DEPARTMENT OF ENERGY

Office of Energy Efficiency and Renewable Energy

10 CFR Part 431

[Docket No. EERE–2007–BT–STD–0012]

RIN 1904–AB44

Energy Conservation Program for Commercial and Industrial Equipment: Packaged Terminal Air Conditioner and Packaged Terminal Heat Pump Energy Conservation Standards

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

ACTION: Notice of proposed rulemaking and public meeting.

SUMMARY: The Energy Policy and Conservation Act (EPCA) prescribes energy conservation standards for various consumer products and commercial and industrial equipment, and requires the Department of Energy (DOE) to administer an energy conservation program for these products. In this notice, DOE is proposing amended energy conservation standards for packaged terminal air conditioners (PTACs) and packaged terminal heat pumps (PTHPs) and is announcing a public meeting.

DATES: DOE will hold a public meeting on May 1, 2008, from 9 a.m. to 4 p.m., in Washington, DC. DOE must receive requests to speak at the public meeting before 4 p.m., April 21, 2008. DOE must receive a signed original and an electronic copy of statements to be given at the public meeting before 4 p.m., April 21, 2008.

DOE will accept comments, data, and information regarding the notice of proposed rulemaking (NOPR) before and after the public meeting, but no later than June 6, 2008. See section VII, ''Public Participation,'' of this NOPR for details.

ADDRESSES: The public meeting will be held at the U.S. Department of Energy, Forrestal Building, Room 1E–245, 1000 Independence Avenue, SW., Washington, DC. Please note that foreign nationals visiting DOE Headquarters are subject to advance security screening procedures, requiring a 30-day advance notice. If you are a foreign national and wish to participate in the public meeting, please inform DOE as soon as possible by contacting Ms. Brenda Edwards at (202) 586–2945 so that the necessary procedures can be completed.

You may submit comments identified by docket number EERE–2007–BT–STD–0012 and/or Regulation Identifier Number (RIN) 1904–AB44 using any of the following methods:

- *Federal eRulemaking Portal: http://www.regulations.gov.* Follow the instructions for submitting comments.
- *E-mail: ptac_hp@ee.doe.gov.* Include EERE–2007–BT–STD–0012 and/or RIN 1904–AB44 in the subject line of your message.
- *Postal Mail:* Ms. Brenda Edwards, U.S. Department of Energy, Building Technologies Program, Mailstop EE–2J, 1000 Independence Avenue, SW., Washington, DC 20585–0121. Telephone: (202) 586–2945. Please submit one signed paper original.
- *Hand Delivery/Courier:* Ms. Brenda Edwards, U.S. Department of Energy, Building Technologies Program, 950 L'Enfant Plaza, 6th Floor, Washington, DC 20024. Please submit one signed original paper copy.

Instructions: All submissions received must include the agency name and docket number or RIN for this rulemaking. For detailed instructions on submitting comments and additional information on the rulemaking process, see section VII, ''Public Participation,'' of this document.

Docket: For access to the docket to read background documents or comments received, visit the U.S. Department of Energy, Forrestal Building, Resource Room of the Building Technologies Program, 950 L'Enfant Plaza, SW., 6th Floor, Washington, DC 20024, (202) 586–2945, between 9 a.m. and 4 p.m., Monday through Friday, except Federal holidays. Please call Ms. Brenda Edwards at the above telephone number for additional information regarding visiting the Resource Room.

FOR FURTHER INFORMATION CONTACT: Wes Anderson, Project Manager, Energy Conservation Standards for Packaged Terminal Air Conditioners and Packaged Terminal Heat Pumps, U.S. Department of Energy, Energy Efficiency and Renewable Energy, Building Technologies Program, EE–2J, 1000 Independence Avenue, SW., Washington, DC 20585–0121, (202) 586–7335. E-mail: *Wes.Anderson@ee.doe.gov.* Francine Pinto, Esq., or Eric Stas, Esq., U.S. Department of Energy, Office of General Counsel, GC–72, 1000 Independence Avenue, SW., Washington, DC 20585–0121, (202) 586–9507. E-mail: *Francine.Pinto@hq.doe.gov* or *Eric.Stas@hq.doe.gov.*

SUPPLEMENTARY INFORMATION:

I. Summary of the Proposed Rule

The Energy Policy and Conservation Act (EPCA), as amended, provides the Department of Energy (DOE) the authority to establish energy conservation standards for certain commercial equipment covered by the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) and the Illuminating Engineering Society of North America (IESNA) Standard 90.1, including packaged terminal air conditioners (PTACs) and packaged terminal heat pumps (PTHPs), the subject of this proceeding. (42 U.S.C. 6313(a)(6)(A)) Section 342(a)(6)(A) provides that DOE may prescribe a standard more stringent than the level in ASHRAE/IESNA Standard 90.1, after ASHRAE amends the energy conservation standards found in ASHRAE/IESNA Standard 90.1, if DOE can demonstrate ''by clear and convincing evidence,'' that such a more stringent standard ''would result in significant additional conservation of energy and is technologically feasible and economically justified.'' (42 U.S.C. 6313(a)(6)(A)(II) In accordance with these criteria discussed in this notice, DOE proposes to amend the energy conservation standards for PTACs and PTHPs by raising the efficiency levels for this equipment to the levels shown in Table I.1, above the efficiency levels specified by ASHRAE/IESNA Standard 90.1–1999. The proposed standards would apply to all covered PTACs and PTHPs manufactured on or after the date four years after publication of the final rule in the **Federal Register**. (42 U.S.C. 6313(a)(6)(D)) The proposed standards for PTACs and PTHPs represent an improvement in energy efficiency of 12 to 33 percent compared to the efficiency levels specified by ASHRAE/IESNA Standard 90.1–1999, depending on the equipment class.

TABLE I.1.—PROPOSED ENERGY CONSERVATION STANDARDS FOR PTACS AND PTHPS

Equipment class			Proposed energy conservation standards*
Equipment	Category	Cooling capacity	
PTAC	Standard Size**	<7,000 Btu/h	EER = 11.4
		≥7,000 Btu/h and ≤15,000 Btu/h	EER = 13.0 − (0.233 × Cap††)
		>15,000 Btu/h	EER = 9.5
	Non-Standard Size†	<7,000 Btu/h	EER = 10.2
		≥7,000 Btu/h and ≤15,000 Btu/h	EER = 11.7 − (0.213 × Cap††)
		>15,000 Btu/h	EER = 8.5
PTHP	Standard Size**	<7,000 Btu/h	EER = 11.8 COP = 3.3
		≥7,000 Btu/h and ≤15,000 Btu/h	EER = 13.4 − (0.233 × Cap††) COP = 3.7 − (0.053 × Cap††)
		>15,000 Btu/h	EER = 9.9 COP = 2.9
	Non-Standard Size†	<7,000 Btu/h	EER = 10.8 COP = 3.0
		≥7,000 Btu/h and ≤15,000 Btu/h	EER = 12.3 − (0.213 × Cap††) COP = 3.1 − (0.026 × Cap††)

TABLE I.1.—PROPOSED ENERGY CONSERVATION STANDARDS FOR PTACS AND PTHPS—Continued

Equipment class			Proposed energy conservation standards*
Equipment	Category	Cooling capacity	
		>15,000 Btu/h	EER = 9.1 COP = 2.8

* For equipment rated according to the DOE test procedure (ARI Standard 310/380–2004), all energy efficiency ratio (EER) values must be rated at 95°F outdoor dry-bulb temperature for air-cooled equipment and evaporatively-cooled equipment and at 85°F entering water temperature for water cooled equipment. All coefficient of performance (COP) values must be rated at 47°F outdoor dry-bulb temperature for air-cooled equipment, and at 70°F entering water temperature for water-source heat pumps.

** Standard size refers to PTAC or PTHP equipment with wall sleeve dimensions greater than or equal to 16 inches high, or greater than or equal to 42 inches wide.

† Non-standard size refers to PTAC or PTHP equipment with wall sleeve dimensions less than 16 inches high and less than 42 inches wide.

†† Cap means cooling capacity in thousand British thermal units per hour (Btu/h) at 95°F outdoor dry-bulb temperature.

DOE's analyses indicate that the proposed energy conservation standards, trial standard level (TSL) 4 for PTAC and PTHP equipment (See section V.A for a discussion of the TSLs), would save a significant amount of energy—an estimated 0.019 quadrillion British thermal units (Btu), or quads, of cumulative energy over 30 years (2012–2042). The economic impacts on the nation (i.e., national net present value) and the commercial customer (i.e., the average life-cycle cost (LCC) savings) are positive.

The national net present value (NPV) of TSL 4 is $17 million using a 7 percent discount rate and $61 million using a 3 percent discount rate, cumulative from 2012 to 2062 in 2006$. This is the estimated total value of future savings minus the estimated increased equipment costs, discounted to 2008. The benefits and costs of the standard can also be expressed in terms of annualized 2006$ values over the forecast period 2012 through 2062. Using a 7 percent discount rate for the annualized cost analysis, the cost of the standard is $3.4 million per year in increased equipment and installation costs while the annualized benefits are $5.0 million per year in reduced equipment operating costs. Using a 3 percent discount rate, the annualized cost of the standard is $2.9 million per year while the annualized benefits of today's standard are $5.6 million per year. See section V.B.3 for additional details.

Using a real corporate discount rate of 5 percent, DOE estimated the industry's NPV (INPV) for manufacturers of PTACs and PTHPs to be $332 million in 2006$. The impact of the proposed standards on INPV of manufacturers of standard size PTACs and PTHPs is estimated to be between an 18 percent loss and a 2 percent loss (−$56 million to −$5 million). The non-standard size PTAC and PTHP industry is estimated to lose between 44 percent and 34 percent of its NPV (−$12 million to −$9 million) as a result of the proposed standards. Additionally, based on DOE's interviews with manufacturers of PTACs and PTHPs, DOE expects minimal plant closings or loss of employment as a result of the proposed standards.

DOE's analyses indicate that the proposed standard, TSL 4, has energy savings and environmental benefits. All of the energy saved is electricity, and DOE expects the energy savings from the proposed standards to eliminate the need for approximately 81 megawatts (MW) of generating capacity by 2042. These results reflect DOE's use of energy price projections from the U.S. Energy Information Administration (EIA)'s Annual Energy Outlook 2007 (AEO2007).[1] The proposed standard has environmental benefits leading to reductions in greenhouse gas emissions (i.e., cumulative (undiscounted) emission reductions) of 2.7 million tons (Mt) of carbon dioxide (CO2) from 2012 to 2042. Additionally, the standard would likely result in 0.16 thousand tons (kt) of nitrogen oxides (NOX) emissions reductions or generate a similar amount of NOX emissions allowance credits in areas where such emissions are subject to emissions caps.

In view of its analyses, DOE believes that the proposed standard, TSL 4, represents the maximum improvement in energy efficiency of PTAC and PTHP equipment that is technologically feasible and economically justified. DOE found that the benefits to the Nation (energy savings, customer average LCC savings, national NPV increase, and emission reductions) of the proposed standards outweigh the burdens (loss of INPV and LCC increases for some customers). When DOE considered higher energy efficiency levels as TSLs, it found that the burdens (loss of manufacturer NPV and LCC increase for some customers) of the higher efficiency levels outweighed the benefits (energy savings, LCC savings for some customers, national NPV increase, and emission reductions) of those higher levels.

DOE recognizes that manufacturers of PTAC and PTHP equipment are also facing a mandated refrigerant phase-out on January 1, 2010. R–22, the only refrigerant currently used by PTACs and PTHPs, is an HCFC refrigerant and subject to the phase-out requirement. Phase-out of this refrigerant could have a significant impact on the manufacturing, performance, and cost of PTAC and PTHP equipment. DOE further discusses and estimated the impacts of the refrigerant phase-out on PTAC and PTHP equipment and on the manufacturers of this equipment in today's notice.

II. Introduction

A. Overview

The proposed standard will save a significant amount of energy and, as a result of less energy being produced, result in a cleaner environment. In the 30-year period after the amended standard becomes effective, the nation will save 0.019 quads of primary energy. These energy savings also will result in significantly reduced emissions of air pollutants and greenhouse gases associated with electricity production, by avoiding the emission of 2.7 Mt of CO_2 and 0.16 kt of NO_X. In addition, once the standard is implemented in 2012, DOE expects to eliminate the need for the construction of approximately 81 MW of new power plants by 2042. In total, DOE estimates the net present value to the Nation of this standard to be $17 million from 2012 to 2062 in 2006$.

Finally, commercial customers will see benefits from the proposed standard. Although DOE expects the price of the high efficiency PTAC and PTHP equipment to be approximately 2 percent higher than the average price of

[1] DOE intends to use EIA's Annual Energy Outlook 2008 (AEO2008) to generate the results for the final rule. In addition, DOE will use 2007$ to reflect all dollar values in the final rule.

this equipment today, the energy efficiency gains will result in lower energy costs. Based on this calculation, DOE estimates that the mean payback period for the high efficiency PTACs will be approximately 11.2 years and the mean payback period for the high efficiency PTHPs will be approximately 4.4 years. When these savings are summed over the lifetime of the high efficiency equipment, customers of PTACs will save $4, on average, and customers of PTHPs will save $35, on average, compared to their expenditures on today's baseline PTACs and PTHPs.

B. Authority

Part A–1 of Title III of EPCA addresses the energy efficiency of certain types of commercial and industrial equipment.[2] (42 U.S.C. 6311–6317) It contains specific mandatory energy conservation standards for commercial PTACs and PTHPs. (42 U.S.C. 6313(a)(3)) The Energy Policy Act of 1992 (EPACT), Public Law 102–486, also amended EPCA with respect to PTACs and PTHPs, providing definitions in section 122(a), test procedures in section 122(b), labeling provisions in section 122(c), and the authority to require information and reports from manufacturers in section 122(e).[3] DOE publishes today's notice of proposed rulemaking (NOPR) pursuant to Part A–1. The PTAC and PTHP test procedures appear at Title 10 Code of Federal Regulations (CFR) section 431.96.

EPCA established Federal energy conservation standards that generally correspond to the levels in ASHRAE/IESNA Standard 90.1, as in effect on October 24, 1992 (ASHRAE/IESNA Standard 90.1–1989), for each type of covered equipment listed in section 342(a) of EPCA, including PTACs and PTHPs. (42 U.S.C. 6313(a)) For each type of equipment, EPCA directed that if ASHRAE/IESNA Standard 90.1 is amended, DOE must adopt an amended standard at the new level in ASHRAE/IESNA Standard 90.1, unless clear and convincing evidence supports a determination that adoption of a more stringent level as a national standard would produce significant additional energy savings and be technologically feasible and economically justified. (42 U.S.C. 6313(a)(6)(A)(ii)(II).

EPCA also provides that in deciding whether such a more stringent standard is economically justified, DOE must, after receiving comments on the proposed standard, determine whether the benefits of the standard exceed its burdens by considering, to the greatest extent practicable, the following seven factors:

(1) The economic impact of the standard on manufacturers and consumers of the products subject to the standard;

(2) The savings in operating costs throughout the estimated average life of the 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 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 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.

(42 U.S.C. 6316(a); 42 U.S.C. 6295(o)(2)(B)(i)–(ii)).

Furthermore, EPCA contains what is commonly known as an ''anti-backsliding'' provision. (42 U.S.C. 6316(a); 42 U.S.C. 6295(o)(1)) This provision mandates that the Secretary not prescribe any amended standard that either increases the maximum allowable energy use or decreases the minimum required energy efficiency of covered equipment. It is a fundamental principle in EPCA's statutory scheme that DOE cannot amend standards downward; that is, weaken standards, from those that have been published as a final rule. *Natural Resources Defense Council* v. *Abraham*, 355 F.3d 179 (2nd Cir. 2004).

Additionally, the Secretary may not prescribe an amended standard if interested persons have established by a preponderance of the evidence that the amended standard is ''likely to result in the unavailability in the United States of any product type (or class)'' with performance characteristics, features, sizes, capacities, and volumes that are substantially the same as those generally available in the United States at the time of the Secretary's finding. (42 U.S.C. 6316(a); 42 U.S.C. 6295(o)(4))

Federal energy efficiency requirements for commercial equipment generally supersede State laws or regulations concerning energy conservation testing, labeling, and standards. (42 U.S.C. 6316(a) and (b)) DOE can, however, grant waivers of preemption for particular State laws or regulations, in accordance with the procedures and other provisions of section 327(d) of EPCA. (42 U.S.C. 6297(d) and 6316(b)(2)(D))

C. Background

1. Current Standards

The current energy conservation standards in EPCA for PTACs and PTHPs apply to all equipment manufactured on or after January 1, 1994, (42 U.S.C. 6313(a)(3)) and correspond to the minimum efficiency levels in ASHRAE/IESNA Standard 90.1–1989. These levels consist of the EER for the cooling mode and the COP for the heating mode. The EER means ''the ratio of the produced cooling effect of an air conditioner or heat pump to its net work input, expressed in Btu/watt-hour.'' 10 CFR 431.92. The COP means ''the ratio of produced cooling effect of an air conditioner or heat pump (or its produced heating effect, depending on model operation) to its net work input, when both the cooling (or heating) effect and the net work input are expressed in identical units of measurement.'' 10 CFR 431.92. Table II.1 depicts the Federal energy conservation standards for PTACs and PTHPs found in 10 CFR 431.97.

TABLE II.1.—EXISTING FEDERAL ENERGY CONSERVATION STANDARDS FOR PTACS AND PTHPS

Equipment class		Existing federal energy conservation standards*
Equipment	Cooling capacity	
PTAC	< 7,000 Btu/h	EER = 8.88
	≥ 7,000 Btu/h and ≤ 15,000 Btu/h	EER = 10.0 − (0.16 × Cap**)

[2] This part was originally titled Part C., However, it was redesignated Part A–1 after Part B of Title III of EPCA was repealed by Public Law 109–58.

[3] These requirements are codified in Part C of Title III of EPCA, now Part A–1, as amended, 42 U.S.C. 6311–6316, and Title 10 of the Code of Federal Regulations, Part 431 (10 CFR Part 431) at 10 CFR 431.92, 431.96, 431.97, and subparts U and V.

TABLE II.1.—EXISTING FEDERAL ENERGY CONSERVATION STANDARDS FOR PTACS AND PTHPS—Continued

Equipment class		Existing federal energy conservation standards*
Equipment	Cooling capacity	
	> 15,000 Btu/h	EER = 7.6
PTHP	< 7,000 Btu/h	EER = 8.88 COP = 2.7
	≥ 7,000 Btu/h and ≤ 15,000 Btu/h	EER = 10.0 − (0.16 × Cap**) COP = 1.3 + (0.16 × EER)
	> 15,000 Btu/h	EER = 7.6 COP = 2.5

* For equipment rated according to the Air-Conditioning and Refrigeration Institute (ARI) standards, all EER values must be rated at 95 °F outdoor dry-bulb temperature for air-cooled products and evaporatively-cooled products and at 85 °F entering water temperature for water cooled products. All COP values must be rated at 47 °F outdoor dry-bulb temperature for air-cooled products, and at 70 °F entering water temperature for water-source heat pumps.
** Cap means cooling capacity in kBtu/h at 95 °F outdoor dry-bulb temperature.

2. History of Standards Rulemaking for Packaged Terminal Air Conditioners and Packaged Terminal Heat Pumps

On October 29, 1999, ASHRAE's Board of Directors approved ASHRAE/IESNA Standard 90.1–1999 (ASHRAE/IESNA Standard 90.1–1999), which addressed efficiency standard levels for 34 categories of commercial heating, ventilating and air-conditioning (HVAC) and water heating equipment covered by EPCA, including PTACs and PTHPs. In amending the ASHRAE/IESNA Standard 90.1–1989 levels for PTACs and PTHPs, ASHRAE acknowledged the physical size constraints between the varying sleeve sizes on the market. Specifically, the wall sleeve dimensions of the PTAC and PTHP affect the energy efficiency of the equipment. Consequently, ASHRAE/IESNA Standard 90.1–1999 used the equipment classes defined by EPCA, which are distinguished by equipment (i.e., air conditioner or heat pump) and cooling capacity, and further separated these equipment classes by wall sleeve dimensions as further discussed in section IV.C.2. Table II.2 shows the efficiency levels in ASHRAE/IESNA Standard 90.1–1999 for PTACs and PTHPs.

TABLE II.2.—ASHRAE/IESNA STANDARD 90.1–1999 ENERGY EFFICIENCY LEVELS FOR PTACS AND PTHPS

Equipment class			ASHRAE/IESNA standard 90.1–1999 efficiency levels*
Equipment	Category	Cooling capacity	
PTAC	Standard Size**	< 7,000 Btu/h	EER = 11.0
		≥ 7,000 Btu/h and ≤ 15,000 Btu/h	EER = 12.5 − (0.213 × Cap††)
		> 15,000 Btu/h	EER = 9.3
	Non-Standard Size†	< 7,000 Btu/h	EER = 9.4
		≥ 7,000 Btu/h and ≤ 15,000 Btu/h	EER = 10.9 − (0.213 × Cap††)
		> 15,000 Btu/h	EER = 7.7
PTHP	Standard Size**	< 7,000 Btu/h	EER = 10.8 COP = 3.0
		≥ 7,000 Btu/h and ≤ 15,000 Btu/h	EER = 12.3 − (0.213 × Cap††) COP = 3.2 − (0.026 × Cap††)
		> 15,000 Btu/h	EER = 9.1 COP = 2.8
	Non-Standard Size†	< 7,000 Btu/h	EER = 9.3 COP = 2.7
		≥ 7,000 Btu/h and ≤ 15,000 Btu/h	EER = 10.8 − (0.213 × Cap††) COP = 2.9 − (0.026 × Cap††)
		>15,000 Btu/h	EER = 7.6 COP = 2.5

* For equipment rated according to ARI standards, all EER values must be rated at 95°F outdoor dry-bulb temperature for air-cooled products and evaporatively-cooled products and at 85°F entering water temperature for water cooled products. All COP values must be rated at 47°F outdoor dry-bulb temperature for air-cooled products, and at 70°F entering water temperature for water-source heat pumps.
** Standard size refers to PTAC or PTHP equipment with wall sleeve dimensions greater than or equal to 16 inches high, or greater than or equal to 42 inches wide.
† Non-standard size refers to PTAC or PTHP equipment with wall sleeve dimensions less than 16 inches high and less than 42 inches wide. ASHRAE/IESNA Standard 90.1–1999 also includes a factory labeling requirement for non-standard size PTAC and PTHP equipment as follows: "MANUFACTURED FOR REPLACEMENT APPLICATIONS ONLY; NOT TO BE INSTALLED IN NEW CONSTRUCTION PROJECTS."
†† Cap means cooling capacity in kBtu/h at 95°F outdoor dry-bulb temperature.

Following the publication of ASHRAE/IESNA Standard 90.1–1999, DOE performed a screening analysis that covered 24 of the 34 categories of equipment addressed in ASHRAE/IESNA Standard 90.1–1999, to determine if more stringent levels would result in significant additional energy conservation of energy, be technologically feasible and economically justified. For each of these types of equipment, the screening analysis examined a range of efficiency levels that included the levels specified in EPCA and ASHRAE/IESNA Standard 90.1–1999, as well as the maximum technologically feasible efficiency levels. The report "Screening Analysis for EPACT-Covered Commercial [Heating, Ventilating and Air-Conditioning] HVAC and Water-Heating

Equipment'' (commonly referred to as the 2000 Screening Analysis)[4] summarizes this analysis, and estimates the annual national energy consumption and the potential for energy savings that would result if the covered equipment were to meet efficiency levels higher than those specified in ASHRAE/IESNA Standard 90.1–1999. The baselines for the comparison were the corresponding levels specified in ASHRAE/IESNA Standard 90.1–1999 and EPCA.

On January 12, 2001, DOE published a final rule for commercial HVAC and water heating equipment, which concluded that the 2000 Screening Analysis indicated at least a reasonable possibility of finding ''clear and convincing evidence'' that more stringent standards ''would be technologically feasible and economically justified and would result in significant additional conservation of energy'' for PTACs and PTHPs. 66 FR 3336, 3349. Under EPCA, these are the criteria for DOE adoption of standards more stringent than those in ASHRAE/IESNA Standard 90.1. (42 U.S.C. 6313(a)(6)(A)(ii)(II))

In addition, on March 13, 2006, DOE issued a Notice of Availability (NOA) announcing the availability of a technical support document (TSD) DOE was using in re-assessing whether to adopt, as uniform national standards, energy conservation standards contained in amendments to the ASHRAE/IESNA Standard 90.1–1999 for certain types of commercial equipment. 71 FR 12634. In the NOA, DOE revised the energy savings analysis from the 2000 Screening Analysis and summarized the assumptions and results in the NOA TSD. *Id.* DOE also stated that, even though the revised analysis reduced the potential energy savings that might result from more stringent standards than the efficiency levels specified in ASHRAE/IESNA Standard 90.1–1999 for PTACs and PTHPs, DOE believed that there was a possibility that clear and convincing evidence exists that more stringent standards are warranted. Therefore, DOE stated in the NOA that it was inclined to seek more stringent standard levels than the efficiency levels in ASHRAE/IESNA Standard 90.1–1999 for PTACs and PTHPs through a separate rulemaking. 71 FR 12639. Lastly, on March 7, 2007, DOE issued a final rule reaffirming DOE's inclination in the March 2006 NOA and stating DOE's decision to explore more stringent efficiency levels than in ASHRAE/IESNA Standard 90.1–1999 for PTACs and PTHPs through a separate rulemaking. 72 FR 10038, 10044.

In January 2008, ASHRAE published ASHRAE/IESNA Standard 90.1–2007, which reaffirmed the definitions and efficiency levels for PTACs and PTHPs in ASHRAE/IESNA Standard 90.1–1999. Since the definitions and efficiency levels for PTACs and PTHPs are the same in the two versions of ASHRAE/IESNA Standard 90.1, DOE is only referencing the ASHRAE/IESNA Standard 90.1–1999 version throughout today's notice even though DOE reviewed both versions.

III. General Discussion

A. Test Procedures

Section 343(a) of EPCA authorizes the Secretary to amend the test procedures for PTACs and PTHPs to the latest version generally accepted by industry or the rating procedures developed by the Air-Conditioning and Refrigeration Institute (ARI)[5], as referenced by ASHRAE/IESNA Standard 90.1, unless the Secretary determines by clear and convincing evidence the latest version of the industry test procedure does not meet the requirements for test procedures described in paragraphs (2) and (3) of that section. (42 U.S.C. 6314(a)(4))

DOE published a final rule on October 21, 2004, that amends its test procedure for PTACs and PTHPs to incorporate by reference the most recent amendments to the industry test procedure for PTACs and PTHPs, ARI Standard 310/380–2004. 69 FR 61962 (October 21, 2004). DOE does not believe further modifications to this test procedure are necessary at this time because no further amendments have been made to the industry test procedure for PTACs and PTHPs.

B. Technological Feasibility

1. General

DOE considers design options technologically feasible if the industry is already using them or if research has progressed to development of a working prototype. DOE defines technological feasibility as: ''Technologies incorporated in commercially available products or in working prototypes will be considered technologically feasible.'' 10 CFR part 430, subpart C, appendix A, section 4(a)(4)(i).

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 equipment that is the subject of the rulemaking. In consultation with interested parties, DOE develops a list of design options for consideration in the rulemaking. All technologically feasible design options are candidates in this initial assessment. DOE eliminates from consideration, early in the process, any design option that is not practicable to manufacture, install, or service; that will have adverse impacts on equipment utility or availability; or for which there are adverse impacts on health or safety. 10 CFR 430, subpart C, appendix A, section 4(a)(4). In addition, for the types of equipment identified in section 342(a) of EPCA, 42 U.S.C. 6313(a), which includes PTACs and PTHPs, DOE eliminates from consideration any design option whose technological feasibility is not supported by clear and convincing evidence.

The design options DOE considered as part of this rulemaking all have the potential to improve EER or COP. DOE considered any design option for PTACs and PTHPs to be technologically feasible if it is used in equipment the PTAC and PTHP industry distributes in commerce or is in a working prototype.

2. Maximum Technologically Feasible Levels

In developing today's proposed standards, DOE has determined the maximum improvement in energy efficiency that is technologically feasible (''max tech'') for PTACs and PTHPs. EPCA requires that DOE adopt amended energy conservation standards for equipment covered by ASHRAE/IESNA Standard 90.1 that achieves the maximum improvement in energy efficiency that is technologically feasible and economically justified, or to identify the ''max tech'' efficiency levels. (42 U.S.C. 6316(a); 42 U.S.C. 6295(o)(2)(A)) Therefore, in reviewing the amended ASHRAE/IESNA Standard 90.1 efficiency standards for PTACs and PTHPs, DOE identified the ''max tech'' levels as part of the engineering analysis (Chapter 5 of the TSD). At the present time, those levels are the levels set forth in TSL 7. For the representative cooling capacities within a given equipment class, PTACs and PTHPs utilizing R–22 with these efficiency levels already are being offered for sale and there is no

[4] U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy. ''Energy Conservation Program for Consumer Products: Screening Analysis for EPACT-Covered Commercial HVAC and Water-Heating Equipment Screening Analysis.'' April 2000.

[5] The Air-Conditioning and Refrigeration Institute (ARI) and the Gas Appliance Manufacturers Association (GAMA) announced on December 17, 2007, that their members voted to approve the merger of the two trade associations to represent the interests of cooling, heating, and commercial refrigeration equipment manufacturers. The merged association became AHRI on Jan. 1, 2008.

equipment at higher efficiency levels that are currently available. Table III.1 lists the ''max tech'' levels that DOE identified for this rulemaking.

TABLE III.1.—''MAX TECH'' EFFICIENCY LEVELS (≥7,000 BTU/H AND ≤15,000 BTU/H EQUIPMENT CLASSES)*

Equipment type	Equipment class	Cooling capacity (Btu/h)	''Max tech'' efficiency level**
PTAC	Standard Size†	9,000	12.0 EER
		12,000	11.5 EER
	Non-standard Size††	11,000	11.2 EER
PTHP	Standard Size†	9,000	12.0 EER 3.5 COP
		12,000	11.7 EER 3.3 COP
	Non-standard Size††	11,000	11.4 EER 2.9 COP

* As discussed in section IV.C.2 of today's notice, DOE is presenting the results for two cooling capacities of standard size PTACs and PTHPs, 9,000 Btu/h and 12,000 Btu/h, which fall within the equipment classes of PTACs and PTHPs with cooling capacities ≥7,000 Btu/h and ≤15,000 Btu/h.

** For equipment rated according to the DOE test procedure, all EER values would be rated at 95°F outdoor dry-bulb temperature for air-cooled products and evaporatively-cooled products and at 85°F entering water temperature for water cooled products. All COP values must be rated at 47°F outdoor dry-bulb temperature for air-cooled products, and at 70°F entering water temperature for water-source heat pumps.

† Standard size refers to PTAC or PTHP equipment with wall sleeve dimensions greater than or equal to 16 inches high, or greater than or equal to 42 inches wide.

†† Non-standard size refers to PTAC or PTHP equipment with wall sleeve dimensions less than 16 inches high and less than 42 inches wide.

C. Energy Savings

1. Determination of Savings

DOE used the national energy savings (NES) Microsoft Excel spreadsheet to estimate energy savings that could result from amended energy conservation standards for PTACs and PTHPs. The spreadsheet forecasts energy savings over the period of analysis for TSLs relative to the base case. DOE quantified the energy savings attributable to an energy conservation standard as the difference in energy consumption between the trial standards case and the base case. The base case represents the forecast of energy consumption in the absence of amended mandatory energy conservation standards beyond the levels in ASHRAE/IESNA Standard 90.1–1999. Section IV.G of this Notice and Chapter 11 of the TSD describes the NES spreadsheet model.

The NES spreadsheet model calculates the energy savings in both site energy (in kilowatt-hours (kWh)) or source energy (in British thermal units (Btu)). Site energy is the energy directly consumed at building sites by PTACs and PTHPs. DOE expresses national energy savings in terms of source energy savings (i.e., savings in energy used to generate and transmit the energy consumed at the site). Chapter 11 of the TSD contains a table of factors used to convert site energy consumption in kWh to source energy consumption in Btu. DOE derived these conversion factors, which change over time, from EIA's AEO2007.

2. Significance of Savings

Section 342(a)(6)(A)(ii)(II) of EPCA allows DOE to adopt a more stringent standard for PTACs and PTHPs than the amended level in ASHRAE/IESNA Standard 90.1, if clear and convincing evidence supports a determination that the more stringent standard would result in ''significant'' additional energy savings. (42 U.S.C. 6313(a)(6)(A)(ii)(II)) While EPCA does not define the term ''significant,'' a U.S. Court of Appeals, in *Natural Resources Defense Council* v. *Herrington*, 768 F.2d 1355, 1373 (D.C. Cir. 1985), indicated that Congress intended ''significant'' energy savings in section 325 of EPCA to mean savings that are not ''genuinely trivial.'' For all the TSLs considered in this rulemaking, DOE's estimates of energy savings provide clear and convincing evidence that the additional energy savings to be achieved from exceeding the corresponding efficiency level[s] in ASHRAE/IESNA Standard 90.1–1999 are nontrivial, and therefore DOE considers them ''significant'' as required by section 342 of EPCA. (42 U.S.C. 6313 (a)(6)(A)(ii)(II))

D. Economic Justification

As noted earlier, EPCA provides seven factors for DOE to evaluate in determining whether an energy conservation standard for PTAC and PTHP is economically justified. (42 U.S.C. 6316(a); 42 U.S.C. 6295(o)(2)(B)(i)–(ii)) The following discussion explains how DOE has addressed each factor in this rulemaking.

1. Economic Impact on Manufacturers and Commercial Customers

DOE has established procedures, interpretations, and policies to guide DOE in considering new or amended appliance energy conservation standards. DOE investigates the impacts of amended energy conservation standards of PTACs and PTHPs on manufacturers through the manufacturer impact analysis (MIA) (see Chapter 13 of the TSD). First, DOE uses an annual cash flow approach in determining the quantitative impacts of a new or amended energy conservation standard on manufacturers. This includes both a short- and long-term assessment based on the cost and capital requirements during the period between the announcement of a regulation and the time when the regulation comes into effect. Impacts analyzed include INPV, cash flows by year, changes in revenue and income, and other measures of impact, as appropriate. Second, DOE analyzes and reports the impacts on different types of manufacturers, paying particular attention to impacts on small manufacturers. Third, DOE considers the impact of standards on domestic manufacturer employment, manufacturing capacity, plant closures, and loss of capital investment. Finally, DOE takes into account cumulative impacts of different DOE regulations on manufacturers.

For customers, DOE measures the economic impact as the change in installed cost and life-cycle operating costs, i.e., the LCC. Chapter 8 of the TSD presents the LCC of the equipment at each efficiency level examined. LCC, described below, is one of the seven factors EPCA requires DOE to consider in determining the economic justification for a new or amended standard. (42 U.S.C. 6316(a); 42 U.S.C. 6295(o)(2)(B)(i)(II))

2. Life-Cycle Costs

The LCC is the sum of the purchase price, including the installation and operating expense (including operating energy consumption, maintenance, and repair expenditures) discounted over the lifetime of the equipment. To determine the purchase price including installation, DOE estimated the markups that are added to the manufacturer selling price (MSP) by distributors and contractors, and estimated installation costs from an analysis of PTAC and PTHP installation cost estimates for each of the equipment classes. DOE determined that maintenance cost is not dependent on PTAC and PTHP efficiency and that repair cost increases with MSP.

In estimating operating energy costs, DOE used the average commercial electricity price in each State, using EIA data from 2006.[6] DOE modified the 2006 average commercial electricity prices to reflect the average electricity prices for each of four types of businesses examined in this analysis. The LCC savings analysis compares the LCCs of equipment designed to meet possible proposed energy conservation standards with the LCC of the equipment likely to be installed in the absence of amended energy conservation standards. The LCC analysis also defines a range of energy price forecasts for electricity used in the economic analyses.

For each PTAC and PTHP equipment class, DOE calculated both the LCC and LCC savings at various efficiency levels. The LCC analysis estimated the LCC for representative equipment used in four types of buildings, two of which were hotels/motels and health care facilities that are representative of the segment of U.S. commercial building stock that uses PTACs and PTHPs.

To account for uncertainty and variability in specific inputs, such as equipment lifetime and discount rate, DOE used a distribution of values with probabilities attached to each value. For each of the four types of commercial buildings, DOE sampled the value of these inputs from the probability distributions. As a result, the analysis produced a range of LCCs. A distinct advantage of this approach is that DOE can identify the percentage of customers achieving LCC savings or attaining certain payback values due to an increased energy conservation standard, in addition to identifying the average LCC savings or average payback period for that standard. DOE gives the LCC savings as a distribution, with a mean value and a range. DOE's analysis assumes that the customer purchases the PTAC and PTHP in 2012. Chapter 8 of the TSD contains the details of the LCC calculations.

[6] The EIA data for 2006 is the latest data set published by EIA on commercial electricity prices by State.

3. Energy Savings

While significant additional energy conservation is a separate statutory requirement for imposing a more stringent energy conservation standard than the level in ASHRAE/IESNA Standard 90.1, EPCA requires that DOE consider the total projected energy savings expected to result directly from the standard when determining the economic justification for a standard. (42 U.S.C. 6316(a); 42 U.S.C. 6295(o)(2)(B)(i)(III)) DOE used the NES spreadsheet results in its consideration of total projected savings. Section V.B.3 discusses the savings figures.

4. Lessening of Utility or Performance of Equipment

In establishing equipment classes, and in evaluating design options and the impact of proposed standards, DOE has attempted to avoid proposing amended standards for PTACs and PTHPs that would lessen the utility or performance of such equipment. (See 42 U.S.C. 6316(a); 42 U.S.C. 6295(o)(2)(B)(i)(IV)) The design options considered in the engineering analysis of this rulemaking do not involve changes in equipment design or unusual installation requirements that could reduce the utility or performance of PTACs and PTHPs. In addition, DOE is also considering manufacturers' concerns that one-third of the non-standard size market subject to the more stringent standards under ASHRAE/IESNA Standard 90.1–1999 would not be able to meet the efficiency levels specified by ASHRAE/IESNA Standard 90.1–1999 for standard size equipment due to the physical size constraints of the wall sleeve as further discussed in section IV.A.2.

5. Impact of Any Lessening of Competition

EPCA directs that DOE consider any lessening of competition that is likely to result from proposed standards. The Attorney General considers the impact, if any, of any lessening of competition likely to result from imposition of a proposed standard. (42 U.S.C. 6316(a); 42 U.S.C. 6295(o)(2)(B)(i)(V)) DOE has transmitted a copy of this NOPR to the Attorney General soliciting written views on this issue.

6. Need of the Nation To Conserve Energy

The non-monetary benefits of the proposed standards are likely to be reflected in improvements to the security and reliability of the Nation's energy system-namely, reductions in the overall demand for energy will result in a reduction in the Nation's reliance on foreign sources of energy and increased reliability of the Nation's electricity system. DOE conducts a utility impact analysis to show the reduction in installed generation capacity. The proposed standards are also likely to result in improvements to the environment. In quantifying these improvements, DOE has defined a range of primary energy conversion factors and associated emission reductions based on the generation displaced by energy conservation standards. DOE reports the environmental effects from each TSL in the environmental assessment, Chapter 16 of the TSD. (42 U.S.C. 6313(a); 42 U.S.C. 6295(o)(2)(B)(i)(VI))

7. Other Factors

EPCA allows the Secretary of Energy, in determining whether a proposed standard is economically justified, to consider any other factors that the Secretary deems to be relevant. (42 U.S.C. 6316(a); 42 U.S.C. 6295(o)(2)(B)(i)(VII)) DOE considered the impacts of setting different amended energy conservation standards for PTACs and PTHPs (i.e., the amended standard level for a given PTAC cooling capacity would be different from the amended standard level for a give PTHP with the same cooling capacity). DOE also considered the effects of potential equipment switching within the PTAC and PTHP market (e.g., switching from PTHPs to PTACs, which include a less-efficient heating system). In addition, DOE also considered the uncertainty associated with the market due to the impending refrigerant phase-out in 2010, including equipment availability, compressor availability, and the available efficiencies of R–410A PTACs and PTHPs. Lastly, DOE considered the uniqueness of the non-standard size of this equipment and any differential impacts that might result on this industry from amended energy conservation standards. The non-standard size market is further discussed in section IV and the impacts on the non-standard size industry from amended energy conservation standards are estimated in section V.

IV. Methodology and Analyses

This section addresses the analyses DOE has performed for this rulemaking. A separate sub-section addresses each analysis. DOE used a spreadsheet to calculate the LCC and payback periods (PBPs) of potential amended energy conservation standards. Another spreadsheet was used to provide shipments forecasts and then calculates national energy savings and net present value impacts of potential amended energy conservation standards. DOE also assessed manufacturer impacts, largely through use of the Government Regulatory Impact Model (GRIM).

DOE also estimated the impacts of proposed PTAC and PTHP energy conservation standards on electric utilities and the environment using a version of EIA's National Energy Modeling System (NEMS). The NEMS model simulates the U.S. energy economy and has been developed over several years by the EIA primarily for preparing the *AEO*. The NEMS produces a widely known baseline forecast for the United States through 2030 that is available in the public domain. The version of NEMS used for the proposed energy conservation standards analysis is called NEMS–BT , and is based on the AEO2007 version with minor modifications. The NEMS–BT offers a sophisticated picture of the effect of standards, since it can measure the interactions between the various energy supply and demand sectors and the economy as a whole.

A. Market and Technology Assessment

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

1. Definitions of a PTAC and a PTHP

Section 340 of EPCA defines a ''packaged terminal air conditioner'' as ''a wall sleeve and a separate unencased combination of heating and cooling assemblies specified by the builder and intended for mounting through the wall. It includes a prime source of refrigeration, separable outdoor louvers, forced ventilation, and heating availability by builder's choice of hot water, steam, or electricity.'' (42 U.S.C. 6311(10)(A)) EPCA defines a ''packaged terminal heat pump'' as ''a packaged terminal air conditioner that utilizes reverse cycle refrigeration as its prime heat source and should have supplementary heat source available to builders with the choice of hot water, steam, or electric resistant heat.'' (42 U.S.C. 6311(10)(B)) DOE codified these definitions in 10 CFR 431.92 in a final rule issued October 21, 2004. 69 FR 61970.

2. Equipment Classes

When evaluating and establishing energy conservation standards, DOE generally divides covered equipment into equipment classes by the type of energy used or by capacity or other performance-related features that affect efficiency. Different energy conservation standards may apply to different equipment classes. (42 U.S.C. 6316(a); 42 U.S.C. 6295(q))

PTACs and PTHPs can be divided into various equipment classes categorized by physical characteristics that affect equipment efficiency. Key characteristics affecting the energy efficiency of the PTAC or PTHP are whether the equipment has reverse cycle heating (i.e., air conditioner or heat pump), the cooling capacity, and the physical dimensions of the unit.

The existing Federal energy conservation standards for PTACs and PTHPs correspond to the efficiency levels in ASHRAE/IESNA Standard 90.1–1989, as shown in Tables 1 and 2 of 10 CFR Part 431.97, dividing PTACs and PTHPs into six equipment classes. These equipment classes are differentiated by whether the equipment has supplemental heating or reverse cycle heating (i.e., air conditioner or heat pump) and by cooling capacity in Btu/h.

When installed, PTACs and PTHPs are fitted into a wall sleeve. There is a wide variety of wall sleeve sizes found in different buildings. These wall sleeves are market driven (i.e., the applications or facilities where the PTACs or PTHPs are installed is what determines the ''market standard'' wall sleeve dimension) and require manufacturers to offer various PTACs and PTHPs that can fit into various wall sleeve dimensions. For new units, the industry has standardized the wall sleeve dimension for PTACs and PTHPs in buildings over the past 20 years to be 16 inches high by 42 inches wide. Therefore, units that have a wall sleeve dimension of 16 inches high by 42 inches wide are considered ''standard size'' equipment and all other units are considered ''non-standard size'' equipment. In contrast, the industry does not have a common wall sleeve dimension that is typical for all older existing facilities. These facilities, such as high-rise buildings found in large cities, typically use non-standard size equipment. In these installations, altering the existing wall sleeve opening to accommodate the more efficient, standard size equipment could include extensive structural changes to the building, could be very costly, and is therefore, rarely done.

When ASHRAE amended the efficiency levels for PTACs and PTHPs in 1999, it acknowledged the physical size constraints among various sleeve sizes on the market. Consequently, ASHRAE/IESNA Standard 90.1–1999 used the equipment classes defined by EPCA, which are distinguished by whether the product has reverse cycle heating (i.e., air conditioner or heat pump) and cooling capacity in Btu/h, and further separated these equipment classes by wall sleeve dimensions.

ASHRAE/IESNA Standard 90.1–1999 refers to wall sleeve dimensions in two categories: ''New Construction'' and ''Replacement.'' ASHRAE/IESNA Standard 90.1–1999 does not describe ''New Construction,'' but Table 6.21D, footnote b of ASHRAE/IESNA Standard 90.1–1999 states that ''replacement'' efficiencies apply only to units: (1) ''Factory labeled as follows: Manufactured for Replacement Applications Only; Not to be Installed in New Construction Projects''; and (2) ''with existing wall sleeves less than 16 inches high and less than 42 inches wide.'' DOE understands that the ''New Construction'' category under ASHRAE/IESNA Standard 90.1–1999 is residual, and covers all other PTAC and PTHPs. Hence, this category consists of equipment with wall sleeve dimensions greater than or equal to 16 inches high and greater than or equal to 42 inches wide, or lacking the requisite label. In addition, when ASHRAE approved ASHRAE/IESNA Standard 90.1–1999, not only did it include delineations by wall sleeve dimensions, but it also associated these delineations with specified efficiency levels. The efficiency levels associated with non-standard equipment, or ''Replacement'' equipment, are significantly less stringent than those associated with standard size equipment, or ''New Construction'' equipment.

ARI recently submitted a continuous maintenance proposal on PTAC and

PTHP equipment to the ASHRAE/IESNA Standard 90.1 committee, which in part suggests alterations to the delineations within ASHRAE/IESNA Standard 90.1–1999 for standard and non-standard size equipment.[7] ARI believes ASHRAE misclassified approximately one-third of the non-standard size market when it adopted ASHRAE/IESNA Standard 90.1–1999. ARI believes the one third of the non-standard size market subject to the more stringent standards under ASHRAE/IESNA Standard 90.1–1999 are not capable of meeting the efficiency levels specified by ASHRAE/IESNA Standard 90.1–1999 for standard size equipment due to the physical size constraints of the wall sleeve. For example, a PTAC or PTHP unit with wall sleeve dimensions of 16.5 inches high and 27 inches wide would be classified as standard size equipment under ASHRAE's delineations and would be required to meet the higher efficiency levels specified by ASHRAE/IESNA Standard 90.1–1999. However, since this unit does not have the industry standard wall sleeve dimension of 16 inches high by 42 inches wide, ARI believes these units are solely non-standard units that are used in very old buildings and should therefore be considered as replacement units. Due to the space limitations typically associated with non-standard size PTACs and PTHPs, manufacturers have few options to increase energy efficiency. As noted above, many of the existing buildings cannot be retrofitted to accommodate larger wall sleeves associated with more efficient standard-size units.

In response to this apparent misclassification within ASHRAE/IESNA Standard 90.1–1999, ARI proposed a continuous maintenance proposal to ASHRAE that includes a new definition for non-standard size PTACs and PTHPs in place of the ''replacement'' delineation in ASHRAE/IESNA Standard 90.1–1999. The new definition of non-standard size PTACs and PTHPs reads: ''*equipment with existing sleeves having an external wall opening of less than 16 in. high or less than 42 in. wide, and having a cross-sectional area less than 670 in*^{2}.'' Effectively, this new definition of non-standard equipment would allow approximately five percent of the total PTAC and PTHP market to qualify for the less stringent, non-standard efficiency levels.

DOE recognizes ARI's concerns regarding non-standard size equipment and the possible misclassification under the delineations established by ASHRAE/IESNA Standard 90.1–1999. When ASHRAE approved ASHRAE/IESNA Standard 90.1–1999, not only did it include delineations by wall sleeve dimensions, but it also associated these delineations with specified efficiency levels. The efficiency levels associated with non-standard equipment, or ''Replacement'' equipment, are significantly less stringent than those associated with standard size equipment, or ''New Construction'' equipment.

DOE reviewed the ARI shipment data and found approximately 15 percent of the total market (i.e., approximately 67,000 units shipped annually) are non-standard size equipment. Under ASHRAE/IESNA Standard 90.1–1999, approximately 5 percent of the total non-standard size equipment market would be required to meet the more stringent standards established for standard size equipment. If DOE were to adopt equipment classes consistent with those delineations in ASHRAE/IESNA Standard 90.1–1999, manufacturers could be forced to cease production of those equipment lines, which are potentially misclassified and could not meet the more stringent standards. Under the ARI continuous maintenance proposal to ASHRAE, all of the non-standard size equipment would be subject to the less stringent standards.

Since ARI's proposed definitions would effectively reclassify some equipment under ASHRAE/IESNA 90.1–1999's delineations as non-standard size equipment, DOE believes ASHRAE must adopt ARI's continuous maintenance proposal before DOE can officially use this definition as the basis for DOE's standard. (42 U.S.C. 6313(a)(6)(A)(ii)) DOE understands that the ARI continuous maintenance proposal on PTACs and PTHPs has been approved by ASHRAE as Addendum t to ASHRAE/IESNA Standard 90.1–2007 and will be the subject of public review. If ASHRAE is able to adopt Addendum t to ASHRAE/IESNA Standard 90.1–2007 prior to September 2008, when DOE must issue a final rule on this rulemaking, DOE proposes to incorporate that version of the ASHRAE standard, including the modified definition in its final rule.

At this time, DOE seeks stakeholder comment on Addendum t to ASHRAE/IESNA Standard 90.1–2007 (i.e., ARI's continuous maintenance proposal to ASHRAE). Specifically, Addendum t to ASHRAE/IESNA Standard 90.1–2007 incorporates the following revised definition for non-standard size equipment: ''*equipment with existing sleeves having an external wall opening of less than 16 in. high or less than 42 in. wide, and having a cross-sectional area less than 670 in*^{2}.'' If ASHRAE were to approve Addendum t to ASHRAE/IESNA Standard 90.1–2007 prior to September 2008, DOE proposes to adopt equipment classes in the final rule for PTACs and PTHPs as shown in Table IV.1.

TABLE IV.1.—EQUIPMENT CLASSES FOR PTACS AND PTHPS IF ASHRAE ADOPTS ADDENDUM T TO ASHRE/IESNA STANDARD 90.1–2007

Equipment Class		
Equipment	Category	Cooling capacity
PTAC	Standard Size*	< 7,000 Btu/h
		≥ 7,000 Btu/h and ≤ 15,000 Btu/h
		> 15,000 Btu/h
	Non-Standard Size**	< 7,000 Btu/h
		≥ 7,000 Btu/h and ≤ 15,000 Btu/h
		> 15,000 Btu/h
PTHP	Standard Size*	< 7,000 Btu/h
		≥ 7,000 Btu/h and ≤ 15,000 Btu/h
		> 15,000 Btu/h
	Non-Standard Size**	< 7,000 Btu/h

[7] Air-Conditioning and Refrigeration Institute. Continuous Maintenance Proposal on Package Terminal Equipment. October 5, 2007.

TABLE IV.1.—EQUIPMENT CLASSES FOR PTACS AND PTHPS IF ASHRAE ADOPTS ADDENDUM T TO ASHRE/IESNA STANDARD 90.1–2007—Continued

Equipment Class		
Equipment	Category	Cooling capacity
		≥ 7,000 Btu/h and ≤ 15,000 Btu/h > 15,000 Btu/h

* Standard size refers to PTAC or PTHP equipment with wall sleeve dimensions having an external wall opening of greater than or equal to 16 inches high or greater than or equal to 42 inches wide, and having a cross-sectional area greater than or equal to 670 inches squared.

** Non-standard size refers to PTAC or PTHP equipment with existing wall sleeve dimensions having an external wall opening of less than 16 inches high or less than 42 inches wide, and having a cross-sectional area less than 670 inches squared.

DOE would add the definitions of standard size and non-standard size as defined in the footnotes of Table IV.1 under 10 CFR 431.2. This is identified as Issue 1 under ''Issues to Which DOE Seeks Comment'' in section VII.E of today's proposed rule.

In the absence of final action by ASHRAE on the addendum, DOE would subdivide EPCA's existing classes for this equipment by wall sleeve dimensions, consistent with ASHRAE/IENSNA Standard 90.1–1999. Specifically, DOE would adopt equipment classes in the final rule for PTACs and PTHPs as shown in Table IV.2.

TABLE IV.2.—EQUIPMENT CLASSES FOR PTACS AND PTHPS IF ASHRAE DOES NOT ADOPT ADDENDUM T TO ASHRE/IESNA STANDARD 90.1–2007

Equipment class		
Equipment	Category	Cooling capacity
PTAC	Standard Size*	< 7,000 Btu/h ≥ 7,000 Btu/h and ≤ 15,000 Btu/h > 15,000 Btu/h
	Non-Standard Size**	< 7,000 Btu/h ≥ 7,000 Btu/h and ≤ 15,000 Btu/h > 15,000 Btu/h
PTHP	Standard Size*	< 7,000 Btu/h ≥ 7,000 Btu/h and ≤ 15,000 Btu/h > 15,000 Btu/h
	Non-Standard Size**	< 7,000 Btu/h ≥ 7,000 Btu/h and ≤ 15,000 Btu/h > 15,000 Btu/h

* Standard size refers to PTAC or PTHP equipment with wall sleeve dimensions greater than or equal to 16 inches high, or greater than or equal to 42 inches wide.

** Non-standard size refers to PTAC or PTHP equipment with wall sleeve dimensions less than 16 inches high and less than 42 inches wide.

DOE would add the definitions of standard size and non-standard size as defined in the footnotes of Table IV.2 under section 10 CFR 431.2.

For the purposes of today's notice, DOE has based the proposed standards and the proposed definitions of non-standard and standard size PTACs and PTHPs as shown in the rule language of today's notice on the delineations in ASHRAE/IESNA Standard 90.1–1999. However as stated above, if ASHRAE adopts Addendum t to ASHRAE/IESNA Standard 90.1–2007 prior to September 2008, DOE proposes to incorporate the modified definitions from the Addendum in the final rule. (42 U.S.C. 6313(a)(6)(A)(ii)) If Addendum t is not available for DOE to include in the final rule, DOE's ability to do so at a later date will be constrained by the anti-backsliding provision. (42 U.S.C. 6316(a); 42 U.S.C. 6295(o)(1))

3. Market Assessment

The subjects addressed in this market assessment for this rulemaking include trade associations, manufacturers, and the quantities and types of equipment sold and offered for sale. The information DOE gathered serves as resource material throughout the rulemaking. Chapter 3 of the TSD provides additional detail on the market assessment.

a. Trade Association

The Air-Conditioning, Heating, and Refrigeration Institute (AHRI), formerly and throughout this notice referred to as ARI, is the trade association representing PTAC and PTHP manufacturers. ARI and the Gas Appliance Manufacturers Association (GAMA) announced on December 17, 2007, that their members voted to approve the merger of the two trade associations to represent the interests of cooling, heating, and commercial refrigeration equipment manufacturers. The merged association became AHRI on Jan. 1, 2008.

ARI develops and publishes technical standards for residential and commercial equipment using rating criteria and procedures for measuring and certifying equipment performance. The DOE test procedure is an ARI standard. ARI has developed a certification program that the majority of the manufacturers in the PTAC and PTHP industry have used to certify their equipment. Manufacturers certify their own equipment by providing ARI with test data. Through the ARI certification program, ARI evaluates the test data and determines if the equipment conforms to ARI 310/380–2004.[8] Once ARI has determined that the equipment has met all the requirements under ARI 310/380–2004 standards and certification

[8] DOE has incorporated by reference ARI Standard 310/380–2004 as the DOE test procedure at 10 CFR 431.97.

program, it is added to a directory of certified equipment. DOE used ARI's certification data, as summarized by the 2006 ARI directory of certified PTACs and PTHPs, in the engineering analysis.

b. Manufacturers

DOE identified five large manufacturers of standard size PTAC and PTHP that hold approximately 90 percent of the market in terms of shipments. These five manufacturers include: General Electric (GE) Company, Carrier Corporation, Amana,[9] Trane,[10] and McQuay International. Three major manufacturers including McQuay International, RetroAire, and Fedders Islandaire, Inc. share the non-standard size PTAC and PTHP market. All of the major manufacturers certify their equipment with ARI and are included in the ARI directory of certified products.

The standard size PTAC and PTHP market differs from the non-standard size PTAC and PTHP industry in that many of the manufacturers are domestically owned with manufacturing facilities located outside of the United States. Currently there is only one major manufacturer of standard size PTAC and PTHP equipment manufacturing equipment in the United States. In addition, there has been a recent trend in the PTAC and PTHP standard size market for foreign owned companies to enter and sell equipment in the United States.

Almost all of the manufacturers of non-standard size PTACs and PTHPs are domestically owned with manufacturing facilities located inside of the United States. The non-standard manufacturers tend to specialize in equipment solely for replacement applications. In addition, non-standard size manufacturers produce PTAC and PTHP equipment on a made-to-order basis. Unlike standard size manufacturers, there has not been an influx of foreign owned companies to sell non-standard size PTAC and PTHP equipment in the United States.

In addition, DOE takes into consideration the impact of amended energy conservation standards on small businesses. At this time, DOE has identified several small business in both the standard size and non-standard size PTAC and PTHP industry that fall under the Small Business Administration (SBA)'s definition as having 750 employees or fewer. DOE studies the potential impacts on these small businesses in detail during the MIA (section IV.I of today's notice and Chapter 13 of the TSD).

[9] Amana is a trademark of Maytag Corporation and is used under license to Goodman Global, Inc.

[10] Trane is a trademark and business of American Standard companies.

c. Shipments

DOE reviewed data collected by the U.S. Census Bureau and ARI to evaluate the annual PTAC and PTHP equipment shipment trends and the value of these shipments. The historical shipments data shown in Tables IV.3 provide a picture of the market for PTAC and PTHP equipment. The historical shipments for PTACs and PTHPs are based on data provided by ARI for the years 1997–2005.

TABLE IV.3.—2006 TOTAL PTAC AND PTHP INDUSTRY ESTIMATED SHIPMENT DATA FROM ARI (STANDARD AND NON-STANDARD)

Year	Total (thousands of units)
2005	484
2004	446
2003	399
2002	389
2001	388
2000	402
1999	453
1998	471
1997	434

Using currently available data, ARI estimated that 85 percent of the shipments for PTACs and PTHPs are standard size units, while 15 percent are non-standard size units. In addition, ARI identified the two cooling capacities for standard size PTACs and PTHPs with the highest number of shipments, which are 9,000 Btu/h and 12,000 Btu/h.

4. Technology Assessment

In the technology assessment, DOE identified technologies and design options that could improve the efficiency of PTACs and PTHPs. This assessment provides the technical background and structure on which DOE bases its screening and engineering analyses. For PTACs and PTHPs, DOE based its list of technologically feasible design options on input from manufacturers, industry experts, component suppliers, trade publications, and technical papers.

In surveying PTAC and PTHP technology options, DOE considered a wide assortment of equipment literature, information derived from the teardown analysis, information derived from the stakeholder interviews, and the previous DOE energy conservation standards rulemaking for air-conditioning rulemaking analyses. The following technology options were identified as potential means to improve PTAC and PTHP performance:

- Scroll compressors
- Variable-speed compressors
- Higher efficiency compressors
- Complex control boards
- Higher efficiency fan motors
- Microchannel heat exchangers
- Increase heat exchanger area
- Material treatment of heat exchanger
- Recircuiting heat exchanger coils
- Improved air flow and fan design
- Heat pipes
- Corrosion protection

B. Screening Analysis

The purpose of the screening analysis is to evaluate the technologies that improve equipment efficiency to determine which technologies to consider further and which to screen out. DOE consulted with a range of parties, including industry, technical experts, and others to develop a list of technologies for consideration. DOE then applied the following four screening criteria to determine which technologies are unsuitable for further consideration in the rulemaking (10 CFR Part 430, Subpart C, Appendix A at 4(a)(4) and 5(b)):

(1) Technological feasibility. Technologies incorporated in commercial equipment or in working prototypes will be considered technologically feasible.

(2) Practicability to manufacture, install, and service. If mass production of a technology in commercial equipment and reliable installation and servicing of the technology could be achieved on the scale necessary to serve the relevant market at the time of the effective date of the standard, then that technology will be considered practicable to manufacture, install, and service.

(3) Adverse impacts on equipment utility or equipment availability. If a technology is determined to have significant adverse impact on the utility of the equipment to significant subgroups of customers, or result in the unavailability of any covered equipment type with performance characteristics (including reliability), features, sizes, capacities, and volumes that are substantially the same as equipment 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 will have significant adverse impacts on health or safety, it will not be considered further.

DOE eliminated three technologies because they have no effect on, or do not increase EER or COP as measured by the test procedure since the test procedure measures steady-state energy efficiency. However, these features (i.e., variable speed compressors, complex control boards, and corrosion protection) can reduce the energy consumption of the PTAC or PTHP in actual applications, since they affect the cyclic operation of the equipment. They do not affect the measure of efficiency (i.e., EER and COP) since both are steady-state measures, not cyclic measures.

DOE also eliminated six of the technologies it identified in the market and technology assessment. The specific technologies that were eliminated based on the four screening criteria outlined above are: (1) Scroll compressors, (2) higher efficiency fan motors, (3) microchannel heat exchangers, (4) material treatment of heat exchangers, (5) improved airflow and fan design, and (6) heat pipes. DOE screened out scroll compressors because they are not currently practical to manufacturer in the sizes necessary for use in PTACs and PTHPs. DOE screened out higher efficiency fan motors, improved airflow and fan design because further gains in PSC fan motor technology or changing the type of fan design would affect the size of the motor or fan. Because PTACs and PTHPs are space-constrained equipment, it is unlikely that manufacturers would be able to redesign the motor or fans that would be practical to manufacture, install, and service on a scale necessary to serve the relevant market at the time of the effective date of the standard. DOE screened out microchannel heat exchangers because they are still in the research stage for PTAC and PTHP equipment and would not be practicable to manufacture, install, or service on a scale necessary to serve the relevant market at the time of the effective date of the standard. DOE screened out material treatment of heat exchangers because it is currently patented and only used by one PTAC and PTHP manufacturer; thus, it would not be practical to manufacture on broad scale for the entire industry. Lastly, DOE screened out heat pipes because they are still in the research stage and their energy savings potential has not been fully established.

Based on equipment literature, teardown analysis, and manufacturer interviews, DOE has identified higher efficiency compressors,[11] increasing the heat exchanger area, and recircuiting the heat exchanger coils as the most common ways by which manufacturers improve the energy efficiency of their PTACs and PTHPs as measured by the test procedure and that are not excluded by the four criteria in Appendix A to Subpart B of 10 CFR Part 430 listed above. See Chapter 3 of the TSD for additional detail on the technology assessment and technologies analyzed.

There are PTACs and PTHPs utilizing R–22 in the market at various efficiency levels incorporating the three design options analyzed in today's notice. DOE believes this constitutes clear and convincing evidence that all of the efficiency levels discussed in today's notice is technologically feasible. However, DOE recognizes the uncertainty associated with the conversion to R–410A refrigerant and will take this into further consideration when weighing the benefits and burdens for each TSL. For more details on how DOE developed the technology options and the process for screening these options, refer to the market and technology assessment (see Chapter 3 of the TSD) and the screening analysis (see Chapter 4 of the TSD).

C. Engineering Analysis

The purpose of the engineering analysis is to establish the relationship between the cost and efficiency of PTACs and PTHPs, to show the manufacturing costs of achieving increased efficiency. For each equipment class, this analysis estimates the baseline manufacturer cost, as well as the incremental cost for equipment at efficiency levels above the baseline. In determining the performance and the costs of more efficient equipment, DOE considers technologies and design option combinations not eliminated in the screening analysis. The output of the engineering analysis is a set of cost-efficiency relationships or cost-efficiency curves that are used in further analyses (e.g., the LCC and PBP analyses and the national impact analysis (NIA)).

DOE typically structures its engineering analysis around one of three methodologies: (1) The design-option approach, which calculates the incremental costs of adding specific design options to a baseline model; (2) the efficiency-level approach, which calculates the relative costs of achieving increases in energy efficiency levels, without regard to the particular design options used to achieve such increases; and (3) the reverse-engineering or cost-assessment approach, which involves ''bottom-up'' manufacturing cost assessments for achieving various levels of increased efficiency, based on detailed data derived from equipment tear-downs, as to costs for parts, material, labor, shipping/packaging, and investment for models that operate at particular efficiency levels.

1. Approach

For PTACs and PTHPs, each energy efficiency level is expressed as an EER, which is a function of cooling capacity. For each class analyzed, DOE used representative cooling capacities corresponding to the cooling capacities with the highest equipment shipments within a given equipment class. For the purposes of conducting the analyses, DOE believes that the results from the representative cooling capacities can be extrapolated to the entire range of cooling capacities for each equipment class. DOE's approach for extending the results to the omitted cooling capacities is discussed further in section V.1 of this NOPR. DOE seeks comment on this approach to extend the engineering analysis to cooling capacities for which complete analysis was not performed. This is identified as Issue 2 under ''Issues to Which DOE Seeks Comment'' in section VII.E of today's proposed rule.

For this analysis, DOE used a design option approach, which involved consultation with outside experts, review of publicly available cost and performance information, and modeling of equipment cost. The design options DOE considered in the Engineering Analysis include higher efficiency compressors, increasing the heat exchanger area, and recircuiting the heat exchanger coils. The design option analysis provides transparency of assumptions and results and the ability to perform independent analyses for verification. The methodology used to perform design-option analysis and derive the cost-efficiency relationship is described in detail in Chapter 5 of the TSD.

2. Equipment Classes Analyzed

For the engineering analysis, DOE reviewed all twelve equipment classes covered by this rulemaking. Since the wall sleeve dimensions effect the energy efficiency of the equipment, DOE examined standard size and non-standard size PTACs and PTHPs separately. In addition, since the energy efficiency equations for PTACs and PTHPs established by EPCA and ASHRAE/IESNA Standard 90.1–1999 are a function of the equipment's cooling capacity, DOE examined specific cooling capacities for standard size and non-standard size PTACs and PTHPs, which are referred to as representative cooling capacities. See

[11] Currently, all PTAC and PTHP manufacturers incorporate rotary compressors into their equipment designs. DOE is referring to rotary compressors throughout today's notice unless specifically noted.

Table 1 and Table 2 of 10 CFR Part 431.97 and ASHRAE/IESNA Standard 90.1–1999 for the energy efficiency equations. DOE reviewed the shipments data provided by ARI for the 2000 Screening Analysis and today's rulemaking,[12] and found the majority of shipments have a cooling capacity within the 7,000 Btu/h to 15,000 Btu/h range. See Chapter 3 of the TSD for more details on the shipments data. Consequently, DOE choose to examine these four equipment classes further.

For standard size PTAC and PTHP equipment classes, DOE identified two representative cooling capacities. The representative cooling capacities for standard size PTACs and PTHPs are 9,000 Btu/h and 12,000 Btu/h. DOE found these two representative cooling capacities to have the highest number of shipments based on data in the 2006 ARI Directory, the ACEEE database of equipment, as well as the shipment information provided to DOE found in the 2000 Screening Analysis. For non-standard size equipment, DOE could not identify representative cooling capacities or wall sleeve dimensions. The non-standard size PTAC and PTHP market also has a greater variety of shipments based on the customers that use them and specialized applications. DOE used 11,000 Btu/h as the representative cooling capacity for non-standard size equipment because it is the middle of the cooling capacity range. Therefore, for the engineering analysis and subsequent analyses, DOE analyzed non-standard size PTACs and PTHPs with 11,000 Btu/h cooling capacity. See Chapter 5 of the TSD for additional details.

DOE developed the cost-efficiency curves based on these representative cooling capacities and wall sleeve-size units. Table IV.4 exhibits the representative cooling capacities within each equipment class analyzed in the engineering analysis.

TABLE IV.4.—REPRESENTATIVE COOLING CAPACITIES FOR THE ENGINEERING ANALYSIS

Equipment type	Equipment class	Representative cooling capacity (Btu/h)
PTAC	Standard Size*	9,000
		12,000
	Non-Standard Size**	11,000
PTHP	Standard Size*	9,000
		12,000
	Non-Standard Size**	11,000

* Standard size refers to PTAC or PTHP equipment with wall sleeve dimensions greater than or equal to 16 inches high, or greater than or equal to 42 inches wide.
** Non-standard size refers to PTAC or PTHP equipment with wall sleeve dimensions less than 16 inches high and less than 42 inches wide.

DOE's selection of representative cooling capacities for further examination is based on shipment information provided by ARI. For the PTAC and PTHP equipment classes with a cooling capacity greater than or equal to 7,000 Btu/h and less than or equal to 15,000 Btu/h, the energy efficiency equation characterizes the relationship between the EER of the equipment and cooling capacity (i.e., EER is a function of the cooling capacity of the equipment). Therefore, for these equipment classes, DOE explicitly analyzed the two cooling capacities with the greatest number of shipments, which allows DOE to investigate the slope of the energy efficiency capacity relationship. For all cooling capacities less than 7,000 Btu/h and all cooling capacities greater than 15,000 Btu/h, the EER is calculated based on the energy efficiency equation for 7,000 Btu/h or 15,000 Btu/h, respectively.

For PTACs and PTHPs, DOE is proposing to equate the amended energy conservation standards for equipment with a cooling capacity less than 7,000 Btu/h with the amended energy conservation standards for equipment with a cooling capacity equal to 7,000 Btu/h. Similarly, for PTACs and PTHPs, DOE is proposing to equate the amended energy conservation standards for equipment with a cooling capacity greater than 15,000 Btu/h to the amended energy conservation standards for equipment with a cooling capacity equal to 15,000 Btu/h. This is the same method established in the Energy Policy Act of 1992 as shown by the existing Federal minimum energy conservation standards and maintained by ASHRAE Standard 90.1–1999 for calculating the EER and COP of equipment with cooling capacities less than 7,000 Btu/h and greater than 15,000 Btu/h. More details explaining how DOE developed the proposed energy efficiency equations based on the analysis results for the representative cooling capacities are found in section V.A of today's notice.

3. Cost Model

DOE developed a manufacturing cost model to estimate the manufacturing production cost (MPC) of PTACs and PTHPs. The manufacturing cost model is a spreadsheet model, which details the structured bill of materials to estimate the MPCs of a PTAC or PTHP based on all the manufacturing and fabrication resources required to manufacture the equipment. Developing the cost model involved disassembling various PTACs and PTHPs, analyzing the materials and manufacturing processes, and developing component costing flexible enough to be applicable to all equipment classes. In addition to disassembling various PTACs and PTHPs, manufacturers provided DOE supplemental component data for various PTAC and PTHP equipment. The manufacturing cost model used the component specifications supplied by manufacturers, the teardown data, component cost sources, and engineering interviews to estimate the MPCs. DOE reported the MPCs in aggregated form to maintain confidentiality of sensitive component data. DOE obtained input from stakeholders on the MPC estimates and assumptions to confirm accuracy. DOE used the cost model for all of the representative cooling capacities within the PTAC and PTHP equipment classes. Chapter 5 of the TSD provides details and assumptions of the cost model.

DOE applied a manufacturer markup to the MPC estimates to arrive at the MSP. This is the price at which the

[12] ARI provided DOE shipments data from 2000 for the 2000 Screening Analysis and shipments data from 2006 for today's rulemaking.

manufacturer can recover both production and non-production costs [13] and earns a profit. DOE developed a market-share-weighted average industry markup by examining the major PTAC and PTHP manufacturers' gross margin information from annual reports and Securities and Exchange Commission (SEC) 10–K reports. The manufacturers DOE examined represent approximately 75 percent of the PTAC and PTHP industry. Each of these companies is a subsidiary of a more diversified parent company that manufactures equipment other than PTACs and PTHPs. Because the SEC 10-K reports do not provide gross margin information at the subsidiary level, the estimated markups represent the average markups that the parent company applies over its entire range of offerings.

DOE evaluated manufacturer markups from 2002 to 2006, except for one manufacturer, whose markup was evaluated from 1998 to 2002 because data from the latter years was not publicly available. The manufacturer markup is calculated as 100/(100 − average gross margin), where gross margin is calculated as revenue − cost of goods sold (COGS). DOE used Internal Revenue Service industry statistics to validate the SEC 10-K and annual report information. DOE estimated the average manufacturer markup within the industry as 1.29. See Chapter 5 of the TSD for additional details.

4. Baseline Equipment

As mentioned above, the engineering analysis estimates the incremental costs for equipment with efficiency levels above the baseline in each equipment class. For the purpose of the engineering analysis, DOE used the engineering baseline EER as the starting point to build the cost efficiency curves. DOE usually uses the Federal minimum energy conservation standards to represent the baseline model's energy efficiency in the engineering analysis. However, all of the PTAC and PTHP equipment offered for sale, according to the ARI directory, exceed the efficiency levels specified by the existing Federal minimum energy conservation standards. Consequently, DOE identified the lowest efficiency equipment currently on the market and is utilizing it as the engineering baseline.

DOE established engineering baseline specifications for each of the equipment classes modeled in the engineering analysis by reviewing available manufacturer data, selecting several representative units from available manufacturer data, and then aggregating the physical characteristics of the selected units. These specifications include wall sleeve dimensions, number of components, and other equipment features that affect energy consumption, as well as a base cost (the cost of a piece of equipment not including the major efficiency-related components such as compressors, fan motors, and heat exchanger coils). By excluding the equipment designs, which can be attributable to specific manufacturers, DOE created an engineering baseline that is representative of each equipment class with average characteristics, including dimensions, components, and other equipment features that are necessary to calculate the MPC of each unit within each equipment class. The cost model was used to develop the MPC for each equipment class. Specifications of the baseline equipment are provided in Chapter 5 of the TSD.

In estimating the economic impacts of standards, DOE used the efficiency levels in ASHRAE/IESNA Standard 90.1–1999 as the baseline efficiencies in order to estimate the impacts of standards more stringent than ASHRAE/IESNA Standard 90.1–1999. ASHRAE/IESNA Standard 90.1–1999 is the least stringent energy efficiency level DOE could adopt since EPCA directs that if ASHRAE/IESNA Standard 90.1 is amended, DOE must adopt an amended standard at the new level in ASHRAE/IESNA Standard 90.1 unless clear and convincing evidence supports a determination that adoption of a more stringent level as a national standard would produce significantly more energy savings and be technologically feasible and economically justified. (42 U.S.C. 6313(a)(6)(A)(ii)(II)) Consequently, the minimum energy conservation standard levels DOE could adopt in this rulemaking proceeding would be the efficiency levels contained in ASHRAE/IESNA Standard 90.1–1999. Thus, DOE is evaluating in this rulemaking whether efficiency levels above those contained in ASHRAE/IESNA Standard 90.1–1999 are technologically feasible and economically justified.[14]

5. Alternative Refrigerant Analysis

a. R–22

In 1987, the United Nations Environment Programme (UNEP) adopted the Montreal Protocol on Substances that Deplete the Ozone Layer (Montreal Protocol), which regulates the phase-out of ozone-depleting substances through a collaborative and international effort. In 1988, the United States ratified the Montreal Protocol and thus committed to the phase-out.[15]

In 1990, the Clean Air Act was amended to include Title VI, "Stratospheric Ozone Protection," to implement the Montreal Protocol. (42 U.S.C. 7671, *et seq.*) Title VI mandated the phase-out by 2020 of hydrochlorofluorocarbon (HCFC) refrigerants for use in new air-conditioning systems. (42 U.S.C. 7671d) Title VI, however, also authorized the Environmental Protection Agency (EPA) to accelerate this date if certain criteria were met, (42 U.S.C. 7671e) and EPA subsequently adopted a rule on December 10, 1993 to require the phase-out of HCFC refrigerants for use in new equipment by 2010. 58 FR 65018. R–22, the only refrigerant currently used by PTACs and PTHPs, is an HCFC refrigerant and subject to the phase-out requirement. Phase-out of this refrigerant could have a significant impact on the manufacturing, performance, and cost of PTAC and PTHP equipment.

b. R–410A

As part of the engineering analysis, DOE performed an alternative refrigerant analysis to characterize the performance implications on PTACs and PTHPs. This analysis included researching technical journal reports, discussions with industry experts and manufacturers, and developing an analysis that used the methodology DOE used in performing the engineering analysis as to equipment using the R–22 refrigerant. ARI, in comment on the March 13, 2006, Notice of Document Availability (71 FR 12634) commented that R–410A is the most likely replacement refrigerant for R–22 in standard and non-standard size PTACs and PTHPs. (Docket No. EE–RM/STD–03–100, EE–RM/STD–03–200, EE–RM/STD–03–300, ARI, No. 26 at pp. 2–3) [16]

[13] Full production costs include direct labor, direct material, and direct overhead. Non-production costs include selling, general and administrative, research and development, and interest. See Chapter 5 of the TSD for more details.

[14] DOE's estimates of potential energy savings from an amended energy conservation standard are further discussed in section V.3.

[15] The 1987 Montreal Protocol on Substances that Deplete the Ozone Layer (as agreed in 1987). United Nations Environment Programme. *http://ozone.unep.org/Ratification_status/montreal_protocol.shtml.*

[16] "ARI, No. 26 at pp 2–3" refers (1) to a statement that was submitted by the Air-Conditioning and Refrigeration Institute and is recorded in the Resource Room of the Building Technologies Program in the docket under "Energy Efficiency Program for Commercial and Industrial Equipment: Efficiency Standards for Commercial Heating, Air-Conditioning and Water Heating Equipment," Docket Number EE–RM–STD–03–100, EE–RM–

Every manufacturer interview confirmed that the industry is planning to substitute R–410A for R–22 in PTACs and PTHPs. Industry representatives expressed a preference for R–410A due to its performance similarities to R–22 and experience with other HVAC equipment that use R–410A. Therefore, DOE performed its alternative refrigerant analysis based on the use of R–410A. See Chapter 5 of the TSD for additional details.

DOE identified the ''max-tech'' efficiency levels as described in section III.B.2 of today's proposed rule. These ''max-tech'' efficiency levels are based on currently available R–22 PTACs and PTHPs for a given representative cooling capacity within a given equipment class. In order to analyze the impact of using R–410A in PTACs and PTHPs, DOE considered the impact of using R–410A on PTAC components, the engineering analysis of past rulemakings that addressed the refrigerant phase-out, and markets in which a similar transition has occurred.

First, DOE expects that the phase-out of R–22 and the subsequent adoption of R–410A refrigerants in PTACs and PTHPs will require the redesign of the sealed systems found inside the PTAC and PTHP units. The sealed system consists of the indoor and outdoor heat exchangers, the compressor, refrigerant flow-control devices, and any piping that connects these components through which refrigerant flows during unit operation. Since R–22 refrigerants have different operating characteristics than R–410A, the sealed system in a PTAC or PTHP unit using R–410A will have to be redesigned to optimize the unit for operation with R–410A. Specifically, equipment using R–410A operates at higher system pressure requiring stronger sealed system walls and the use of different oils (i.e., R–410 equipment will use POE, while R–22 equipment uses mineral). In addition, R–410A compressors must also be designed with thicker and stronger compressor shells and components to withstand 50 percent to 60 percent more pressure than R–22 compressors.[17]

The loss in compressor efficiency can be overcome with optimized heat exchanger design to a limited extent. As discussed in the market and technology assessment (Chapter 3 of the TSD), different heat exchanger redesigns not currently associated with compressors could increase overall system performance. According to manufacturers, some redesigns, such as adding coils, re-circuiting, and increasing the frontal heat exchanger surface area, are applicable to PTACs and PTHPs regardless of the refrigerant used. However, DOE does not have sufficient information to predict with precision the performance benefits of heat exchanger redesigns. Initially, DOE expects any such redesigns to result in efficiency improvements insufficient to offset the efficiency reductions resulting from the switch from R–22 to R–410A. Thus, DOE expects the overall system efficiency of R–410A PTAC and PTHP equipment will be lower than if that equipment used R–22, as predicted by manufacturer testing, ARI's research,[18] National Institute of Standards and Technology studies,[19] and as observed in response to the transition from R–22 to R–410A in the residential air conditioning market. Optimizing the heat exchanger and HVAC circuits to compensate could be costly, depending on whether a heat exchanger manufacturer needs to change the fin tooling, expansion, and assembly systems.

Therefore, in this rulemaking, DOE is using an overall lower system performance for PTAC and PTHP equipment with R–410A. For standard size PTACs and PTHPs with 9,000 Btu/h cooling capacity, DOE calculated an overall system performance degradation consistent with ARI estimates of 6.3 percent.[20] For standard size PTACs and PTHPs with 12,000 Btu/h cooling capacity, DOE calculated overall system performance degradation consistent with ARI estimates of 7.6 percent.[21] For non-standard size PTACs and PTHPs of all cooling capacities, DOE calculated overall system performance degradation of 6.8 percent. See Chapter 5 of the TSD for additional details.

DOE has no evidence that the incremental efficiency gains from the design options used in the R–22 case would have a different effect on the system performance of R–410A equipment. Therefore, DOE assumed the design options for the R–22 analysis previously discussed are applicable to the alternative refrigerant analysis. DOE also assumed that the corresponding incremental EER improvement for each design option in the R–22 analysis would be the same in the alternative refrigerant analysis. See Chapter 5 of the TSD for additional details.

Similar issues existed within the residential, central air conditioning industry. Systems utilizing R–410A have been available in the residential air-conditioning market for several years, and DOE believes the impact of the refrigerant transition to R–410A for PTACs and PTHPs and on the manufacturers and purchasers of central air conditioners and heat pumps will be similar. The residential air-conditioning market is a much larger market than the PTAC and PTHP market, and thus offers greater incentives for compressor manufacturers to make the necessary investments to produce more efficient R–410A compressors. Initially, DOE found that the R–410A compressors available for use in residential, central air conditioning equipment were less efficient than their R–22 counterparts they were replacing. However, DOE has observed that residential, central air conditioning manufacturers were able to develop technologies and redesign their equipment, so that the R–22 phase-out has had little effect on system efficiency when the equipment eventually came onto the market.

At a minimum, DOE believes manufacturers of PTAC and PTHP equipment will be able to manufacture equipment with R–410A at the efficiency levels specified by ASHRAE/IESNA Standard 90.1–1999. Since PTAC and PTHP equipment utilizing R–22 exists at efficiency levels well above ASHRAE/IESNA Standard 90.1–1999, DOE believes the manufacturers will be able to produce equipment utilizing R–410A at least at the efficiency levels specified by ASHRAE/IESNA Standard 90.1–1999, even after the estimated performance degradations from the engineering analysis are applied. DOE has preliminarily concluded that the R–410A compressors available for use in PTAC and PTHP equipment could be less efficient than their R–22 counterparts could at the time the takes effect, based upon manufacturer feedback during interviews and by examining other air-conditioning markets where similar refrigerant transitions have taken place. However, DOE is hopeful that over time component manufacturers and PTAC and PTHP manufacturers will be able to

STD–03–200, and EE–RM–STD–03–300, as comment number 26; and (2) a passage that appears on pages 2 and 3 of that statement.

[17] Emerson Climate Technologies. R410A Questions. *http://www.emersonclimate.com/faq_copeland.htm#R410A* (Last accessed August 2, 2007.) We will need to save the portion of this web site that we rely upon for the administrative record.

[18] Air-Conditioning and Refrigeration Institute. *Response to ASHRAE 90.1 Continuous Maintenance Proposal on Package Terminal Equipment.* May 18, 2006.

[19] Payne, W., Domanski, P. *A Comparison of an R22 and an R410A Air Conditioner Operating at High Ambient Temperatures.* National Institute of Standards and Technology Building Environment Division: Thermal Machinery Group. *http://www.fire.nist.gov/bfrlpubs/build02/PDF/b02186.pdf.* (Last accessed August 2, 2007.)

[20] Air-Conditioning and Refrigeration Institute. *Response to ASHRAE 90.1 Continuous Maintenance Proposal on Package Terminal Equipment.* May 18, 2006.

[21] *Id.*

overcome the degradation in system efficiency caused by the switch to R–410A refrigerant. Therefore, DOE is continuing to analyze, the higher, R–22-based, energy efficiency levels identified in section III.B.2 as the ''max-tech'' efficiency levels. DOE will give particular attention to the PTAC and PTHP efficiency levels that cannot be met with current technologies and practices with R–410A in weighing the benefits and burdens of the various TSLs. Based on information received in public comments concerning this NOPR, DOE may consider and adopt in the final rule other potential standard levels that take into account the impact of R–410A.

c. R–410A Compressor Availability

The availability of R–410A compressors in a wide range of efficiencies is uncertain. Several compressor manufacturers make R–22, PTAC and PTHP compressors of different capacities and efficiencies for standard and non-standard equipment. When the market transitions to R–410A, these manufacturers may only offer one line of compressors for PTACs and PTHPs. In engineering interviews, compressor manufacturers said they do not know if R–410A compressors will have equivalent performance to R–22 compressors by the 2010 date. They also stated in interviews that they expect to offer R–410A compressors at only one efficiency level in the initial stages of the phase-out, which could further reduce compressor options for PTAC and PTHP manufacturers.

d. R–410A Manufacturing Production Cost

To derive the baseline MPCs for the R–410A PTACs and PTHPs, DOE made additional cost determinations (e.g., R–410 refrigerant pricing, R–410A compressor pricing, etc.) and incorporated them in the same cost model used for the R–22 engineering analysis. See Chapter 5 of the TSD for additional details about component prices using R–410A. DOE assumed a 25 percent increase in heat exchanger tubing thickness to account for the higher pressures of R–410A refrigerant based on technical journals and manufacturer interviews. DOE switched the working refrigerant in the cost model to R–410A and used the current R–410A refrigerant price based upon cost estimates from refrigerant suppliers and engineering interviews with manufacturers. During engineering interviews, several manufacturers of PTAC and PTHP equipment and several component manufacturers stated that compressor prices would increase anywhere between 10 percent and 20 percent from current R–22 compressor prices. To incorporate manufacturers' comments, DOE assumed that compressor costs would increase by 15 percent, which is consistent with the feedback DOE received during the engineering interviews. Using the above assumptions, DOE recalculated baseline equipment and design option MPCs to establish the cost-efficiency relationship for R–410A equipment.

The physical differences between PTACs and PTHPs are mainly in the reversing valve and other minor components. The results from the engineering and teardown analysis showed that the sum of the MPCs for reversing valves and other minor components are constant across the cost-efficiency relationship for the R–22 case. Therefore, DOE initially concluded that the cost-efficiency relationship (i.e., cost-efficiency curves) of PTACs is the same as the cost-efficiency relationship of PTHPs, minus the MPCs for the reversing valve and other minor components at various cooling capacities. In performing the alternative refrigerant analysis, DOE found no evidence that the cost-efficiency relationships for PTACs and PTHPs would be any different for equipment using R–410A. Therefore, DOE assumed that incremental cumulative MPCs for PTACs and PTHPs of the same equipment class would be the same as in the R–22 case (i.e., that both PTACs and PTHPs have the same incremental cost-efficiency curves in the R–410A case). To be consistent, DOE used the same cost model as in the R–22 analysis to estimate MPCs of equipment at various efficiency levels in the R–410A analysis. Chapter 5 of the TSD provides additional details on the alternative refrigerant analysis.

6. Cost-Efficiency Results

The results of the engineering analysis are reported as a set of cost-efficiency data (or ''curves'') in the form of MPC (in dollars) versus EER, which form the basis for other analyses in the NOPR. DOE created cost-efficiency curves for the six representative cooling capacities within the four equipment classes of PTACs and PTHPs, as discussed in section IV.C.2, above. DOE used the R–410A cost-efficiency curves for all subsequent analyses in the NOPR. See Chapter 5 of the TSD for additional detail on the engineering analysis and complete cost-efficiency results.

DOE also conducted a sensitivity analysis on material prices to examine the effect of spikes in metal prices that the industry has experienced over the past few years. The sensitivity analysis used the annual average 2006 prices for various metals used in the manufacturing of PTACs and PTHPs. Chapter 5 of the TSD shows the results of the sensitivity analysis.

7. Mapping Energy Efficiency Ratio to Coefficient of Performance

DOE used the analyses detailed in the sections above to determine the relationship between cost and cooling efficiency (EER) for PTACs and PTHPs. DOE also performed an analysis to determine the heating efficiency (COP) that corresponds to the cooling efficiency (EER) analyzed. DOE reviewed the 2006 ARI directory and the PTHP units listed. There were 675 units listed, which DOE separated into two groups based on wall sleeve size (standard size and non-standard size). DOE then selected all of the standard size 9,000 and 12,000 Btu/h cooling capacity units, and all of the non-standard units. Within each group, DOE next eliminated repetitive and discontinued units and then constructed a listing of the units by EER and ranked them by COP. DOE graphed each listing (EER versus COP) and calculated the minimum, maximum, and average COPs. Table IV.5 shows the average EER and COP pairings for PTHPs. DOE seeks comment on the average EER and COP pairings for PTHPs as shown in Table IV.5, which DOE has identified as Issue 3 under ''Issues to Which DOE Seeks Comment'' in section VII.E of this NOPR. Additional details detailing how DOE arrived at the average EER and COP pairings for PTHPs is shown in Chapter 5 of the TSD.

TABLE IV.5.—AVERAGE EER AND COP PAIRINGS FOR PTHPS

Equipment class	Efficiency level				
Standard Size PTHP—9,000 Btu/h Cooling Capacity	EER = 10.9 COP = 3.1	EER = 11.1 COP = 3.2	EER = 11.3 COP = 3.3	EER = 11.5 COP = 3.3	EER = 12 COP = 3.5
Standard Size PTHP—12,000 Btu/h Cooling Capacity	EER = 10.2 COP = 3.0	EER = 10.4 COP = 3.1	EER = 10.6 COP = 3.1	EER = 10.8 COP = 3.1	EER = 11.7 COP = 3.3

TABLE IV.5.—AVERAGE EER AND COP PAIRINGS FOR PTHPS—Continued

Non-Standard Size PTHP—11,000 Btu/h Cooling Capacity	EER = 9.4 COP = 2.8	EER = 9.7 COP = 2.8	EER = 10.0 COP = 2.9	EER = 10.7 COP = 2.9	EER = 11.4 COP = 2.9

D. Markups To Determine Equipment Price

DOE understands that the price of PTAC or PTHP equipment depends on the distribution channel the customer uses to purchase the equipment. Typical distribution channels include manufacturers' national accounts, wholesalers, mechanical contractors, and/or general contractors.

The customer price of this equipment is not generally known. Therefore, DOE developed supply chain markups in the form of multipliers that represent increases above MSP and include distribution costs. DOE applied these markups (or multipliers) to the MSPs it developed from the engineering analysis, and then added sales taxes and installation costs, to arrive at the final installed equipment prices for baseline and higher efficiency equipment. See Chapter 6 of the TSD for additional details on markups. As shown in Table IV.6, DOE identified four distribution channels for PTACs and PTHPs to describe how the equipment passes from the manufacturer to the customer.

TABLE IV.6.—DISTRIBUTION CHANNELS FOR PTAC AND PTHP EQUIPMENT

Channel 1	Channel 2	Channel 3	Channel 4
Manufacturer (through national accounts).	Manufacturer	Manufacturer	Manufacturer.
	Wholesaler	Wholesaler	Wholesaler.
		Mechanical Contractor	General Contractor.
Customer	Customer	Customer	Customer.

Using Ducker Worldwide data,[22] DOE estimated percentages, for both the new construction and replacement markets, of the total sales in each market through each of the four distribution channels, as shown in Table IV.7. The entire market of PTAC and PTHP equipment consists of standard size equipment (85 percent of shipment volume) and non-standard size equipment (15 percent of shipment volume). Of the standard size equipment, 80 percent are sold for the replacement market and 20 percent are for the new construction market. Non-standard size equipment is only used in the replacement market. This results in approximately 17 percent of PTAC and PTHP equipment that are purchased to be installed in new construction, while the remaining 83 percent is assumed to replace existing PTAC and PTHP equipment.

TABLE IV.7.—PERCENTAGE OF PTAC AND PTHP MARKET SHARES PASSING THROUGH EACH DISTRIBUTION CHANNEL

	Channel 1	Channel 2	Channel 3	Channel 4
Replacement Market	15	25	60	0
New Construction Market	30	0	38	32

For each of the steps in the distribution channels presented above, DOE estimated a baseline markup and an incremental markup. DOE defined a baseline markup as a multiplier that converts the MSP of equipment with baseline efficiency to the customer purchase price for the equipment at the same baseline efficiency level. An incremental markup is defined as the multiplier to convert the incremental increase in MSP of higher efficiency equipment to the customer purchase price for the same equipment. Both baseline and incremental markups are only dependent on the particular distribution channel and are independent of the efficiency levels of the PTACs and PTHPs.

DOE developed the markups for each step of the distribution channels based on available financial data. DOE based the wholesaler and mechanical contractor markups on the Heating, Airconditioning & Refrigeration Distributors International (HARDI) 2005 Profit Planning Report, Air Conditioning Contractors of America (ACCA), and the 2002 U.S. Census Bureau financial data for the plumbing, heating, and air conditioning industry.[23] DOE derived the general contractor markups from U.S. Census Bureau financial data for the commercial and institutional building construction sector. DOE estimated average markup for sales through national accounts to be one-half of those for the wholesaler to customer distribution channel. DOE determined this markup for national accounts on an assumption that the resulting national account equipment price must fall somewhere between the MSP (i.e., a markup of 1.0) and the customer price under a typical chain of distribution (i.e., a markup of wholesaler, mechanical contractor, or general contractor).

The overall markup is the product of all the markups (baseline or incremental markups) for the different steps within a distribution channel plus sales tax. Sales taxes were calculated based on State-by-State sales tax data reported by the Sales Tax Clearinghouse. Because both contractor costs and sales tax vary by State, DOE developed distributions of markups within each distribution channel as a function of State and

[22] Ducker Worldwide, 2001. 2000 U.S. Market for Residential and Specialty Air Conditioning: Packaged Terminal Air Conditioning. HVAC0002. Final Report, March 2001. Ducker Industrial Standards, 6905 Telegraph Road, Suite 300, Bloomfield Hills, Michigan 48301.

[23] The 2002 U.S. Census Bureau financial data for the plumbing, heating, and air conditioning industry is the latest version data set and was issued in December 2004.

business type (e.g., large chain hotel/motel, independent hotel, health care facility, or office). Because the State-by-State distribution of PTAC and PTHP units varies by business type (e.g., large chain hotels/motels may be more prevalent relative to independent hotels in one part of the country than in another), the National level distribution of the markups varies among business types. Additional detail on markups can be found in Chapter 6 of the TSD.

E. Energy Use Characterization

The building energy use characterization analysis was used to assess the energy savings potential of PTAC and PTHP equipment at different efficiency levels. This analysis accomplishes this by estimating the energy use of PTACs and PTHPs at specified energy efficiency levels through energy use simulations for key commercial building types, across a range of climate zones. The energy simulations yielded hourly estimates of the building energy consumption, including lighting, plug, and air-conditioning and heating equipment. The annual energy consumption of PTACs and PTHPs are used in subsequent analyses including the LCC, PBP, and NES.

In determining the reduction in energy consumption of PTAC and PTHP equipment due to increased efficiency, DOE did not take into account a rebound effect. The rebound effect occurs when a piece of equipment, when it is made more efficient, would be used more intensively, so the expected energy savings from the efficiency improvement do not fully materialize. Since the user of the equipment, e.g., the customer in a hotel/motel room, does not pay the utility bill, the customer's usage will be unaffected by increasing the efficiency. Therefore, DOE has no basis for concluding that a rebound effect would occur and has not taken the rebound effect into affect in the energy use characterization. DOE seeks comment on the rebound effect for the PTAC and PTHP customer and DOE's assumption that the rebound effect is not applicable to this industry. DOE identified this as Issue 4 under ''Issues on Which DOE Seeks Comment'' in section VII.E of this NOPR. See Chapter 7 of the TSD for additional details.

1. Building Type

PTAC and PTHP units generally are used in hotel/motel rooms, health care facilities (e.g., assisted living homes, nursing homes etc.), small offices, or any application that requires individual zone heating and cooling. According to the Ducker Worldwide analysis, PTAC and PTHP units are primarily used in hotels/motels with less than 125 rooms and less than 3 stories, each. Therefore, DOE selected this type of hotel/motel building as the representative commercial building in order to assess the energy use of PTAC and PTHP units. While DOE realizes that PTACs and PTHPs are found in other building types, DOE believes that, based on engineering judgment and consultation with industry experts, the cooling and heating loads of an individual room served by a single PTAC or PTHP unit are independent of the building type in which the room is situated.

2. Simulation Approach

DOE used a whole-building hourly simulation tool, DOE–2.1E, to estimate the energy use of PTACs and PTHPs in the representative hotel/motel building for various efficiency levels and equipment classes at various climate locations within the United States. The DOE–2.1E program has a built-in PTAC/PTHP module in its HVAC system components. DOE used the EIA 2003 Commercial Building Energy Consumption Survey (2003 CBECS) as the primary source of data, supplemented by other data sources, to develop the representative building size and other building characteristics for this analysis (i.e., aspect ratio, building construction type, envelope characteristics, internal loads and schedules, mechanical systems and equipment etc.). DOE modeled hotel/motel guest rooms facing in all orientations by rotating a symmetrical rectangular floor plan prototype building 90 degrees to capture the orientation-driven changes in annual energy use of the PTAC and PTHP. The Ducker Worldwide analysis and other available data estimated that PTHPs represent approximately 45 percent of the total market for packaged terminal equipment. Therefore, DOE estimated the annual energy use per unit using a PTHP as well as a PTAC in each climate location. DOE assumed that generally the building would use a PTAC or PTHP unit. DOE calculated the weighted-average annual energy use for each PTAC and PTHP equipment class in each State through the population weighting of the representative climate location(s) within the state. DOE further aggregated the energy use at the State level to national average energy use using the 2000 Census population data, published by the U. S. Census Bureau.

DOE estimated the annual energy use for each equipment class at the baseline efficiency level (i.e., the efficiency level specified by ASHRAE/IESNA Standard 90.1–1999) plus five higher efficiency levels. As is to be expected, annual energy use of PTAC and PTHP units decreases as the efficiency level increases from the baseline efficiency level to the highest efficiency level analyzed. Additional details on the energy use characterization analysis can be found in Chapter 7 of the TSD.

F. Life-Cycle Cost and Payback Period Analyses

DOE conducted the LCC and PBP analyses to estimate the economic impacts of potential standards on individual customers of PTACs and PTHPs. DOE analyzed these impacts for PTACs and PTHPs, first, by calculating the change in customers' LCCs likely to result from higher efficiency levels as compared with the baseline efficiency levels. The LCC calculation considers total installed cost (MSP, sales taxes, distribution chain markups, and installation cost), operating expenses (energy, repair, and maintenance costs), equipment lifetime, and discount rate. DOE calculated the LCC for all customers as if each would purchase a new PTAC or PTHP unit in the year the standard takes effect. A standard becomes effective on the date on and after which the equipment manufactured must meet or exceed the standard, which is September 30, 2012 for this rulemaking. To compute LCCs, DOE discounted future operating costs to the time of purchase and summed them over the lifetime of the equipment.

Second, DOE analyzed the effect of changes in installed costs and operating expenses by calculating the PBP of potential standards relative to baseline efficiency levels. The PBP estimates the amount of time it would take the customer to recover, through lower operating costs, the increment that represents the increase in purchase expense of more energy efficient equipment. The PBP is that change in purchase price divided by the change in annual operating cost that results from the standard. DOE expresses this period in years. Similar to the LCC, the PBP is based on the total installed cost and the operating expenses. However, unlike the LCC, only the first year's operating expenses are considered in the calculation of the PBP. Because the PBP does not account for changes in operating expense over time or the time value of money, it is also referred to as a simple PBP.

DOE conducted the LCC and PBP analyses using a spreadsheet model developed in Microsoft Excel. When combined with Crystal Ball (a commercially available software program), the LCC and PBP model generates a Monte Carlo simulation to perform the analyses by incorporating uncertainty and variability considerations in certain of the key parameters as discussed below. The results of DOE's LCC and PBP analyses are summarized in section V.B.1.a below and described in detail in TSD Chapter 8.

1. Approach

Recognizing that each business that uses PTAC and PTHP equipment is unique, DOE analyzed variability and uncertainty by performing the LCC and PBP calculations for four types of businesses, each of which tends to have different costs of financing because of the nature of the business. The first type of business is a ''large chain'' hotel or motel, which, DOE believes, has access to a wide range of financing options and thus a relative low financing costs. The second type is an ''independent'' hotel or motel, which is not affiliated with a national chain, which has fewer financing options and thus a relative high financing costs. A third type of business is called ''health care'' and includes nursing homes, as well as assisted living and long-term care facilities, which, similar to the large chain hotel, has a relative low financing costs. The fourth type is called ''office'' and applies to small office buildings that are occupied by offices of non-hospital medical professionals such as physicians and dentists which, DOE believes, has the fewest financing options, and as a result, the highest costs. DOE derived the financing costs based on data from the Damodaran Online site.[24]

The LCC analysis used the estimated annual energy use for each PTAC or PTHP unit as described in section IV.E, energy use characterization. Energy use of PTACs and PTHPs is sensitive to climate, so it varies by State within the United States. Aside from energy use, other important factors influencing the LCC and PBP analyses include energy prices, installation costs, equipment distribution markups, and sales tax. At the National level, the LCC spreadsheets explicitly modeled both the uncertainty and the variability in the model's inputs, using probability distributions based on the shipment of PTAC and PTHP equipment to different States.

As mentioned above, DOE generated LCC and PBP results as probability distributions using a simulation based on Monte Carlo analysis methods, in which certain key inputs to the analysis consist of probability distributions rather than single-point values. Therefore, the outcomes of the Monte Carlo analysis can also be expressed as probability distributions. As a result, the Monte Carlo analysis produces a range of LCC and PBP results. A distinct advantage of this type of approach is that DOE can identify the percentage of customers achieving LCC savings or attaining certain PBP values due to an increased efficiency level, in addition to the average LCC savings or average PBP for that efficiency level.

2. Life-Cycle Cost Inputs

For each efficiency level analyzed, the LCC analysis requires input data for the total installed cost of the equipment, its operating cost, and the discount rate. Table IV.8 summarizes the inputs and key assumptions used to calculate the customer economic impacts of all energy efficiency levels analyzed in this rulemaking. A more detailed discussion of the inputs follows.

TABLE IV.8.—SUMMARY OF INPUTS AND KEY ASSUMPTIONS USED IN THE LCC AND PBP ANALYSES

Inputs	Description
Affecting Installed Costs	
Equipment Price	Derived by multiplying MSP (from the engineering analysis) by wholesaler markups and contractor markups plus sales tax (from markups analysis). Used the probability distribution for the different markups to describe their variability.
Installation Cost	Includes installation labor, installer overhead, and any miscellaneous materials and parts, derived from RS Means CostWorks 2007.
Affecting Operating Costs	
Annual Energy Use	Derived from whole-building hourly energy use simulation for PTACs or PTHPs in a representative hotel/motel building in various climate locations (from energy use characterization analysis). Used annual electricity use per unit. Used the probability distribution to account for which State a unit will be shipped to, which in turn affects the annual energy use.
Electricity Price	Calculated average commercial electricity price in each State, as determined from EIA data for 2006. Used the AEO2007 forecasts to estimate the future electricity prices. Used the probability distribution for the electricity price.
Maintenance Cost	Annual maintenance cost did not vary as a function of efficiency.
Repair Cost	Estimated the annualized repair cost for baseline efficiency PTAC and PTHP equipment as $15, based on costs of extended warranty contracts for PTACs and PTHPs and further discussed in Chapter 8 of the TSD. Assumed that repair costs would vary in direct proportion with the MSP at higher efficiency levels because it generally costs more to replace components that are more efficient.
Affecting Present Value of Annual Operating Cost Savings	
Equipment Lifetime	Used the probability distribution of lifetimes, with mean lifetime for each of four equipment classes assumed to be 10 years based on literature reviews and consultation with industry experts.
Discount Rate	Mean real discount rates ranging from 5.7 percent for owners of health care facilities to 8.2 percent for independent hotel/motel owners. Used the probability distribution for the discount rate.
Date Standards Become Effective	September 30, 2012 (four years after the publication of the final rule).

[24] Damodaran Online. Leonard N. Stern School of Business, New York University: *http://www.stern.nyu.edu/adamodar/New_Home_Page/data.html*. January 2006.

TABLE IV.8.—SUMMARY OF INPUTS AND KEY ASSUMPTIONS USED IN THE LCC AND PBP ANALYSES—Continued

Inputs	Description
Analyzed Efficiency Levels	
Analyzed Efficiency Levels	Baseline efficiency levels (ASHRAE/IESNA Standard 90.1–1999) and five higher efficiency levels for six equipment classes (DOE also considered levels that were combinations of efficiency levels for PTACs and PTHPs).

a. Equipment Prices

The price of a PTAC or PTHP reflects the application of distribution channel markups and the addition of sales tax to the MSP. As described in section IV.C above, DOE determined manufacturing costs for a set of six cooling capacities of equipment representing all equipment classes. To derive the manufacturing costs for other sizes of PTACs and PTHPs, DOE scaled the costs from these six cooling capacities. For the LCC and PBP analyses and subsequent analyses in today's rulemaking, DOE used the manufacturing costs as developed in the Engineering Analysis for PTAC and PTHP equipment utilizing R–410A.

Each baseline MSP is the price charged by manufacturers to either a wholesaler/distributor or very large customer for equipment meeting a baseline efficiency. Each standard-level MSP increase is the change in MSP associated with producing equipment at an efficiency level above the baseline. DOE developed MSP, which increases as a function of efficiency level for each of the six representative capacities. Refer to Chapter 5 of the TSD for details.

The markup is the percentage increase in price as the PTAC and PTHP equipment passes through the distribution channel. As discussed earlier, distribution chain markups are based on one of four distribution channels, as well as whether the equipment is being purchased for the new construction market or to replace existing equipment. Probability distributions were used for the different distribution channel markups to describe their variability. DOE developed markups for both the standard size and non-standard size PTAC and PTHP equipment as explained in section IV.D above.

b. Installation Costs

DOE derived installation costs for PTACs and PTHPs from data provided in *RS Means CostWorks 2007* (RS Means).[25] RS Means provides estimates on the person-hours required to install PTAC and PTHP equipment and the labor rates associated with the type of crew required to install the equipment. Specifically, RS Means provides person-hour and labor rate data for the installation of ''Unitary Air Conditioning Equipment,'' which includes PTAC and PTHP equipment. Labor rates vary significantly from region to region of the country and the RS Means data provide the necessary information to capture this regional variability. RS Means provides cost indices that reflect the labor rates for 295 cities in the United States. Several cities in all 50 States and the District of Columbia are identified in the RS Means data. DOE incorporated these cost indices into the analysis to capture variation in installation cost, depending on the location of the customer. DOE calculated the installation cost by multiplying the number of person-hours by the applicable labor rate. DOE assumed the installation costs are fixed for each equipment class and independent of the efficiency of the equipment.

c. Annual Energy Use

DOE estimated the electricity consumed by the PTAC and PTHP equipment based on the energy use characterization as described previously in section IV.E. DOE used a whole-building hourly simulation tool to estimate the energy use in a representative hotel/motel building for different efficiency levels and equipment classes at various climate locations within the United States. DOE aggregated the average annual energy use per unit at the State level by applying a population-weighting factor for each examined climate location within a State. Details of the annual energy use calculations can be found in TSD Chapter 7.

d. Electricity Prices

The applicable electricity prices are needed to convert the electric energy savings into energy cost savings. Because of the wide variation in electricity consumption patterns, wholesale costs, and retail rates across the country, it is important to consider regional differences in electricity prices. In order to simplify the NOPR analysis, DOE decided not to develop marginal electricity prices from the tariff-based electricity price model in this rulemaking. Instead, DOE used average effective commercial electricity prices at the State level from EIA data for 2006. This approach captured a wide range of commercial electricity prices across the Untied States. Furthermore, DOE recognized that different kinds of businesses typically use electricity in different amounts at different times of the day, week, and year, and therefore face different effective prices. To make this adjustment, DOE used EIA's 2003 CBECS data set to identify the average prices paid by the four kinds of businesses in this analysis and compared them with the average prices paid by all commercial customers.[26] The ratios of prices paid by the four types of businesses to the national average commercial prices seen in the 2003 CBECS were used as multipliers to adjust the average commercial 2006 price data from EIA.

DOE weighted the prices paid by each business in each State by the estimated sales of PTACs and PTHPs to each business type to obtain a weighted-average national electricity price. The State/business type weights reflect the probabilities that a given PTAC or PTHP unit shipped will be operated with a given electricity price. To account for this variability, DOE used a probability distribution for not only which State the equipment is shipped to, but also to determine which business type would purchase the equipment and therefore, what electricity price they would pay. The effective prices (2006$) range from approximately 5.5 cents per kWh to approximately 23.2 cents per kWh. The development and use of State-average electricity prices by business type are described in more detail in Chapter 8 of the TSD.

The electricity price trend provides the relative change in electricity prices for future years out to the year 2042. Estimating future electricity prices is difficult, especially considering that there are efforts in many States throughout the country to restructure

[25] R.S. Means Company, Inc. 2007. RS Means CostWorks 2007. Kingston, Massachusetts.

[26] EIA's 2003 CBECS is the most recent version of the data set.

the electricity supply industry. DOE applied the AEO2007 reference case as the default scenario and extrapolated the trend in values from the years 2020 to 2030 of the forecast to establish prices in the years 2030 to 2042. This method of extrapolation is in line with methods currently being used by the EIA to forecast fuel prices for the Federal Energy Management Program. DOE provides a sensitivity analysis of the LCC savings and PBP results to future electricity price scenarios using both the AEO2007 high-growth and low-growth forecasts in Chapter 8 of the TSD.

e. Maintenance Costs

Maintenance costs are the costs to the customer of maintaining equipment operation. Maintenance costs include services such as cleaning heat-exchanger coils and changing air filters. DOE was not able to identify publicly available data on annual maintenance costs per unit. DOE estimated annual routine maintenance costs for PTAC and PTHP equipment at $50 per year per unit. Some manufacturers interviewed for the manufacturer impact analysis indicated verbally that this assumption was reasonable. Because data were not available to indicate how maintenance costs vary with equipment efficiency, DOE thus determined to use this preventative maintenance costs that remain constant as equipment efficiency is increased.

f. Repair Costs

The repair cost is the cost to the customer for replacing or repairing components that have failed in the PTAC and PTHP equipment. DOE estimated the annualized repair cost for baseline efficiency PTAC and PTHP equipment as $15, based on costs of extended warranty contracts PTACs and PTHPs. DOE determined that repair costs would increase in direct proportion with increases in equipment prices, because the price of PTAC and PTHP equipment increases with its efficiency and DOE recognizes that complexity for repair will increase as the efficiency of equipment increases.

DOE specifically seeks comment on its estimation for the repair costs, as well as the installation and maintenance costs. In particular, DOE is interested in how the installation, maintenance, and repair costs may change with the use of R–410A refrigerant in 2010 because DOE's estimates are based on data from the field for equipment using R–22. See Chapter 8 of the TSD for additional information. DOE identified this as Issue 5 under ''Issues on Which DOE Seeks Comment'' in section VII.E of this NOPR.

g. Equipment Lifetime

DOE defines equipment lifetime as the age when a PTAC or PTHP unit is retired from service. DOE reviewed available literature and consulted with manufacturers in order to establish typical equipment lifetimes. The literature and experts consulted offered a wide range of typical equipment lifetimes. Individuals with previous experience in manufacturing or distribution of PTACs and PTHPs suggested a typical lifetime of 5 to 15 years. Some experts suggested that the lifetime could be even lower because of the daily or continuous use of the equipment and neglect of maintenance such as cleaning the heat exchangers or replacing the air filters. Previously, DOE used a 15-year lifetime for PTACs and PTHPs in the 2000 Screening Analysis based on data from ASHRAE's 1995 *Handbook of HVAC Applications.* Stakeholders commented on the 2000 Screening Analysis and suggested DOE use the 10-year lifetime assumption rather than 15-year lifetime to more accurately reflect the life and usage characteristics of this equipment.[27] 66 FR 3336, 3349[0]. Therefore, based on the information it gathered, DOE concluded that a typical lifetime of 10 years is appropriate for PTAC and PTHP equipment. Furthermore, DOE modeled the lifetime of PTAC and PTHP equipment as a Weibull statistical distribution with an average lifetime of 10 years and a maximum lifetime of 20 years. Chapter 3 of the TSD contains a discussion of equipment lifetime, and TSD Chapter 8 discusses how equipment life is modeled in the LCC analysis.

h. Discount Rate

The discount rate is the rate at which future expenditures are discounted to establish their present value. DOE estimated the discount rate by estimating the cost of capital for purchasers of PTAC and PTHP equipment. Most purchasers use both debt and equity capital to fund investments. Therefore, for most purchasers, the discount rate is the weighted average cost of debt and equity financing, or the weighted-average cost of capital (WACC), less the expected inflation.

To estimate the WACC of PTAC and PTHP equipment purchasers, DOE used a sample of companies including large hotel/motel chains and health care chains drawn from a database of 7,319 U.S. companies given on the *Damodaran Online* website. This database includes most of the publicly traded companies in the United States. Based on this database, DOE calculated the weighted average after-tax discount rate for PTAC and PTHP purchases, adjusted for inflation, as 5.71 percent for large hotel chains and 5.65 percent for health care (nursing homes and assisted living facilities). The cost of capital for independent hoteliers, and small office companies with more limited access to capital is more difficult to determine. Individual credit-worthiness varies considerably, and some franchisees have access to the financial resources of the franchising corporation. However, personal contacts with a sample of commercial bankers yielded an estimate for the small operator weighted cost of capital of about 200 to 300 basis points (2 percent to 3 percent) higher than the rates for larger hotel chains. Therefore, DOE used a central value equal to the weighted average of discount rate for large hotel chains plus 2.5 percent for independent hotel/motels and the same adder was used to the discount rate for large nursing home/assisted care companies to derive an estimate for small office buildings. As a result, DOE calculated the weighted average after-tax discount rate for PTAC and PTHP purchases, adjusted for inflation, as 8.21 percent for independent hotels and 8.15 percent for small offices (medical and dental offices). The discount rate is another key variable for which DOE used a probability distribution in the LCC and PBP analyses. TSD Chapter 8 contains the detailed calculations on the discount rate.

3. Payback Period

DOE also determined the economic impact of potential standards on customers by calculating the PBP of the TSLs relative to a baseline efficiency level. The PBP measures the amount of time it takes the commercial customer to recover the assumed higher purchase expense of more energy efficient equipment through lower operating costs. Similar to the LCC, the PBP is based on the total installed cost and the operating expenses and is calculated as a range of payback periods, depending on the probability distributions of the two key inputs (i.e., the supply chain markups and where the unit is likely to be shipped to). However, unlike for the LCC, in the calculation of the PBP, by definition, DOE considered only the first year's operating expenses. Because the PBP does not take into account changes in operating expense over time

[27] U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy. ''Energy Efficiency Program for Commercial and Industrial Equipment: Efficiency Standards for Commercial Heating, Air Conditioning and Water Heating Equipment; Final Rule''. January 2001.

or the time value of money, it is also referred to as a simple payback period. Additional details of the PBP can be found in Chapter 8 of the TSD.

G. National Impact Analysis—National Energy Savings and Net Present Value Analysis

The national impacts analysis evaluates the impact of a proposed standard from a national perspective rather than from the customer perspective represented by the LCC. This analysis assesses the NES, and the NPV (future amounts discounted to the present) of total commercial customer costs and savings, which are expected to result from amended standards at specific efficiency levels. For each TSL, DOE calculated the NPV, as well as the NES, as the difference between a base case forecast (without amended standards) and the standards case (with amended standards). The NES refers to cumulative energy savings from 2012 through 2042. The NPV refers to cumulative monetary savings. DOE calculated net monetary savings in each year relative to the base case as the difference between total operating cost savings and increases in total installed cost. Cumulative savings are the sum of the annual NPV over the specified period. DOE accounted for operating cost savings until 2062; that is, until all the equipment installed through 2042 is retired.

1. Approach

Over time, in the standards case, equipment that is more efficient gradually replaces less efficient equipment. This affects the calculation of both the NES and NPV, both of which are a function of the total number of units in use and their efficiencies, and thus are dependent on annual shipments and equipment lifetime, including changes in shipments and retirement rates in response to changes in equipment costs due to standards. Both calculations start by using the estimate of shipments, and the quantity of units in service, that are derived from the shipments model.

With regard to estimating the NES, because more efficient PTACs and PTHPs gradually replace less efficient ones, the energy per unit of capacity used by the PTACs and PTHPs in service gradually decreases in the standards case relative to the base case. DOE calculated the NES by subtracting energy use under a standards scenario from energy use in a base-case scenario.

Unit energy savings for each equipment class are the same weighted-average values as calculated in the LCC and PBP spreadsheet. To estimate the total energy savings for each TSL, DOE first calculated the national site energy consumption (i.e., the energy directly consumed by the units of equipment in operation) for PTACs or PTHPs for each year, beginning with the expected effective date of the standards (2012), for the base case forecast and the standards case forecast. Second, DOE determined the annual site energy savings, consisting of the difference in site energy consumption between the base case and the standards case. Third, DOE converted the annual site energy savings into the annual amount of energy saved at the source of electricity generation (the source energy), using a site-to-source conversion factor. Finally, DOE summed the annual source energy savings from 2012 to 2042 to calculate the total NES for that period. DOE performed these calculations for each TSL considered in this rulemaking.

DOE considers whether a rebound effect is applicable in its NES analysis. A rebound effect occurs when an increase in equipment efficiency leads to an increased demand for its service. EIA in its NEMS model assumes a certain elasticity factor to account for an increased demand for service due to the increase in cooling (or heating) efficiency. EIA refers to this as an efficiency rebound.[28] For the commercial cooling equipment market, there are two ways that a rebound effect could occur:

1. An increased use of the cooling equipment within the commercial buildings they are installed in.
2. Additional instances of cooling a commercial building where it was not being cooled before.

The first instance does not occur for the PTAC and PTHP equipment that are typically used in guest rooms of hotel/motel buildings, and patient rooms in hospitals and health care clinics since these buildings are already being operated and conditioned 24 hours a day and seven days a week. Furthermore, the guest or the patient in these rooms has no incentive to use the equipment more or less, because they do not pay the electricity bills.

Additionally, DOE feels that the PTAC and PTHP equipment would not significantly penetrate into previously un-cooled building spaces. The existing market for this equipment is specialized to lodging type applications where the equipment serves both a cooling and heating need for a small room on the perimeter of a building. Drawbacks for installing these equipment in other spaces include noise, increased installation costs, high use of electric resistance heating, and their limitation of being able to provide cooling to only perimeter spaces. These considerations make the packaged terminal equipment, in general, not the first choice for adding cooling to other non-conditioned building spaces. Therefore, DOE did not assume a rebound effect in the present NOPR analysis.

To estimate NPV, DOE calculated the net impact as the difference between total operating cost savings (including electricity, repair, and maintenance cost savings) and increases in total installed costs (which consists of MSP, sales taxes, distribution chain markups, and installation cost). DOE calculated the NPV of each TSL over the life of the equipment, using the following three steps. First, DOE determined the difference between the equipment costs under the TSL case and the base case in order to obtain the net equipment cost increase resulting from the TSL. Second, DOE determined the difference between the base case operating costs and the TSL operating costs, in order to obtain the net operating cost savings from the TSL. Third, DOE determined the difference between the net operating cost savings and the net equipment cost increase in order to obtain the net savings (or expense) for each year. DOE then discounted the annual net savings (or expenses) to the year 2008 for PTACs and PTHPs bought on or after 2012 and summed the discounted values to provide the NPV of a TSL. An NPV greater than zero shows net savings (i.e., the TSL would reduce customer expenditures relative to the base case in present value terms). An NPV that is less than zero indicates that the TSL would result in a net increase in customer expenditures in present value terms.

To make the analysis more accessible and transparent to all stakeholders, DOE used an MS Excel spreadsheet model to calculate the energy savings and the national economic costs and savings from amended standards. In addition, the TSD (chapter 10) and other documentation on the website that DOE provides during the rulemaking help explain the models and how to use them, and stakeholders can review DOE's analyses by changing various input quantities within the spreadsheet.

Unlike the LCC analysis, the NES spreadsheet does not use distributions for inputs or outputs. DOE examined sensitivities by applying different scenarios. DOE used the NES spreadsheet to perform calculations of energy savings and NPV, using the annual energy consumption and total

[28] EIA, 2007. Assumptions to the Annual Energy Outlook 2007. accessed at *http://www.eia.doe.gov/oiaf/aeo/assumption/index.html*

installed cost data from the LCC analysis. DOE forecasted the energy savings, energy cost savings, equipment costs, and NPV of benefits for each of equipment classes from 2012 through 2042. The forecasts provided annual and cumulative values for all four output parameters as described above.

2. Shipments Analysis

An important element in the estimate of the future impact of a standard is equipment shipments. DOE developed shipments projections under a base case and each of the standards cases using a shipments model. DOE used the standards case shipments projection and, in turn, the standards case equipment stock to determine the NES. The shipments portion of the spreadsheet model forecasts PTAC and PTHP shipments from 2012 to 2042. The details of the shipment projections are given in chapter 10 of the TSD.

DOE developed shipments forecasts by accounting for: (1) The growth in the building stock of hotel/motel, health care and office buildings that are the primary end users of PTACs and PTHPs; (2) market segments; (3) equipment retirements; and (4) equipment ages.

The shipments model assumes that, in each year, each existing PTAC or PTHP either ages by one year or breaks down, and that equipment that breaks down is replaced. In addition, new equipment can be shipped into new commercial building floor space, and old equipment can be removed through demolitions. Historical shipments are critical to the development of the shipments model, since DOE used the historical data to calibrate the model. DOE's primary source of historical data for shipments of PTACs and PTHPs was the shipment data provided by ARI. ARI provided DOE with shipments data for 10 years (1997–2006), which allowed DOE to allocate sales of equipment to the different equipment classes. The shipments data is summarized in Chapter 3 of the TSD.

Although there is a provision in the spreadsheet for a change in projected shipments in response to efficiency level increases, DOE has no information with which to calibrate such a relationship. Therefore, for the NOPR analysis, DOE presumed that the shipments do not change in response to the changing TSLs.

Table IV.9 shows the forecasted shipments for the different equipment classes of PTACs and PTHPs for the baseline efficiency level (ASHRAE/IESNA Standard 90.1–1999) for selected years from 2012 to 2042. As equipment purchase price increases with efficiency, generally a drop in shipments would be expected. Although there is a provision in the shipments analysis spreadsheet for a change in shipments as the efficiency increases and the equipment becomes more expensive, DOE has no basis for concluding that such a change would occur as the efficiency of PTACs and PTHPs increases. Therefore, DOE presumed that total shipments do not change with TSL and that the effect of the standards would be to shift the percentage mix of shipments from lower to higher efficiencies. Table IV.9 also shows the cumulative shipments for PTAC and PTHP equipment from 2012 to 2042.

TABLE IV.9.—SHIPMENTS FORECAST FOR BASE CASE PTAC AND PTHP EQUIPMENT

Equipment	Thousands of units shipped by year and equipment class								
	2012	2015	2020	2025	2030	2035	2040	2042	Cumulative shipments (2012–2042)
Standard Size PTACs	242	249	266	286	307	333	361	373	9,256
Standard Size PTHPs	181	186	199	214	230	249	270	279	6,918
Non-Standard Size PTACs	17	16	15	13	12	11	10	9	398
Non-Standard Size PTHPs	13	12	11	10	9	8	7	7	300
Total	453	464	490	522	558	600	648	668	16,873

DOE also uses the shipments estimates developed above as an input to the MIA, discussed in section IV.I. Chapter 10 of the TSD provides additional details on the shipments forecasts.

3. Base Case and Standards Case Forecasted Distribution of Efficiencies

The annual energy consumption of a PTAC or PTHP unit is directly related to the efficiency of the unit. Thus, DOE forecasted shipment-weighted average equipment efficiencies that, in turn, enabled a determination of the shipment-weighted annual energy consumption values for the base case and each TSL analyzed. DOE based shipment-weighted average efficiency trends for PTAC and PTHP equipment on first converting the 2005 PTAC and PTHP equipment shipments by equipment class into market shares by equipment class. DOE then adapted a cost-based method used in the NEMS to estimate market shares for each equipment class by TSL. Then, from those market shares and projections of shipments by equipment class, DOE extrapolated future equipment efficiency trends both for a base case scenario and standards case scenarios. The difference in equipment efficiency between the base case and standards cases was the basis for determining the reduction in per-unit annual energy consumption that could result from amended standards. There is, however, the refrigerant phase-out issue that also affects the equipment efficiency. DOE recognizes that the industry has been able to meet the ASHRAE/IESNA Standard 90.1–1999 efficiency levels with R–22 as the primary refrigerant, but is waiting to switch to R–410A as the primary refrigerant starting in 2010.

For the base case, DOE assumed that, absent amended standards, forecasted market shares would remain frozen at the 2012 efficiency levels until the end of the forecast period (30 years after the effective date—the year 2042). DOE realized that this prediction may have the effect of causing DOE to overestimate the savings associated with the TSLs discussed in this notice since historical data indicated PTACs and PTHP equipment efficiencies or relative equipment class preferences may change voluntarily over time. Therefore, DOE seeks comment on this assumption and the potential significance of any overestimate of savings. In particular, DOE requests data that would enable it to better characterize the likely increases in efficiency that would occur over the 30-year analysis period absent adoption of either the standards proposed, or the TSLs considered, in this rule. DOE identified this as Issue 6 under ''Issues to Which DOE Seeks Comment'' in section VII.E of this NOPR.

For each of the TSLs analyzed, DOE used a ''roll-up'' scenario to establish the market shares by efficiency level for the year that standards become effective (i.e., 2012). Information available to DOE suggests that the efficiencies of equipment in the base case that did not meet the standard level under consideration would ''roll-up'' to meet the standard level. In addition, available information suggests that all equipment efficiencies in the base case that were above the standard level under consideration would not be affected.

DOE specifically seeks input on its basis for the NES-forecasted base case distribution of efficiencies and its prediction on how amended energy conservation standards impact the distribution of efficiencies in the standards case. DOE identified this as Issue 7 under ''Issues on Which DOE Seeks Comment'' in section VII.E of this NOPR.

In addition, DOE specifically seeks comment on whether DOE's adoption of higher amended energy conservation standard levels would be likely to cause the PTAC and PTHP customers to shift to using other, less efficient type of equipment. Acknowledging over 80 percent of PTAC and PTHP equipment are sold for the replacement market, DOE believes it is unlikely that PTAC and PTHP equipment users would switch to other type of equipment due to the additional installation cost caused by this potential switching. However, DOE recognizes that potential equipment switching from PTHPs to a combination of PTACs and electric resistance heating might occur if DOE were to adopt a standard level for PTHPs significantly higher than the proposed standard level for PTACs. DOE specifically seeks input on whether disparity in the proposed standards for PTACs and PTHPs is likely to cause the PTHP customers to shift to PTACs with electric resistance heating. DOE identified this as Issue 8 under ''Issues on Which DOE Seeks Comment'' in section VII.E of this NOPR.

4. National Energy Savings and Net Present Value

The PTAC and PTHP equipment stock at any point in time is the total number of PTACs and PTHPs purchased or shipped from previous years that have survived until that point. The NES spreadsheet, through the use of the shipments model, keeps track of the total number of PTAC and PTHP units shipped each year. For purposes of the NES and NPV analyses, DOE assumes that retirements follow a Weibull distribution with a 10-year mean lifetime. Retired units are not replaced until 2042. For units shipped in 2042, any units still remaining at the end of 2062 are retired.

The national annual energy consumption is the product of the annual unit energy consumption and the number of PTAC and PTHP units of each vintage. This approach accounts for differences in unit energy consumption from year to year. In determining national annual energy consumption, DOE initially calculated the annual energy consumption at the site (i.e., electricity in kWh consumed by the PTAC and PTHP unit). DOE then calculated primary energy consumption from site energy consumption by applying a marginal site-to-source conversion factor to account for losses associated with the generation, transmission, and distribution of electricity.

The site-to-source conversion factor is a multiplier used for converting site energy consumption, expressed in kWh, into primary or source energy consumption, expressed in quads (quadrillion Btu). The site-to-source conversion factor accounts for losses in electricity generation, transmission, and distribution. DOE obtained these conversion factors using the NEMS model. The conversion factors vary over time, due to projected changes in electricity generation sources (i.e., the power plant types projected to provide electricity to the country).

To discount future impacts, DOE follows OMB guidance in the selection of seven percent and three percent in evaluating the impacts of regulations. In selecting the discount rate corresponding to a public investment, OMB directs agencies to use ''the real Treasury borrowing rate on marketable securities of comparable maturity to the period of analysis.'' Office of Management and Budget (OMB) Circular No. A–94, ''Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs,'' dated October 29, 1992, section 8.c.1. The seven percent rate is an estimate of the average before-tax rate of return on private capital in the United States economy, and reflects the returns to real estate and small business capital as well as corporate capital. DOE used this discount rate to approximate the opportunity cost of capital in the private sector, since recent OMB analysis has found the average rate of return on capital to be near this rate. In addition, DOE used the 3 percent rate to capture the potential effects of standards on private customers' consumption (e.g., through higher prices for equipment and purchase of reduced amounts of energy). This rate represents the rate at which ''society'' discounts future consumption flows to their present value. This rate can be approximated by the real rate of return on long-term government debt (e.g., yield on Treasury notes minus annual rate of change in the Consumer Price Index), which has averaged about 3 percent on a pre-tax basis for the last 30 years. Table IV.10 summarizes the inputs to the NES spreadsheet model along with a brief description of the data sources. The results of DOE's NES and NPV analysis are summarized in section V.B.3 below and described in detail in TSD Chapter 11.

TABLE IV.10.—SUMMARY OF NES AND NPV MODEL INPUTS

Inputs	Description
Shipments	Annual shipments from shipments model (see Chapter 10 of the TSD).
Effective Date of Standard	September 2012.
Base Case Efficiencies	Distribution of base case shipments by efficiency level.
Standard Case Efficiencies	Distribution of shipments by efficiency level for each standards case. Standards case annual shipment-weighted market shares remain the same as in the base case and each standard level for all efficiencies above the TSL. All other shipments are at the TSL efficiency.
Annual Energy Use per Unit	Annual national weighted-average values are a function of efficiency level (Chapter 7 of the TSD).
Total Installed Cost per Unit	Annual weighted-average values are a function of efficiency level (Chapter 8 of the TSD).

TABLE IV.10.—SUMMARY OF NES AND NPV MODEL INPUTS—Continued

Inputs	Description
Repair Cost per Unit	Annual weighted-average values increase with manufacturer's cost level (Chapter 8 of the TSD).
Maintenance Cost per Unit	Annual weighted-average value equals $50 (Chapter 8 of the TSD).
Escalation of Electricity Prices	2007 EIA AEO forecasts (to 2030) and extrapolation for beyond 2030 (Chapter 8 of the TSD).
Electricity Site-to-Source Conversion Factor	Conversion factor varies yearly and is generated by EIA's NEMS* model. Includes the impact of electric generation, transmission, and distribution losses.
Discount Rate	3 percent and 7 percent real.
Present Year	Future costs are discounted to year 2008.

* Chapter 14 on the utility impact analysis provides more detail on NEMS model.

H. Life-Cycle Cost Sub-Group Analysis

In analyzing the potential impact of new or amended standards on customers, DOE evaluates the impact on identifiable groups (i.e., subgroups) of customers, such as different types of businesses, which may be disproportionately affected by a national standard level. For this rulemaking, DOE identified small businesses as a PTAC and PTHP customer subgroup that could be disproportionately affected, and examined the impact of proposed standards on this group.

DOE determined the impact on this PTAC and PTHP customer sub-group using the LCC spreadsheet model. DOE conducted the LCC and PBP analysis for both PTAC and PTHP customers. The standard LCC and PBP analysis (described in section IV.F) includes various types of businesses occupying commercial buildings that use PTAC and PTHP equipment. The LCC spreadsheet model allows for the identification of one or more subgroups of businesses, which can then be analyzed by sampling only each such subgroup. The results of DOE's LCC subgroup analysis are summarized in section V.B.1.c below and described in detail in TSD Chapter 12.

I. Manufacturer Impact Analysis

1. Overview

DOE performed an MIA to estimate the financial impact of higher energy conservation standards on both manufacturers of standard size PTACs and PTHPs and manufacturers of non-standard size PTACs and PTHPs, and to calculate the impact of such standards on employment and manufacturing capacity. The MIA has both quantitative and qualitative aspects. The quantitative part of the MIA relies on the GRIM, an industry-cash-flow model customized for this rulemaking. The GRIM inputs are information regarding the industry cost structure, shipments, and revenues. This includes information from many of the analyses described above, such as manufacturing costs and prices from the engineering analysis and shipments forecasts. The key GRIM output is the industry net present value. Different sets of assumptions (scenarios) will produce different results. The qualitative part of the MIA addresses factors such as equipment characteristics, characteristics of particular firms, and market and equipment trends, and includes assessment of the impacts of standards on sub-groups of manufacturers. The complete MIA is outlined in Chapter 13 of the TSD.

DOE conducted the MIA for PTACs and PTHPs in three phases. Phase 1, Industry Profile, consisted of preparing an industry characterization, including data on market share, sales volumes and trends, pricing, employment, and financial structure. Phase 2, Industry Cash Flow, focused on the industry as a whole. In this phase, DOE used the GRIM to prepare an industry-cash-flow analysis. Using publicly available information developed in Phase 1, DOE adapted the GRIM's generic structure to perform an analysis of PTAC and PTHP energy conservation standards. In Phase 3, Subgroup Impact Analysis, DOE conducted interviews with manufacturers representing the majority of domestic PTAC and PTHP sales. This group included large and small manufacturers of both standard and non-standard size PTACs and PTHPs, providing a representative cross-section of the industry. During these interviews, DOE discussed engineering, manufacturing, procurement, and financial topics specific to each company and also obtained each manufacturer's view of the industry as a whole. The interviews provided valuable information DOE used to evaluate the impacts of an amended energy conservation standard on manufacturers' cash flows, manufacturing capacities, and employment levels.

a. Phase 1, Industry Profile

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

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

b. Phase 2, Industry Cash Flow Analysis

Phase 2 of the MIA focused on the financial impacts of amended energy conservation standards on the industry as a whole. Higher energy conservation standards can affect a manufacturer's cash flow in three distinct ways, resulting in: (1) A need for increased investment; (2) higher production costs per unit; and (3) altered revenue by virtue of higher per-unit prices and changes in sales values. To quantify these impacts in Phase 2 of the MIA, DOE performed separate cash flow analyses, using the GRIM, on the part of the industry that manufactures standard size PTACs and PTHPs and on the part of the industry that manufactures non-standard size equipment. In performing these analyses, DOE used the financial values derived during Phase 1 and the shipment scenarios used in the NES analyses.

c. Phase 3, Sub-Group Impact Analysis

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

DOE established two sub-groups for the MIA corresponding to the two types of PTAC and PTHP equipment and manufacturers, i.e., manufacturers of standard size equipment and manufacturers of non-standard size equipment. The standard size PTAC and PTHP market is mostly domestically owned with manufacturing facilities located outside of the United States, where as the non-standard size PTAC and PTHP market is mostly domestically owned with manufacturing facilities located inside of the United States. There has been a recent trend of foreign owned, foreign operated companies to enter the standard size PTAC and PTHP market and sell equipment within the United States.

Based on the identification of these two sub-groups, DOE prepared two different interview guides—one for standard size PTAC and PTHP manufacturers and one for non-standard size PTAC and PTHP manufacturers. These interview guides were used to tailor the GRIM to address unique financial characteristics of manufacturers of each equipment size. DOE interviewed companies from each subgroup, including small and large companies, subsidiaries and independent firms, and public and private corporations. The purpose of the meetings was to develop an understanding of how manufacturer impacts vary with the TSLs. During the course of the MIA, DOE interviewed manufacturers representing the majority of domestic PTAC and PTHP sales. Many of these same companies also participated in interviews for the engineering analysis. However, the MIA interviews broadened the discussion from primarily technology-related issues to include business related topics. One objective was to obtain feedback from industry on the assumptions used in the GRIM and to isolate key issues and concerns.

DOE also evaluated the impact of the energy conservation standards on the manufacturing impacts of small businesses. Small businesses, as defined by the SBA for the PTAC and PTHP manufacturing industry, are manufacturing enterprises with 750 or fewer employees. DOE shared the interview guides with small manufacturers and tailored specific questions for small PTAC and PTHP manufacturers. See Chapter 13 of the TSD for details.

2. Government Regulatory Impact Model Analysis

As mentioned above, DOE uses the GRIM to quantify changes in cash flow that result in a higher or lower industry value. The GRIM analysis uses a standard, annual-cash-flow analysis that incorporates manufacturer prices, manufacturing costs, shipments, and industry financial information as inputs and models changes in costs, distribution of shipments, investments, and associated margins that would result from new or amended regulatory conditions (in this case, standard levels). The GRIM spreadsheet uses a number of inputs to arrive at a series of annual cash flows, beginning with the base year of the analysis, 2007, and continuing to 2042. DOE calculated INPVs by summing the stream of annual discounted cash flows during this period.

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

3. Manufacturer Interviews

As part of the MIA, DOE discussed potential impacts of amended energy conservation standards with manufacturers responsible for a majority of PTAC and PTHP sales. The manufacturers interviewed manufacture 90 percent of the standard size PTACs and PTHPs and over 50 percent of the non-standard size PTACs and PTHPs.[29] These interviews were in addition to those DOE conducted as part of the engineering analysis. The interviews provided valuable information that DOE used to evaluate the impacts of amended energy conservation standards on manufacturers' cash flows, manufacturing capacities, and employment levels.

a. Issues

According to all manufacturers interviewed, the biggest concern relating to this rulemaking is the EPA mandated phase-out of the HCFC refrigerants that are used in current PTAC and PTHP equipment. Every manufacturer interviewed stated that it intends to switch from the current R–22 refrigerant to R–410A refrigerant in PTAC and PTHP equipment, regardless of equipment class. All manufacturers interviewed expect to be affected by the refrigerant phase-out for the following reasons:

- Availability of R–410A refrigerant compressors—All of the manufacturers interviewed stated their concern that only a small number of compressors utilizing R–410A refrigerant are or will be available before the R–22 refrigerant must be replaced in 2010. Furthermore, not all current cooling capacities available in R–22 refrigerant compressors are or will be available in R–410A refrigerant versions. In addition, not all voltages currently offered by some manufacturers of PTAC and PTHP equipment are or will be available in an R–410A refrigerant version. All manufacturers noted that the small size of their industry gives them little to no leverage to encourage compressor manufacturers to develop R–410A refrigerant compressors for them.
- Compressor performance degradation—According to all manufacturers of PTAC and PTHP equipment, R–410A refrigerant compressors currently on the market have at least a 0.8 to 1.0 EER compressor performance degradation relative to the R–22 refrigerant compressors that they are intended to replace. The degradation in compressor performance can be attributed to several factors including a reduction in displacement, increase in complexity, necessity of increase in strength of the compressor shell, and use of non-mineral oils. As a result, some manufacturers anticipate difficulty initially meeting even the ASHRAE/IESNA Standard 90.1–1999 efficiency levels with R–410A-based units.
- Increase in manufacturing costs—All manufacturers expect their PTAC and PTHP equipment manufacturing costs to increase as the sealed-system portions of the equipment are upgraded

[29] DOE contacted other non-standard size manufacturers as part of the MIA, but they did not wish to participate in the MIA process.

to handle the higher system pressures associated with R–410A refrigerant. In addition to an increase in manufacturing cost to accommodate higher working pressures associated with R–410A refrigerant and increased refrigerant and compressor costs, manufacturers are concerned about the anticipated drop in compressor efficiency, which would cause them to incorporate some level of redesign into their R–410A refrigerant equipment to help offset this degradation and would further increase manufacturing costs. All manufacturers noted that cost-recovery is very difficult in this industry due to intense price competition. Multiple United States-based manufacturers noted the entry of foreign-based competitors as a source for the intense price competition.

- Combination of regulations—All manufacturers anticipate that the combination of the R–22 refrigerant phase-out and possible amendment of Federal energy conservation standards will lead the industry to reduce the scope of equipment offered. In addition, several manufacturers anticipate as a result of the three factors just discussed, shifts in market share, consolidation within the industry, and/or the departure of marginal manufacturers from the business.

Other manufacturing issues include the delineation of non-standard size equipment classes and the timing of the regulations. First, manufacturers of non-standard size PTACs and PTHPs anticipate that, if the ASHRAE/IESNA Standard 90.1–1999 equipment class definition (*i.e.*, equipment with wall sleeve dimensions less than 16 inches high and less than 42 inches wide) is adopted by DOE, a significant portion of the equipment they currently offer for replacement purposes will be misclassified as new construction. For example, a PTAC or PTHP unit with one of its wall sleeve dimensions less than the 16 inches high and 42 inches wide would be classified as standard size equipment. Manufacturers stated that these types of units are often sold on demand as custom order to replace existing equipment with the same wall sleeve dimensions. The comments assert that if DOE adopts the ASHRAE definitions of standard and non-standard units, it will force a small volume of non-standard sleeve size equipment to meet higher efficiency levels, intended for standard size equipment, which these units are physically unable to meet because of physical constraints due to the equipment size. Further, some manufacturers estimated that up to half of their equipment lines could be eliminated if DOE chooses to adopt ASHRAE's delineations of equipment classes.[30]

Second, the EPA mandated R–22 refrigerant phase-out date (January 1, 2010) and the anticipated effective date of the DOE amended energy conservation standards rulemaking (September 2012) are a concern for all manufacturers. All manufacturers stated that, because of the gap between these dates, as well as the fact that DOE does not expect to promulgate its rule until September 30, 2008, each manufacturer will have to make a separate development effort to comply with each of these regulations. Most manufacturers stated that there could be some gains if each is able to combine its efforts to comply with the conversion to R–410A refrigerant and amended minimum energy conservation standards. Most manufacturers were uncertain, however, of the magnitude of the anticipated benefit from any such combined effort.

b. Government Regulatory Impact Model Scenarios and Key Inputs

i. Base Case Shipments Forecast

The GRIM estimates manufacturer revenues based on total-unit-shipment forecasts and the distribution of these values by EER. Changes in the efficiency mix at each standard level are a key driver of manufacturer finances. For this analysis, the GRIM used both the NES shipments forecasts and a modified version referred to as the R–410A shipments forecasts for both standard size and non-standard size PTACs and PTHPs from 2007 to 2042. Total shipments forecasted by the NES for the base case in 2012 are shown in Table IV.11 and are further discussed in this section of today's notice. DOE allocated to the closest representative cooling capacity, in the appropriate equipment class, any shipments forecasted by the NES of equipment that was not within one of the representative cooling capacities. For example, the total PTAC or PTHP shipments with a cooling capacity less than 10,000 Btu/h for standard size equipment are included with the 9,000 Btu/h representative cooling capacity.

TABLE IV.11.—TOTAL NES-FORECASTED SHIPMENTS IN 2012

Equipment class (cooling capacities)	Total industry shipments*
Standard Size PTACs (9,000 Btu/h)	97,900
Standard Size PTHPs (9,000 Btu/h)	76,500
Standard Size PTACs (12,000 Btu/h)	144,100
Standard Size PTHPs (12,000 Btu/h)	104,400
Non-Standard Size PTACs	17,100
Non-Standard Size PTHPs	12,900

* Estimates rounded to the nearest hundred.

DOE also estimated, in the shipments analysis, the distribution of efficiencies in the base case for PTACs and PTHPs. (See Chapter 10 of the TSD.) Table IV.12 shows one example of the distribution of efficiencies in the base case for standard size PTACs with a cooling capacity of 9,000 Btu/h plus those with cooling capacities allocated to this category. The distribution of efficiencies in the base case for other equipment classes shown in Chapter 10 of the TSD.

TABLE IV.12.—NES DISTRIBUTION OF SHIPMENTS IN THE BASE CASE FOR STANDARD SIZE PTACS WITH COOLING CAPACITIES LESS THAN 10,000 BTU/H

TSL (EER)	Baseline 10.6	TSL 1, 2, 4 10.9	TSL 3 11.1	TSL 5 11.3	TSL 6 11.5	TSL 7 12.0
Distribution of Shipments (%)	19.2	18.0	17.2	16.4	15.6	13.5

During the course of the MIA interviews, DOE asked manufacturers to comment on the NES shipment forecasts. For all equipment classes, manufacturers were in general agreement with the NES total shipment

[30] DOE understands that ARI has submitted a continuous maintenance proposal to modify the definitions of non-standard size PTACs and PTHPs, which was subsequently approved by ASHRAE as Addendum t to ASHRAE/IESNA Standard 90.1–2007. As further discussed in section IV.A.2 above, if ASHRAE is able to adopt Addendum t to ASHRAE/IESNA Standard 90.1–2007 prior to September 2008, when DOE must issue a final rule on this rulemaking, DOE proposes to incorporate the modified definition into its final rule.

results. However, their views differed on the impacts of the refrigerant phase-out on the distribution of efficiencies in the base case.

Many manufacturers commented that the NES shipments forecast did not adequately account for the reduction in efficiency resulting from the refrigerant phase-out. Manufacturers believe there will be a system performance degradation as characterized in the engineering analysis. In particular, manufacturers commented that they were planning to implement R–410A refrigerant as a ''drop-in'' redesign to meet the initial 2010 deadline. In a drop-in redesign, manufacturers would continue to use the current basic R–22 design for the PTAC or PTHP equipment, and only replace compressors, refrigerant and make other minor adjustments.

DOE considered manufacturers' concerns with the NES shipments forecast and derived an alternative shipments forecast (referred to as the ''R–410A-shipments forecast''). Several manufacturers interviewed stated that total shipments for both standard and non-standard size equipment would not be affected by the R–22 refrigerant phase-out. Therefore, DOE assumed that the total industry shipments forecasted in the shipment analysis would not change due to the refrigerant phase-out (i.e., DOE assumed the total shipments of equipment with R–410A refrigerant would be equal to the total shipments of equipment with R–22 refrigerant as forecasted by the NES). Furthermore, DOE assumed that, for both standard and non-standard size PTACs and PTHPs, the distributions by efficiencies would shift in accordance with the degradation in system performance that the engineering analysis estimates will occur in 2010 (i.e., effective date for the R–22 refrigerant phase-out).

DOE assumed that manufacturers with equipment that would fall below ASHRAE/IESNA Standard 90.1–1999 levels with a drop-in redesign would nevertheless modify such equipment so that it would achieve at least these baseline efficiency levels. As an example of the impact of the refrigerant phase-out on the distribution of efficiencies in the base case, Table IV.13 illustrates the change in the distribution of efficiencies for standard size PTACs with a cooling capacity of 9,000 Btu/h from 2009 to 2010. DOE is seeking comment about the distribution of efficiencies in the R–410A base case for each of the representative cooling capacities.

TABLE IV.13.—R–410A DISTRIBUTION OF EFFICIENCIES AS FORECASTED BY THE NES AND AS FORECASTED BY THE R–410A-SHIPMENT FORECAST

TSL (EER)	Baseline 10.6	TSL 1, 2, 4 10.9	TSL 3 11.1	TSL 5 11.3	TSL 6 11.5	TSL 7 12.0
NES Distribution of Shipments (%)	19.2	18.0	17.2	16.4	15.6	13.5
R–410A-Shipments Forecast Distribution of Shipments (%)	70.9	15.6	0	13.5	0	0

ii. Standards Case Shipments Forecast

For each standards case, DOE assumed that shipments at efficiencies below the projected minimum standard levels were most likely to roll up to those efficiency levels in response to an increase in energy conservation standards. This scenario assumes that demand for high efficiency equipment is a function of its price without regard to the standard level. In addition, DOE assumed that manufacturers would not be able to manufacture equipment higher than TSL 5 or TSL 6 depending on equipment class for R–410A equipment using today's technology. For TSLs above TSL 5 or TSL 6 depending on equipment class, DOE assumed one hundred percent of the products would be manufactured at the efficiency levels specified by the TSL. See Chapter 13 for additional details.

iii. R–410A Base Case and Amended Energy Conservation Standards Markup Scenarios

The PTAC and PTHP manufacturer impact analysis is explicitly structured to account for the cumulative burden of sequential refrigerant and amended energy conservation standards. This section describes the markup scenarios DOE used to calculate the base case INPV after implementation of the R–22 refrigerant phase-out, and the standards case INPV at each TSL.

DOE learned from interviews with manufacturers that the majority of manufacturers offer only one equipment line. A single equipment line means that there is no markup strategy used to differentiate a lower efficiency piece of equipment from a premium piece of equipment. Through its analysis of the PTAC and PTHP industry, DOE also learned that prices of a PTAC and a PTHP made by the same manufacturer at the same cooling capacity do not demand different pricing strategies. Therefore, for the R–22 base case industry cash flow analysis, DOE assumed a flat markup for all equipment regardless of whether it is a PTAC or PTHP and regardless of cooling capacity.

During interviews, many manufacturers stated that they have not been able to recover fully the increased costs from increased metals prices. Instead, manufacturers were only able to recover a percentage of the full increase in manufacturing production cost. Many manufacturers believe a similar situation would happen as a result of both the R–22 refrigerant phase-out and amended energy conservation standards. Therefore, DOE made different assumptions about how manufacturers could recoup both R–410A refrigerant conversion costs and the costs associated with amended energy conservation standards, so that it could examine the effects of different cost recovery scenarios.

After discussions with manufacturers, DOE analyzed two distinct R–410A base case and amended energy conservation standards markup scenarios: (1) The flat markup scenario, and (2) the partial cost recovery markup scenario. The flat markup scenario can also be characterized as the ''preservation of gross margin percentage'' scenario. Under this scenario, DOE applied, across all TSLs, a single uniform ''gross margin percentage'' markup that DOE believes represents the current markup for manufacturers in the PTAC and PTHP industry. This flat markup scenario implies that, as production costs increase with efficiency, the absolute dollar markup will also increase. DOE calculated that the non-production cost markup, which consists of SG&A expenses, R&D expenses, interest, and profit, is 1.29. This markup is consistent with the one DOE used in the engineering analysis and GRIM analysis for the base case. The implicit assumption behind the ''partial cost recovery'' scenario is that the industry can pass-through only part of its regulatory-driven increases in production costs to consumers in the form of higher prices. DOE implemented this markup scenario in the GRIM by setting the non-production cost markups at each TSL to yield an increase in MSP equal to half the increase in production cost. These markup scenarios characterize the markup conditions described by manufacturers, and reflect the range of market responses manufacturers expect as a result of the R–22 phase-out and the amended energy conservation standards. See Chapter 13 of the TSD for additional details of the markup scenarios.

iv. Equipment and Capital Conversion Costs

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

DOE assessed the R&D expenditures manufacturers would be required to make at each TSL. It obtained financial information through manufacturer interviews and compiled the results in an aggregated form to mask any proprietary or confidential information from any one manufacturer. For both standard size and non-standard size PTACs and PTHPs at each TSL, DOE considered a number of manufacturer responses. DOE estimated the total equipment conversion expenditures by gathering the responses received during the manufacturer interviews, then weighted these data by market share for each industry and, finally, extrapolated each manufacturer's R&D expenditures for each product.

DOE also evaluated the level of capital conversion costs manufacturers would incur to comply with amended energy conservation standards. It prepared preliminary estimates of the capital investments required using the manufacturing cost model. DOE then used the manufacturer interviews to gather additional data on the level of capital investment required at each TSL. Manufacturers explained how different TSLs impacted their ability to use existing plants, warehouses, tooling, and equipment. From the interviews, DOE was able to estimate what portion of existing manufacturing assets needed to be replaced and/or reconfigured, and what additional manufacturing assets were required to manufacture the higher efficiency equipment. In most cases, DOE projects that, as standard levels for PTACs and PTHPs increase, the proportion of existing assets that manufacturers would have to replace would also increase. Additional information on the estimated equipment conversion and capital conversion costs is set forth in Chapter 13 of the TSD.

J. Employment Impact Analysis

Employment impact is one of the factors that DOE considers in selecting a standard. Employment impacts include direct and indirect impacts. Direct employment impacts are any changes in the number of employees for PTAC and PTHP manufacturers, their suppliers, and related service firms. Indirect impacts are those changes of employment in the larger economy that occur due to the shift in expenditures and capital investment that is caused by the purchase and operation of more efficient PTAC and PTHP equipment. The MIA in this rulemaking addresses only the employment impacts on manufacturers of PTACs and PTHPs, *i.e.*, the direct employment impacts (See Chapter 13 of the TSD); this section describes other, primarily indirect, employment impacts.

Indirect employment impacts from PTAC and PTHP standards consist of the net jobs created or eliminated in the national economy, other than in the manufacturing sector being regulated, as a consequence of (1) reduced spending by end users on energy (electricity, gas—including liquefied petroleum gas—and oil); (2) reduced spending on new energy supply by the utility industry; (3) increased spending on the purchase price of new PTACs and PTHPs; and (4) the effects of those three factors throughout the economy. DOE expects the net monetary savings from standards to be redirected to other forms of economic activity. DOE also expects these shifts in spending and economic activity to affect the demand for labor.

In developing this proposed rule, DOE estimated indirect national employment impacts using an input/output model of the United States economy, called ImSET (Impact of Sector Energy Technologies) developed by DOE's Building Technologies Program. ImSET is a personal-computer-based, economic-analysis model that characterizes the interconnections among 188 sectors of the economy as national input/output structural matrices, using data from the United States Department of Commerce's 1997 Benchmark United States table.[31] The ImSET model estimates changes in employment, industry output, and wage income in the overall United States economy resulting from changes in expenditures in the various sectors of the economy. DOE estimated changes in expenditures using the NES spreadsheet. ImSET then estimated the net national indirect employment impacts of potential PTAC and PTHP equipment efficiency standards on employment by sector.

The ImSET input/output model suggests the proposed PTAC and PTHP efficiency standards could increase the net demand for labor in the economy; the gains would most likely be very small relative to total national employment. DOE therefore concludes only that the proposed PTAC and PTHP standards are likely to produce employment benefits that are sufficient to offset fully any adverse impacts on employment in the PTAC and PTHP industry. For more details on the employment impact analysis, see Chapter 15 of the TSD.

K. Utility Impact Analysis

The utility impact analysis estimates the effects of reduced energy consumption due to improved equipment efficiency on the utility industry. This utility analysis consists of a comparison between forecast results for a case comparable to the AEO2007 Reference Case and forecasts for policy cases incorporating each of the PTAC and PTHP TSLs.

DOE analyzed the effects of proposed standards on electric utility industry generation capacity and fuel consumption using a variant of the EIA's NEMS. NEMS, which is available in the public domain, is a large, multi-sectoral, partial-equilibrium model of the United States energy sector. EIA uses NEMS to produce its AEO, a widely recognized baseline energy forecast for the United States. DOE used a variant known as NEMS–BT.

DOE conducted the utility analysis as policy deviations from the AEO2007, applying the same basic set of assumptions. The utility analysis reported the changes in installed capacity and generation—by fuel type—that result for each TSL, as well as changes in end-use electricity sales. Chapter 14 of the TSD provides details

[31] Lawson, Ann M., Kurt S. Bersani, Mahnaz Fahim-Nader, and Jiemin Guo. 2002. ''Benchmark Input-Output Accounts of the U.S. Economy, 1997,'' Survey of Current Business, December, pp. 19–117.

of the utility analysis methods and results.

L. Environmental Analysis

DOE has prepared a draft Environmental Assessment (EA) pursuant to the National Environmental Policy Act and the requirements under 42 U.S.C. 6295(o)(2) to determine the environmental impacts of the proposed standards. (42 U.S.C. 6316(a)) As part of the environmental analysis, DOE calculated the reduction in power plant emissions of CO_2, NO_X and mercury (Hg), using the NEMS–BT computer model. The EA has been integrated into Chapter 16 of the TSD. The analyses do not include the estimated reduction in power plant emissions of SO_2 because, as discussed below, any such reduction resulting from an energy conservation standard would not affect the overall level of SO_2 emissions in the United States.

The NEMS–BT is run similarly to the AEO2007 NEMS, except that PTAC and PTHP energy usage is reduced by the amount of energy (by fuel type) saved due to the TSLs. DOE obtained the inputs of national energy savings from the NES spreadsheet model. For the environmental analysis, the output is the forecasted physical emissions. The net benefit of the standard is the difference between emissions estimated by NEMS–BT and the AEO2007 Reference Case. The NEMS–BT tracks CO_2 emissions using a detailed module that provides results with a broad coverage of all sectors and inclusion of interactive effects.

In the case of SO_2, the Clean Air Act Amendments of 1990 set an emissions cap on all power generation. The attainment of this target, however, is flexible among generators and is enforced by applying market forces, using emissions allowances and tradable permits. As a result, accurate simulation of SO_2 trading tends to imply that the effect of energy conservation standards on physical emissions will be near zero because emissions will always be at, or near, the ceiling. Thus, there is virtually no real possible SO_2 environmental benefit from electricity savings as long as there is enforcement of the emissions ceilings. However, although there may not be an actual reduction in SO_2 emissions from electricity savings, there still may be an economic benefit from reduced demand for SO_2 emission allowances. Electricity savings decrease the generation of SO_2 emissions from power production, and consequently can decrease the need to purchase or generate SO_2 emissions allowance credits. This decreases the costs of complying with regulatory caps on emissions.

M. Discussion of Other Issues

1. Effective Date of the Proposed Amended Energy Conservation Standards

Generally, covered equipment to which a new or amended energy conservation standard applies must comply with the standard if they are manufactured or imported on or after a specified date. Section 342(a)(6)(A)(ii)(II) of EPCA directs DOE to ‘‘establish an amended uniform national standard for [PTACs and PTHPs] at the minimum level for each effective date specified in the amended ASHRAE Standard 90.1 [–1999 for PTACs and PTHPs], unless the Secretary determines, by rule published in the **Federal Register** and supported by clear and convincing evidence, that adoption of a uniform national standard more stringent than such amended ASHRAE/IESNA Standard 90.1 [–1999 for PTACs and PTHPs] would result in significant additional conservation of energy and is technologically feasible and economically justified.’’ (42 U.S.C. 6313(a)(6)(A)(ii)(II)) In today's NOPR, DOE is proposing to adopt a rule prescribing energy conservation standards higher than the efficiency levels contained in ASHRAE/IESNA Standard 90.1–1999. EPCA states that any such standards ‘‘shall become effective for products manufactured on or after a date which is four years after the date such rule is published in the **Federal Register**.’’ (42 U.S.C. 6313(a)(6)(D)) DOE has applied this four-year implementation period to determine the effective date of any energy conservation standard prescribed by this rulemaking. Thus, since DOE expects to issue a final rule in this proceeding in September 2008 [32], the rule would apply to products manufactured on or after September 2012, four years from the date of publication of the final rule. Thus, DOE calculated the LCCs and PBPs for all customers as if each one purchased a new PTAC or PTHP in 2012.

[32] This rulemaking is subject to a Consent Decree filed with the U.S. District Court for the Southern District of New York to settle the consolidated cases of *State of New York, et al.* v. *Bodman*, and *Natural Resources Defense Council, Inc., et al.,* (Civ. 7807 (JES) and Civ. 7808 (JES) (S.D.N.Y consolidated December 6, 2005)), under which DOE is required to publish a final rule for amended energy conservation standards for PTACs and PTHPs by September 30, 2008.

2. ASHRAE/IESNA Standard 90.1–1999 Labeling Requirement

ASHRAE/IESNA Standard 90.1–1999 established separate categories for PTACs and PTHPs based on standard and non-standard size wall sleeve dimensions. Further, it described standard size units as being for new construction and non-standard size units as being for replacement purposes. In addition, ASHRAE Standard 90.1–1999 includes a labeling requirement in order to differentiate between new construction and replacement equipment. Specifically, under ASHRAE/IESNA Standard 90.1–1999, to be considered a non-standard size unit (*i.e.*, replacement), PTACs and PTHPs must have a sleeve size less than 16 inches high and less than 42 inches wide, and be labeled as being for replacement applications only. DOE believes ASHRAE included a labeling requirement for PTACs and PTHPs to help deter less efficient, non-standard size equipment from being used for new construction.

Section 344 of EPCA provides the Secretary with the authority to establish labeling rules for certain commercial equipment, including PTACs and PTHPs. (42 U.S.C. 6315(e)) Section 344 of EPCA directs the Secretary to consider labeling rules which: (1) Indicate the energy efficiency of the equipment on the permanent nameplate attached to such equipment or on other nearby permanent marking; (2) prominently display the energy efficiency of the equipment in new equipment catalogs used by the manufacturer to advertise the equipment; and (3) include such other markings as the Secretary determines necessary solely to facilitate enforcement of the standards established for such equipment. (42 U.S.C. 6315(e)) In addition, section 344 of EPCA states that the Secretary shall not promulgate labeling rules for any class of industrial equipment, including PTACs and PTHPs, unless DOE has determined that:

- Labeling in accordance with this section is technologically and economically feasible with respect to such class;
- Significant energy savings will likely result from such labeling; and
- Labeling in accordance with this section is likely to assist consumers in making purchasing decisions.

(42 U.S.C. 6315(h)).

At this time, DOE is uncertain of the types of energy use or efficiency information commercial customers and owners of PTACs and PTHPs would find useful for making purchasing decisions. Before DOE can establish labeling rules, it must first ascertain whether the above-referenced criteria are met. DOE will work with the Federal Trade Commission and other stakeholders to determine the types of information and the forms (*e.g.*, labels, fact sheets, or directories) that would be most useful for commercial customers and owners of PTACs and PTHPs. DOE preliminarily believes that a label on PTAC and PTHP equipment indicating the equipment class would be useful for enforcement of both the energy conservation standards as well as the building codes and would assist States and other stakeholders in determining which application correlates to a given PTAC or PTHP (based upon size). DOE anticipates proposing labeling requirements for PTAC and PTHP equipment in a separate rulemaking. DOE invites public comment on the type of information and other requirements or factors it should consider in developing a proposed labeling rule for PTACs and PTHPs.

V. Analytical Results

A. Trial Standard Levels

Table V.1 presents the baseline efficiency level and the efficiency level of each TSL analyzed for standard size and non-standard size PTACs and PTHPs subject to today's proposed rule. The baseline efficiency levels correspond to the efficiency levels specified by the energy efficiency equations in ASHRAE/IESNA Standard 90.1–1999. TSLs 1, 3, 5, 6 represent matched pairs of efficiency levels for the three representative cooling capacities of PTACs and PTHPs. The efficiency levels for PTACs and PTHPs with the same cooling capacity and wall sleeve dimensions are equal. DOE maintained the 0.7 EER decrement established by ASHRAE/IESNA Standard 90.1–1999 between the standard size equipment with cooling capacities of 9,000 Btu/h and 12,000 Btu/h. TSL 7 is the maximum technologically feasible (''max tech'') level for each class of equipment as discussed in section III.B.2, above. TSLs 2 and 4 combine different efficiency pairings between PTACs and PTHPs. In other words, DOE examined the impacts of amended energy conservation standards when PTACs and PTHPs are required to meet different efficiency levels. For TSL 2, DOE combined TSL 1 for PTACs and TSL 3 for PTHPs. For TSL 4, DOE combined TSL 1 for PTACs and TSL 5 for PTHPs. These two combination levels serve to maximize LCC savings, while recognizing the differences in LCC results for PTACs and PTHPs.

TABLE V.1.—STANDARD SIZE AND NON-STANDARD SIZE PTACS AND PTHPS BASELINE EFFICIENCY LEVELS AND TSLS

Equipment class (cooling capacity)	Efficiency metric	Baseline (ASHRAE/IESNA Standard 90.1–1999)	TSL 1	TSL 2	TSL 3	TSL 4	TSL 5	TSL 6	TSL 7 Max-Tech
Standard Size PTAC 9,000 Btu/h.	EER	10.6	10.9	10.9	11.1	10.9	11.3	11.5	12.0
Standard Size PTAC 12,000 Btu/h.	EER	9.9	10.2	10.2	10.4	10.2	10.6	10.8	11.5
Non-Standard Size PTAC 11,000 Btu/h.	EER	8.6	9.4	9.4	9.7	9.4	10.0	10.7	11.2
Standard Size PTHP 9,000 Btu/h.	EER	10.4	10.9	11.1	11.1	11.3	11.3	11.5	12.0
	COP	3.0	3.1	3.2	3.2	3.3	3.3	3.3	3.5
Standard Size PTHP 12,000 Btu/h.	EER	9.7	10.2	10.4	10.4	10.6	10.6	10.8	11.7
	COP	2.9	3.0	3.1	3.1	3.1	3.1	3.1	3.3
Non-Standard PTHP 11,000 Btu/h.	EER	8.5	9.4	9.7	9.7	10.0	10.0	10.7	11.4
	COP	2.6	2.8	2.8	2.8	2.9	2.9	2.9	2.9

As stated in the engineering analysis (see Chapter 5 of this TSD), current Federal energy conservation standards and the efficiency levels specified by ASHRAE/IESNA Standard 90.1–1999 for PTACs and PTHPs are a function of the equipment's cooling capacity. Both the Federal energy conservation standards and the efficiency standards in ASHRAE/IESNA Standard 90.1–1999 are based on equations to calculate the efficiency levels for PTACs and PTHPs with a cooling capacity greater than or equal to 7,000 Btu/h and less than or equal to 15,000 Btu/h for each equipment class. To derive the standards (i.e., efficiency level as a function of cooling capacity), DOE plotted the representative cooling capacities and the corresponding efficiency levels for each TSL. DOE then calculated the equation of the line passing through the EER values for 9,000 Btu/h and 12,000 Btu/h for standard size PTACs and PTHPs. More details describing how DOE determined the energy efficiency equations for each TSL are found in Chapter 9 of the TSD. Table V.2 and Table V.3 identify the energy efficiency equations for each TSL for standard size PTACs and PTHPs.

TABLE V.2.—ENERGY-EFFICIENCY EQUATIONS (EER AS A FUNCTION OF COOLING CAPACITY) BY TSL FOR STANDARD SIZE PTACS

Standard size** PTACs	Energy efficiency equation*
Baseline ASHRAE/IESNA Standard 90.1–1999	$EER = 12.5 - (0.213 \times Cap^{\dagger}/1000)$
TSL 1	$EER = 13.0 - (0.233 \times Cap^{\dagger}/1000)$
TSL 2	$EER = 13.0 - (0.233 \times Cap^{\dagger}/1000)$
TSL 3	$EER = 13.2 - (0.233 \times Cap^{\dagger}/1000)$
TSL 4	$EER = 13.0 - (0.233 \times Cap^{\dagger}/1000)$

TABLE V.2.—ENERGY-EFFICIENCY EQUATIONS (EER AS A FUNCTION OF COOLING CAPACITY) BY TSL FOR STANDARD SIZE PTACS—Continued

Standard size** PTACs	Energy efficiency equation*
TSL 5	EER = 13.4 − (0.233 × Cap†/1000)
TSL 6	EER = 13.6 − (0.233 × Cap†/1000)
TSL 7	EER = 13.5 − (0.167 × Cap†/1000)

* For equipment rated according to the DOE test procedure, all EER values must be rated at 95 °F outdoor dry-bulb temperature for air-cooled products and evaporatively-cooled products and at 85 °F entering water temperature for water cooled products.
** Standard size refers to PTAC or PTHP equipment with wall sleeve dimensions greater than or equal to 16 inches high, or greater than or equal to 42 inches wide.
† Cap means cooling capacity in Btu/h at 95 °F outdoor dry-bulb temperature.

TABLE V.3.—ENERGY-EFFICIENCY EQUATIONS (EER AS A FUNCTION OF COOLING CAPACITY) BY TSL FOR STANDARD SIZE PTHPS

Standard size** PTHPs	Energy efficiency equation*
Baseline ASHRAE/IESNA Standard 90.1–1999	EER = 12.3 − (0.213 × Cap†/1000) COP = 3.2 − (0.026 × Cap†/1000)
TSL 1	EER = 13.0 − (0.233 × Cap†/1000) COP = 3.6 − (0.046 × Cap†/1000)
TSL 2	EER = 13.2 − (0.233 × Cap†/1000) COP = 3.6 − (0.044 × Cap†/1000)
TSL 3	EER = 13.2 − (0.233 × Cap†/1000) COP = 3.6 − (0.044 × Cap†/1000)
TSL 4	EER = 13.4 − (0.233 × Cap†/1000) COP = 3.7 − (0.053 × Cap†/1000)
TSL 5	EER = 13.4 − (0.233 × Cap†/1000) COP = 3.7 − (0.053 × Cap†/1000)
TSL 6	EER = 13.6 − (0.233 × Cap†/1000) COP = 3.8 − (0.053 × Cap†/1000)
TSL 7	EER = 12.9 − (0.100 × Cap†/1000) COP = 4.1 − (0.074 × Cap†/1000)

* For equipment rated according to the DOE test procedure, all EER values must be rated at 95 °F outdoor dry-bulb temperature for air-cooled products and evaporatively-cooled products and at 85 °F entering water temperature for water cooled products. All COP values must be rated at 47 °F outdoor dry-bulb temperature for air-cooled products, and at 70 °F entering water temperature for water-source heat pumps.
** Standard size refers to PTAC or PTHP equipment with wall sleeve dimensions greater than or equal to 16 inches high, or greater than or equal to 42 inches wide.
† Cap means cooling capacity in Btu/h at 95 °F outdoor dry-bulb temperature.

For non-standard size PTACs and PTHPs, DOE used the ASHRAE/IESNA Standard 90.1–1999 equation slope and the representative cooling capacity (i.e., 11,000 Btu/h cooling capacity) to determine the energy efficiency equations corresponding to each TSL. More details describing how DOE determined the energy efficiency equations for each TSL are found in Chapter 9 of the TSD. Table V.4 and Table V.5 identify the energy efficiency equations for each TSL for non-standard size PTAC and PTHP.

TABLE V.4—ENERGY-EFFICIENCY EQUATIONS (EER AS A FUNCTION OF COOLING CAPACITY) BY TSL FOR NON-STANDARD SIZE PTACS

Non-standard size** PTACs	Energy efficiency equation*
Baseline ASHRAE/IESNA Standard 90.1–1999	EER = 10.9 − (0.213 × Cap†/1000)
TSL 1	EER = 11.7 − (0.213 × Cap†/1000)
TSL 2	EER = 11.7 − (0.213 × Cap†/1000)
TSL 3	EER = 12.0 − (0.213 × Cap†/1000)
TSL 4	EER = 11.7 − (0.213 × Cap†/1000)
TSL 5	EER = 12.3 − (0.213 × Cap†/1000)
TSL 6	EER = 13.0 − (0.213 × Cap†/1000)
TSL 7	EER = 13.5 − (0.213 × Cap†/1000)

* For equipment rated according to the DOE test procedure, all EER values must be rated at 95 °F outdoor dry-bulb temperature for air-cooled products and evaporatively-cooled products and at 85 °F entering water temperature for water cooled products.
** Non-standard size refers to PTAC or PTHP equipment with wall sleeve dimensions less than 16 inches high and less than 42 inches wide.
† Cap means cooling capacity in Btu/h at 95 °F outdoor dry-bulb temperature.

TABLE V.5—ENERGY-EFFICIENCY EQUATIONS (EER AS A FUNCTION OF COOLING CAPACITY) BY TSL FOR NON-STANDARD SIZE PTHPS

Non-standard size** PTHPs	Energy efficiency equation*
Baseline ASHRAE/IESNA Standard 90.1–1999	EER = 10.8 − (0.213 × Cap†/1000) COP = 2.9 − (0.026 × Cap†/1000)
TSL 1	EER = 11.7 − (0.213 × Cap†/1000) COP = 3.1 − (0.026 × Cap†/1000)
TSL 2	EER = 12.0 − (0.213 × Cap†/1000) COP = 3.1 − (0.026 × Cap†/1000)
TSL 3	EER = 12.0 − (0.213 × Cap†/1000) COP = 3.1 − (0.026 × Cap†/1000)
TSL 4	EER = 12.3 − (0.213 × Cap†/1000) COP = 3.1 − (0.026 × Cap†/1000)
TSL 5	EER = 12.3 − (0.213 × Cap†/1000) COP = 3.1 − (0.026 × Cap†/1000)
TSL 6	EER = 13.0 − (0.213 × Cap†/1000) COP = 3.2 − (0.026 × Cap†/1000)
TSL 7	EER = 13.7 − (0.213 × Cap†/1000) COP = 3.2 − (0.026 × Cap†/1000)

* For equipment rated according to the DOE test procedure, all EER values must be rated at 95 °F outdoor dry-bulb temperature for air-cooled products and evaporatively-cooled products and at 85 °F entering water temperature for water cooled products. All COP values must be rated at 47 °F outdoor dry-bulb temperature for air-cooled products, and at 70 °F entering water temperature for water-source heat pumps.
** Non-standard size refers to PTAC or PTHP equipment with wall sleeve dimensions less than 16 inches high and less than 42 inches wide.
† Cap means cooling capacity in Btu/h at 95 °F outdoor dry-bulb temperature.

For PTACs and PTHPs with cooling capacity less than 7,000 Btu/h, DOE determined the EERs using a cooling capacity of 7,000 Btu/h in the efficiency-capacity equations. For PTACs and PTHPs with a cooling capacity greater than 15,000 Btu/h cooling capacity, DOE determined the EERs using a cooling capacity of 15,000 Btu/h in the efficiency-capacity equations. This is the same method established in the Energy Policy Act of 1992 and provided in ASHRAE 90.1–1999 for calculating the EER and COP of equipment with cooling capacities smaller than 7,000 Btu/h and larger than 15,000 Btu/h.

B. Economic Justification and Energy Savings

1. Economic Impacts on Commercial Customers

a. Life-Cycle Cost and Payback Period

DOE's LCC and PBP analyses provided five outputs for each TSL that are reported in Tables V.6 through V.11 below. The first three outputs are the proportion of PTAC and PTHP purchases where the purchase of a standard-compliant piece of equipment would create a net LCC increase, no impact, or a net LCC savings for the customer. The fourth output is the average net LCC savings from standard-compliant equipment. Finally, the fifth output is the average PBP for the customer investment in standard-compliant equipment.

TABLE V.6.—SUMMARY LCC AND PBP RESULTS FOR STANDARD SIZE PTAC WITH A COOLING CAPACITY OF 9,000 BTU/H

	Trial standard level						
	1	2	3	4	5	6	7
EER	10.9	10.9	11.1	10.9	11.3	11.5	12
PTAC with Net LCC Increase (%)	11	11	23	11	35	47	65
PTAC with No Change in LCC (%)	81	81	63	81	46	29	14
PTAC with Net LCC Savings (%)	8	8	14	8	19	23	22
Mean LCC Savings* ($)	0	0	0	0	(2)	(4)	(13)
Mean PBP (years)	11.6	11.6	12.5	11.6	13.2	14.0	16.0

*Numbers in parentheses indicate negative LCC savings, i.e., an increase in LCC.

TABLE V.7.—SUMMARY LCC AND PBP RESULTS FOR STANDARD SIZE PTHP WITH A COOLING CAPACITY OF 9,000 BTU/H

	Trial standard level						
	1	2	3	4	5	6	7
EER	10.9	11.1	11.1	11.3	11.3	11.5	12
PTHP with Net LCC Increase (%)	4	6	6	8	8	15	20
PTHP with No Change in LCC (%)	81	64	64	47	47	30	14
PTHP with Net LCC Savings (%)	15	30	30	45	45	55	66
Mean LCC Savings ($)	13	23	23	32	32	30	40
Mean Payback Period (years)	4.5	4.0	4.0	3.9	3.9	4.5	4.8

TABLE V.8.—SUMMARY LCC AND PBP RESULTS FOR STANDARD SIZE PTAC WITH A COOLING CAPACITY OF 12,000 BTU/H

	Trial standard level						
	1	2	3	4	5	6	7
EER	10.2	10.2	10.4	10.2	10.6	10.8	11.5
PTAC with Net LCC Increase (%)	13	13	25	13	41	54	75
PTAC with No Change in LCC (%)	80	80	62	80	44	28	12
PTAC with Net LCC Savings (%)	7	7	13	7	15	18	13
Mean LCC Savings* ($)	(1)	(1)	(3)	(1)	(7)	(11)	(36)
Mean PBP (years)	13.0	13.0	13.9	13.0	14.8	15.9	19.8

*Numbers in parentheses indicate negative savings, i.e., an increase in LCC.

TABLE V.9.—SUMMARY LCC AND PBP RESULTS FOR STANDARD SIZE PTHP WITH A COOLING CAPACITY OF 12,000 BTU/H

	Trial standard level						
	1	2	3	4	5	6	7
EER	10.2	10.4	10.4	10.6	10.6	10.8	11.7
PTHP with Net LCC Increase (%)	5	7	7	15	15	27	45
PTHP with No Change in LCC (%)	80	62	62	45	45	28	12
PTHP with Net LCC Savings (%)	15	31	31	40	40	45	43
Mean LCC Savings ($)	15	26	26	22	22	18	8
Mean PBP (years)	4.9	4.4	4.4	5.3	5.3	6.1	7.5

TABLE V.10.—SUMMARY LCC AND PBP RESULTS FOR NON-STANDARD SIZE PTACS WITH A COOLING CAPACITY OF 11,000 BTU/H

	Trial standard level						
	1	2	3	4	5	6	7
EER	9.4	9.4	9.7	9.4	10	10.7	11.2
PTAC with Net LCC Increase (%)	3	3	9	3	16	33	48
PTAC with No Change in LCC (%)	80	80	62	80	44	27	12
PTAC with Net LCC Savings (%)	17	17	30	16	40	40	40
Mean LCC Savings ($)	27	27	31	27	33	26	12
Mean PBP (years)	4.2	4.2	4.9	4.2	5.7	7.8	9.6

TABLE V.11.—SUMMARY LCC AND PBP RESULTS FOR NON-STANDARD SIZE PTHPS WITH A COOLING CAPACITY OF 11,000 BTU/H

	Trial Standard level						
	1	2	3	4	5	6	7
EER	9.4	9.7	9.7	10	10	10.7	11.4
PTHP with Net LCC Increase (%)	0	2	2	3	3	14	29
PTHP with No Change in LCC (%)	81	62	62	45	45	27	12
PTAC with Net LCC Savings (%)	19	36	36	53	53	59	59
Mean LCC Savings ($)	61	66	66	81	80	74	53
Mean PBP (years)	2.0	2.6	2.6	2.8	2.8	4.2	5.8

For PTACs and PTHPs with a cooling capacity less than 7,000 Btu/h, DOE established the proposed energy conservation standards using a cooling capacity of 7,000 Btu/h in the proposed efficiency-capacity equation. DOE believes the LCC and PBP impacts for equipment in this category will be similar to the impacts of the 9,000 Btu/h units because the MSP and usage characteristics are in a similar range. Similarly, for PTACs and PTHPs with a cooling capacity greater than 15,000 Btu/h, DOE established the proposed energy conservation standards using a cooling capacity of 15,000 Btu/h in the proposed efficiency-capacity equation. Further, for PTACs and PTHPs with a cooling capacity greater than 15,000 Btu/h, DOE believes the impacts will be similar to units with a cooling capacity of 12,000 Btu/h. More details explaining how DOE developed the proposed energy efficiency equations based on the analysis results for the representative cooling capacities are provided in Section V.A of today's notice.

b. Life-Cycle Cost Sub-Group Analysis

Using the LCC spreadsheet model, DOE determined the impact of the TSLs on the following customer subgroup: small businesses. Table V.12 shows the mean LCC savings from proposed energy conservation standards, and Table V.13 shows the mean payback period (in years) for this subgroup. More detailed discussion on the LCC subgroup analysis and results can be found in Chapter 12 of the TSD.

TABLE V.12.—MEAN LIFE-CYCLE COST SAVINGS FOR PTAC OR PTHP EQUIPMENT PURCHASED BY LCC SUB-GROUPS (2006$)

Equipment class (cooling capacity)	TSL 1	TSL 2	TSL 3	TSL 4	TSL 5	TSL 6	TSL 7
Standard Size PTAC (9,000 Btu/h)	($1)	($1)	($2)	($1)	($4)	($7)	($17)
Standard Size PTHP (9,000 Btu/h)	10	19	19	26	26	23	30
Standard Size PTAC (12,000 Btu/h)	(2)	(2)	(5)	(2)	(9)	(15)	(42)
Standard Size PTHP (12,000 Btu/h)	11	20	20	16	16	11	(4)
Non-Standard Size PTAC	22	22	25	22	26	16	1
Non-Standard Size PTHP	53	56	56	69	69	60	37

*Numbers in parentheses indicate negative savings.

TABLE V.13.—MEAN PAYBACK PERIOD FOR PTAC OR PTHP EQUIPMENT PURCHASED BY LCC SUB-GROUPS (YEARS)

Equipment class (cooling capacity)	TSL 1	TSL 2	TSL 3	TSL 4	TSL 5	TSL 6	TSL 7
Standard Size PTAC (9,000 Btu/h)	11.5	11.5	12.4	11.5	13.2	13.9	15.9
Standard Size PTHP (9,000 Btu/h)	4.5	4.0	4.0	3.9	3.9	4.5	4.8
Standard Size PTAC (12,000 Btu/h)	12.9	12.9	13.8	12.9	14.7	15.7	19.7
Standard Size PTHP (12,000 Btu/h)	4.9	4.4	4.4	5.2	5.2	6.1	7.5
Non-Standard Size PTAC	4.2	4.2	4.9	4.2	5.7	7.8	9.5
Non-Standard Size PTHP	2.0	2.6	2.6	2.8	2.8	4.2	5.8

For PTACs and PTHPs with a cooling capacity less than 7,000 Btu/h, DOE believes that the LCC and PBP impacts for equipment in this category will be similar to the impacts of the 9,000 Btu/h units because the MSP and usage characteristics are in a similar range. Similarly, for PTACs and PTHPs with a cooling capacity greater than 15,000 Btu/h, DOE believes the impacts will be similar to units with a cooling capacity of 12,000 Btu/h. See chapter 5 of the TSD for how we selected representative capacities that were analyzed.

2. Economic Impacts on Manufacturers

DOE performed an MIA to estimate the impact of amended energy conservation standards on PTAC and PTHP manufacturers. (See TSD, Chapter 13.)

a. Industry Cash Flow Analysis Results

i. Standard Size PTACs and PTHPs

Table V.14 and Table V.15 show the MIA results for each TSL using both markup scenarios described above for standard size PTACs and PTHPs.[33]

TABLE V.14.—MANUFACTURER IMPACT ANALYSIS FOR STANDARD SIZE PTACS AND PTHPS UNDER THE FLAT MARKUP SCENARIO

R–410A full cost recovery with amended energy standards full recovery of increased cost									
	Units	Base case	Trial standard level						
			1	2	3	4	5	6	7
INPV	(2006$ millions)	305	305	303	306	300	308	304	314
Change in INPV	(2006$ millions)	....	(0)	(2)	1	(5)	3	(1)	9
	(%)	....	−0.1	−0.8	0.2	−1.5	0.9	−0.2	3.1
R–410A Equipment Conversion Expenses *.	(2006$ millions)	14.0	....	....	....	....	....	....	....
R–410A Capital Conversion Expenses *.	(2006$ millions)	7.0	....	....	....	....	....	....	....
Amended Energy Conservation Standards Equipment Conversion Expenses.	(2006$ millions)	....	4.4	7.2	6.1	10.3	7.0	13.1	17.5
Amended Energy Conservation Standards Capital Conversion Expenses.	(2006$ millions)	....	3.4	5.6	4.7	7.9	5.4	10.1	13.5
Total Investment Required **	(2006$ millions)	....	28.8	33.8	31.9	39.2	33.4	44.3	52.2

* Equipment conversion expenses and capital conversion expenses for converting PTACs and PTHPs to R–410A are made in 2009 and accounted for in the base case.

** Total investment calculates both the equipment conversion expenses and the capital investments necessary for both converting PTACs and PTHPs to R–410A and complying with amended energy conservation standards.

[33] The MIA estimates the impacts on standard size manufacturers of equipment in the entire range of cooling capacities (i.e., the MIA results in Tables V.15 and V.16 take into consideration the impacts on manufacturers of equipment from all 6 standard size equipment classes).

TABLE V.15.—MANUFACTURER IMPACT ANALYSIS FOR STANDARD SIZE PTACS AND PTHPS UNDER THE PARTIAL COST RECOVERY MARKUP SCENARIO

R–410A base case full cost recovery with amended energy standards partial cost recovery

	Units	Base case	Trial standard level						
			1	2	3	4	5	6	7
INPV	(2006$ millions)	305	268	257	250	249	236	210	139
Change in INPV	(2006$ millions)	....	(37)	(48)	(55)	(56)	(69)	(95)	(166)
	(%)	....	−12.1	−15.7	−18.1	−18.3	−22.7	−31.2	−54.5
R–410A Equipment Conversion Expenses*.	(2006$ millions)	14.0	....	....	....	....	....	....	....
R–410A Capital Conversion Expenses*.	(2006$ millions)	7.0	....	....	....	....	....	....	....
Amended Energy Conservation Standards Equipment Conversion Expenses.	(2006$ millions)	....	4.4	7.2	6.1	10.3	7.0	13.1	17.5
Amended Energy Conservation Standards Capital Conversion Expenses.	(2006$ millions)	....	3.4	5.6	4.7	7.9	5.4	10.1	13.5
Total Investment Required**	(2006$ millions)	....	28.8	33.8	31.9	39.2	33.4	44.3	52.2

* Equipment conversion expenses and capital conversion expenses for converting PTACs and PTHPs to R–410A are made in 2009 and accounted for in the base case.

** Total investment calculates both the equipment conversion expenses and the capital investments necessary for both converting PTACs and PTHPs to R–410A and complying with amended energy conservation standards.

For the results shown above, DOE examined only the impacts of amended energy conservation standards on the INPV. The results shown assume that manufacturers are able to recover all of costs associated with the conversion to R–410A refrigerant, which allows DOE to examine the impacts of the refrigerant phase-out separately in the cumulative regulatory burden analysis. DOE also estimated the impacts of amended energy conservation standards when manufacturers were only able to recover part of the costs associated with the conversion to R–410A and presented the results in the TSD. See Chapter 13 of the TSD for a complete summary of results including the cumulative regulatory burden analysis.

At TSL 1, the impact on INPV and cash flow varies greatly depending on the manufacturers and their ability to pass on increases in MPCs to the customer. DOE estimated the impacts in INPV at TSL 1 to range from less than −$1 million up to −$37 million, or a change in INPV of negative 0.1 percent up to negative 12.1 percent. At this level, the industry cash flow decreases by approximately 25 percent, to $9 million, compared to the base case value of $12 million in the year leading up to the standards. Since more than 75 percent of PTAC and PTHP market is at or above the efficiency levels specified by TSL 1 using the R–22 refrigerant, those manufacturers that do not fall below the efficiency levels specified by TSL 1 after the refrigerant phase-out will not have to make additional modifications to their product lines to conform to the amended energy conservation standards. DOE expects the lower end of the impacts to be reached, which indicates that industry revenues and costs are not significantly negatively impacted as long as manufacturers are able to recover fully the increase in manufacturer production cost from the customer.

At TSL 2, the impact on INPV and cash flow would be similar to TSL 1 and dependent on whether manufacturers are able to recover fully the increases in MPCs from the customer. DOE estimated the impacts in INPV at TSL 2 to range from −$2 million up to −$48 million, or a change in INPV of −0.8 percent up to −15.7 percent. At this level, the industry cash flow decreases by approximately 33 percent, to $8 million, compared to the base case value of $12 million in the year leading up to the standards. Up to 75 percent of PTACs and up to 50 percent of PTHPs being sold are already at or above this level using R–22 refrigerant. Similar to TSL 1 for PTACs, manufacturers whose equipment does not fall below the efficiency levels specified by TSL 1 after the refrigerant phase-out will not have to make additional modifications to their product lines to conform to TSL 2. For PTHPs, the required higher level of efficiency will cause some manufactures to make additional modifications to their product lines to conform to the amended energy conservation standards. These additional plant and product modifications are estimated in the capital and product conversion costs shown in Tables V.14 and V. 15. Even though TSL 2 requires efficiency levels that are different for PTACs and PTHPs, there are small differences between the EER values for a given capacity in sleeve size, which will minimize the amount of redesign manufacturers will have to undertake to modify their product lines. DOE expects the impacts of TSL 2 on manufacturers of standard size PTACs will be greater than TSL 1, but the magnitude of impacts largely depends on the ability of manufacturers to recover fully the increase in MPC from the customer and minimize the level of redesign between the two efficiency levels.

At TSL 3, the impact on INPV and cash flow continues to vary depending on the manufacturers and their ability to pass on increases in MPCs to the customer. DOE estimated the impacts in INPV at TSL 3 to range from approximately positive $1 million to −$55 million, or a change in INPV of 0.2 percent to −18.1 percent. At this level, the industry cash flow decreases by approximately 33 percent, to $8 million, compared to the base case value of $12 million in the year leading up to the standards. Currently the bulk of the equipment being sold is already at or above this level using R–22 refrigerant. DOE does not expect industry revenues and costs to be impacted significantly as long as standard size PTAC and PTHP manufacturers are able the increase in manufacturer production cost from the customer. The positive INPV value is explained by increases in MSP due to higher costs of R–410A equipment, which DOE assumed under this scenario that manufacturers would be able to recover fully the investments needed for conversion to R–410A. See Chapter 13 of the TSD for additional details of each markup scenario.

At TSL 4, DOE estimated the impacts in INPV to range from approximately −$5 million to −$56 million, or a change in INPV of −1.5 percent up to −18.3 percent. At this level, the industry cash flow decreases by approximately 50 percent, to $6 million, compared to the base case value of $12 million in the year leading up to the standards. At higher TSLs, manufacturers have a harder time fully passing on larger increases in MPCs to the customer. At to TSL 4, manufacturers are concerned about whether they will be able to produce PTHPs, by the effective date of the standard, that use R–410A refrigerant. Using the performance degradations from the engineering analysis, TSL 4 for PTHPs using R–410A would correspond to the ''max-tech'' efficiency levels for PTHPs unless higher efficiency compressors enter the market prior to the effective date of an amended energy conservation standard. Based on information submitted by industry, manufacturers would be required to redesign completely their PTHP equipment lines. Since most manufacturers only manufacture one product line, and combine their R&D efforts for PTACs and PTHPs into one design, manufacturers would likely choose to redesign their entire equipment offering. Similar to TSL 1, for PTACs, manufacturers that do not fall below TSL 1 after the refrigerant phase-out will not have to make additional modifications to their PTAC equipment lines to conform to TSL 4. Due to the disparity between efficiency levels of standard size PTACs and PTHPs specified by TSL 4, DOE initially believes that it is more likely that the higher end of the range of impacts could be reached (i.e., a drop of 18.3 percent in INPV).

At TSL 5, DOE estimated the impacts in INPV to range from approximately $3 million up to −$69 million, or a change in INPV of approximately 1 percent up to −22.7 percent. At this level, the industry cash flow decreases by approximately 33 percent, to $8 million, compared to the base case value of $12 million in the year leading up to the standards. As with TSL 4, standard size PTAC and PTHP manufacturers continue to have a hard time fully passing on larger increases in MPCs to the customer. At TSL 5, manufacturers stated their concerns over the ability to be able to produce both PTACs and PTHPs by the effective date of the standard utilizing R–410A refrigerant. Using the performance degradations from the engineering analysis, TSL 5 would correspond to the ''max-tech'' efficiency levels for both PTACs and PTHPs using R–410A unless higher efficiency compressors enter the market prior to the effective date of an amended energy conservation standard. Based on information submitted by industry, the majority of manufacturers would require a complete redesign of their equipment. Thus, DOE believes it is likely that the higher range of the impacts could be reached.

At TSL 6, DOE estimated the impacts in INPV to range from −$1 million up to −$95 million, or a change in INPV of approximately −0.2 percent up to −31.2 percent. At this level, the industry cash flow decreases by approximately 66 percent, to $4 million, compared to the base case value of $12 million in the year leading up to the standards. At higher TSLs, manufacturers have a harder time fully passing on larger increases in MPCs to the customer, and therefore manufacturers expect the higher end of the range of impacts to be reached (i.e., a drop of 31.2 percent in INPV). TSL 6 requires the production of standard size PTACs and PTHPs using R–410A that are not currently available on the market today assuming the system performance degradations estimated in the engineering analysis. If manufacturers do not have the ability to integrate a high efficiency R–410A compressor into the PTACs and PTHPs, the impacts could be greater than characterized by DOE's MIA analysis.

At TSL 7 (max tech), DOE estimated the impacts in INPV to range from $9 million up to −$166 million, or a change in INPV of approximately 3 percent up to −54.5 percent. At this level, the industry cash flow decreases by approximately 92 percent, to $1 million, compared to the base case value of $12 million in the year leading up to the standards. At higher TSLs, manufacturers have a harder time fully passing on larger increases in MPCs to the customer, and therefore manufacturers expect the higher end of the range of impacts to be reached (i.e., a drop of 31.2 percent in INPV). Currently, there is only one model being manufactured at these efficiency levels, which uses R–22 refrigerant. Most manufacturers did not provide DOE with projected equipment conversion costs or capital conversion costs at this level, since they could not conceive of what designs using R–410A might achieve this efficiency level. The industry would experience an increase in net present value if it were able to fully pass through to customers the increase in production costs associated with meeting new amended energy conservation standards. However, there is a risk of very large negative impacts if manufacturers' expectations are realized about reducing profit margins. During the interviews, manufacturers expressed disbelief at the possibility of manufacturing an entire equipment line at the max-tech levels using R–410A refrigerant.

ii. Non-Standard Size PTACs and PTHPs

Table V.16 and Table V.17 shows the MIA results for each TSL using both markup scenarios described above for non-standard size PTACs and PTHPs.[34]

TABLE V.16.—MANUFACTURER IMPACT ANALYSIS FOR NON-STANDARD SIZE PTACS AND PTHPS UNDER FULL COST RECOVERY MARKUP SCENARIO

R–410A full cost recovery with amended energy standards full recovery of increased cost									
	Units	Base case	Trial standard level						
			1	2	3	4	5	6	7
INPV	(2006$ millions)	28	25	22	23	18	21	18	16
Change in INPV	(2006$ millions)		(2)	(5)	(4)	(9)	(7)	(9)	(11)
	(%)		−7.7	−18.5	−15.7	−34.2	−24.6	−32.9	−40.6

[34] The MIA estimates the impacts on non-standard size manufacturers of equipment in the entire range of cooling capacities (i.e., the MIA results in Tables V.15 and V.16 take into consideration the impacts on manufacturers of equipment from all 6 non-standard size equipment classes).

TABLE V.16.—MANUFACTURER IMPACT ANALYSIS FOR NON-STANDARD SIZE PTACS AND PTHPS UNDER FULL COST RECOVERY MARKUP SCENARIO—Continued

R–410A full cost recovery with amended energy standards full recovery of increased cost									
	Units	Base case	Trial standard level						
			1	2	3	4	5	6	7
R–410A Equipment Conversion Expenses *.	(2006$ millions)	0.6							
R–410A Capital Conversion Expenses *.	(2006$ millions)	7.0							
Amended Energy Conservation Standards Equipment Conversion Expenses.	(2006$ millions)		2.5	6.3	5.6	10.6	8.8	11.9	15.0
Amended Energy Conservation Standards Capital Conversion Expenses.	(2006$ millions)		1.3	2.2	1.9	3.5	2.6	3.2	3.9
Total Investment Required **.	(2006$ millions)		11.4	16.1	15.1	21.7	18.9	22.7	26.5

* Equipment conversion expenses and capital conversion expenses for converting PTACs and PTHPs to R–410A are made in 2009 and accounted for in the base case.
** Total investment calculates both the equipment conversion expenses and the capital investments necessary for both converting PTACs and PTHPs to R–410A and complying with amended energy conservation standards.

TABLE V.17.—MANUFACTURER IMPACT ANALYSIS FOR NON-STANDARD SIZE PTACS AND PTHPS UNDER THE PARTIAL COST RECOVERY MARKUP SCENARIO

R–410A Base case full cost recovery with amended energy standards partial cost recovery									
	Units	Base case	Trial standard level						
			1	2	3	4	5	6	7
INPV	(2006$ millions)	28	23	20	20	15	17	13	7
Change in INPV	(2006$ millions)		(4)	(7)	(7)	(12)	(10)	(15)	(21)
	(%)		−14.8	−26.9	−25.7	−43.9	−37.5	−53.4	−74.7
R–410A Equipment Conversion Expenses *.	(2006$ millions)	0.6							
R–410A Capital Conversion Expenses *.	(2006$ millions)	7.0							
Amended Energy Conservation Standards Equipment Conversion Expenses.	(2006$ millions)		2.5	6.3	5.6	10.6	8.8	11.9	15.0
Amended Energy Conservation Standards Capital Conversion Expenses.	(2006$ millions)		1.3	2.2	1.9	3.5	2.6	3.2	3.9
Total Investment Required **.	(2006$ millions)		11.4	16.1	15.1	21.7	18.9	22.7	26.5

* Equipment conversion expenses and capital conversion expenses for converting PTACs and PTHPs to R–410A are made in 2009 and accounted for in the base case.
** Total investment calculates both the equipment conversion expenses and the capital investments necessary for both converting PTACs and PTHPs to R–410A and complying with amended energy conservation standards.

For the results shown above, DOE examined only the impacts of amended energy conservation standards on the INPV. The results shown assume that manufacturers are able to recover all of costs associated with the conversion to R–410A refrigerant, which allows DOE to examine the impacts of the refrigerant phase-out separately in the cumulative regulatory burden analysis. See Chapter 13 of the TSD for a complete summary of results including the cumulative regulatory burden analysis.

At TSL 1, DOE estimated the impacts in INPV to range from less than −$2 million up to −$4 million, or a change in INPV of −7.7 percent up to −14.8 percent. At this level, the industry cash flow decreases by approximately 50 percent, $1 million, compared to the base case value of $2 million in the year leading up to the standards. Since more than half of the equipment being sold is already at or above this level using R–22 refrigerant, those manufacturers that do not fall below TSL 1 using R–410A refrigerant will not have to make additional modifications to their product lines to conform to the amended energy conservation standards. At TSL 1, the results of the analysis show the least impact on manufacturers.

At TSL 2, DOE estimated the impacts in INPV to range from −$5 million up to −$7 million, or a change in INPV of −18.5 percent up to −26.9 percent. At this level, the industry cash flow decreases by approximately 150 percent, −$1 million, compared to the base case value of $2 million in the year leading up to the standards. At this level, the majority of the industry is impacted. At higher TSLs, manufacturers have a harder time fully passing on larger increases in MPCs to the customer, thus manufacturers expect the higher end of the range of impacts to be reached (i.e., a drop of 26.9 percent in INPV).

At TSL 3, DOE estimated the impacts in INPV to range from −$4 million up to −$7 million, or a change in INPV of −15.7 percent up to −25.7 percent. At this level, the industry cash flow decreases by approximately 150 percent, −$1 million, compared to the base case value of $2 million in the year leading up to the standards. At higher TSLs, manufacturers continue to have a hard time fully passing on larger increases in MPCs to the customer, thus manufacturers expect the higher end of the range of impacts to be reached (i.e., a drop of 25.7 percent in INPV). Manufacturers stated that the level of re-design required to manufacture all the equipment lines and cooling capacity ranges would be so extensive that they would consider not investing the time, research, or development efforts necessary to make equipment utilizing R–410A at TSL 3.

At TSL 4, DOE estimated the impacts in INPV to range from −$9 million up to −$12 million, or a change in INPV of −34.2 percent up to −43.9 percent. At this level, the industry cash flow decreases by approximately 250 percent, −$3 million, compared to the base case value of $2 million in the year leading up to the standards. At TSL 4, manufacturers stated their concerns over the ability to be able to produce PTHPs by the effective date of the standard utilizing R–410A refrigerant. Using the performance degradations from the engineering analysis, TSL 4 for PTHPs would correspond to the ''max-tech'' efficiency levels for PTHPs unless higher efficiency compressors enter the market prior to the effective date of an amended energy conservation standard. Based on information submitted by industry, manufacturers would be required to redesign completely their PTHP equipment lines.

At TSL 5, DOE estimated the impacts in INPV to range from −$7 million up to −$10 million, or a change in INPV of −24.6 percent up to −37.5 percent. At this level, the industry cash flow decreases by approximately 200 percent, −$2 million, compared to the base case value of $2 million in the year leading up to the standards. Using the performance degradations from the engineering analysis, TSL 5 for PTACs and PTHPs would correspond to the ''max-tech'' efficiency levels for PTHPs unless higher efficiency compressors enter the market prior to the effective date of an amended energy conservation standard.

At TSL 6, DOE estimated the impacts in INPV to range from −$9 million up to −$15 million, or a change in INPV of −32.9 percent up to −53.4 percent. At this level, the industry cash flow decreases by approximately 300 percent, −$4 million, compared to the base case value of $2 million in the year leading up to the standards.

At TSL 5 and 6, manufacturers stated their concerns over the ability to be able to produce this equipment by the effective date of the standard utilizing R–410A. Based on information submitted by industry, manufacturers would require a complete redesign of their non-standard PTAC and PTHP platforms. Many manufacturers stated they would be unwilling to redesign completely non-standard size equipment because of the small size of the market and the declining sales. Manufacturers also commented non-standard size PTACs and PTHPs are manufactured to order based on unique building designs for replacement applications. Therefore, manufacturers did not see the advantage to completely redesigning non-standard size PTACs and PTHPs in small and declining market.

At TSL 7, DOE estimated the impacts in INPV to range from −$11 million up to −$21 million, or a change in INPV of −40.6 percent up to −74.7 percent. At this level, the industry cash flow decreases by approximately 350 percent, −$5 million, compared to the base case value of $2 million in the year leading up to the standards. During their MIA interviews, all manufacturers stated that this level is simply not achievable with current technologies after the refrigerant phase-out. In addition, some manufacturers would not provide equipment conversion cost or capital conversion costs at this level, since they could not conceive what designs might reach this efficiency level.

Lastly, non-standard size manufacturers stated great concern over the amplification of impacts if ASHRAE/IESNA Standard 90.1–1999 definitions are adopted by DOE and their equipment lines are reduced. Several manufacturers believe the ASHRAE/IESNA Standard 90.1–1999 definitions would cause up to 50 percent of their equipment lines to be misclassified. Consequently, this equipment would be required to meet the higher energy conservation standards for standard size equipment, which manufacturers do not believe is attainable with non-standard size equipment. If manufacturers' expectations were reached with a declining equipment offering, the INPV and cash flow impacts of the declining industry as estimated by the MIA would be further negatively affected.

b. Cumulative Regulatory Burden

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

As previously mentioned, all PTAC and PTHP manufacturers believe that the refrigerant phase-out will be the biggest external burden on manufacturers. DOE took all comments and concerns into consideration and examined different impacts the refrigerant phase-out would have on standard and non-standard size PTAC and PTHP industries. DOE first examined the possible impacts on INPV from converting current production of R–22 equipment into R–410A equipment. DOE then examined the possible impacts of amended energy conservation standards on the R–410A base case. In other words, DOE examined the cumulative impacts of both R–410A conversion and compliance with the proposed energy conservation standards (see Chapter 13 of the TSD). Table V.18 and Table V.19 show the changes in INPV because of conversion to R–410A in 2012 on the base case (i.e., the shipments forecast in the absence of amended mandatory energy conservation standards beyond the levels in ASHRAE/IESNA Standard 90.1–1999). For the results presented in the two tables below, DOE assumed manufacturers would be able to cover fully any increase in manufacturing costs associated with the conversion to R–410A in 2010. DOE also estimated the impacts on the base case from the R–410A conversion if manufacturers were not able to recover fully the increases in MPCs and displayed the results in Chapter 13 of the TSD. In general, if manufacturers were not able to recover fully the increases in MPC because of the R–410A conversion, the impacts on the base case would be amplified.

TABLE V.18.—CHANGES IN INDUSTRY NET PRESENT VALUE FOR STANDARD SIZE PTACS AND PTHPS FROM R–410A CONVERSION

TSL	Energy conservation standards flat markup		
	INPV $MM	Change in INPV from base case	
		$MM	% Change
Base Case (R–22 only)	298	....	....
Base Case (R–22 with R–410A Conversion)	305	7	2.3%

TABLE V.19.—CHANGES IN INDUSTRY NET PRESENT VALUE FOR NON-STANDARD SIZE PTACS AND PTHPS FROM R–410A CONVERSION

TSL	Energy conservation standards flat markup		
	INPV $MM	Change in INPV from base case	
		$MM	% Change
Base Case (R–22 only)	32	....	....
Base Case (R–22 with R–410A Conversion)	28	(4)	− 12.5%

c. Impacts on Employment

DOE estimated industry-wide labor expenditures based on the engineering analysis. Coil fabrication; tube cutting and soldering; electronic connection assembly; package assembly; testing and packing of the completed PTAC or PTHP represent the bulk of the labor. DOE estimated the amount of labor needed to perform these functions, and incorporated these estimates into the GRIM, which projects labor expenditures annually. Under the GRIM, total labor expenditures are a function of the labor intensity in manufacturing equipment, the sales volume, and the unit cost of labor (i.e., the wage rate), which remains fixed in real terms over time. Table V.20 and Table V.21 provide DOE's estimate of the changes in labor measured as the change in labor expenditures for standard and non-standard size PTACs and PTHPs in 2012, the date DOE expects the amended energy conservation standard to become effective, compared to the base case.

TABLE V.20.—PROJECTED CHANGE IN LABOR EXPENDITURES, STANDARD SIZE PTACS AND PTHPS (2012)

Trial standard levels						
TSL 1	TSL 2	TSL 3	TSL 4	TSL 5	TSL 6	TSL 7
+1.9%	+2.4%	+3.0%	+2.9%	+4.3%	+5.7%	+11.5%

TABLE V.21.—PROJECTED CHANGE IN LABOR EXPENDITURES, NON-STANDARD SIZE PTACS AND PTHPS (2012)

Trial standard levels						
TSL 1	TSL 2	TSL 3	TSL 4	TSL 5	TSL 6	TSL 7
+1.8%	+2.2%	+2.7%	+2.6%	+3.7%	+7.3%	+11.6%

Based on these results, DOE expects no significant discernable direct employment impacts among standard and non-standard size PTAC and PTHP manufacturers for TSL1 through TSL 7. This conclusion is independent of any conclusions regarding employment impacts in the broader United States economy, which are documented in Chapter 15 of the TSD. This conclusion also ignores the possible relocation of domestic employment to lower-labor-cost countries. Manufacturers stated their concerns, throughout the interviews, about increasing offshore competition entering the market over the past five years.

d. Impacts on Manufacturing Capacity

According to the majority of standard and non-standard size PTAC and PTHP manufacturers, amended energy conservation standards will not significantly affect the manufacturer's production capacity. Any necessary redesign of PTACs and PTHPs will not change the fundamental assembly of the equipment. However, manufacturers anticipate some minimal changes to the assembly line due to the conversion to R–410A refrigerant. Because of the properties of R–410A refrigerant, the assembly line will need to give special attention to creating vacuums within each unit's chambers, and additional assembly will be needed if the number of fan motors increases. DOE believes manufacturers will be able to maintain production capacity levels and continue to meet market demand under amended energy conservation standards.

e. Impacts on Subgroups of Manufacturers

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

DOE evaluated the impact of amended energy conservation standards on small businesses, as defined by the SBA for the PTAC and PTHP manufacturing industry as manufacturing enterprises with 750 or fewer employees. DOE shared the interview guides with small PTAC and PTHP manufacturers and tailored specific questions for these manufacturers. During DOE's interviews with small manufacturers, they provided information, which suggested that the impacts of standards on them would not differ from impacts on larger companies within the industry. (See TSD, Chapter 13.)

3. National Impact Analysis

a. Amount and Significance of Energy Savings

Table V.22 shows the forecasted national energy savings for all the equipment classes of PTACs and PTHPs at each of the TSLs. DOE estimated the national energy savings using the AEO2007 energy price forecast. The table also shows the magnitude of the energy savings if the savings are discounted at rates of 7 percent and 3 percent. Each TSL considered in this rulemaking would result in significant energy savings, and the amount of savings increases with higher energy conservation standards. (See TSD, Chapter 11.)

TABLE V.22.—SUMMARY OF CUMULATIVE NATIONAL ENERGY SAVINGS FOR PTACS AND PTHPS (ENERGY SAVINGS FOR UNITS SOLD FROM 2012 TO 2042)

Trial standard level	Primary national energy savings (quads) (sum of all equipment classes)		
	Undiscounted	3% Discounted	7% Discounted
1	0.008	0.005	0.002
2	0.014	0.008	0.004
3	0.017	0.009	0.004
4	0.019	0.010	0.005
5	0.027	0.014	0.007
6	0.038	0.021	0.010
7	0.086	0.046	0.023

DOE reports both undiscounted and discounted values of energy savings. There is evidence that each TSL that is more stringent than the corresponding level in ASHRAE/IESNA Standard 90.1–1999 results in additional energy savings, ranging from 0.008 quads to 0.086 quads for TSLs 1 through 7. For example, the estimated energy savings for TSL 4 is equivalent to the electricity used annually by approximately 4,000 motels.[35]

b. Net Present Value

The NPV analysis is a measure of the cumulative benefit or cost of standards to the Nation. Tables V.23 and V.24 provide an overview of the NPV results.

TABLE V.23.—SUMMARY OF CUMULATIVE NET PRESENT VALUE FOR PTACS

Trial standard level	NPV* (billion 2006$)	
	7% discount rate	3% discount rate
1	$0.000	$0.005
2	0.000	0.005
3	(0.001)	0.007
4	0.000	0.005
5	(0.006)	0.005
6	(0.014)	(0.000)
7	(0.066)	(0.071)

*Numbers in parentheses indicate negative NPV, i.e., a net cost.

TABLE V.24.—SUMMARY OF CUMULATIVE NET PRESENT VALUE FOR PTHPS

Trial standard level	NPV* (billion 2006$)	
	7% discount rate	3% discount rate
1	$0.006	$0.021
2	0.014	0.043
3	0.014	0.043
4	0.016	0.056
5	0.016	0.056
6	0.010	0.052

TABLE V.24.—SUMMARY OF CUMULATIVE NET PRESENT VALUE FOR PTHPS—Continued

Trial standard level	NPV* (billion 2006$)	
	7% discount rate	3% discount rate
7	(0.001)	0.074

*Numbers in parentheses indicate negative NPV, i.e., a net cost.

Use of a 3 percent discount rate increases the present value of future equipment-purchase costs and operating cost savings. Because annual operating cost savings in later years grow at a faster rate than annual equipment purchase costs, use of a 3 percent discount rate increases the NPV at most TSLs. (See TSD, Chapter 11.)

c. Impacts on Employment

DOE develops estimates of the indirect employment impacts of proposed standards in the economy in general. As discussed above, DOE expects energy conservation standards for PTACs and PTHPs to reduce energy bills for commercial customers, and the resulting net savings to be redirected to other forms of economic activity. DOE

[35] Energy Information Agency. *http://www.eia.doe.gov/emeu/cbecs/cbecs2003/detailed_tables_2003/2003set1/2003pdf/b1.pdf.* June 2006.

also realizes that these shifts in spending and economic activity could affect the demand for labor. To estimate these effects, DOE used an input/output model of the U.S. economy using BLS data (as described in section IV.J). (See TSD, Chapter 15.)

This input/output model suggests the proposed PTAC and PTHP energy conservation standards are likely to increase the net demand for labor in the economy. Neither the BLS data nor the input/output model used by DOE includes the quality or wage level of the jobs. As shown in Table V.25, DOE estimates that net indirect employment impacts from a proposed PTAC and PTHP standards are likely to be very small. The net increase in jobs is so small that it would be imperceptible in national labor statistics and might be offset by other, unanticipated effects on employment.

TABLE V.25.—NET NATIONAL CHANGE IN INDIRECT EMPLOYMENT, JOBS IN 2042

Trial standard level	Net national change in jobs (number of jobs)	
	PTACs	PTHPs
1	11	20
2	11	40
3	24	40
4	11	62
5	44	62
6	69	82
7	147	195

4. Impact on Utility or Performance of Equipment

In performing the engineering analysis, DOE considered design options that would not lessen the utility or performance of the individual classes of equipment. (42 U.S.C. 6316(a); 42 U.S.C. 6295(o)(2)(B)(i)(IV)) As presented in section III.D.4, of this notice, DOE concluded that none of the efficiency levels proposed for standard size and non-standard size equipment in this notice will reduce the utility or performance of PTACs and PTHPs except the small fraction of the market that is potentially misclassified under ASHRAE/IESNA Standard 90.1–1999. PTAC and PTHP manufacturers currently offer equipment that meet or exceed the proposed standard levels. As detailed in section IV.A.2 above, DOE recognizes ARI's concerns regarding non-standard size equipment and the possible misclassification under the definitions established by ASHRAE/IESNA Standard 90.1–1999. If ASHRAE is able to adopt Addendum t to ASHRAE/IESNA Standard 90.1–2007 prior to September 2008, DOE proposes to incorporate the modified definition in the final rule to help alleviate manufacturers concerns about reduced product availability.

5. Impact of Any Lessening of Competition

EPCA directs DOE to consider any lessening of competition that is likely to result from standards. It directs the Attorney General to determine in writing the impact, if any, of any lessening of competition likely to result from a proposed standard. (42 U.S.C. 6316(a); 42 U.S.C. 6295(o)(2)(B)(i)(V)) To assist the Attorney General in making such a determination, DOE has provided the Department of Justice (DOJ) with copies of this notice and the TSD for review. DOE found that numerous foreign manufacturers have entered the standard size PTAC and PTHP market over the past several years. DOE believes this will continue to happen in this market regardless of the proposed standard level chosen.

6. Need of the Nation To Conserve Energy

Increasing the energy efficiency of PTACs and PTHPs promotes the Nation's energy security by reducing overall demand for energy, and thus reducing the Nation's reliance on foreign sources of energy. Reduced demand also may improve the reliability of the Nation's electricity system, particularly during peak-load periods. As a measure of this reduced demand, DOE expects the proposed standards to eliminate the need for the construction of new power plants with approximately 81 megawatts (MW) electricity generation capacity in 2042.

Enhanced energy efficiency also produces environmental benefits. The expected energy savings from higher [PTAC and PTHP] standards will reduce the emissions of air pollutants and greenhouse gases associated with fossil fuel use as well as other energy-related environmental impacts. Table V.26 shows cumulative CO_2, NO_X, and Hg emissions reductions for all the [PTAC and PTHP] equipment classes over the forecast period. The cumulative CO_2, NO_X and Hg emission reductions range up to 6.13 Mt, 0.53 kt, and −0.04 t, respectively, for PTACs and 6.94 Mt, 0.40 kt, and −0.03 t, respectively, for PTHPs. In Chapter 16 of the TSD, DOE reports annual changes in CO_2, NO_X and Hg emissions attributable to each TSL. As discussed in section IV.L, DOE does not report SO_2 emissions reduction from power plants because such reduction from an energy conservation standard would not affect the overall level of SO_2 emissions in the United States due to the caps on power plant emissions of SO_2.

The impact of these NO_X emissions will be affected by the Clean Air Interstate Rule (CAIR) issued by the U.S. Environmental Protection Agency on March 10, 2005.[36] 70 FR 25162 (May 12, 2005). CAIR will permanently cap emissions of NO_X in 28 eastern States and the District of Columbia. As with SO_2 emissions, a cap on NO_X emissions means that equipment energy conservation standards are not likely to have a physical effect on NO_X emissions in States covered by the CAIR caps. Therefore, while the emissions cap may mean that physical emissions reductions in those States will not result from standards, standards could produce an environmental-related economic benefit in the form of lower prices for emissions allowance credits. However, as with SO_2 allowance prices, DOE does not plan to monetize this benefit for those States because the impact on the NO_X allowance price from any single energy conservation standard is likely to be small and highly uncertain. DOE seeks comment on how it might value NO_X emissions for the 22 States not covered under CAIR.

With regard to mercury emissions, DOE is able to report an estimate of the physical quantity changes in mercury emissions associated with an energy conservation standard. Based on the NEMS–BT modeling, Hg emissions generally decline out to 2020 or 2025. However, there is a slight Hg increase by 2030, depending on the TSL level and the equipment type. These changes in Hg emissions, as shown in Table V.26, are extremely small, i.e., none of the changes come close to approaching a 1 percent change in annual emissions. The NEMS–BT model accounts for a wide variety of factors. One possible reason for the Hg emissions increase could be due to emissions banking. The NEMS–BT model assumed that power plant operators would be permitted to bank emission allowances from years in which they release fewer emissions than the maximum permitted. Power plant operators may then release more emissions than permitted by their allowances in a later year.

The NEMS–BT model assumed that these emissions would be subject to EPA's Clean Air Mercury Rule[37] (CAMR), which would permanently cap emissions of mercury for new and existing coal-fired plants in all States by 2010. Similar to SO_2 and NO_X, DOE assumed that under such system, energy

[36] See *http://www.epa.gov/cleanairinterstaterule/*.

[37] 70 FR 28606 (May 18, 2005).

conservation standards would result in no physical effect on these emissions, but would be expected to result in an environmental-related economic benefit in the form of a lower price for emissions allowance credits. DOE's plan for addressing analysis does not include monetizing the benefits of reduced mercury emissions, because DOE considered that valuation of such impact from any single energy conservation standard would likely be small and highly uncertain.

On February 8, 2008, the U.S. Court of Appeals for the District of Columbia Circuit (D.C. Circuit) issued its decision in *State of New Jersey, et al.* v. *Environmental Protection Agency,*[38] in which the Court, among other actions, vacated the CAMR referenced above. Accordingly, DOE is considering whether changes are needed to its plan for addressing the issue of mercury emissions in light of the D.C. Circuit's decision. DOE invites public comment on addressing mercury emissions in this rulemaking.

TABLE V.26.—SUMMARY OF EMISSIONS REDUCTIONS FOR [PTAC AND PTHP] (CUMULATIVE REDUCTIONS FOR EQUIPMENT SOLD FROM 2012 TO 2042)

	Trial standard levels						
	TSL 1	TSL 2	TSL 3	TSL 4	TSL 5	TSL 6	TSL 7
Emissions reductions for PTACs*							
CO_2 (Mt)	0.50	0.50	1.06	0.50	1.83	2.95	6.13
NO_X (kt)	0.04	0.04	0.09	0.04	0.16	0.26	0.53
Hg (t)	0.00	0.00	-0.01	0.00	-0.01	-0.02	-0.04
Emissions reductions for PTHPs*							
CO_2 (Mt)	0.73	1.49	1.49	2.19	2.19	3.00	6.94
NO_X (kt)	0.04	0.08	0.08	0.12	0.12	0.13	0.40
Hg (t)	0.00	-0.01	-0.01	-0.01	-0.01	-0.02	-0.03

* Negative values indicate emission increases.

DOE is considering taking into account a monetary benefit of CO_2 emission reductions associated with this rulemaking. During the preparation of its most recent review of the state of climate science, the Intergovernmental Panel on Climate Change (IPCC) identified various estimates of the present value of reducing carbon-dioxide emissions by one ton over the life that these emissions would remain in the atmosphere. The estimates reviewed by the IPCC spanned a range of values. In the absence of a consensus on any single estimate of the monetary value of CO_2 emissions, DOE used the estimates identified by the study cited in Summary for Policymakers prepared by Working Group II of the IPCC's Fourth Assessment Report to estimate the potential monetary value of the CO_2 reductions likely to result from the standards under consideration in this rulemaking.

To put the potential monetary benefits from reduced CO_2 emissions into a form that is likely to be most useful to decision makers and stakeholders, DOE used the same methods used to calculate the net present value of consumer costs savings: The estimated year-by-year reductions in CO_2 emissions were converted into monetary values ranging from the $0 and $14 per ton. These estimates were based on an assumption of no benefit to an average benefit value reported by the IPCC.[39] The resulting annual values were then discounted over the life of the affected appliances to the present using both 3 percent and 7 percent discount rates. The resulting estimates of the potential range of net present value benefits associated with the reduction of CO_2 emissions are reflected in Table V.27.

TABLE V.27.—PRELIMINARY ESTIMATES OF SAVINGS FROM CO_2 EMISSIONS REDUCTIONS UNDER CONSIDERED PTACS AND PTHP TRIAL STANDARD LEVELS

PTAC TSL	Estimated CO_2 (Mt) emission reductions	Value of estimated CO_2 emission reductions based on IPCC range (million $)
1	0.50	0 to 7.00
2	0.50	0 to 7.00
3	1.06	0 to 14.84
4	0.50	0 to 7.00
5	1.83	0 to 25.62
6	2.95	0 to 41.3
7	6.13	0 to 85.82

[38] No. 05–1097, 2008 WL 341338, at *1 (D.C. Cir. Feb. 8, 2008).

[39] According to the IPCC, the mean social cost of carbon (SCC) reported in studies published in peer-reviewed journals was U.S. $43 per ton of carbon. This translates into about $12 per ton of carbon dioxide. The literature review (Tol 2005) from which this mean was derived did not report the year in which these dollars are denominated. However, since the underlying studies spanned several years on either side of 2000, the estimate is often treated as year 2000 dollars. Updating that estimate to 2007 dollars yields a SCC of $14 per ton of carbon dioxide.

TABLE V.27.—PRELIMINARY ESTIMATES OF SAVINGS FROM CO_2 EMISSIONS REDUCTIONS UNDER CONSIDERED PTACS AND PTHP TRIAL STANDARD LEVELS—CONTINUED

PTHP TSL	Estimated CO_2 (Mt) emission reductions	Value of estimated CO_2 emission reductions based on IPCC range (million $)
1	0.73	0 to 10.22
2	1.49	0 to 26.64
3	1.49	0 to 26.64
4	2.19	0 to 30.66
5	2.19	0 to 30.66
6	3.00	0 to 42.00
7	6.94	0 to 97.16

DOE relied on the average of the IPCC reported estimate as an upper bound on the benefits resulting from reducing each metric ton of U.S. CO_2 emissions. It is important to note that the estimate of the upper bound value represents the value of worldwide impacts from potential climate impacts caused by CO_2 emissions, and are not confined to impacts likely to occur within the U.S. In contrast, most of the other estimates of costs and benefits of increasing the efficiency of PTACs and PTHPs in this proposal include only the economic values of impacts that would be experienced in the U.S. For example, in determining impacts on manufacturers, DOE generally does not consider impacts that occur solely outside of the U.S. Consequently, as DOE considers a monetary value for CO_2 emission reductions, the value might be restricted to a representation of those cost/benefits likely to be experienced in the United States. Currently, there are no estimated values for the U.S. benefits likely to result from CO_2 emission reductions. However, DOE expects that, if such values were developed, DOE would use those U.S. benefit values, and not world benefit values, in its analysis. DOE further expects that, if such values were developed, they would be lower than comparable global values. DOE invites public comment on the above discussion of CO_2.

7. Other Factors

The Secretary of Energy, in determining whether a standard is economically justified, may consider any other factors that he/she deems to be relevant. (42 U.S.C. 6316 (a); 42 U.S.C. 6295(o)(2)(B)(i)(VI)) The Secretary has decided to consider the impacts of setting different amended energy conservation standards for PTACs and PTHPs (i.e., setting an amended standard level for a given PTAC cooling capacity, which would be significantly different from the amended standard level for a PTHP with the same cooling capacity). In addition, DOE also considered the uncertainties associated with the impending refrigerant phase-out in 2010, including equipment availability, compressor availability, and the available efficiencies of R–410A PTACs and PTHPs.

C. Proposed Standard

1. Overview

EPCA, at 42 U.S.C. 6313(a)(6)(A)(ii)(II), specifies that, for any commercial and industrial equipment addressed in section 342(a)(6)(A)(i) of EPCA, 42 U.S.C. 6313(a), DOE may prescribe an energy conservation standard more stringent than the level for such equipment in ASHRAE/IESNA Standard 90.1, as amended, only if ''clear and convincing evidence'' shows that a more stringent standard ''would result in significant additional conservation of energy and is technologically feasible and economically justified.'' (42 U.S.C. 6313(a)(6)(A)(ii)(II)).

In selecting the proposed energy conservation standards for PTACs and PTHPs for consideration in today's notice of proposed rulemaking, DOE started by examining the maximum technologically feasible levels, and determined whether those levels were economically justified. Upon finding the maximum technologically feasible levels not to be justified, DOE analyzed the next lower TSL to determine whether that level was economically justified. DOE repeated this procedure until it identified a TSL that was economically justified.

To aid the reader as DOE discusses the benefits and/or burdens of each TSL, Table V.28 presents a summary of quantitative analysis results for each TSL based on the assumptions and methodology discussed above. This table presents the results or, in some cases, a range of results, for each TSL, and will aid the reader in the discussion of costs and benefits of each TSL. The range of values reported in this table for industry impacts represents the results for the different markup scenarios that DOE used to estimate manufacturer impacts.

TABLE V.28.—SUMMARY OF RESULTS BASED UPON THE AEO2007 ENERGY PRICE FORECAST *

	TSL 1	TSL 2	TSL 3	TSL 4	TSL 5	TSL 6	TSL 7
Primary energy saved (quads)	0.008	0.014	0.017	0.019	0.027	0.038	0.086
7% Discount rate	0.002	0.004	0.004	0.005	0.007	0.010	0.023
3% Discount rate	0.005	0.008	0.009	0.010	0.014	0.021	0.046
Generation capacity reduction (GW) **	0.042	0.062	0.081	0.081	0.141	0.209	0.461
NPV (2006$ billion):							
7% Discount rate	$0.007	$0.014	$0.013	$0.017	$0.010	($0.004)	($0.067)
3% Discount rate	$0.026	$0.049	$0.050	$0.061	$0.061	$0.052	$0.003
Industry impacts:							
Industry NPV (2006$ million)	(2)–(41)	(8)–(55)	(4)–(62)	(14)–(68)	(4)–(80)	(10)–(110)	(2)–(187)
Industry NPV (% Change)	(1)–(12)	(2)–(17)	(1)–(19)	(4)–(20)	(1)–(24)	(3)–(33)	(1)–(56)
Cumulative emissions impacts†:							
CO_2 (Mt)	1.24	1.99	2.55	2.69	4.02	5.95	13.07
NO_X (kt)	0.08	0.12	0.17	0.16	0.28	0.39	0.93

TABLE V.28.—SUMMARY OF RESULTS BASED UPON THE AEO2007 ENERGY PRICE FORECAST *—Continued

	TSL 1	TSL 2	TSL 3	TSL 4	TSL 5	TSL 6	TSL 7
Hg (t)	0.00	−0.01	−0.02	−0.01	−0.02	−0.04	−0.07
Mean LCC savings * (2006$):							
Standard Size PTAC, 9,000 Btu/h	0	0	(0)	0	(2)	(4)	(13)
Standard Size PTHP, 9,000 Btu/h	13	23	23	32	32	30	40
Standard Size PTAC, 12,000 Btu/h	(1)	(1)	(3)	(1)	(6)	(11)	(36)
Standard Size PTHP, 12,000 Btu/h	14	26	26	22	22	18	8
Non-Standard Size PTAC	27	27	31	27	33	26	12
Non-Standard Size PTHP	61	66	66	81	81	74	53
Mean PBP (years):							
Standard Size PTAC, 9,000 Btu/h	11.6	11.6	12.5	11.6	13.2	14.0	16.0
Standard Size PTHP, 9,000 Btu/h	4.5	4.0	4.0	3.9	3.9	4.5	4.8
Standard Size PTAC, 12,000 Btu/h	13.0	13.0	13.9	13.0	14.8	15.9	19.8
Standard Size PTHP, 12,000 Btu/h	4.9	4.4	4.4	5.3	5.3	6.1	7.5
Non-Standard Size PTAC	4.2	4.2	4.9	4.2	5.7	7.8	9.6
Non-Standard Size PTHP	2.0	2.6	2.6	2.8	2.8	4.2	5.8
LCC Results:							
Standard Size PTAC, 9,000 Btu/h							
Net Cost (%)	11.7	11.7	23.5	11.7	35.4	47.5	64.8
No Impact (%)	80.8	80.8	62.8	80.8	45.5	29.1	13.5
Net Benefit (%)	7.5	7.5	13.8	7.5	19.1	23.4	21.6
Standard Size PTHP, 9,000 Btu/h							
Net Cost (%)	4.0	6.2	6.2	8.0	8.0	14.7	19.7
No Impact (%)	81.2	63.7	63.7	46.7	46.7	30.2	14.4
Net Benefit (%)	14.9	30.1	30.1	45.3	45.3	55.2	65.9
Standard Size PTAC, 12,000 Btu/h							
Net Cost (%)	12.9	12.9	25.7	12.9	40.8	54.3	74.7
No Impact (%)	80.1	80.1	61.6	80.1	44.1	27.6	12.1
Net Benefit (%)	7.0	7.0	12.7	7.0	15.1	18.1	13.2
Standard Size PTHP, 12,000 Btu/h							
Net Cost (%)	4.9	7.2	7.2	15.0	15.0	26.7	44.8
No Impact (%)	80.2	62.1	62.1	44.6	44.6	27.9	12.1
Net Benefit (%)	14.8	30.7	30.7	40.5	40.5	45.4	43.0
Non-Standard Size PTAC							
Net Cost (%)	3.4	3.4	8.8	3.4	16.3	32.9	48.1
No Impact (%)	80.2	80.2	61.6	80.2	43.8	26.9	12.5
Net Benefit (%)	16.4	16.4	29.6	16.4	39.9	40.2	39.4
Non-Standard Size PTHP							
Net Cost (%)	0.2	1.9	1.9	2.8	2.8	13.8	28.9
No Impact (%)	80.9	62.4	62.4	44.6	44.6	27.4	12.4
Net Benefit (%)	18.9	35.7	35.7	52.7	52.7	58.8	58.7

* Parentheses indicate negative (−) values. For LCCs, a negative value means an increase in LCC by the amount indicated.
** Change in installed generation capacity by the year 2042 based on AEO2007 Reference Case.
† CO_2 emissions impacts include physical reductions at power plants. NO_X emissions impacts include physical reductions at power plants as well as production of emissions allowance credits where NO_X emissions are subject to emissions caps. SO_2 emissions impacts include physical reductions at households only.

In addition to the quantitative results, DOE also considered other factors that might affect economic justification. DOE took into consideration the EPA mandated refrigerant phase-out and its effect on PTAC and PTHP equipment efficiency, which concern both standard size and non-standard size PTACs and PTHPs. In addition, DOE considered the uniqueness of the PTAC and PTHP industry, that is, manufacturers of non-standard size equipment. In particular, DOE considered the declining shipments of this equipment, the small size segment of the industry (both relative to the rest of the PTAC and PTHP industry and in absolute terms), and the differential impacts of potential amended energy conservation standards on non-standard size manufacturers when compared to standard size manufacturers.

2. Conclusion

First, DOE considered TSL 7, the max-tech level. TSL 7 would likely save 0.086 quads of energy through 2042, an amount DOE considers significant. Discounted at seven percent, the projected energy savings through 2042 would be 0.023 quads. For the Nation as a whole, DOE projects that TSL 7 would result in a net decrease of $67 million in NPV, using a discount rate of seven percent. The emissions reductions at TSL 7 are 13.07 Mt of CO2 and 0.93 kt of NO_X. Total generating capacity in 2042 is estimated to decrease compared to the reference case by 0.461 gigawatts (GW) under TSL 7.

At TSL 7, DOE projects that the average PTAC customer will experience an increase in LCC for all standard size equipment classes. Purchasers of PTACs are projected to lose on average $21 (2006$) over the life of the product and purchasers of PTHPs would save on average $26 (2006$). DOE estimates LCC increases for 70 percent of customers in the Nation that purchase a standard size PTAC, and for 34 percent of customers in the Nation that purchase a standard size PTHP. DOE also estimates LCC increases for 48 percent of customers in the Nation that purchase a non-standard size PTAC, and for 29 percent of customers in the Nation that purchase a non-standard size PTHP. The mean payback period of each standard size PTAC equipment classes at TSL 7 is projected to be substantially longer than the mean lifetime of the equipment.

The projected change in industry value (INPV) ranges from a decrease of $2 million to a decrease of $187 million. For PTACs and PTHPs, the impacts are driven primarily by the assumptions regarding the ability to pass on larger increases in MPCs to the customer. Currently, there is only one product line being manufactured at TSL 7 efficiency levels, and it uses R–22 refrigerant, as discussed in section III.B.2 above. DOE believes that PTAC and PTHP manufacturers will eventually be able to design and produce R–410A equipment at TSL 7, based on manufacturers' response to the residential central air conditioners refrigerant phase-out and amended energy conservation standards. However, DOE has not initially been able to identify technologies and design approaches for R–410A units to meet these higher levels in the absence of a high efficiency compressor. At TSL 7, DOE recognizes the risk of very large negative impacts if manufacturers' expectations about reduced profit margins are realized. In particular, if the high end of the range of impacts is reached as DOE expects, TSL 7 could result in a net loss of 56 percent in INPV to the PTAC and PTHP industry.

After carefully considering the analysis and weighing the benefits and burdens of TSL 7, the Secretary has reached the following initial conclusion: At TSL 7, even if manufacturers overcome the barriers to produce R–410 equipment by the effective date of an amended energy conservation standard, the benefits of energy savings and emissions reductions would be outweighed by the potential multi-million dollar negative net economic cost to the Nation, the economic burden on consumers, and the large capital conversion costs that could result in a reduction in INPV for manufacturers.

Next, DOE considered TSL 6. Primary energy savings is estimated at 0.038 quads of energy through 2042, which DOE considers significant. Discounted at seven percent, the energy savings through 2042 would be 0.010 quads. For the Nation as a whole, DOE projects that TSL 6 would result in a net decrease of $4 million in NPV, using a discount rate of seven percent. The emissions reductions are projected to be 5.95 Mt of CO2 and 0.39 kt of NO_X. Total generating capacity in 2042 under TSL 6 is estimated to decrease by 0.209 GW.

At TSL 6, DOE found the impacts of amended energy conservation standards on customers of PTACs would likely differ significantly from their impacts on PTHP customers. While only 22 percent of customers of standard size PTHPs would likely have an LCC increase at TSL 6, a majority of customers of standard size PTACs (52 percent) would have LCC increase at this TSL. A customer for a standard size PTAC, on average, would experience an increase in LCC of $8, while the customer for a standard size PTHP, on average, would experience a decrease in LCC of $23. In addition, the customer for a non-standard size PTAC, on average, would experience a decrease in LCC of $26, while the customer for a non-standard size PTHP, on average, would experience a decrease in LCC of $74. At TSL 6, DOE projects that the average PTAC customer for a standard size PTAC will experience an increase in LCC in each equipment class. In addition, the mean payback period of each standard size PTAC equipment class at TSL 6 is projected to be substantially longer than the mean lifetime.

At TSL 6, the projected change in INPV ranges between a loss of $10 million and a loss of $110 million. For manufacturers of non-standard size equipment alone, DOE estimated a decrease in the collective value of the industry to range from 33 percent to 53 percent. The magnitude of projected impacts is still largely determined, however, by the manufacturers' ability to pass on larger increases in MPC to the customer. Thus, the potential INPV decrease of $110 million assumes DOE's projections of partial cost recovery as described in Chapter 13 of the TSD. In addition, at TSL 6 the impending refrigerant phase-out could have a significant impact on manufacturers. Currently, both standard size and non-standard size PTACs and PTHPs using R–22 refrigerant are available on the market at TSL 6 efficiency levels. But, if the performance degradations that DOE estimated in the engineering analysis for R–410A equipment prove to be valid, manufacturers might be unable to produce R–410A equipment at these levels unless high efficiency R–410A compressors become available. The absence of such compressors would likely mean that the negative financial impacts of TSL 6 would be greater than characterized by DOE's MIA analysis. Even though the ability of manufacturers to produce equipment utilizing R–410A is greater at TSL 6 than at TSL 7, DOE anticipates that it would still be difficult for manufacturers to produce standard size and non-standard size PTACs and PTHPs at TSL 6 in the full range of capacities available today due to the physical size constraints imposed by the wall sleeve dimensions.

While DOE recognizes the increased economic benefits to the nation that could result from TSL 6, DOE concludes that the benefits of a Federal standard at TSL 6 would still be outweighed by the economic burden that would be placed upon PTAC customers. In addition, DOE believes at TSL 6, the benefits of energy savings and emissions impacts would be outweighed by the large impacts on manufacturers' INPV. Finally, DOE is concerned that manufacturers may be unable to offer the full capacity range of equipment utilizing R–410A by the effective date of the amended energy conservation standards.

Next, DOE considered TSL 5. DOE projects that TSL 5 would save 0.027 quads of energy through 2042, an amount DOE considers significant. Discounted at seven percent, the projected energy savings through 2042 would be 0.007 quads. For the Nation as a whole, DOE projects TSL 5 to result in net savings in NPV of $10 million, using a discount rate of seven percent, and $61 million, using a discount rate of three percent. The estimated emissions reductions are 4.02 Mt of CO_2 and 0.28 kt of NO_X. Total generating capacity in 2042 under TSL 5 would likely decrease by 0.141 GW.

At TSL 5, DOE projects that the average customer for standard size PTAC will experience an increase in LCC in each equipment classes. Purchasers of PTACs are projected to lose on average $5 (2006$) over the life of the product and purchasers of PTHPs would save on average $26 (2006$). DOE estimates LCC savings for 39 percent of customers of standard size PTACs, and for 12 percent of customers of standard size PTHPs. LCC increases are estimated for 16 percent of customers of non-standard size PTACs, and for 3 percent of customers of non-standard size PTHPs. The mean payback period for each standard size PTAC equipment class at TSL 6 is projected to be substantially longer than the mean lifetime of the equipment.

The projected change in INPV ranges between a loss of $4 million and a loss of $80 million. For manufacturers of non-standard size equipment alone, DOE projects their collective industry value would decrease by 25 percent to 38 percent. Just as with TSL 6 and 7, the projected impacts continue to be driven primarily by the manufacturers' ability to pass on increases in MPCs to the customer. The loss of $80 million assumes DOE's projections of partial cost recovery as described in Chapter 13 of the TSD. TSL 5 requires the production of standard size and non-standard size PTACs and PTHPs using R–410A that would have efficiencies equivalent to the ''max tech'' efficiency levels with R–410A applying the degradations estimated in the engineering analysis in the absence of a high efficiency compressor.

After carefully considering the analysis and weighing the benefits and burdens, the Secretary has concluded that, at TSL 5, the benefits of energy savings and emissions reductions would be outweighed by the potential multi-million dollar net economic cost to the Nation, the economic burden on PTAC consumers as compared with PTHP customers, and the large capital conversion costs that could result in a reduction in INPV for manufacturers.

Next, DOE considered TSL 4. For TSL 4, DOE combined TSL 1 for PTACs and TSL 5 for PTHPs. This combination of efficiency levels serves to maximize LCC savings, while recognizing the differences in LCC results for PTACs and PTHPs. DOE projects that TSL 4 would save 0.019 quads of energy through 2042, an amount DOE considers significant. Discounted at seven percent, the projected energy savings through 2042 would be 0.005 quads. For the Nation as a whole, DOE projects that TSL 4 would result in net savings in NPV of $17 million, using a discount rate of seven percent, and $61 million, using a discount rate of three percent. The estimated emissions reductions are 2.69 Mt of CO_2 and 0.16 kt of NO_X. Total generating capacity in 2042 under TSL 4 would likely increase by 0.081 GW.

At TSL 4, DOE projects that the average PTAC or PTHP customer would experience LCC savings. Purchasers of standard size PTACs, on average, have LCC increase of $1 (2006$) over the life of the product and purchasers of PTHPs would save on average $26 (2006$). DOE estimates LCC savings for 12 percent of customers in the Nation that purchase a standard size PTAC, and for 12 percent of customers in the Nation that purchase a standard size PTHP. DOE estimates LCC increases for 3 percent of customers in the Nation that purchase a non-standard size PTAC, and for 3 percent of customers in the Nation that purchase a non-standard size PTHP. For both standard size and non-standard size PTACs and PTHPs, the remainder of customers would experience either a decrease or no change in LCC. DOE also projects that the mean payback period of each standard size PTAC equipment class at TSL 4 would be substantially longer than the mean lifetime of the equipment.

The projected change in INPV ranges between a loss of $14 million and a loss of $68 million. For manufacturers of non-standard size equipment alone, DOE projects their collective industry value would decrease by 34 percent to 44 percent. Just as with TSL 5, 6, and 7, the projected impacts continue to be driven primarily by the manufacturers' ability to pass on increases in MPCs to the customer. The loss of $68 million assumes DOE's projections of partial cost recovery as described in Chapter 13 of the TSD. TSL 4 requires the production of standard size and non-standard size PTACs at TSL 1 efficiency levels and PTHPs at TSL 5 efficiency levels. Thus, TSL 4 requires the production of standard size and non-standard size PTHPs using R–410A that would have efficiencies equivalent to the ''max tech'' efficiency levels with R–410A applying the degradations estimated in the engineering analysis in the absence of a high efficiency compressor.

After considering the analysis and weighing the benefits and the burdens, DOE tentatively concludes that the benefits of a TSL 4 standard outweigh the burdens. In particular, the Secretary concludes that TSL 4 saves a significant amount of energy and is technologically feasible and economically justified. Therefore, DOE today proposes to adopt the energy conservation standards for PTACs and PTHPs at TSL 4. Table V.29 demonstrates the proposed energy conservation standards for all equipment classes of PTACs and PTHPs, including all cooling capacities.

TABLE V.29.—PROPOSED ENERGY CONSERVATION STANDARDS FOR PTACS AND PTHPS

Equipment class			Proposed energy conservation standards*
Equipment	Category	Cooling capacity	
PTAC	Standard Size**	< 7,000 Btu/h	EER = 11.4
		≥7,000 Btu/h and ≤15,000 Btu/h	EER = 13.0 − (0.233 × Cap††)
		>15,000 Btu/h	EER = 9.5
	Non-Standard Size†	<7,000 Btu/h	EER = 10.2
		≥ 7,000 Btu/h and ≤ 15,000 Btu/h	EER = 11.7 − (0.213 × Cap††)
		> 15,000 Btu/h	EER = 8.5
PTHP	Standard Size**	< 7,000 Btu/h	EER = 11.8, COP = 3.3
		≥ 7,000 Btu/h and ≤ 15,000 Btu/h	EER = 13.4 − (0.233 × Cap††) COP = 3.7 − (0.053 × Cap††)
		> 15,000 Btu/h	EER = 9.9, COP = 2.9
	Non-Standard Size†	< 7,000 Btu/h	EER = 10.8, COP = 3.0
		≥ 7,000 Btu/h and ≤ 15,000 Btu/h	EER = 12.3 − (0.213 × Cap††) COP = 3.1 − (0.026 × Cap††)
		> 15,000 Btu/h	EER = 9.1, COP = 2.8

* For equipment rated according to the DOE test procedure (ARI Standard 310/380–2004), all energy efficiency ratio (EER) values must be rated at 95° F outdoor dry-bulb temperature for air-cooled equipment and evaporatively-cooled equipment and at 85° F entering water temperature for water cooled equipment. All coefficient of performance (COP) values must be rated at 47° F outdoor dry-bulb temperature for air-cooled equipment, and at 70° F entering water temperature for water-source heat pumps.

** Standard size refers to PTAC or PTHP equipment with wall sleeve dimensions greater than or equal to 16 inches high, or greater than or equal to 42 inches wide.

† Non-standard size refers to PTAC or PTHP equipment with wall sleeve dimensions less than 16 inches high and less than 42 inches wide.

†† Cap means cooling capacity in thousand British thermal units per hour (Btu/h) at 95° F outdoor dry-bulb temperature.

As noted, TSL 4 would require PTHPs to meet the same efficiency levels as specified in TSL 5. DOE believes that these efficiency levels are equivalent to the expected ''max tech'' efficiency levels for equipment utilizing R–410A applying the degradations estimated in the engineering analysis. Therefore, DOE strongly encourages stakeholders to scrutinize closely the analyses and other information presented with this notice, and to comment on the viability of this standard level. In addition, since TSL 4 requires different efficiency levels for PTACs and PTHPs, DOE solicits comment on potential equipment switching as discussed in section IV.G.3 of today's notice. In particular, DOE is interested in receiving comment on whether: (1) Evidence shows that equipment switching is likely and would likely negate the energy savings from setting a standard at different efficiency levels for PTHPs and PTACs; and (2) such evidence warrants DOE adoption of some other TSL level or the ASHRAE/IESNA Standard 90.1–1999 efficiency levels rather than TSL 4 for the final rule.

Aside from the considerations discussed above, DOE is also concerned about the unique nature of the non-standard size segment of the PTAC and PTHP industry. At TSL 4, non-standard size manufacturers are expected to lose from $9 million to $12 million in INPV, which is a reduction in 34 percent to 44 percent. Many manufacturers stated they would be unwilling to redesign completely non-standard size equipment because of the small size of the market and the declining sales. In supporting this assertion, manufacturers also pointed out that non-standard size PTACs and PTHPs are manufactured to order based on unique building designs for replacement applications. In addition, manufacturers expressed great concern that negative impacts would be amplified if DOE were to adopt the ASHRAE/IESNA Standard 90.1–1999 equipment class delineations, and their equipment lines were reduced. Several manufacturers believe the ASHRAE/IESNA Standard 90.1–1999 delineations would cause up to 50 percent of their equipment lines to be misclassified, and be subject to standard levels they could not meet with resulting decline in equipment offerings. If these concerns were realized, the negative INPV and cash flow impacts on the declining industry would be even greater than estimated by the MIA. DOE is particularly interested in receiving comments on the differential impacts on non-standard size manufacturers and on whether DOE should adopt lower minimum efficiency levels (e.g., TSL 1, TSL 2, or TSL 3) for non-standard size PTAC and PTHP equipment in the final rule.

VI. Procedural Issues and Regulatory Review

A. Review Under Executive Order 12866

Today's regulatory action has been determined to be a significant regulatory action under Executive Order 12866, ''Regulatory Planning and Review.'' 58 FR 51735 (October 4, 1993). Accordingly, this action was subject to review under the Executive Order by the Office of Information and Regulatory Affairs at the Office of Management and Budget (OMB).

The Executive Order requires that each agency identify in writing the specific market failure or other specific problem that it intends to address that warrant new agency action, as well as assess the significance of that problem, to enable assessment of whether any new regulation is warranted. Executive Order 12866, § 1(b)(1).

DOE's preliminary analysis suggests that much of the hospitality industry segment using PTAC and PTHP equipment tends to be small hotels or motels. DOE believes that these small hotels and motels tend to be individually owned and operated, and lack corporate direction in terms of energy policy. The transaction costs for these smaller owners or operators to research, purchase, and install optimum efficiency equipment are too high to make such action commonplace. DOE believes that there is a lack of information and/or information processing capability about energy efficiency opportunities in the PTAC and PTHP market available to hotel or motel owners. Unlike residential heating and air conditioning products, PTACs and PTHPs are not included in energy labeling programs such as the Federal Trade Commission's energy labeling program. Furthermore, the energy use of PTACs and PTHPs is dependent on climate and the equipment usage and, as such, is not readily available for the owners or operators to make a decision on whether improving the energy efficiency of PTAC and PTHP equipment is cost-effective. DOE seeks data on the efficiency levels of existing PTAC and PTHP equipment in use by building type (e.g., hotel, motel, small office building, nursing home facility, etc.), electricity price (and/or geographic region of the country) and installation type (i.e., new construction or replacement).

DOE recognizes that PTACs and PTHPs are not purchased in the same manner as regulated appliances that are sold in retail stores, e.g., room air conditioners. When purchased by the end user, PTACs and PTHPs are more likely purchased through contractors and builders that perform the installation. The Air-Conditioning and Refrigeration Institute (ARI) Directory of Certified Product Performance includes PTACs and PTHPs and provides the energy efficiency and capacity information on PTACs and PTHPs produced by participating manufacturers. DOE seeks comment on the experience with this directory and the extent to which the information it provides leads to more informed choices, specifically given how such equipment are purchased.

To the extent, there is potentially a substantial information problem, one could expect the energy efficiency for PTACs and PTHPs to be more or less randomly distributed across key variables such as energy prices and usage levels. However, since data are not available on how such equipment is purchased, DOE seeks detailed data on the distribution of energy efficiency levels for both new construction and replacement markets. DOE plans to use these data to test the extent to which purchasers of this equipment behave as if they are unaware of the costs associated with their energy consumption. In the case of the PTHP equipment with multiple heating systems (reverse cycle and electric resistance), estimating the energy consumption from component level changes is even more complex. DOE found energy efficiency and energy cost savings are not the primary drivers of the hotel and motel business. Instead, hotel and motel operators work on a fixed budget and are primarily concerned with providing clean and comfortable rooms to the customers to ensure customer satisfaction. If consumer satisfaction decreases, hotel or motel owners may incur increased transaction costs, thus preventing access to capital to finance energy efficiency investment.

A related issue is the problem of asymmetric information (one party to a transaction has more and better information than the other) and/or high transactions costs (costs of gathering information and effecting exchanges of goods and services) among the PTAC and PTHP equipment customers. In the case of PTACs and PTHPs, in many cases, the party responsible for the equipment purchase may not be the one who pays the cost to operate it. For example, PTAC and PTHP equipment are also used in nursing homes and medical office buildings where the builder or complex owner often makes decisions about PTACs and PTHPs without input from tenants nor do they offer options to tenants to upgrade them. Furthermore, DOE believes the tenant typically pays the utility bills. If there were no transactions costs, it would be in the builder or complex owners' interest to install equipment the tenants would choose on their own. For example, a tenant who knowingly faces higher utility bills from low-efficiency equipment would expect to pay less in rent, thereby shifting the higher utility cost back to the complex owner. However, this information is not costless, and it may not be in the interest of the tenant to take the time to develop it, or, in the case of the complex owner who installs less efficient equipment, to convey that information to the tenant.

To the extent that asymmetric information and/or high transaction costs are problems, one would expect to find certain outcomes with respect to PTAC and PTHP efficiency. For example, other things being equal, one would not expect to see higher rents for office complexes with high efficiency equipment. Alternatively, one would expect higher energy efficiency in rental units where the rent includes utilities compared to those where the tenant pays the utility bills separately. DOE seeks data that might enable it to conduct tests of market failure.

In addition, this rulemaking is likely to yield certain ''external'' benefits resulting from improved energy efficiency of PTACs and PTHPs that are not captured by the users of such equipment. These include both environmental and energy security related externalities that are not reflected in energy prices, such as reduced emissions of greenhouse gases. With regard to environmental externalities, the emissions reductions in today's proposed rule are projected to be 2.7 Mt of CO_2 and 0.16 kt of NO_X. DOE invites comments on the weight that should be placed on these factors in DOE's determination of the maximum energy efficiency level at which the total benefits are likely to exceed the total burdens resulting from an amended DOE standard.

DOE conducted a regulatory impact analysis (RIA) and, under the Executive Order, was subject to review by the Office of Information and Regulatory Affairs (OIRA) in the OMB. DOE presented to OIRA for review the draft proposed rule and other documents prepared for this rulemaking, including the RIA, and has included these documents in the rulemaking record. They are available for public review in the Resource Room of the Building Technologies Program, 950 L'Enfant Plaza, SW., 6th Floor, Washington, DC 20024, (202) 586–9127, between 9 a.m. and 4 p.m., Monday through Friday, except Federal holidays.

The RIA is contained in the TSD prepared as a separate report for the rulemaking. The RIA consists of: (1) A statement of the problem addressed by this regulation, and the mandate for government action; (2) a description and analysis of the feasible policy alternatives to this regulation; (3) a quantitative comparison of the impacts of the alternatives; and (4) the national economic impacts of the proposed standard.

The RIA calculates the effects of feasible policy alternatives to PTAC and PTHP amended energy conservation standards, and provides a quantitative comparison of the impacts of the alternatives. DOE evaluated each alternative in terms of its ability to achieve significant energy savings at reasonable costs, and compared it to the effectiveness of the proposed rule. DOE analyzed these alternatives using a series of regulatory scenarios as input to the NES Shipments Model for PTACs and PTHPs, which it modified to allow inputs for these measures.

DOE identified the following major policy alternatives for achieving increased PTAC and PTHP energy efficiency:

- No new regulatory action;
- Commercial customer rebates;
- Commercial customer tax credits;
- Voluntary energy-efficiency targets—ENERGY STAR;

TABLE VI.1.—NON-REGULATORY ALTERNATIVES TO STANDARDS

Policy alternatives	Energy savings* (quads)	Net present value** (billion 2006$)	
		7% Discount rate	3% Discount rate
No New Regulatory Action	0.000	0.000	0.000
Commercial Customer Rebates	0.006	0.003	0.017
Commercial Customer Tax Credits	0.010	0.007	0.032
Voluntary Energy-Efficiency Targets—ENERGY STAR	0.017	0.013	0.057
Today's Standards at TSL 4	0.019	0.016	0.061

* Energy savings are in source quads.
** Net present value is the value in the present of a time series of costs and savings. DOE determined the net present value from 2012 to 2062 in billions of 2006$.

The net present value amounts shown in Table VI.1 refer to the NPV for commercial customers. The costs to the government of each policy (such as rebates or tax credits) are not included in the costs for the NPV since, on balance, customers are both paying for (through taxes) and receiving the benefits of the payments. The following paragraphs discuss each of the policy alternatives listed in Table VI.1. (See TSD, Regulatory Impact Analysis.)

No new regulatory action. The case in which no regulatory action is taken with regard to PTACs and PTHPs constitutes the ''base case'' (or ''No Action'') scenario. In this case, between the years 2012 and 2042, PTACs and PTHPs are expected to use 2.63 quads of primary energy. By definition, no new regulatory action yields zero (0) energy savings and a net present value of zero dollars.

Financial Incentives Policies. DOE considered several scenarios in which the Federal government would provide some form of financial incentive. It studied two types of incentives: tax credits and rebates. Tax credits could be granted to customers who purchase high efficiency PTAC and PTHP equipment. Alternatively, the government could issue tax credits to manufacturers or customers to offset costs associated with producing or purchasing high-efficiency equipment. For this analysis, only a customer tax credit, patterned after provision in the EPACT of 2005, was considered. The second incentive program involved a rebate program that was nominally patterned after existing rebate programs currently offered by several utilities.

Commercial Customer Rebates. DOE modeled the impact of the customer rebate policy by determining the increased customer participation rate due to the rebates (i.e., the percent increase in customers purchasing high-efficiency equipment). It then applied the resulting increase in market share of efficient units to the NES spreadsheet model to estimate the resulting NES and NPV with respect to the base case.

After reviewing several utility rebate programs currently in place (see Chapter 3 of the TSD), DOE decided to pattern a potential national rebate program after a program now undertaken by Xcel Energy. Xcel Energy is a large utility that provides service to eight Western and Midwestern states. A small public utility in Minnesota, Shakopee Public Utilities, offers a similar rebate program.

Under these programs, commercial and industrial businesses buying PTACs can receive a base payment of $7.50 per ton for units rated at 9.20 EER and $1.25 per ton for every incremental increase of 0.1 EER above base requirements. When compared against the incremental retail costs of higher efficiency PTACs shown in Chapter 8 of the TSD, the rebates generally range between 17 and 23 percent of the incremental cost beyond TSL 1. Because the baseline (ASHRAE/IESNA Standard 90.1–1999) efficiency standards are above 9.2 EER for all equipment, it is more difficult to assess an appropriate level of the rebate for equipment just above the baseline (specifically, at TSL 1) used in this NOPR. For purposes of this analysis, it was assumed that the same incremental fraction of the cost between the baseline unit and TSL 1 would be rebated as for higher incremental efficiency levels. A base payment for any unit exceeding a minimum efficiency was also assumed to be paid to commercial or industrial customers applying for the rebate. The specific provisions of the rebate assumed for PTAC equipment were:

(a) $10.00 per ton for units rated above the ASHRAE/IESNA Standard 90.1–1999 efficiency levels.

(b) A rebate paying 25 percent of the incremental price difference between the baseline efficiency level and the particular TSL.

For PTHP equipment, the rebate programs offered by Xcel Energy and Shakopee Public Utilities double the payment for incremental efficiency above the baseline (from $1.25 to $2.50 per ton per 0.1 increments in the EER). Following that pattern, the provisions assumed for the PTHP equipment were:

(a) $10.00 per ton for units rated above the ASHRAE/IESNA Standard 90.1–1999 efficiency levels.

(b) A rebate paying 50 percent of the incremental price difference between the baseline efficiency level and the particular TSL.

As an example comparison, the rebate application form for Xcel Energy shows the calculation for 9,000 Btu/h PTAC with an EER of 11.0. This unit would receive a rebate of $39.37 under Xcel Energy's program. Under the provisions of the National rebate program constructed for this analysis, a 9,000 Btu/h PTHP unit at TSL 2 (EER = 11.1) would receive a rebate of $38.97.

Using the method described in Chapter 10 of the TSD to estimate market shares, a new distribution of sales by efficiency level (corresponding to the various TSLs) was computed. The rebates elicit greater purchases of higher efficiency equipment that lower the overall average annual energy consumption per unit. The changes in shipment-weighted annual energy consumption are shown in Table VI.2.

TABLE VI.2.—SHIPMENT-WEIGHTED AVERAGE ANNUAL ENERGY CONSUMPTION PER UNIT FOR CUSTOMER REBATE PROGRAM

Equipment classes	Representative cooling capacity (Btu/h)	ASHRAE/IESNA standard 90.1–1999 (base case) kWh/yr	Customer rebate	Percent change
Standard Size PTAC	9,000	1,012	1,007	−0.46
	12,000	1,277	1,271	−0.49
Standard Size PTHP	9,000	1,984	1,974	−0.49
	12,000	2,379	2,366	−0.54
Non-Standard Size PTAC	11,000	1,556	1,549	−0.42
Non-Standard Size PTHP	11,000	2,505	2,499	−0.23

The rebate program lowers the retail cost to the customer, but must be financed by tax revenues. From a societal point of view, the installed cost at any efficiency level does not change with the rebate policy; it simply transfers part of the cost from the customer to tax payers as a whole. Thus, for calculation of total cost of equipment, the revised estimates of sales by efficiency level are multiplied by the pre-rebate costs (i.e., identical to those in the base case).

Commercial Customer Tax Credits. DOE assumed a (commercial or industrial) customer tax credit that is patterned after the tax credits that were created in EPACT 2005. EPACT 2005 provided tax credits to customers who purchase and install specific products such as energy efficient windows, insulation, doors, roofs, and heating and cooling equipment. For many of these products, the tax credit is equal to the 10 percent of the retail cost, limited to specific dollar levels. For example, to receive the tax credit for energy efficient windows, the windows need to meet the requirements of the 2000 IECC and updated versions of the IECC published since 2000.

The 10 percent customer tax credits were assumed to apply to all PTAC equipment above the baseline efficiency (ASHRAE/IESNA Standard 90.1–1999). The credits were assumed to apply only to the retail cost of the equipment and not to any additional costs related to installation.

The 10 percent cost tax credit leads to increased shares of sales of equipment with efficiencies above the baseline. In Chapter 11, a market allocation algorithm is used to estimate market shares of current sales of PTAC and PTHP equipment. This same algorithm was used to estimate the impact of the tax credit upon the shares of equipment by efficiency (as before, the discrete efficiency levels correspond to the TSLs).

As for the rebate policy, the method described in Chapter 11 of the TSD was used to estimate the change in market shares that may result from a 10 percent tax credit. A new distribution of sales by efficiency level (corresponding to the various TSLs) was computed. The tax credits elicit greater purchases of higher efficiency equipment that lower the overall average annual energy consumption per unit. The changes in shipment-weighted annual energy consumption are shown in Table VI.3.

TABLE VI.3.—SHIPMENT-WEIGHTED AVERAGE ANNUAL ENERGY CONSUMPTION PER UNIT FOR CUSTOMER TAX CREDIT PROGRAM

Equipment classes	Representative cooling capacity (Btu/h)	ASHRAE/IESNA standard 90.1–1999 (base case) kWh/yr	Customer tax credit (10%)	Percent change
Standard Size PTAC	9,000	1,012	1,005	−0.68
	12,000	1,277	1,269	−0.65
Standard Size PTHP	9,000	1,984	1,971	−0.64
	12,000	2,379	2,364	−0.63
Non-Standard Size PTAC	11,000	1,556	1,544	−0.78
Non-Standard Size PTHP	11,000	2,505	2,487	−0.73

DOE assumed that a policy for national voluntary energy efficiency targets would be administered through the Federal government's ENERGY STAR voluntary program conducted by the Environmental Protection Agency (EPA) and DOE. EPA and DOE qualify energy efficient products as those that exceed Federal minimum standards by a specified amount, or if no Federal standard exists, exhibit selected energy saving features. Generally, the ENERGY STAR program works to recognize the top quartile of the products on the market, meaning that approximately 25 percent of products on the market meet or exceed the ENERGY STAR levels.

Although an ENERGY STAR program for PTACs and PTHPs does not exist, DOE is in the process of developing such a program. The program is designed to encourage manufacturers to manufacture and promote compliant (labeled) equipment and for customers to purchase labeled equipment. As yet, no specific criteria have been established as to the specific efficiency levels that would qualify PTAC or PTHP equipment to receive an ENERGY STAR label. Most types of appliances and equipment in the ENERGY STAR program must be 10 percent or more efficient than the prevailing National efficiency standard. For the purpose of modeling PTACs and PTHPs, DOE has assumed that TSL 3 is a reasonable estimate of where an ENERGY STAR qualifying efficiency level may be established.

The promotional activities of the ENERGY STAR program are directed toward increasing the sales of qualifying equipment over time. For purposes of this analysis, DOE assumed that the market shares of ENERGY STAR equipment would increase by a minimum of 20 percent as compared to the base case. The revised market shares of sales by efficiency translate into percentage increases (above the base case) in the average EER for future shipments.

Because this is a voluntary program, without specific financial incentives, some method must be developed to generate the market distribution of equipment with various efficiencies that would result from an ENERGY STAR program. As for the financial incentive programs, the market shares algorithm described in Chapter 11 of the TSD was employed. For each equipment class, the overall increase in the sales-weighted efficiency achieved in this manner is shown in Table VI.4.

TABLE VI.4.—SHIPMENT-WEIGHTED AVERAGE ANNUAL ENERGY CONSUMPTION PER UNIT FOR A FUTURE ENERGY STAR PROGRAM

Equipment	Representative cooling capacity	ASHRAE/IESNA standard 90.1–1999 (base case) kWh/yr	ENERGY STAR level	Percent change
Standard Size PTAC	9,000 Btu/h	1,012	1,006	−0.64%
	12,000 Btu/h	1,277	1,271	−0.50%
Standard Size PTHP	9,000 Btu/h	1,984	1,958	−1.32%
	12,000 Btu/h	2,379	2,353	−1.09%
Non-Standard Size PTAC	11,000 Btu/h	1,556	1,532	−1.52%
Non-Standard Size PTHP	11,000 Btu/h	2,505	2,463	−1.68%

Early Replacement Incentives. Early replacement refers to the replacement of PTAC/PTHP equipment before the end of their useful lives. The purpose of this policy is to retrofit or replace old, inefficient equipment with high efficiency units. DOE studied the feasibility of a Federal program to promote early replacement of appliances and equipment under EPACT 1992. In this study, DOE identified Federal policy options for early replacement that include a direct national program, replacement of Federally-owned equipment, promotion through equipment manufacturers, customer incentives, incentives to utilities, market behavior research, and building regulations.

While cost effective opportunities to install units that are more efficient exist on a limited basis, DOE determined that a Federal early replacement program is not economically justified because the market for PTAC and PTHP equipment is relatively small and narrow. Moreover, the savings are not likely to be significantly higher than those achieved by a voluntary program such as ENERGY STAR program. A temporary surge in PTAC and PTHP sales in the early 2000s further reduces the potential for an effective early replacement program.

Bulk Government Purchases. In this policy alternative, bulk government purchases refers to Federal, State, and local governments being encouraged to purchase equipment meeting the energy conservation standards. The motivations for this policy are that (1) aggregating public sector demand could provide a market signal to manufacturers and vendors that some of their largest customers seek suppliers with equipment that meet an efficiency target at good prices, and (2) this could induce ''market pull'' impacts through the effects of manufacturers and vendors achieving economies of scale for high efficiency equipment. As with the early retirement policy, bulk government purchases may provide cost effective opportunities to install more efficient equipment on a limited basis, however it was concluded that a widespread bulk purchase program was not economically justified. This is because the segment/share of the market that would be affected by a bulk government purchase program is a small portion of an already relatively small market, as most of the shipments/sales are to non-governmental customers.

Energy Conservation Standards (TSL 4). DOE proposes to adopt the energy conservation levels listed in section V.C. As indicated in the paragraphs above, none of the alternatives DOE examined would save as much energy as the proposed standards. In addition, several of the alternatives would require new enabling legislation, such as customer tax credits, since authority to carry out those alternatives does not presently exist.

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

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

Small businesses, as defined by the Small Business Administration (SBA) for the PTAC and PTHP manufacturing industry, are manufacturing enterprises with 750 employees or fewer. DOE used the small business size standards published on January 31, 1996, as amended, by the SBA to determine whether any small entities would be required to comply with the rule. 61 FR 3286 and codified at 13 CFR part 121. The size standards are listed by North American Industry Classification System (NAICS) code and industry description. PTAC and PTHP manufacturing is classified under NAICS 333415.

The PTAC and PTHP industry is characterized by both domestic and international manufacturers. Standard size PTACs and PTHPs are primarily manufactured abroad with the exception of one domestic PTAC and PTHP manufacturer. Non-standard size PTACs and PTHPs are primarily manufactured domestically by a handful of manufacturers. Consolidation within the PTAC and PTHP industry has reduced the number of parent companies that manufacture similar equipment under different affiliates and labels. Prior to issuing this notice of proposed rulemaking, DOE interviewed two small businesses affected by the rulemaking. DOE also obtained information about small business impacts while interviewing manufacturers that exceed the small business size threshold of 750 employees.

DOE reviewed ARI's Applied Directory of Certified Product Performance (2006) and created a list of every manufacturer that had certified equipment ratings in the directory. DOE also asked stakeholders and ARI representatives within the PTAC and PTHP industry if they were aware of any other small manufacturers. DOE then looked at publicly available data and contacted manufacturers, where needed, to determine if they meet the SBA's definition of a small manufacturing facility and have their manufacturing facilities located within the United States. Based on this analysis, DOE estimates that there are two small manufacturers of PTACs and PTHPs. Of these two manufacturers, one of them operates manufacturing facilities within the United States. The one domestic manufacturer solely produces non-standard equipment. DOE, then, contacted both small manufacturers. It subsequently conducted two on-site interviews with small manufacturers, one standard size manufacturer and one non-standard size manufacturer, to determine if there are differential impacts on these companies that may result from amended energy conservation standards.

DOE found that, in general, small manufacturers have the same concerns as large manufacturers regarding amended energy conservation standards. DOE summarized the key issues for standard size and non-standard size manufacturers in section IV.I.3 of today's notice. Both manufacturers echoed the same concerns regarding amended energy conservation standards as the larger manufacturers. In addition, the small manufacturer of non-standard size equipment particularly stated its concern for the equipment class misclassification within ASHRAE/IESNA Standard 90.1–1999, which is detailed in sections IV.A.2 and V.C of today's notice. DOE found no significant differences in the R&D emphasis or marketing strategies between small business manufacturers and large manufacturers. Therefore, for the classes comprised primarily of small businesses, DOE believes the GRIM analysis, which models each equipment class separately, is representative of the small businesses affected by standards. The qualitative and quantitative GRIM results are summarized in section V.B.2 of today's notice.

DOE reviewed the standard levels considered in today's notice of proposed rulemaking under the provisions of the Regulatory Flexibility Act and the procedures and policies published on February 19, 2003. Based on the foregoing, DOE determined that it cannot certify that these proposed energy conservation standard levels, if promulgated, would have no significant economic impact on a substantial number of small entities. DOE made this determination because of the potential impacts that the proposed energy conservation standard levels under consideration for standard size and non-standard size PTACs and PTHPs would have on the manufacturers, including the small businesses, which manufacture them. Consequently, DOE has prepared an initial regulatory flexibility analysis (IRFA) for this rulemaking. The IRFA describes potential impacts on small businesses associated with standard size and non-standard size PTAC and PTHP design and manufacturing.

The potential impacts on standard size and non-standard size PTAC and PTHP manufacturers are discussed in the following sections. DOE has transmitted a copy of this IRFA to the Chief Counsel for Advocacy of the Small Business Administration for review.

1. Reasons for the Proposed Rule

Part A–1 of Title III of EPCA addresses the energy efficiency of certain types of commercial and industrial equipment. (42 U.S.C. 6311–6317) It contains specific mandatory energy conservation standards for commercial PTACs and PTHPs. (42 U.S.C. 6313(a)(3)) EPACT 1992, Public Law 102–486, also amended EPCA with respect to PTACs and PTHPs, providing definitions in section 122(a), test procedures in section 122(b), labeling provisions in section 122(c), and the authority to require information and reports from manufacturers in section 122(e).[40] DOE publishes today's NOPR pursuant to Part A–1. The PTAC and PTHP test procedures appear at Title 10 CFR section 431.96.

EPCA established Federal energy conservation standards that generally correspond to the levels in ASHRAE/IESNA Standard 90.1, as in effect on October 24, 1992 (ASHRAE/IESNA Standard 90.1–1989), for each type of covered equipment listed in section 342(a) of EPCA, including PTACs and PTHPs. (42 U.S.C. 6313(a)) For each type of equipment, EPCA directed that if ASHRAE/IESNA Standard 90.1 is amended, DOE must adopt an amended standard at the new level in ASHRAE/IESNA Standard 90.1, unless clear and convincing evidence supports a determination that adoption of a more stringent level as a national standard would produce significant additional energy savings and be technologically feasible and economically justified. (42 U.S.C. 6313(a)(6)(A)(ii)(II)) In accordance with these statutory criteria, DOE is proposing in today's notice to amend the energy conservation standards for PTACs and PTHPs by raising the efficiency levels for this equipment above the efficiency levels specified by ASHRAE/IESNA Standard 90.1–1999.

2. Objectives of, and Legal Basis For, the Proposed Rule

For each type of equipment, EPCA directed that if ASHRAE/IESNA Standard 90.1 is amended, DOE must adopt an amended standard at the new level in ASHRAE/IESNA Standard 90.1, unless clear and convincing evidence supports a determination that adoption of a more stringent level as a national standard would produce significant additional energy savings and be technologically feasible and economically justified. (42 U.S.C. 6313(a)(6)(A)(ii)(II)) To determine whether economic justification exists, DOE reviews comments received and conducts analysis to determine whether the economic benefits of the proposed standard exceed the burdens to the greatest extent practicable, taking into consideration seven factors set forth in 42 U.S.C. 6295(o)(2)(B) (see Section II.B of this preamble). (42 U.S.C. 6316(a)) Further information concerning the background of this rulemaking is provided in Chapter 1 of the TSD.

[40] These requirements are codified in Part A–1 of Title III of EPCA, as amended, 42 U.S.C. 6311–6316, and Title 10 of the Code of Federal Regulations, Part 431 (10 CFR Part 431) at 10 CFR 431.92, 431.96, 431.97, and subparts U and V.

3. Description and Estimated Number of Small Entities Regulated

By researching the standard size and non-standard size PTAC and PTHP market, developing a database of manufacturers, and conducting interviews with manufacturers (both large and small), DOE was able to estimate the number of small entities that would be regulated under a proposed energy conservation standard. DOE estimates that, of the 4 domestic manufacturers it has identified as making residential PTACs and PTHPs, one is known to be a small business. See Chapter 12 of the TSD for further discussion about the methodology used in DOE's manufacturer impact analysis and its analysis of small-business impacts.

4. Description and Estimate of Compliance Requirements

Potential impacts on manufacturers, including small businesses, come from impacts associated with standard size and non-standard size design and manufacturing. The margins and/or market share of manufacturers, including small businesses, in the standard size and non-standard size PTAC and PTHP industry could be negatively impacted in the long term by the standard levels under consideration in this notice of proposed rulemaking, specifically TSL 4. At TSL 4, as opposed to lower TSLs, small manufacturers would have less flexibility in choosing a design path. However, as discussed under subsection 6 (Significant alternatives to the rule) below, DOE expects that the differential impact on small, standard and non-standard size PTAC and PTHP manufacturers (versus large businesses) would be smaller in moving from TSL 1 to TSL 2 than it would be in moving from TSL 3 to TSL 4. The rationale for DOE's expectation is best discussed in a comparative context and is therefore elaborated upon in subsection 6 (Significant alternatives to the rule). As discussed in the introduction to this IRFA, DOE expects that the differential impact associated with PTAC and PTHP design and manufacturing on small, non-standard size and standard size businesses would be negligible.

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

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

6. Significant Alternatives to the Rule

The primary alternatives to the proposed rule considered by DOE are the other TSLs besides the one being considered today, TSL 4. These alternative TSLs and their associated impacts on small business are discussed in the subsequent paragraphs. In addition to the other TSLs considered, the TSD associated with this proposed rule includes a report referred to in section VI.A in the preamble as the regulatory impact analysis (RIA—discussed earlier in this report and in detail in the TSD). This report discusses the following policy alternatives: (1) No new regulatory action, (2) financial incentives policies, (3) voluntary energy efficiency targets—ENERGY STAR, (4) early replacement incentives, and (5) bulk government purchases. The energy savings and beneficial economic impacts of these regulatory alternatives are one to two orders of magnitude smaller than those expected from the standard levels under consideration.

The entire non-standard size PTAC and PTHP industry has such low shipments that no designs are produced at high volume. There is little repeatability of designs, so small businesses can competitively produce many non-standard size PTAC and PTHP designs. The PTAC and PTHP industry as a whole primarily has experience producing equipment with efficiencies that would comply with the ASHRAE/IESNA Standard 90.1–1999 baseline. In addition, the standard-size PTAC and PTHP industry produces a significant number of units that would comply with efficiency levels above the baseline using R–22 refrigerant. All manufacturers, including small businesses, would have to develop designs to enable compliance to higher TSLs, with the expected Environmental Protection Agency mandated alternative refrigerant requirement to take affect in 2010. Development costs would be more burdensome to small businesses. Product redesign costs tend to be fixed and do not scale with sales volume. Thus, small businesses would be at a relative disadvantage at higher TSLs because research and development efforts would be on the same scale as those for larger companies, but these expenses would be recouped over smaller sales volumes.

At TSL 4, manufacturers stated their concerns over the ability to be able to produce PTHPs by the future effective date of the standard using R–410A refrigerant. Using the performance degradations from the engineering analysis, TSL 4 for PTHPs would correspond to the ''max-tech'' efficiency levels for PTHPs unless higher efficiency compressors enter the market prior to the effective date of an amended energy conservation standard. At TSL 4 and above, DOE estimates that the majority of manufacturers would be negatively impacted, especially non-standard size manufacturers. Based on information submitted by industry, manufacturers would require a complete redesign of their non-standard PTAC and PTHP platforms' higher TSLs. They did not see the advantage to completely redesigning non-standard size PTACs and PTHPs in small and declining market and would not be willing to redesign completely non-standard size equipment because of the small size of the market and the declining sales. Manufacturers also commented non-standard size PTACs and PTHPs are manufactured to order based on unique building designs for replacement applications. This concern was echoed by all manufacturers, not just small business manufacturers.

The primary difference between TSL 3 and TSL 4 from the manufacturers' viewpoint is that at TSL 3 both PTACs and PTHPs have to conform to the same, higher efficiency levels at a given capacity. TSL 4 would require manufacturers to design PTHPs at higher efficiency levels than that of PTACs at the same cooling capacity. The differences in efficiencies between PTACs and PTHPs could negatively affect the margins or decrease the market share of small businesses because manufacturers would potentially need to design separate platforms of PTACs and PTHPs. Each platform would require significant capital for research and development that small business may not readily have as their large competitors.

Chapter 12 of the TSD contains more information about the impact of this rulemaking on manufacturers. DOE interviewed two small businesses affected by this rulemaking (see also section IV.F.1 above). DOE also obtained information about small business impacts while interviewing manufacturers that exceed the small business size threshold of 750 employees.

C. Review Under the Paperwork Reduction Act

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

D. Review Under the National Environmental Policy Act

DOE has prepared a draft environmental assessment (EA) of the impacts of the proposed rule, pursuant to the National Environmental Policy Act of 1969 (42 U.S.C. 4321 *et seq.*), the regulations of the Council on Environmental Quality (40 CFR parts 1500–1508), and DOE's regulations for compliance with the National Environmental Policy Act (10 CFR part 1021). The EA has been incorporated into the TSD; the environmental impact analyses are contained primarily in Chapter 16 for that document. Before issuing the final rule for PTACs and PTHPs, DOE will consider public comments and, as appropriate, issue the final EA. Based on the EA, DOE will determine whether to issue a finding of no significant impact or prepare an environmental impact statement for this rulemaking.

E. Review Under Executive Order 13132

Executive Order 13132, ''Federalism,'' 64 FR 43255 (August 4, 1999) imposes certain requirements on agencies formulating and implementing policies or regulations that preempt State law or 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 assess carefully the necessity for such actions. The Executive Order also requires agencies to have an accountable process to ensure meaningful and timely input by State and local officials in the development of regulatory policies that have federalism implications. On March 14, 2000, DOE published a statement of policy describing the intergovernmental consultation process it will follow in the development of such regulations. 65 FR 13735. DOE has examined today's proposed rule and has determined that it does not have a substantial direct effect on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government. EPCA governs and prescribes Federal preemption of State regulations as to energy conservation for the equipment that is the subject of today's proposed rule. States can petition DOE for exemption from such preemption to the extent, and based on criteria, set forth in EPCA. (42 U.S.C. 6297(d) and 6316(b)(2)(D)) No further action is required by Executive Order 13132.

F. Review Under Executive Order 12988

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

G. Review Under the Unfunded Mandates Reform Act of 1995

Title II of the Unfunded Mandates Reform Act of 1995 (Pub. L. 104–4) (UMRA) requires each Federal agency to assess the effects of Federal regulatory actions on State, local, and Tribal governments and the private sector. For a proposed regulatory action likely to result in a rule that may cause the expenditure by State, local, and Tribal governments, in the aggregate, or by the private sector of $100 million or more in any one year (adjusted annually for inflation), section 202 of UMRA requires a Federal agency to publish a written statement that estimates the resulting costs, benefits, and other effects on the national economy. (2 U.S.C. 1532(a),(b)) 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 proposed ''significant intergovernmental mandate,'' and requires an agency plan for giving notice and opportunity for timely input to potentially affected small governments before establishing any requirements that might significantly or uniquely affect small governments. On March 18, 1997, DOE published a statement of policy on its process for intergovernmental consultation under UMRA (62 FR 12820) (also available at *http://www.gc.doe.gov*). The proposed rule published today contains neither an intergovernmental mandate nor a mandate that may result in expenditure of $100 million or more in any year, so these requirements 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 rule would not have any impact on the autonomy or integrity of the family as an institution. Accordingly, DOE has concluded that it is not necessary to prepare a Family Policymaking Assessment.

I. Review Under Executive Order 12630

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

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

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

K. Review Under Executive Order 13211

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

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

L. Review Under the Information Quality Bulletin for Peer Review

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

In response to OMB's Bulletin, DOE conducted formal in-progress peer reviews of the energy conservation standards development process and analyses and has prepared a Peer Review Report pertaining to the energy conservation standards rulemaking analyses. The ''Energy Conservation Standards Rulemaking Peer Review Report'' dated February 2007 has been disseminated and is available at the following Web site: *http://www.eere.energy.gov/buildings/appliance_standards/peer_review.html.* DOE on June 28–29, 2005.

VII. Public Participation

A. Attendance at Public Meeting

The time and date of the public meeting are listed in the **DATES** section at the beginning of this notice of proposed rulemaking. The public meeting will be held at the U.S. Department of Energy, Forrestal Building, Room 1E–245, 1000 Independence Avenue, SW., Washington, DC, 20585–0121. To attend the public meeting, please notify Ms. Brenda Edwards at (202) 586–2945. Foreign nationals visiting DOE Headquarters are subject to advance security screening procedures, requiring a 30-day advance notice. Any foreign national wishing to participate in the meeting should advise DOE of this fact as soon as possible by contacting Ms. Brenda Edwards to initiate the necessary procedures.

B. Procedure for Submitting Requests To Speak

Any person who has an interest in today's notice, or who is a representative of a group or class of persons that has an interest in these issues, may request an opportunity to make an oral presentation. Such persons may hand-deliver requests to speak, along with a computer diskette or CD in WordPerfect, Microsoft Word, PDF, or text (ASCII) file format to the address shown in the **ADDRESSES** section at the beginning of this notice of proposed rulemaking between the hours of 9 a.m. and 4 p.m., Monday through Friday, except Federal holidays. Requests may also be sent by mail or e-mail to: *Brenda.Edwards@ee.doe.gov*.

Persons requesting to speak should briefly describe the nature of their interest in this rulemaking and provide a telephone number for contact. DOE requests persons selected to be heard to submit an advance copy of their statements by 4 p.m., April 21, 2008. At its discretion, DOE may permit any person who cannot supply an advance copy of their statement to participate, if that person has made advance alternative arrangements with the Building Technologies Program. The request to give an oral presentation should ask for such alternative arrangements.

C. Conduct of Public Meeting

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

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

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

DOE will make the entire record of this proposed rulemaking, including the transcript from the public meeting, available for inspection at the U.S. Department of Energy, Forrestal Building, Resource Room of the Building Technologies Program, 950 L'Enfant Plaza, SW., 6th Floor, Washington, DC 20024, (202) 586–9127, between 9 a.m. and 4 p.m., Monday through Friday, except Federal holidays. Any person may buy a copy of the transcript from the transcribing reporter.

D. Submission of Comments

DOE will accept comments, data, and information regarding the proposed rule before or after the public meeting, but no later than the date provided at the beginning of this notice of proposed rulemaking. Please submit comments, data, and information electronically. Send them to the following e-mail address: *ptac_hp@ee.doe.gov*. Submit electronic comments in WordPerfect, Microsoft Word, PDF, or text (ASCII) file format and avoid the use of special characters or any form of encryption. Comments in electronic format should be identified by the docket number EE–RM/STD–2007–BT–STD–0012 and/or RIN 1904–AB44, and wherever possible carry the electronic signature of the author. Absent an electronic signature, comments submitted electronically must be followed and authenticated by submitting the signed original paper document. No telefacsimiles (faxes) will be accepted.

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

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

E. Issues on Which DOE Seeks Comment

DOE is particularly interested in receiving comments and views of interested parties concerning the following issues:

1. Addendum t to ASHRAE/IESNA Standard 90.1–2007 (i.e., ARI's continuous maintenance proposal on PTACs and PTHPs), which proposes changes to the non-standard delineations in ASHRAE/IESNA Standard 90.1–1999. As explained in section IV.C.2, of this preamble, DOE proposes to incorporate the modified definitions in Addendum t in the final rule if ASHRAE adopts Addendum t prior to September 2008.

2. The approach to extrapolate the engineering analysis to cooling capacities for which complete analysis was not performed.

3. The EER and COP pairings for PTHPs based on current ARI product directory information.

4. The rebound effect for the PTAC and PTHP industry.

5. Estimation for the installation, maintenance, and repair costs. In particular, DOE is interested in how the installation, maintenance, and repair costs may change with the implementation of R–410A refrigerant in 2010 because DOE's estimates are based on R–22 data from the field.

6. The prediction and the potential significance of the overestimate in energy savings due to the assumption that forecasted market shares of PTACs and PTHPs at each efficiency level considered in the NOPR would remain frozen beginning in 2012 until the end of the forecast period (30 years after the effective date—the year 2042). In particular, DOE requests data that would enable it to better characterize the likely increases in efficiency that would occur over the 30-year analysis period in the absence of this rule (i.e., the distribution of efficiency levels in absence of standards is assumed to be constant).

7. The NES-forecasted base case distribution of efficiencies after the refrigerant phaseout and its prediction on how amended energy conservation standards impact the distribution of efficiencies in the standards case.

8. Whether amended energy conservation standards will result in PTAC and PTHP customers shifting to other, less efficient equipment types.

9. The NES shipments forecasts of total shipments for standard size and non-standard size equipment. In addition, the distribution of standard size equipment being placed into new construction buildings versus replacing existing units.

10. The proposed standard level, TSL 4, for standard size PTACs and PTHPs and non-standard size PTACs and PTHPs.

11. Whether DOE should consider either a higher or a lower TSL, including the ASHRAE/IESNA Standard 90.1–1999 baseline efficiency levels, in the final rule due to the magnitude of the impacts and the cumulative regulatory burdens of the R–22 phaseout.

12. The proposal to adopt TSL 4 which requires different efficiency levels for PTACs and PTHPs, DOE is interested in receiving comment on potential equipment switching as discussed in section IV.G.3 of today's notice (i.e., will TSL 4 cause PTHP customers to shift to less efficient PTACs).

13. The unique impacts on the non-standard size equipment and manufacturers. In particular, the consideration of a lower TSL for non-standard size PTACs and PTHPs due to the unique market and potentially

substantial impacts. For example, at TSL 4, non-standard size manufacturers are expected to lose from $9 million to $12 million in INPV, which is a reduction in 34 percent to 44 percent. In addition, whether the ASHRAE/IESNA Standard 90.1–1999 delineations for standard and non-standard size units would result in equipment lines being misclassified and unavailable.

14. The above-discussed approach for labeling of PTACs and PTHPs. Specifically, DOE invites comments on the types of energy use information and format consumers would find useful on a PTAC or PTHP label.

VIII. Approval of the Office of the Secretary

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

List of Subjects in 10 CFR Part 431

Administrative practice and procedure, Energy conservation, Household appliances.

Issued in Washington, DC, on March 28, 2008.

Alexander A. Karsner,

Assistant Secretary, Energy Efficiency and Renewable Energy.

For the reasons set forth in the preamble, chapter II of title 10, Code of Federal Regulations, part 431 is proposed to be amended to read as set forth below.

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

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

Authority: 42 U.S.C. 6291–6317.

2. Section 431.92 of Subpart F is amended by adding in alphabetical order new definitions for ''Non-standard size'' and ''Standard size,'' to read as follows:

§ 431.92 Definitions concerning commercial air conditioners and heat pumps.

* * * * *

Non-standard size means a packaged terminal air conditioner or packaged terminal heat pump with wall sleeve dimensions less than 16 inches high and less than 42 inches wide.

* * * * *

Standard size means a packaged terminal air conditioner or packaged terminal heat pump with a wall sleeve dimension greater than or equal to 16 inches high, or greater than or equal to 42 inches wide.

* * * * *

3. Section 431.97 of Subpart F is amended by revising paragraph (a), including Tables 1 and 2, and by adding a new paragraph (c) to read as follows:

§ 431.97 Energy efficiency standards and their effective dates.

(a) All small or large commercial package air-conditioning and heating equipment manufactured on or after January 1, 1994 (except for large commercial package air-conditioning and heating equipment, for which the effective date is January 1, 1995), and before January 1, 2010 in the case of the air-cooled equipment covered by the standards in paragraph (b), must meet the applicable minimum energy efficiency standard level(s) set forth in Tables 1 and 2 of this section. Each packaged terminal air conditioner or packaged terminal heat pump manufactured on or after January 1, 1994, and before September 30, 2012, must meet the applicable minimum energy efficiency standard level(s) set forth in Tables 1 and 2 of this section.

TABLE 1 TO § 431.97.—MINIMUM COOLING EFFICIENCY LEVELS

Product	Category	Cooling capacity	Sub-category	Efficiency level[1]	
				Products manufactured until October 29, 2003	Products manufactured on and after October 29, 2003
Small Commercial Packaged Air Conditioning and Heating Equipment.	Air Cooled, 3 Phase	<65,000 Btu/h	Split System	SEER = 10.0	SEER = 10.0.
			Single Package	SEER = 9.7	SEER = 9.7.
	Air Cooled	≥65,000 Btu/h and <135,000 Btu/h.	All	EER = 8.9	EER = 8.9.
	Water Cooled Evaporatively Cooled, and Water-Source.	<17,000 Btu/h	AC	EER = 9.3	EER = 12.1.
			HP	EER = 9.3	EER = 11.2.
		≥17,000 Btu/h and <65,000 Btu/h.	AC	EER = 9.3	EER = 12.1.
			HP	EER = 9.3	EER = 12.0.
		≥65,000 Btu/h and <135,000 Btu/h.	AC	EER = 10.5	EER = 11.5.[2]
			HP	EER = 10.5	EER = 12.0.
Large Commercial Packaged Air Conditioning and Heating Equipment.	Air Cooled	≥135,000 Btu/h and <240,000 Btu/h.	All	EER = 8.5	EER = 8.5.
	Water-Cooled and Evaporatively Cooled.	≥135,000 Btu/h and <240,000 Btu/h.	All	EER = 9.6	EER = 9.6.[3]
Packaged Terminal Air Conditioners and Heat Pumps.	All	<7,000 Btu/h	All	EER = 8.88	EER = 8.88.
		≥7,000 Btu/h and ≤15,000 Btu/h		EER = 10.0 − (0.16 × capacity [in kBtu/h at 95°F outdoor dry-bulb temperature]).	EER = 10.0 − (0.16 × capacity [in kBtu/h at 95°F outdoor dry-bulb temperature]).
		>15,000 Btu/h		EER = 7.6	EER = 7.6

[1] For equipment rated according to the ARI standards, all EER values must be rated at 95 °F outdoor dry-bulb temperature for air-cooled products and evaporatively-cooled products and at 85 °F entering water temperature for water-cooled products. For water-source heat pumps rated according to the ISO standard, EER must be rated at 30 °C (86 °F) entering water temperature.

[2] Deduct 0.2 from the required EER for units with heating sections other than electric resistance heat.

[3] Effective 10/29/2004, the minimum value became EER = 11.0.

TABLE 2 TO § 431.97.—MINIMUM HEATING EFFICIENCY LEVELS

Product	Category	Cooling capacity	Sub-category	Efficiency level[1]	
				Products manufactured until October 29, 2003	Products manufactured on and after October 29, 2003
Small Commercial Packaged Air Conditioning and Heating Equipment.	Air Cooled, 3 Phase	<65,000 Btu/h	Split System	HSPF = 6.8	HSPF = 6.8.
			Single Package	HSPF = 6.6	HSPF = 6.6.
	Water-Source	<135,000 Btu/h	Split System and Single Package.	COP = 3.8	COP = 4.2.
	Air Cooled	≥65,000 Btu/h and ≤135,000 Btu/h.	All	COP = 3.0	COP = 3.0.
Large Commercial Packaged Air Conditioning and Heating Equipment.	Air Cooled	≥135,000 Btu/h and <0,000 Btu/h.	Split System and Single Package.	COP = 2.9	COP = 2.9.
Packaged Terminal Heat Pumps.	All	All	All	COP = 1.3+(0.16 × the applicable minimum cooling EER prescribed in Table 1—Minimum Cooling Efficiency Levels).	COP = 1.3+(0.16 × the applicable minimum cooling EER prescribed in Table 1—Minimum Cooling Efficiency Levels).

[1] For units tested by ARI standards, all COP values must be rated at 47° F outdoor dry-bulb temperature for air-cooled products, and at 70° F entering water temperature for water-source heat pumps. For heat pumps tested by the ISO Standard 13256–1, the COP values must be obtained at the rating point with 20° C (68° F) entering water temperature.

* * * * *

(c) Each packaged terminal air conditioner or packaged terminal heat pump manufactured on or after September 30, 2012, shall have an Energy Efficiency Ratio and Coefficient of Performance no less than:

Equipment	Category	Cooling capacity	Efficiency level*
Packaged Terminal Air Conditioner.	Standard Size	<7,000 Btu/h	EER = 11.4
		≥7,000 Btu/h and ≤15,000 Btu/h	EER = 13.0—(0.233 × Cap**)
		>15,000 Btu/h	EER = 9.5
	Non-Standard Size	<7,000 Btu/h	EER = 10.2
		≥7,000 Btu/h and ≤15,000 Btu/h	EER = 11.7—(0.213 × Cap**)
		>15,000 Btu/h	EER = 8.5
Packaged Terminal Heat Pump.	Standard Size	<7,000 Btu/h	EER = 11.8 COP = 3.3
		≥7,000 Btu/h and ≤15,000 Btu/h	EER = 13.4—(0.233 × Cap**) COP = 3.7—(0.053 × Cap**)
		>15,000 Btu/h	EER = 9.9 COP = 2.9
	Non-Standard Size	<7,000 Btu/h	EER = 10.8 COP = 3.0
		≥7,000 Btu/h and ≤15,000 Btu/h	EER = 12.3—(0.213 × Cap**) COP = 3.1—(0.026 × Cap**)
		>15,000 Btu/h	EER = 9.1 COP = 2.8

* For equipment rated according to the DOE test procedure, all EER values must be rated at 95° F outdoor dry-bulb temperature for air-cooled products and evaporatively-cooled products and at 85° F entering water temperature for water cooled products. All COP values must be rated at 47° F outdoor dry-bulb temperature for air-cooled products, and at 70° F entering water temperature for water-source heat pumps.

** Cap means cooling capacity in thousand British thermal units per hour (Btu/h) at 95° F outdoor dry-bulb temperature.

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