE FOR THE >1,000 W AND ≤2,000 W EQUIPMENT CLASS

TSL	Efficiency level	Life-cycle cost savings	
		Average LCC savings* (2020$)	Percent of consumers that experience net cost
1	1	(10.47)	48.5
2	1	(10.47)	48.5
3	1	(10.47)	48.5

* The savings represent the average LCC for affected consumers.

b. Rebuttable Presumption Payback

As discussed in section IV.F.9, EPCA establishes a rebuttable presumption that an energy conservation standard is economically justified if the increased purchase cost for a product that meets the standard is less than three times the value of the first-year energy savings resulting from the standard. In calculating a rebuttable presumption payback period for each of the considered ELs, DOE used discrete values, and, as required by EPCA, based the energy use calculation on the DOE test procedures for MHLFs. In contrast, the PBPs presented in section V.B.1.a were calculated using distributions that reflect the range of energy use in the field.

Table V.14 presents the rebuttable-presumption payback periods for the considered ELs for MHLFs. While DOE examined the rebuttable-presumption criterion, it considered whether the standard levels considered for this rule are economically justified through a more detailed analysis of the economic impacts of those levels, pursuant to 42 U.S.C. 6295(o)(2)(B)(i), that considers the full range of impacts to the consumer, manufacturer, Nation, and environment. The results of that analysis serve as the basis for DOE to definitively evaluate the economic justification for a potential standard level, thereby supporting or rebutting the results of any preliminary determination of economic justification.

TABLE V.14—REBUTTABLE-PRESUMPTION PAYBACK PERIODS

EL	Rebuttable presumption payback period (years)					
	≥50 W and ≤100 W	>100 W and <150 W*	≥150 W and ≤250 W**	>250 W and ≤500 W	>500 W and ≤1,000 W	>1,000 W and ≤2,000 W
1	2,150.5	14.3	102.9	195.5	38.1	18.6
2	21.4	10.0	90.2	56.3		
3	21.9	87.6				

* Includes 150 W fixtures initially exempted by EISA 2007, which are fixtures rated only for 150 watt lamps; rated for use in wet locations, as specified by the NFPA 70–2002, section 410.4(A); and containing a ballast that is rated to operate at ambient air temperatures above 50 °C, as specified by UL 1029–2007.

** Excludes 150 W fixtures initially exempted by EISA 2007, which are fixtures rated only for 150 watt lamps; rated for use in wet locations, as specified by the NFPA 70–2002, section 410.4(A); and containing a ballast that is rated to operate at ambient air temperatures above 50 °C, as specified by UL 1029–2007.

Table V.14 reports very large rebuttable-presumption payback periods for some equipment class-efficiency level combinations. These payback periods are the result of very small operating cost savings under the rebuttable-presumption criterion compared to the increased installed cost of moving from EL 0 to the EL under consideration.

2. National Impact Analysis

This section presents DOE's estimates of the national energy savings and the NPV of consumer benefits that would result from each of the TSLs considered as potential amended standards.

a. Significance of Energy Savings

To estimate the energy savings attributable to potential amended standards for MHLFs DOE compared their energy consumption under the no-new-standards case to their anticipated energy consumption under each TSL. The savings are measured over the entire lifetime of products purchased in the 30-year period that begins in the first full year of anticipated compliance with amended standards 2025–2054. Table V.15 presents DOE's projections of the national energy savings for each TSL considered for MHLFs. The savings were calculated using the approach described in section IV.H.1 of this document.

TABLE V.15—CUMULATIVE NATIONAL ENERGY SAVINGS FOR MHLFS; 30 YEARS OF SHIPMENTS

[2025–2054]

Equipment class	Trial standard level		
	1	2	3
Site Energy Savings (quads):			
≥50 W and ≤100 W	0.000006	0.00004	0.00006

TABLE V.15—CUMULATIVE NATIONAL ENERGY SAVINGS FOR MHLFS; 30 YEARS OF SHIPMENTS—Continued

[2025–2054]

Equipment class	Trial standard level		
	1	2	3
>100 W and <150 W	0.000001	0.00001	0.00001
≥150 W and ≤250 W	0.000008	0.00007	0.00007
>250 W and ≤500 W	0.00002	0.0001	0.0001
>500 W and ≤1,000 W	0.00001	0.00001	0.00001
>1,000 W and ≤2,000 W	0.0000003	0.0000003	0.0000003
Total *	0.00004	0.0002	0.0003
Primary Energy Savings (quads):			
≥50 W and ≤100 W	0.00002	0.0001	0.0002
>100 W and <150 W	0.000003	0.00003	0.00004
≥150 W and ≤250 W	0.00002	0.0002	0.0002
>250 W and ≤500 W	0.00004	0.0003	0.0003
>500 W and ≤1,000 W	0.00003	0.00003	0.00003
>1,000 W and ≤2,000 W	0.0000007	0.0000007	0.0000007
Total *	0.0001	0.0006	0.0007
FFC Energy Savings (quads):			
≥50 W and ≤100 W	0.00002	0.0001	0.0002
>100 W and <150 W	0.000003	0.00003	0.00004
≥150 W and ≤250 W	0.00002	0.0002	0.0002
>250 W and ≤500 W	0.00004	0.0003	0.0003
>500 W and ≤1,000 W	0.00003	0.00003	0.00003
>1,000 W and ≤2,000 W	0.0000008	0.0000008	0.0000008
Total *	0.0001	0.0007	0.0007

OMB Circular A–4 [29] requires agencies to present analytical results, including separate schedules of the monetized benefits and costs that show the type and timing of benefits and costs. Circular A–4 also directs agencies to consider the variability of key elements underlying the estimates of benefits and costs. For this rulemaking, DOE undertook a sensitivity analysis using 9 years, rather than 30 years, of product shipments. The choice of a 9-year period is a proxy for the timeline in EPCA for the review of certain energy conservation standards and potential revision of and compliance with such revised standards.[30] The review timeframe established in EPCA is generally not synchronized with the product lifetime, product manufacturing cycles, or other factors specific to MHLFs. Thus, such results are presented for informational purposes only and are not indicative of any change in DOE's analytical methodology. The NES sensitivity analysis results based on a 9-year analytical period are presented in Table V.16. The impacts are counted over the lifetime of MHLFs purchased in 2025–2033.

TABLE V.16—CUMULATIVE NATIONAL ENERGY SAVINGS FOR MHLFS; 9 YEARS OF SHIPMENTS

[2025–2033]

Equipment class	Trial standard level		
	1	2	3
Site Energy Savings (quads):			
≥50 W and ≤100 W	0.000006	0.00004	0.00006
>100 W and <150 W	0.000001	0.00001	0.00001
≥150 W and ≤250 W	0.000008	0.00007	0.00007
>250 W and ≤500 W	0.00002	0.0001	0.0001
>500 W and ≤1,000 W	0.00001	0.00001	0.00001
>1,000 W and ≤2,000 W	0.0000003	0.0000003	0.0000003
Total *	0.00004	0.0002	0.0003
Primary Energy Savings (quads):			

[29] U.S. Office of Management and Budget. *Circular A–4: Regulatory Analysis.* September 17, 2003. *www.whitehouse.gov/omb/circulars_a004_a-4/.* (last accessed June 24, 2021).

[30] Section 325(m) of EPCA requires DOE to review its standards at least once every 6 years, and requires, for certain products, a 3-year period after any new standard is promulgated before compliance is required, except that in no case may any new standards be required within 6 years of the compliance date of the previous standards. While adding a 6-year review to the 3-year compliance period adds up to 9 years, DOE notes that it may undertake reviews at any time within the 6 year period and that the 3-year compliance date may yield to the 6-year backstop. A 9-year analysis period may not be appropriate given the variability that occurs in the timing of standards reviews and the fact that for some products, the compliance period is 5 years rather than 3 years.

TABLE V.16—CUMULATIVE NATIONAL ENERGY SAVINGS FOR MHLFS; 9 YEARS OF SHIPMENTS—Continued

[2025–2033]

Equipment class	Trial standard level		
	1	2	3
≥50 W and ≤100 W	0.00002	0.0001	0.0002
>100 W and <150 W	0.000003	0.00003	0.00004
≥150 W and ≤250 W	0.00002	0.0002	0.0002
>250 W and ≤500 W	0.00004	0.0003	0.0003
>500 W and ≤1,000 W	0.00003	0.00003	0.00003
>1,000 W and ≤2,000 W	0.0000007	0.0000007	0.0000007
Total*	0.0001	0.0006	0.0007
FFC Energy Savings (quads):			
≥50 W and ≤100 W	0.00002	0.0001	0.0002
>100 W and <150 W	0.000003	0.00003	0.00004
≥150 W and ≤250 W	0.00002	0.0002	0.0002
>250 W and ≤500 W	0.00004	0.0003	0.0003
>500 W and ≤1,000 W	0.00003	0.00003	0.00003
>1,000 W and ≤2,000 W	0.0000008	0.0000008	0.0000008
Total*	0.0001	0.0007	0.0007

b. Net Present Value of Consumer Costs and Benefits

DOE estimated the cumulative NPV of the total costs and savings for consumers that would result from the TSLs considered for MHLFs. In accordance with OMB's guidelines on regulatory analysis,[31] DOE calculated NPV using both a 7-percent and a 3-percent real discount rate. Table V.17 shows the consumer NPV results with impacts counted over the lifetime of products purchased in 2025–2054.

TABLE V.17—CUMULATIVE NET PRESENT VALUE OF CUSTOMER BENEFITS FOR MHLFS; 30 YEARS OF SHIPMENTS

[2025–2054]

Equipment class	Trial standard level		
	1	2	3
3 percent (millions 2018$):			
≥50 W and ≤100 W	−0.12	−2.39	−2.44
>100 W and <150 W	0.0027	−0.32	−0.66
≥150 W and ≤250 W	−0.11	−1.67	−1.67
>250 W and ≤500 W	−0.25	−3.27	−3.27
>500 W and ≤1,000 W	−0.077	−0.077	−0.077
>1,000 W and ≤2,000 W	−0.00038	−0.00038	−0.00038
Total*	−0.56	−7.72	−8.12
7 percent (millions 2018$):			
≥50 W and ≤100 W	−0.10	−1.28	−1.35
>100 W and <150 W	−0.00059	−0.17	−0.41
≥150 W and ≤250 W	−0.10	−1.38	−1.38
>250 W and ≤500 W	−0.21	−2.86	−2.86
>500 W and ≤1000 W	−0.080	−0.080	−0.080
>1,000 W and ≤2,000 W	−0.0014	−0.0014	−0.0014
Total*	−0.49	−5.78	−6.10

*Total may not equal sum due to rounding.

The NPV results based on the aforementioned 9-year analytical period are presented in Table V.18. The impacts are counted over the lifetime of products purchased in 2025–2054. As mentioned previously, such results are presented for informational purposes only and are not indicative of any change in DOE's analytical methodology or decision criteria.

[31] U.S. Office of Management and Budget. *Circular A–4: Regulatory Analysis.* September 17, 2003. *https://obamawhitehouse.archives.gov/omb/circulars_a004_a-4/* (last accessed June 28, 2021).

TABLE V.18—CUMULATIVE NET PRESENT VALUE OF CUSTOMER BENEFITS FOR MHLFS; 9 YEARS OF SHIPMENTS
[2025–2033]

Equipment class	Trial standard level		
	1	2	3
3 percent (millions 2020$):			
≥50 W and ≤100 W	−0.12	−2.39	−2.44
>100 W and <150 W	0.0027	−0.32	−0.66
≥150 W and ≤250 W	−0.11	−1.67	−1.67
>250 W and ≤500 W	−0.25	−3.27	−3.27
>500 W and ≤1,000 W	−0.077	−0.077	−0.077
>1,000 W and ≤2,000 W	−0.00038	−0.00038	−0.00038
Total *	−0.56	−7.72	−8.12
7 percent (millions 2020$):			
≥50 W and ≤100 W	−0.10	−1.28	−1.35
>100 W and <150 W	−0.00059	−0.17	−0.41
≥150 W and ≤250 W	−0.10	−1.38	−1.38
>250 W and ≤500 W	−0.21	−2.86	−2.86
>500 W and ≤1,000 W	−0.080	−0.080	−0.080
>1,000 W and ≤2,000 W	−0.0014	−0.0014	−0.0014
Total *	−0.49	−5.78	−6.10

* Total may not equal sum due to rounding.

The previous results reflect the use of a default trend to estimate the change in price for MHLFs over the analysis period (see section IV.H.2 of this document). DOE also conducted a sensitivity analysis that considered one scenario with a lower rate of price decline than the reference case and one scenario with a higher rate of price decline than the reference case. The results of these alternative cases are presented in appendix 10C of the final determination TSD. In the high-price-decline case, the NPV of consumer benefits is higher than in the default case. In the low-price-decline case, the NPV of consumer benefits is lower than in the default case.

C. Final Determination

For this final determination, DOE analyzed whether amended standards for MHLFs would be technologically feasible and cost effective. (42 U.S.C. 6295(m)(1)(A) and 42 U.S.C. 6295(n)(2)) EPCA mandates that DOE consider whether amended energy conservation standards for MHLFs would be technologically feasible. (42 U.S.C. 6316(a); 42 U.S.C. 6295(m)(1)(A) and 42 U.S.C. 6295(n)(2)(B)) DOE has determined that there are technology options that would improve the efficiency of MHLFs. These technology options are being used in commercially available MHLFs and therefore are technologically feasible. (See section IV.B for further information.) Hence, DOE has determined that amended energy conservation standards for MHLFs are technologically feasible.

EPCA requires DOE to consider whether energy conservation standards for MHLFs would be cost effective through an evaluation of the savings in operating costs throughout the estimated average life of the covered product/equipment compared to any increase in the price of, or in the initial charges for, or maintenance expenses of, the covered products/equipment which are/is likely to result from the imposition of an amended standard. (42 U.S.C. 6316(a); 42 U.S.C. 6295(m)(1)(A), 42 U.S.C. 6295(n)(2)(C), and 42 U.S.C. 6295(o)(2)(B)(i)(II)) As presented in the prior section, the average customer purchasing a representative MHLF would experience an increase in LCC at each evaluated standards case as compared to the no-new-standards case. The simple PBP for the average MHLF customer at most ELs is projected to be generally longer than the mean lifetime of the equipment, which further indicates that the increase in installed cost for more efficient MHLFs is not recouped by their associated operating cost savings. The NPV benefits at these TSLs are also negative for all equipment classes at 3-percent and 7-percent discount rates. Based on the previous considerations, DOE has determined that more stringent amended energy conservation standards for MHLFs cannot satisfy the relevant statutory requirements because such standards would not be cost effective as required under EPCA. (*See* 42 U.S.C. 6295(n)(2); 42 U.S.C. 6295(o)(2)(B)(II); 42 U.S.C. 6316(a))

Having determined that amended energy conservation standards for MHLFs would not be cost-effective, DOE did not further evaluate the significance of the amount of energy conservation under the considered amended standards because it has determined that the potential standards would not be cost-effective (and by extension, would not be economically justified) as required under EPCA. (42 U.S.C. 6316(a); 42 U.S.C. 6295(m)(1)(A); 42 U.S.C. 6295(n)(2); 42 U.S.C. 6295(o)(2)(B)).

VI. Procedural Issues and Regulatory Review

A. Review Under Executive Orders 12866

This final determination has been determined to be not significant for purposes of Executive Order (''E.O.'') 12866, ''Regulatory Planning and Review,'' 58 FR 51735 (Oct. 4, 1993). As a result, OMB did not review this final determination.

B. Review Under the Regulatory Flexibility Act

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

DOE reviewed this final determination under the provisions of the Regulatory Flexibility Act and the policies and procedures published on February 19, 2003. DOE has concluded that amended energy conservation standards for metal halide lamp fixtures would not be cost effective (and by extension not economically justified). Because DOE is not amending the current energy conservation standards for MHLFs, DOE certifies that this final determination will not have a significant economic impact on a substantial number of small entities. Accordingly, DOE has not prepared an FRFA for this final determination. DOE will transmit this certification and supporting statement of factual basis to the Chief Counsel for Advocacy of the Small Business Administration for review under 5 U.S.C. 605(b).

C. Review Under the Paperwork Reduction Act

Manufacturers of covered products must certify to DOE that their products comply with any applicable energy conservation standards. To certify compliance, manufacturers must first obtain test data for their products according to the DOE test procedures, including any amendments adopted for those test procedures. DOE has established regulations for the certification and recordkeeping requirements for all covered consumer products and commercial equipment. (See generally 10 CFR part 429.) The collection-of-information requirement for the certification and recordkeeping is subject to review and approval by OMB under the Paperwork Reduction Act (''PRA''). This requirement has been approved by OMB under OMB control number 1910–1400. Public reporting burden for the certification is estimated to average 35 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Notwithstanding any other provision of the law, no person is required to respond to, nor shall any person be subject to a penalty for failure to comply with, a collection of information subject to the requirements of the PRA, unless that collection of information displays a currently valid OMB Control Number. This final determination, which concludes that amended energy conservation standards for MHLFs would not be cost effective (and by extension, not economically justified) as required under the relevant statute, imposes no new information or recordkeeping requirements. Accordingly, clearance from the OMB is not required under the Paperwork Reduction Act. (44 U.S.C. 3501 *et seq.*)

D. Review Under the National Environmental Policy Act of 1969

Pursuant to the National Environmental Policy Act of 1969 (''NEPA''), DOE has analyzed this final determination in accordance with NEPA and DOE's implementing regulations (10 CFR part 1021). DOE has determined that this rule qualifies for categorical exclusion A4 because it is an interpretation or ruling in regards to an existing regulations and otherwise meets the requirements for application of a categorical exclusion. See 10 CFR 1021.410. Therefore, DOE has determined that promulgation of this rule is not a major Federal action significantly affecting the quality of the human environment within the meaning of NEPA, and does not require an environmental assessment or an environmental impact statement.

E. Review Under Executive Order 13132

E.O. 13132, ''Federalism,'' 64 FR 43255 (Aug. 10, 1999), imposes certain requirements on Federal agencies formulating and implementing policies or regulations that preempt State law or that have federalism implications. The Executive order requires agencies to examine the constitutional and statutory authority supporting any action that would limit the policymaking discretion of the States and to carefully assess the necessity for such actions. The Executive order also requires agencies to have an accountable process to ensure meaningful and timely input by State and local officials in the development of regulatory policies that have federalism implications. On March 14, 2000, DOE published a statement of policy describing the intergovernmental consultation process it will follow in the development of such regulations. 65 FR 13735. As this final determination does not amend the standards for MHLFs, there is no impact on the policymaking discretion of the States. Therefore, no further action is required by Executive Order 13132.

F. Review Under Executive Order 12988

With respect to the review of existing regulations and the promulgation of new regulations, section 3(a) of E.O. 12988, ''Civil Justice Reform,'' imposes on Federal agencies the general duty to adhere to the following requirements: (1) Eliminate drafting errors and ambiguity, (2) write regulations to minimize litigation, (3) provide a clear legal standard for affected conduct rather than a general standard, and (4) promote simplification and burden reduction. 61 FR 4729 (Feb. 7, 1996). Regarding the review required by section 3(a), section 3(b) of E.O. 12988 specifically requires that Executive agencies make every reasonable effort to ensure that the regulation (1) clearly specifies the preemptive effect, if any, (2) clearly specifies any effect on existing Federal law or regulation, (3) provides a clear legal standard for affected conduct while promoting simplification and burden reduction, (4) specifies the retroactive effect, if any, (5) adequately defines key terms, and (6) addresses other important issues affecting clarity and general draftsmanship under any guidelines issued by the Attorney General. Section 3(c) of E.O. 12988 requires Executive agencies to review regulations in light of applicable standards in section 3(a) and section 3(b) to determine whether they are met or it is unreasonable to meet one or more of them. DOE has completed the required review and determined that, to the extent permitted by law, this final determination meets the relevant standards of E.O. 12988.

G. Review Under the Unfunded Mandates Reform Act of 1995

Title II of the Unfunded Mandates Reform Act of 1995 (''UMRA'') requires each Federal agency to assess the effects of Federal regulatory actions on State, local, and Tribal governments and the private sector. Public Law 104–4, sec. 201 (codified at 2 U.S.C. 1531). For a regulatory action likely to result in a rule that may cause the expenditure by State, local, and Tribal governments, in the aggregate, or by the private sector of $100 million or more in any one year (adjusted annually for inflation), section 202 of UMRA requires a Federal agency to publish a written statement that estimates the resulting costs, benefits, and other effects on the national economy. (2 U.S.C. 1532(a), (b)) The UMRA also requires a Federal agency to develop an effective process to permit timely input by elected officers of State, local, and Tribal governments on a ''significant intergovernmental mandate,'' and requires an agency plan for giving notice and opportunity for timely input to potentially affected small governments before establishing any requirements that might significantly or uniquely affect them. On March 18, 1997, DOE published a statement of policy on its process for intergovernmental consultation under UMRA. 62 FR 12820. DOE's policy statement is also available at *www.energy.gov/sites/prod/files/gcprod/documents/umra_97.pdf*.

This final determination does not contain a Federal intergovernmental mandate, nor is it expected to require expenditures of $100 million or more in any one year by the private sector. As a result, the analytical requirements of UMRA do not apply.

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

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

I. Review Under Executive Order 12630

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

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

Section 515 of the Treasury and General Government Appropriations Act, 2001 (44 U.S.C. 3516, note) provides for Federal agencies to review most disseminations of information to the public under information quality guidelines established by each agency pursuant to general guidelines issued by OMB. OMB's guidelines were published at 67 FR 8452 (Feb. 22, 2002), and DOE's guidelines were published at 67 FR 62446 (Oct. 7, 2002). Pursuant to OMB Memorandum M–19–15, Improving Implementation of the Information Quality Act (April 24, 2019), DOE published updated guidelines which are available at *www.energy.gov/sites/prod/files/2019/12/f70/DOE%20Final%20Updated%20IQA%20Guidelines%20Dec%202019.pdf*. DOE has reviewed this final determination under the OMB and DOE guidelines and has concluded that it is consistent with applicable policies in those guidelines.

K. Review Under Executive Order 13211

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

Because this final determination does not amend energy conservation standards for MHLFs, it is not a significant energy action, nor has it been designated as such by the Administrator at OIRA. Accordingly, DOE has not prepared a Statement of Energy Effects on this final determination.

L. Information Quality

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

In response to OMB's Bulletin, DOE conducted formal peer reviews of the energy conservation standards development process and the analyses that are typically used and prepared a report describing that peer review.[32] Generation of this report involved a rigorous, formal, and documented evaluation using objective criteria and qualified and independent reviewers to make a judgment as to the technical/scientific/business merit, the actual or anticipated results, and the productivity and management effectiveness of programs and/or projects. DOE has determined that the peer-reviewed analytical process continues to reflect current practice, and the Department followed that process for developing its determination in the case of the present rulemaking.

M. Congressional Notification

As required by 5 U.S.C. 801, DOE will report to Congress on the promulgation of this final determination prior to its effective date. The report will state that it has been determined that the final determination is not a ''major rule'' as defined by 5 U.S.C. 804(2).

VII. Approval of the Office of the Secretary

The Secretary of Energy has approved publication of this final determination.

Signing Authority

This document of the Department of Energy was signed on October 19, 2021, by Kelly Speakes-Backman, Principal Deputy Assistant Secretary and Acting Assistant Secretary for Energy Efficiency and Renewable Energy, pursuant to delegated authority from the Secretary of Energy. That document with the original signature and date is maintained by DOE. For administrative purposes only, and in compliance with requirements of the Office of the Federal Register, the undersigned DOE **Federal Register** Liaison Officer has been authorized to sign and submit the document in electronic format for publication, as an official document of the Department of Energy. This administrative process in no way alters the legal effect of this document upon publication in the **Federal Register**.

[32] The 2007 ''Energy Conservation Standards Rulemaking Peer Review Report'' is available at: *www.energy.gov/eere/buildings/downloads/energy-conservation-standards-rulemaking-peer-review-report-0* (June 18, 2021).

Signed in Washington, DC, on October 20, 2021.

Treena V. Garrett,

Federal Register Liaison Officer, U.S. Department of Energy.

[FR Doc. 2021–23183 Filed 10–22–21; 8:45 am]

BILLING CODE 6450–01–P

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 71

[Docket No. FAA–2021–0520; Airspace Docket No. 21–ASO–17]

RIN 2120–AA66

Amendment and Establishment of Class D and E Airspace; Concord, NC

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule.

SUMMARY: This action amends Class D airspace, establishes Class E airspace designated as an extension to a Class D surface area, and amends Class E airspace extending upward from 700 feet above the surface at Concord-Padgett Regional Airport, Concord, NC. The FAA is taking this action as a result of the Charlotte Class B Biennial Review. This action also updates the airport's name to Concord-Padgett Regional Airport (formerly Concord Regional Airport). In addition, this action updates the geographic coordinates of the airport to coincide with the FAA's database. This action also makes an editorial change replacing the term Airport/Facility Directory with the term Chart Supplement in the legal descriptions of associated Class D airspace. Controlled airspace is necessary for the safety and management of instrument flight rules (IFR) in the area.

DATES: Effective 0901 UTC, January 27, 2022. The Director of the Federal Register approves this incorporation by reference action under 1 CFR part 51, subject to the annual revision of FAA Order JO 7400.11 and publication of conforming amendments.

ADDRESSES: FAA Order JO 7400.11F, Airspace Designations and Reporting Points, and subsequent amendments can be viewed online at *https://www.faa.gov/air_traffic/publications/.* For further information, you can contact the Airspace Policy Group, Federal Aviation Administration, 800 Independence Avenue SW, Washington, DC 20591; Telephone: (202) 267–8783. The Order is also available for inspection at the National Archives and Records Administration (NARA). For information on the availability of FAA Order JO 7400.11F at NARA, email *fr.inspection@nara.gov* or go to *https://www.archives.gov/federal-register/cfr/ibr-locations.html.*

FOR FURTHER INFORMATION CONTACT: John Fornito, Operations Support Group, Eastern Service Center, Federal Aviation Administration, 1701 Columbia Ave., College Park, GA 30337; Telephone (404) 305–6364.

SUPPLEMENTARY INFORMATION:

Authority for This Rulemaking

The FAA's authority to issue rules regarding aviation safety is found in Title 49 of the United States Code. Subtitle I, Section 106 describes the authority of the FAA Administrator. Subtitle VII, Aviation Programs, describes in more detail the scope of the agency's authority. This rulemaking is promulgated under the authority described in Subtitle VII, Part A, Subpart I, Section 40103. Under that section, the FAA is charged with prescribing regulations to assign the use of airspace necessary to ensure the safety of aircraft and the efficient use of airspace. This regulation is within the scope of that authority as it establishes and amends Class D and E airspace in Concord, NC.

History

The FAA published a notice of proposed rulemaking in the **Federal Register** (86 FR 35237, July 2, 2021) for Docket No. FAA–2021–0520 to amend Class D airspace, establish Class E airspace designated as an extension to a Class D surface area, and amend Class E airspace extending upward from 700 feet above the surface at Concord-Padgett Regional Airport, Concord, NC. In addition, the FAA proposed to update the geographic coordinates of the airport to coincide with the FAA's database, and make an editorial change replacing the term Airport/Facility Directory with the term Chart Supplement in the legal description of associated Class D airspace.

Interested parties were invited to participate in this rulemaking effort by submitting written comments on the proposal to the FAA. No comments were received.

Class D and Class E airspace designations are published in Paragraphs 5000, 6004, and 6005, respectively, of FAA Order JO 7400.11F, dated August 10, 2021, and effective September 15, 2021, which is incorporated by reference in 14 CFR 71.1. The Class E airspace designations listed in this document will be published subsequently in the Order.

Availability and Summary of Documents for Incorporation by Reference

This document amends FAA Order JO 7400.11F, Airspace Designations and Reporting Points, dated August 10, 2021, and effective September 15, 2021. FAA Order JO 7400.11F is publicly available as listed in the **ADDRESSES** section of this document. FAA Order JO 7400.11F lists Class A, B, C, D, and E airspace areas, air traffic routes, and reporting points.

The Rule

The FAA is amending 14 CFR part 71 by amending the Class D airspace and Class E airspace extending upward from 700 feet above the surface at Concord-Padgett Regional Airport, Concord, NC, by updating the airport's name to Concord-Padgett Regional Airport, (formerly Concord Regional Airport), and updating the geographical coordinates to coincide with the FAA's database. In addition, this action amends Class E airspace extending upward from 700 feet above the surface at Concord-Padgett Regional Airport, Concord, NC, by increasing the radius to 8.8 miles (formerly 6.5 miles). This action also establishes Class E airspace designated as an extension to a Class D surface area airspace for Concord-Padgett Regional Airport within 1 mile each side of the 010° bearing from the Concord-Padgett Regional Airport, extending from the 4.0-mile radius to 6.3 miles northeast of the airport, and within 1 mile each side of the 190° bearing from the airport, extending from the 4.0-mile radius to 6.3 miles southwest from the airport. In addition, the FAA replaces the outdated term Airport/Facility Directory with the term Chart Supplement in the associated Class D airspace in the legal descriptions for Concord-Padgett Regional Airport.

FAA Order JO 7400.11, Airspace Designations and Reporting Points, is published yearly and effective on September 15.

Regulatory Notices and Analyses

The FAA has determined that this regulation only involves an established body of technical regulations for which frequent and routine amendments are necessary to keep them operationally current. It therefore: (1) Is not a "significant regulatory action" under Executive Order 12866; (2) is not a "significant rule" under DOT Regulatory Policies and Procedures (44 FR 11034; February 26, 1979); and (3) does not warrant preparation of a regulatory evaluation as the anticipated