CHAPTER 1. INTRODUCTION

TABLE OF CONTENTS

LIST OF TABLES

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1.1 PURPOSE OF THE DOCUMENT

This preliminary technical support document (TSD) is a stand-alone report that documents the technical analyses and results in support of the information presented in the preliminary analysis for establishing energy conservation standards for walk-in coolers and freezers (WICF).

1.2 OVERVIEW OF APPLIANCE STANDARDS

Title III of the Energy Policy and Conservation Act of 1975, as amended (EPCA or the Act) sets forth a variety of provisions designed to improve energy efficiency. Part B of Title III (42 U.S.C. 6291–6309) provides for the Energy Conservation Program for Consumer Products Other Than Automobiles. The National Energy Conservation Policy Act (NECPA), Pub. L. 95-619, amended EPCA to add Part C of Title III, which established an energy conservation program for certain industrial equipment. (42 U.S.C. 6311-6317) (These parts were subsequently redesignated as Parts A and A-1, respectively, for editorial reasons.) Section 312 of the Energy Independence and Security Act of 2007 (EISA 2007) further amended EPCA by adding certain equipment to this energy conservation program, including walk-in coolers and walk-in freezers (collectively "walk-in equipment" or "walk-ins"), the subject of this rulemaking. (42 U.S.C 6311(1), (2), 6313(f) and 6314(a)(9))

DOE is required to design each standard for this equipment to: (1) achieve the maximum improvement in energy efficiency that is technologically feasible and economically justified, and (2) result in significant conservation of energy. (42 U.S.C. 6295(o)(2)(A) and (o)(3), 42 U.S.C. 6313(f)(4)(A); see 42 U.S.C. 6295(o)(2)(A) and (o)(3)(B)) To determine whether a proposed standard is economically justified, DOE will, after receiving comments on the proposed standard, determine whether the benefits of the standard exceed its burdens to the greatest extent practicable, considering the following seven factors:

1. The economic impact of the standard on the manufacturers and on the consumers of the products subject to such standard;
2. 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 maintenance expenses of, the covered products which are likely to result from the imposition of the standard;
3. The total projected amount of energy savings likely to result directly from the imposition of the standard;
4. Any lessening of the utility or the performance of the covered products likely to result from the imposition of the standard;
5. The impact of any lessening of competition, as determined in writing by the Attorney General, that is likely to result from the imposition of the standard;
6. The need for national energy conservation; and
7. Other factors the Secretary considers relevant.

(See 42 U.S.C. 6295(o)(2)(B)(i); 6313(f)) For walk-ins, DOE is applying those factors in a manner consistent with its other energy conservation standards rulemakings to ascertain the maximum improvement in energy efficiency that is technologically feasible and economically justified for this equipment.

1.3 OVERVIEW OF WALK-IN COOLER AND FREEZER STANDARDS

1.3.1 General WICF Rulemaking History

EPCA was amended by the Energy Independence and Security Act of 2007 (EISA), Pub. L. 110-140. In particular, section 312(a) of EISA amends section 340 of EPCA by adding in new subsection 340(20) (42 U.S.C 6311(20)), which defines walk-in coolers and freezers as follows:

> *(20) WALK-IN COOLER; WALK-IN FREEZER.—*
> *(A) IN GENERAL.—The terms "walk-in cooler" and "walk-in freezer" mean an enclosed storage space refrigerated to temperatures, respectively, above, and at or below 32 degrees Fahrenheit that can be walked into, and has a total chilled storage area of less than 3,000 square feet.*
> *(B) EXCLUSION.—The terms "walk-in cooler" and "walk-in freezer" do not include products designed and marketed exclusively for medical, scientific, or research purposes.*

In addition, section 312(b) of EISA amends section 342 of EPCA in several ways. First, section 312(b) adds new subsection 342(f)(1) (42 U.S.C. 6313(f)(1)), which establishes prescriptive standards for walk-in coolers and freezers manufactured on or after January 1, 2009:

> *(1) IN GENERAL.—Subject to paragraphs (2) through (5), each walk-in cooler or walk-in freezer manufactured on or after January 1, 2009, shall—*
> *(A) have automatic door closers that firmly close all walk-in doors that have been closed to within 1 inch of full closure, except that this subparagraph shall not apply to doors wider than 3 feet 9 inches or taller than 7 feet;*
> *(B) have strip doors, spring hinged doors, or other method of minimizing infiltration when doors are open;*
> *(C) contain wall, ceiling, and door insulation of at least R–25 for coolers and R–32 for freezers, except that this subparagraph shall not apply to glazed portions of doors nor to structural members;*
> (D) contain floor insulation of at least R–28 for freezers;
> *(E) for evaporator fan motors of under 1 horsepower and less than 460 volts, use—*
> *(i) electronically commutated motors (brushless direct current motors); or*
> *(ii) 3-phase motors;*
> *(F) for condenser fan motors of under 1 horsepower, use—*
> *(i) electronically commutated motors;*
> *(ii) permanent split capacitor-type motors; or*
> *(iii) 3-phase motors; and*

(G) for all interior lights, use light sources with an efficacy of 40 lumens per watt or more, including ballast losses (if any), except that light sources with an efficacy of 40 lumens per watt or less, including ballast losses (if any), may be used in conjunction with a timer or device that turns off the lights within 15 minutes of when the walk-in cooler or walk-in freezer is not occupied by people.

Second, section 312 of EISA amends section 342 of EPCA by adding new subsection 342(f)(2) (42 U.S.C. 6313(f)(2)), which establishes requirements for electronically commutated motors for walk-in coolers and freezers described in paragraph (1)(E)(i);

(2) ELECTRONICALLY COMMUTATED MOTORS.—
(A) IN GENERAL.—The requirements of paragraph (1)(E)(i) for electronically commutated motors shall take effect January 1, 2009, unless, prior to that date, the Secretary determines that such motors are only available from 1 manufacturer.
(B) OTHER TYPES OF MOTORS.—In carrying out paragraph (1)(E)(i) and subparagraph (A), the Secretary may allow other types of motors if the Secretary determines that, on average, those other motors use no more energy in evaporator fan applications than electronically commutated motors.
(C) MAXIMUM ENERGY CONSUMPTION LEVEL.—The Secretary shall establish the maximum energy consumption level under subparagraph (B) not later than January 1, 2010.

Third, section 312 of EISA amends section 342 of EPCA by adding new subsection 342(f)(3) (42 U.S.C. 6313(f)(3)), which establishes additional requirements for walk-in coolers or walk-in freezers with transparent reach-in doors manufactured on or after January 1, 2009;

(3) ADDITIONAL SPECIFICATIONS.—Each walk-in cooler or walk-in freezer with transparent reach-in doors manufactured on or after January 1, 2009, shall also meet the following specifications:
(A) Transparent reach-in doors for walk-in freezers and windows in walk-in freezer doors shall be of triple-pane glass with either heat-reflective treated glass or gas fill.
(B) Transparent reach-in doors for walk-in coolers and windows in walk-in cooler doors shall be—
(i) double-pane glass with heat-reflective treated glass and gas fill; or
(ii) triple-pane glass with either heat-reflective treated glass or gas fill.
(C) If the appliance has an antisweat heater without antisweat heat controls, the appliance shall have a total door rail, glass, and frame heater power draw of not more than 7.1 watts per square foot of door opening (for freezers) and 3.0 watts per square foot of door opening (for coolers).
(D) If the appliance has an antisweat heater with antisweat heat controls, and the total door rail, glass, and frame heater power draw is more than 7.1 watts per square foot of door opening (for freezers) and 3.0 watts per square foot of door

opening (for coolers), the antisweat heat controls shall reduce the energy use of the antisweat heater in a quantity corresponding to the relative humidity in the air outside the door or to the condensation on the inner glass pane.

Finally, section 312 of EISA adds new subsection 342(f)(4) (42 U.S.C. 6313(f)(4)), which directs the Secretary to issue by rule, no later than January 1, 2012, performance-based standards for walk-in coolers and freezers manufactured on or after 3 years after the final rule is published, or 5 years if the Secretary determines, by rule, that a 3-year period is inadequate. This requirement is the subject of this rulemaking.

(4) PERFORMANCE-BASED STANDARDS.—

(A) IN GENERAL.—Not later than January 1, 2012, the Secretary shall publish performance-based standards for walk-in coolers and walk-in freezers that achieve the maximum improvement in energy that the Secretary determines is technologically feasible and economically justified.

(B) APPLICATION.—

(i) IN GENERAL.—Except as provided in clause (ii), the standards shall apply to products described in subparagraph (A) that are manufactured beginning on the date that is 3 years after the final rule is published.

(ii) DELAYED EFFECTIVE DATE.—If the Secretary determines, by rule, that a 3-year period is inadequate, the Secretary may establish an effective date for products manufactured beginning on the date that is not more than 5 years after the date of publication of a final rule for the products.

1.3.2 Framework and Analysis Methodology

In December 2008, DOE published a *Rulemaking Framework for Walk-In Coolers and Walk-In Freezers*, describing the procedural and analytical approaches DOE anticipated using to evaluate the establishment of energy conservation standards for WICF. This document is available at:

http://www1.eere.energy.gov/buildings/appliance_standards/commercial/pdfs/wicf_framework_doc.pdf

DOE held a public meeting on February 4, 2009, to discuss procedural and analytical approaches to the rulemaking, and to inform interested parties and facilitate their involvement in the rulemaking process. The analytical framework presented at the public meeting described different analyses, such as the engineering analysis and the life-cycle cost (LCC) and payback period (PBP) analyses, the methods proposed for conducting them, and the relationships among the various analyses. See **Error! Reference source not found.** for all the analyses discussed at the public meeting to be undertaken in each of the formal public rulemaking documents.

Table 1.3.1 WICF Analyses

Preliminary Analysis	NOPR	Final Rule*
Market and technology assessment	Revised preliminary analyses	Revised NOPR analyses
Screening analysis	Life-cycle cost sub-group analysis	
Engineering analysis	Manufacturer impact analysis	
Energy use characterization	Utility impact analysis	
Markups to determine equipment price	Employment impact analysis	
Life-cycle cost and payback period analyses	Environmental assessment	
Shipments analysis	Regulatory impact analysis	
National impact analysis		
Preliminary manufacturer impact analysis		

* During the Final Rule phase, DOE considers the comments submitted by the U.S. Department of Justice in the NOPR phase concerning the impact of any lessening of competition that is likely to result from the imposition of the standard. (42 U.S.C. 6295(o)(2)(B)(v))

As part of the information gathering and sharing process, DOE organized and held interviews with WICF manufacturers. DOE selected companies that represented production of all types of WICF equipment, ranging from small to large manufacturers, and including both Air-Conditioning, Heating and Refrigeration Institute (AHRI) member companies and non-AHRI member companies. DOE had four objectives for these interviews: (1) solicit feedback on the draft engineering analysis (including methodology, production costs, manufacturing processes, and findings); (2) solicit feedback on topics related to the preliminary manufacturer impact analysis; (3) provide an opportunity, early in the rulemaking process, to express specific concerns to DOE; and (4) foster cooperation between the manufacturers and DOE.

There were six general topics related to the preliminary manufacturer impact analysis discussed during each of the interviews: (1) general key issues, (2) WICF shipment projections, (3) capital conversion costs, (4) equipment mix and profitability, (5) market shares and industry consolidation, and (6) cumulative regulatory burden.

DOE incorporated the information gathered at the meetings into its engineering analysis (see chapter 5) and the preliminary manufacturer impact analysis (see chapter 12). Following the publication of the preliminary analysis and the preliminary analysis public meeting, DOE intends to hold additional meetings with manufacturers as part of the consultative process for the manufacturer impact analysis conducted during the NOPR phase.

DOE conducted the LCC and PBP analyses based on an approach that establishes an annual energy expense using regional average electric utility costs for affected businesses and projected those electricity costs into the future using electricity price projections for the commercial sector from the DOE Energy Information Agency (DOE/EIA). Under this approach, LCC results are based on the assumption that manufacturing plants and commercial building customers in the future will face electricity costs similar to those that exist in today's electricity markets.

DOE developed spreadsheets for the LCC and PBP analyses, and for the national impact analyses. The LCC spreadsheet calculates national distributions of life cycle cost savings at

various energy-efficiency levels above the baseline and as well can provide LCC savings based on typical input values for several business types who use CRE as well as distributions of energy costs. DOE also developed a national impact analysis spreadsheet that calculates the national energy savings (NES) and national net present values (NPVs) at various energy-efficiency levels. This spreadsheet includes a model that forecasts shipments for the various equipment classes of WICFs at different efficiency levels.

DOE reviewed the recommendations made on April 21, 1998, by the Advisory Committee on Appliance Energy Efficiency Standards. (Advisory Committee, No. 96)[1] These recommendations related to: (1) using the full range of consumer marginal energy rates (CMERs) in the LCC analysis (replacing the use of national average energy prices), (2) defining a range of energy price futures for each fuel used in the economic analyses, and (3) defining a range of primary energy conversion factors and associated emission reductions based on the generation of energy and emissions that would be displaced by energy-efficiency standards for each rulemaking. DOE's analysis implemented (2) and (3) above, however as discussed previously, DOE conducted the LCC analysis using regional average electricity prices for affected business types and did not develop CMERs in the LCC analysis.

1.4 STRUCTURE OF THE DOCUMENT

This preliminary TSD outlines the analytical approaches used in this rulemaking. The TSD consists of 16 chapters as well as appendices.

Chapter 1 Introduction: provides an overview of the appliance and equipment standards program and how it applies to the WICF rulemaking, and outlines the structure of the document.

Chapter 2 Analytical Framework, Comments from Interested Parties, and DOE Responses: describes the rulemaking process step by step, summarizes comments made from interested parties during the framework document comment period, and provides DOE responses to those comments.

Chapter 3 Market and Technology Assessment: characterizes the WICF equipment market and the technologies available for increasing equipment efficiency.

Chapter 4 Screening Analysis: determines which technology options are viable for consideration in the engineering analysis.

Chapter 5 Engineering Analysis: discusses the methods used for developing the relationship between increased manufacturer price and increased efficiency.

[1] Advisory Committee, No. 96 refers to the recommendations of the Advisory Committee on Energy Efficiency Standards and is available for inspection at the U.S. Department of Energy, Forrestal Building, Room 1J-018 (Resource Room of the Building Technologies Program) in the file under "Energy Conservation Program for Consumer Products: Procedures for Consideration of New or Revised Energy Conservation Standards for Consumer Products," RIN [1904–AA83], as document number 96.

Chapter 6 Markups to Determine Equipment Price: discusses the methods used for establishing markups for converting manufacturer prices to customer prices.

Chapter 7 Energy Use Analysis: discusses the process used for generating energy use estimates of WICF for a variety of equipment classes, climate locations, and standard levels.

Chapter 8 Life-Cycle Cost and Payback Period Analyses: discusses the economic effects of standards on individual customers and users of the equipment and compares the LCC and PBP of equipment with and without higher efficiency standards.

Chapter 9 Shipments Analysis: discusses the methods used for forecasting shipments with and without higher efficiency standards.

Chapter 10 National Impact Analysis: discusses the methods used for forecasting national energy consumption and national economic impacts based on annual shipments and estimates of future efficiency distributions in the absence and presence of higher efficiency standards.

Chapter 11 Life-Cycle Cost Sub-Group Analysis: discusses the effects of standards on a subgroup of WICF customers and compares the LCC and PBP of equipment with and without higher efficiency standards for these customers.

Chapter 12 Preliminary Manufacturer Impact Analysis: discusses the effects of standards on the finances and profitability of manufacturers.

Chapter 13 Utility Impact Analysis: discusses the effects of standards on the installed generation capacity of electric utilities.

Chapter 14 Employment Impact Analysis: discusses the effects of standards on National employment.

Chapter 15 Environmental Assessment: discusses the effects of standards on air-borne emissions of electric utilities.

Chapter 16 Regulatory Impact Analysis: discusses the present regulatory actions as well as the impact of non-regulatory alternatives to setting energy efficiency standards.