DEPARTMENT OF ENERGY

10 CFR Part 431

[Docket Number: 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: Final rule.

SUMMARY: The Department of Energy (DOE) has determined that its adoption of amended energy conservation standards for commercial standard size packaged terminal air conditioners (PTACs) and packaged terminal heat pumps (PTHPs), at efficiency levels more stringent than those in American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE)/ Illuminating Engineering Society of North America (IESNA) Standard 90.1–1999, is supported by clear and convincing evidence that such standards would result in significant additional conservation of energy and are technologically feasible and economically justified. On this basis, DOE is today amending the existing energy conservation standards for these types of equipment. In addition, DOE has determined that its adoption of amended energy conservation standards more stringent than the efficiency levels specified by ASHRAE Standard 90.1–1999 for non-standard size PTACs and PTHPs is not supported by clear and convincing evidence, thus, DOE is adopting the efficiency levels in ASHRAE Standard 90.1–1999 for non-standard size PTACs and PTHPs in today's final rule.

DATES: The effective date of this rule is November 6, 2008. The standards established in today's final rule will be applicable starting October 8, 2012 for standard size PTACs and PTHPs. The standards established in today's final rule will be applicable starting October 7, 2010 for non-standard size PTACs and PTHPs.

ADDRESSES: For access to the docket to read background documents, the technical support document, transcripts of the public meetings in this proceeding, or comments received, visit the U.S. Department of Energy, Resource Room of the Building Technologies Program, 950 L'Enfant Plaza, SW., 6th Floor, Washington, DC 20024, (202) 586–2945, between 9 a.m. and 4 p.m., Monday through Friday, except Federal holidays. For more information about visiting the Resource Room, please call Ms. Brenda Edwards at (202) 586–2945. (**Note:** DOE's Freedom of Information Reading Room no longer houses rulemaking materials.) You may also obtain copies of the final rule notice in this proceeding, related documents (*e.g.*, the notice of proposed rulemaking and technical support document DOE used to reassess whether to adopt certain efficiency levels in ASHRAE Standard 90.1), draft analyses, public meeting materials, and related test procedure documents from the Office of Energy Efficiency and Renewable Energy's Web site at *http://www.eere.energy.gov/buildings/appliance_standards/commercial/packaged_ac_hp.html.*

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I. Summary of the Final Rule and Its Benefits

A. The Standard Levels

The Energy Policy and Conservation Act, as amended (EPCA), (42 U.S.C. 6291, *et seq.*), establishes mandatory 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) (collectively referred to as ''packaged terminal equipment''). EPCA states that the Department of Energy (DOE) may prescribe amended standards for this equipment that exceed the stringency of efficiency levels contained in amendments to ASHRAE Standard 90.1, only if DOE determines by rule that any such 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)) This determination must be ''supported by clear and convincing evidence.'' *Id.* If DOE is unable to find that clear and convincing evidence exists that a more stringent efficiency level than the efficiency level contained in ASHRAE Standard 90.1 would result in a significant additional energy savings and is technologically feasible and economically justified, then EPCA states DOE must establish an amended uniform national standard for the product at the minimum level specified in the amended ASHRAE/IES Standard 90.1. (42 U.S.C. 6313(a)(6)(A)(ii)(I)) The standards in today's final rule, which apply to all packaged terminal equipment, satisfy these requirements and will achieve the maximum improvements in energy efficiency that are technologically feasible and economically justified. (*See* 42 U.S.C. 6316(a); 42 U.S.C. 6295(o)(2)(A).)

Table I.1 shows the amended energy conservation standards that DOE is adopting today. These amended energy conservation standards will apply to standard size PTACs and PTHPs manufactured for sale in the United States, or imported to the United States, on or after October 8, 2012 and non-standard size PTACs and PTHPs manufactured for sale in the United States, or imported to the United States, on or after October 7, 2010.

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

Equipment class			Energy conservation standards *
Equipment	Category	Cooling capacity (British thermal units per hour [Btu/h])	
PTAC	Standard Size **	<7,000	EER = 11.7
		7,000–15,000	EER = 13.8 − (0.300 × Cap ††)
		>15,000	EER = 9.3
	Non-Standard Size †	<7,000	EER = 9.4
		7,000–15,000	EER = 10.9 − (0.213 × Cap ††)
		>15,000	EER = 7.7
PTHP	Standard Size **	<7,000	EER = 11.9 COP = 3.3
		7,000–15,000	EER = 14.0 − (0.300 × Cap ††) COP = 3.7 − (0.052 × Cap ††)
		>15,000	EER = 9.5 COP = 2.9
	Non-Standard Size †	<7,000	EER = 9.3 COP = 2.7
		7,000–15,000	EER = 10.8 − (0.213 × Cap ††) COP = 2.9 − (0.026 × Cap ††)
		>15,000	EER = 7.6 COP = 2.5

* For equipment rated according to the DOE test procedure (Air-Conditioning and Refrigeration Institute [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.

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

† 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 a cross-sectional area less than 670 square inches.

†† Cap means cooling capacity in thousand Btu/h (kBtu/h) at 95 °F outdoor dry-bulb temperature.

DOE only presents the benefits and burdens of adopting a standard level higher than the efficiency levels specified in ASHRAE Standard 90.1–1999. The benefits and burdens of adopting the efficiency levels in ASHRAE Standard 90.1–1999 for non-standard size PTACs and PTHPs are not calculated in this rulemaking because

DOE considers this the baseline efficiency levels even though they represent an increase in energy efficiency when compared to the current Federal energy conservation standards.

B. Current Federal Standards for Packaged Terminal Air Conditioners and Packaged Terminal Heat Pumps

Table I.2 presents the minimum efficiency levels in the current Federal energy conservation standards for PTACs and PTHPs.

TABLE I.2—EXISTING FEDERAL ENERGY CONSERVATION STANDARDS FOR PTACS AND PTHPS

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

* 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. 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.

C. Benefits to Customers of Packaged Terminal Air Conditioners and Packaged Terminal Heat Pumps

Table I.3 presents the impacts on commercial customers of the energy conservation standards adopted in today's final rule.

TABLE I.3—IMPACTS OF NEW STANDARDS FOR A SAMPLE OF COMMERCIAL CUSTOMERS *

Equipment class	Amended energy conservation standard	Total installed cost	Total installed cost increase	Life-cycle cost savings	Payback period (years)
Standard Size PTAC, 9,000 Btu/h Cooling Capacity	11.1 EER	1,229	$22	($3)	13.7
Standard Size PTAC, 12,000 Btu/h Cooling Capacity	10.2 EER	1,469	16	(2)	13.1
Standard Size PTHP, 9,000 Btu/h Cooling Capacity	11.3 EER 3.2 COP	1,362	40	28	4.4
Standard Size PTHP, 12,000 Btu/h Cooling Capacity	10.4 EER 3.0 COP	1,603	38	24	4.6
Non-Standard Size PTAC, 11,000 Btu/h Cooling Capacity.	8.6 EER	1,570	** N/A	** N/A	** N/A
Non-Standard Size PTHP, 11,000 Btu/h Cooling Capacity.	8.5 EER 2.6 COP	1,692	** N/A	** N/A	** N/A

* The values in Table I.3 represent average values and all monetary values are expressed in 2007$.

** DOE did not calculate the implications on commercial customers of non-standard equipment because DOE is adopting the efficiency levels in ASHRAE Standard 90.1–1999 (i.e., the baseline efficiency levels).

The economic impacts on commercial consumers (i.e., the average life-cycle cost (LCC) savings) are positive. For example, the typical, standard size PTAC with a cooling capacity of 9,000 Btu/h that meets the existing Federal energy conservation standards has an installed price of $1,207 and an annual energy cost of $109 (cooling only). A typical, standard size PTHP of the same cooling capacity that meets the existing Federal energy conservation standards has an installed price of $1,362 and an annual energy cost of $209. To meet the new standard, DOE estimates that the installed price of a typical, standard size PTAC with a cooling capacity of 9,000 Btu/h will be $1,229, an increase of $22. This price increase will be offset by an annual energy savings of about $3. Similarly, for a typical, standard size PTHP of the same cooling capacity to meet the new standard, the increase in installed price would be $40, offset by an annual energy savings of $11. Whereas the typical, non-standard size PTAC that meets the ASHRAE Standard 90.1–1999 efficiency levels has an installed price of $1,570 and an annual energy cost of $180.

D. Impact on Manufacturers

Using a real corporate discount rate of five-percent, DOE estimates the net present value (NPV) of the standard size packaged terminal equipment industry to be $427 million in 2007$ and the NPV of the non-standard size packaged terminal equipment industry to be $30 million in 2007$. DOE expects the impact of today's standards on the industry net present value (INPV) of manufacturers of standard size packaged terminal equipment to be between a two-percent loss and a 14 percent loss (−$8 million to −$61 million). Based on DOE's interviews with the manufacturers of PTACs and PTHPs, DOE expects minimal plant closings or loss of employment as a result of the standards for both the standard size and non-standard size industries.

E. National Benefits

DOE estimates the amended energy conservation standards will save approximately 0.032 quads (quadrillion (10^{15}) Btu) of energy over 30 years (2012–2042). This is equivalent to all the electricity used annually by approximately 500 motels.[1]

By 2042, DOE expects the energy savings from the standards to eliminate the need for approximately one new 82-megawatt (MW) power plant. These energy savings will result in cumulative greenhouse gas emission reductions of approximately 1.06 million tons (Mt) of carbon dioxide (CO_2), or an amount equal to that produced by approximately 6,700 cars every year. Additionally, the standards will help alleviate air pollution by resulting in between approximately 90 and 2,130 tons (0.09 and 2.13 kilotons (kt)) of nitrogen oxides (NO_X) cumulative emission reductions from 2012 through 2042. Finally, the standards will also alleviate air pollution by resulting in between approximately 0 and 0.037 tons of mercury (Hg) cumulative emission reductions from 2012 through 2042.

The national NPV of the standard for standard size PTACs and PTHPs is $10 million using a seven-percent discount rate and $54 million using a three-percent discount rate, cumulative from 2012 to 2062 in 2007$. This is the estimated total value of future savings minus the estimated increased equipment costs, discounted to 2008.

The benefits and costs of today's final rule can also be expressed in terms of annualized 2007$ values over the forecast period 2012 through 2042. Using a seven-percent discount rate for the annualized cost analysis, the cost of the amended energy conservation standards established in today's final rule for standard size PTACs and PTHPs is $4.7 million per year in increased equipment and installation costs while the annualized benefits are $5.7 million per year in reduced equipment operating costs. Using a three-percent discount rate, the cost of the amended energy conservation standards established in today's final rule for standard size PTACs and PTHPs is $4.1 million per year, whereas the benefits of today's amended energy conservation standards are $6.5 million per year.

F. Other Considerations

DOE noted in the April 2008 Notice of Proposed Rulemaking (NOPR) that PTAC and PTHP equipment manufacturers also face a mandated refrigerant phaseout on January 1, 2010. 73 FR 18858, 18860 (April 7, 2008). R–22, the only refrigerant currently used by PTACs and PTHPs, is a hydrochlorofluorocarbon (HCFC) refrigerant subject to the phaseout requirement. Phaseout of this refrigerant could have a significant impact on the manufacturing, performance, and cost of PTAC and PTHP equipment. DOE discussed and estimated the impacts of the refrigerant phaseout on PTAC and PTHP equipment and on the manufacturers of this equipment in the NOPR, see generally, 73 FR 18872–74, and today's final rule.

G. Conclusion

DOE concludes that the benefits (energy savings, commercial customer LCC savings, positive national NPV, and emissions reductions) to the Nation of the amended standards for standard size equipment outweigh their costs (loss of manufacturer INPV and commercial customer LCC increases for some users of PTACs and PTHPs). DOE believes that these amended standards are technologically feasible, economically justified, and will save additional significant amounts of energy as compared to the savings that would result from adoption of the efficiency levels for standard size PTACs and PTHPs in ASHRAE Standard 90.1–1999. DOE also believes that the standards for non-standard size equipment (*i.e.*, the efficiency levels in ASHRAE Standard 90.1–1999) are technologically feasible, economically justified, and will save significant amounts of energy compared to the current Federal energy conservation standards. Finally, DOE concludes that today's standards for PTACs and PTHPs are designed to achieve the maximum improvements in energy efficiency that are technologically feasible and economically justified. Currently, PTACs and PTHPs that meet the new standard levels are commercially available utilizing R–22 refrigerant. DOE believes that PTACs and PTHPs utilizing R–410A equipment at the new standard levels will be commercially available by the effective dates of the new standard levels.

II. Introduction

A. Authority

Title III of EPCA sets forth a variety of provisions designed to improve energy efficiency. Part A of Title III (42 U.S.C. 6291–6309) provides for the Energy Conservation Program for Consumer Products Other than Automobiles. Part A–1 of Title III (42 U.S.C. 6311–6317) establishes a similar program for "Certain Industrial Equipment," including PTACs and PTHPs, the subjects of this rulemaking.[2] DOE publishes today's final rule pursuant to Part A–1 of Title III, which provides for test procedures, labeling, and energy conservation standards for PTACs and PTHPs and certain other equipment, and authorizes DOE to require information and reports from manufacturers. The test procedure for PTACs and PTHPs appears in title 10 Code of Federal Regulations (CFR) section 431.96.

EPCA established Federal energy conservation standards that generally correspond to the levels in ASHRAE Standard 90.1, effective October 24, 1992, for most types 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 directs that if ASHRAE Standard 90.1 is amended, DOE must adopt an amended standard at the new level in ASHRAE 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 a more stringent standard is economically justified for equipment such as PTACs and PTHPs, DOE must, after receiving comments on the proposed standard, determine whether the benefits of such a standard exceed its burdens by considering the following seven factors to the greatest extent practicable:

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 products in the type (or class) compared to any increase in the price, initial charges, or maintenance expenses for the covered products that are likely to

[1] Energy Informaton Agency. 2003 CBECS public use sample, where specific building activity = "motel or inn" (PBAPLUS8=39). Anual electricity use averages about 177,700 kWh per yer.

[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.

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 of Energy (Secretary) considers relevant. (42 U.S.C. 6316(a); 42 U.S.C. 6295(o)(2)(B)(i)–(ii))

EPCA also contains an ''anti-backsliding'' provision, which prohibits DOE from prescribing any amended energy conservation standard that either increases the maximum allowable energy use or decreases the minimum required energy efficiency of covered equipment. (42 U.S.C. 6316(a); 42 U.S.C. 6295(o)(1)) It is a fundamental principle in EPCA's statutory scheme that DOE cannot amend standards downward; that is, *DOE may not* weaken standards that have been previously promulgated. *Natural Resources Defense Council* v. *Abraham*, 355 F.3d 179 (2d Cir. 2004).

In addition, EPCA, as amended (42 U.S.C. 6295(o)(2)(B)(iii)), establishes a rebuttable presumption that a standard is economically justified if the Secretary finds that ''the additional cost to the consumer of purchasing a product complying with an energy conservation standard level will be less than three times the value of the energy (and as applicable, water) savings during the first year that the consumer will receive as a result of the standard,'' as calculated under the test procedure in place for that standard. This approach provides an alternative path in establishing economic justification under the EPCA factors. (42 U.S.C. 6295(o)(2)(B)(iii)) DOE considered this test, but believes that the criterion it applies (i.e., a limited payback period) is not sufficient for determining economic justification. Instead, DOE has considered a full range of impacts, including those to the consumer, manufacturer, Nation, and environment.

Additionally, the Secretary may not prescribe an amended standard if interested persons have established by a preponderance of the evidence that the 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))

Section 325(q)(1) of EPCA directs that DOE must specify a different standard level than that which applies generally to such type or class of equipment for any group of products ''which have the same function or intended use, if * * * products within such group—(A) consume a different kind of energy from that consumed by other covered products within such type (or class); or (B) have a capacity or other performance-related feature which other products within such type (or class) do not have and such feature justifies a higher or lower standard'' than applies or will apply to the other products within that type or class. (42 U.S.C. 6295(q)(1)(A) and (B)) In determining whether a performance-related feature justifies such a different standard for a group of products, DOE must consider ''such factors as the utility to the consumer of such a feature'' and other factors DOE deems appropriate. (42 U.S.C. 6295(q)(1)) Any rule prescribing such a standard must include an explanation of the basis on which DOE established such higher or lower level. (42 U.S.C. 6295(q)(2))

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

B. Background

1. Current Standards

As described in greater detail in the NOPR, 73 FR 18861–62, 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); 10 CFR 431.97) Table I.2 details these standards.

2. History of Standards Rulemaking for Packaged Terminal Equipment

On October 29, 1999, ASHRAE adopted ASHRAE Standard 90.1–1999, which revised the efficiency levels for various categories of commercial equipment covered by EPCA, including PTACs and PTHPs. In amending the ASHRAE Standard 90.1–1989 levels for packaged terminal equipment, ASHRAE used the equipment classes contained in EPCA, which are distinguished by equipment type (*i.e.*, air conditioner (PTAC) or heat pump (PTHP)) and cooling capacity. However, ASHRAE further divided these classes by wall sleeve dimensions, because they affect the energy efficiency of PTACs and PTHPs. Table II.1 shows the efficiency levels in ASHRAE Standard 90.1–1999 for this equipment.

TABLE II.1—ASHRAE STANDARD 90.1–1999 ENERGY EFFICIENCY LEVELS FOR PTACS AND PTHPS

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

TABLE II.1—ASHRAE STANDARD 90.1–1999 ENERGY EFFICIENCY LEVELS FOR PTACS AND PTHPS—Continued

Equipment class			ASHRAE standard 90.1–1999 efficiency levels *
Equipment	Category	Cooling capacity (Btu/h)	
		>15,000	EER = 9.1 COP = 2.8
	Non-Standard Size †	<7,000	EER = 9.3 COP = 2.7
		7,000–15,000	EER = 10.8 − (0.213 × Cap ††) COP = 2.9 − (0.026 × Cap ††)
		>15,000	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.

** 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 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.

After publication of ASHRAE Standard 90.1–1999, DOE analyzed many of its equipment categories to evaluate possible consideration of more stringent efficiency levels than those specified in the Standard. DOE summarized this analysis in a report, *Screening Analysis for EPACT-Covered Commercial HVAC [Heating, Ventilating and Air-Conditioning] and Water-Heating Equipment* (commonly referred to as the *2000 Screening Analysis*).[3] On January 12, 2001, DOE published a final rule adopting the efficiency levels in ASHRAE Standard 90.1–1999 for many types of commercial HVAC and water heating equipment, excluding packaged terminal equipment and certain other types of equipment. 66 FR 3336. Regarding PTACs and PTHPs, the preamble to the final rule stated 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.'' 66 FR 3349–50. Under EPCA, these are the criteria for DOE's adoption of standards more stringent than the efficiency levels in ASHRAE Standard 90.1. (42 U.S.C. 6313(a)(6)(A)(ii)(II)).

More recently, DOE announced the availability of a technical support document (TSD) it developed to reassess whether to adopt as national standards certain efficiency levels that were in amendments to ASHRAE Standard 90.1, including the levels in the 1999 amendments for PTACs and PTHPs. 71 FR 12634 (March 13, 2006) (Notice of Availability). According to DOE, although the revised analysis in the TSD reduced the potential energy savings that might result from standards more stringent than the efficiency levels specified in ASHRAE Standard 90.1–1999 for PTACs and PTHPs, DOE was inclined to pursue standards that are more stringent because there was a possibility that clear and convincing evidence exists that such standards are warranted. *Id.* at 12638–39. DOE stated that it would explore more stringent efficiency levels than those in ASHRAE Standard 90.1–1999 for PTACs and PTHPs through a separate rulemaking. *Id.* at 12639.

DOE proposed energy conservation standards for PTACs and PTHPs in a NOPR published on April 7, 2008. 73 FR 18858. In conjunction with the NOPR, DOE also published on its Web site the complete TSD for the proposed rule, which incorporated the final analyses that DOE conducted and technical support documentation of each analysis. The NOPR TSD included the LCC spreadsheets, the national impact analysis spreadsheets, and the manufacturer impact analysis (MIA) spreadsheet—all of which are available on DOE's PTAC and PTHP webpage. The proposed standards were as follows:

TABLE II.2—NOPR PROPOSED ENERGY CONSERVATION STANDARDS FOR PTACS AND PTHPS

Equipment class			Proposed energy conservation standards *
Equipment	Category	Cooling capacity (Btu/h)	
PTAC	Standard Size **	<7,000 7,000–15,000 >15,000	EER = 11.4 EER = 13.0 − (0.233 × Cap ††) EER = 9.5
	Non-Standard Size	<7,000 7,000–15,000 >15,000	EER = 10.2 EER = 11.7 − (0.213 × Cap ††) EER = 8.5

[3] 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. *http://www.eere.energy.gov/buildings/highperformance/pdfs/screening_analysis_main.pdf.*

TABLE II.2—NOPR PROPOSED ENERGY CONSERVATION STANDARDS FOR PTACS AND PTHPS—Continued

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

* For equipment rated according to the DOE test procedure (ARI Standard 310/380–2004), all 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 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 kBtu/h at 95 °F outdoor dry-bulb temperature.

The NOPR also included additional background information on the history of this rulemaking. 73 FR 18862–63. DOE held a public meeting in Washington, DC, on May 1, 2008, to accept oral comments on and solicit information relevant to the proposed rule.

III. General Discussion

A. Test Procedures

Section 343(a) of EPCA, as amended, 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 or recognized by the ARI, or ASHRAE as referenced in ASHRAE Standard 90.1, unless the Secretary determines by clear and convincing evidence that the latest version of the industry test procedure does not meet specific requirements. (*See* 42 U.S.C. 6314(a)(4) As the NOPR explains, DOE has determined that its existing test procedure for PTACs and PTHPs does not need modification. 73 FR 18863. Accordingly, DOE has not adopted a revised test procedure for this equipment.

B. Technological Feasibility

1. General

To adopt standards for PTACs and PTHPs that are more stringent than the efficiency levels in ASHRAE Standard 90.1 as amended, DOE must determine, supported by clear and convincing evidence, that such standards are technologically feasible. (42 U.S.C. 6313(a)(6)(A)(ii)(II)) DOE considers a design option to be technologically feasible if it is in use by the respective industry or if research has progressed to the development of a working prototype. DOE defines technological feasibility as follows: ''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).

This final rule considers the same design options as those evaluated in the NOPR. (See the final rule TSD accompanying this notice, Chapter 4.) Based on equipment literature, the teardown analysis, manufacturer interviews, and the equipment performance degradations provided by AHRI during the NOPR phase of the rulemaking, DOE considered the following design options in the final rule analysis: (1) Higher efficiency compressors; (2) increasing the heat exchanger area; and (3) recircuiting the heat exchanger coils. Since these three design options are commercially available, have been used in PTAC and PTHP equipment, and are the most common ways by which manufacturers improve the energy efficiency of their PTACs and PTHPs, DOE has determined that clear and convincing evidence supports the conclusion that all of the efficiency levels evaluated in this notice are technologically feasible. DOE further discusses the technical feasibility of PTAC and PTHP equipment utilizing R–410A in section IV.C. of today's notice.

2. Maximum Technologically Feasible Levels

In order to evaluate whether energy conservation standards for PTACs and PTHPs are economically justified, DOE determines the maximum improvement in energy efficiency or maximum reduction in energy use that is technologically feasible. (42 U.S.C. 6316(a); 42 U.S.C. 6295(p)(2)) DOE determined the maximum technologically feasible level (''max-tech'') efficiency levels in its engineering analysis for the NOPR. 73 FR 18863–64. (See NOPR TSD Chapter 5.) In the NOPR, DOE based its identification of the max-tech efficiency levels on standard size and non-standard size PTAC and PTHP equipment utilizing R–22 that is currently available on the market. For the final rule, DOE revised the max-tech efficiency levels for standard size and non-standard size PTACs and PTHPs based on submitted comments, which are discussed in section IV.C of today's notice. The max-tech efficiency levels considered for today's final rule are based on the efficiency levels identified in the NOPR and factor performance degradations stemming from the switch to R–410A refrigerant.[4] Table III.1 lists the max-tech efficiency levels that DOE identified for this rulemaking for the

[4] DOE expects the overall system efficiency of R–410A PTAC and PTHP equipment will be lower than if that equipment used R–22, which DOE estimated using an overall system performance degradation. This estimate is based on data submitted by manufacturers and AHRI pointing to a decline in performance when using R–410A refrigerant in place of R–22 refrigerant.

estimated system performance of equipment utilizing R–410A. DOE discusses these levels further in section IV.C.

TABLE III.1—R–410A MAX-TECH EFFICIENCY LEVELS (7,000–15,000 BTU/H EQUIPMENT CLASSES) *

Equipment type	Equipment class	Cooling capacity (Btu/h)	R–410A "Max-Tech" efficiency level **
PTAC	Standard Size †	9,000 12,000	11.5 EER 10.8 EER
	Non-Standard Size ††	11,000	10.0 EER
PTHP	Standard Size †	9,000 12,000	11.5 EER 3.3 COP 10.8 EER 3.1 COP
	Non-Standard Size ††	11,000	10.0 EER 2.9 COP

* As discussed in the NOPR, DOE is presenting the results for two cooling capacities of standard size PTACs and PTHPs, 9,000 and 12,000 Btu/h, which fall within the equipment classes of PTACs and PTHPs with cooling capacities of 7,000–15,000 Btu/h. 73 FR 18870–18871.

** 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 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 square inches.

†† 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 square inches.

C. Energy Savings

DOE forecasted energy savings in its national energy savings (NES) analysis using an NES spreadsheet tool, which the NOPR discussed in greater detail. See generally, 73 FR 18864, 18876, 18880–83, 18899.

Among the criteria that govern DOE's adoption of more stringent standards for PTACs and PTHPs than the amended levels in ASHRAE Standard 90.1, clear and convincing evidence must support a determination that the standards would result in ''significant'' energy savings. (42 U.S.C. 6313(a)(6)(A)(ii)(II)) Although EPCA does not define ''significant,'' the U.S. Court of Appeals for the District of Columbia indicated that Congress intended ''significant'' energy savings to mean savings that were not ''genuinely trivial'' in Section 325 of the Act. *Natural Resources Defense Council* v. *Herrington*, 768 F.2d 1355, 1373 (D.C. Cir. 1985). DOE's estimates of the energy savings for each of the TSLs considered for today's rule provide clear and convincing evidence that the additional energy savings each would achieve by exceeding the corresponding efficiency levels in ASHRAE Standard 90.1–1999 are nontrivial. Therefore, DOE considers these savings to be ''significant'' as required by 42 U.S.C. 6313(a)(6)(A)(ii)(II).

D. Economic Justification

As noted earlier, EPCA provides seven factors to be evaluated in determining whether an energy conservation standard for PTACs and PTHPs is economically justified. (42 U.S.C. 6316(a); 42 U.S.C. 6295(o)(2)(B)(i)–(ii)) The following paragraphs discuss how DOE has addressed each of those seven factors in this rulemaking.

1. Economic Impact on Commercial Consumers and Manufacturers

DOE considered the economic impact of the standards on commercial consumers and manufacturers. For customers, DOE measures the economic impact as the change in installed cost and life-cycle operating costs, *i.e.*, the LCC. (See section V.C.1 and Chapter 8 of the TSD.) DOE investigates the impacts of amended energy conservation standards of PTACs and PTHPs on manufacturers through the manufacturer impact analysis (MIA). (See section V.C.2 and Chapter 13 of the TSD.) This factor is discussed in detail in the NOPR. See generally 73 FR 18860–61, 18864–66, 18869, 18883–87, 18893–99, 18906–07, 18910–12.

2. Life-Cycle Costs

DOE considered life-cycle costs of PTACs and PTHPs. This factor is discussed in detail in the NOPR. See generally 73 FR 18860–61, 18865, 18876–80, 18883, 18888, 18891–93. DOE calculated the sum of the purchase price and the operating expense—discounted over the lifetime of the equipment—to estimate the range in LCC benefits that commercial customers would expect to achieve due to the standards.

3. Energy Savings

Although significant additional conservation of energy is a separate statutory requirement for imposing a more stringent energy conservation standard than the level in the most current ASHRAE Standard 90.1, EPCA also requires that DOE consider the total projected energy savings that will likely result directly from the standard in determining whether a standard is economically justified. (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. 73 FR 18860–61, 18864, 18876, 18880–83, 18899. DOE presents the energy savings at each TSL for standard size and non-standard size PTACs and PTHPs in section V.B of today's notice.

4. Lessening of Utility or Performance of Equipment

In selecting today's standard levels, DOE sought to avoid new standards for PTACs and PTHPs that would lessen the utility or performance of that equipment. (42 U.S.C. 6316(a); 42 U.S.C. 6295(o)(2)(B)(i)(IV)) 73 FR 18865, 18866–68, 18900. The design options considered in the engineering analysis of this rulemaking, which include higher efficiency compressors, increasing the heat exchanger area, and recircuiting the heat exchanger coils, do not involve changes in equipment design or unusual installation requirements that could reduce the utility or performance of PTACs and PTHPs. In the NOPR, DOE considered industry concerns that one-third of the non-standard size market subject to the more stringent standards under ASHRAE Standard 90.1–1999 definition would not be able to meet the efficiency levels specified by ASHRAE Standard 90.1–1999 for standard size equipment due to the physical size constraints of the wall sleeve if this equipment class delineation was adopted. In today's final rule, DOE is adopting the equipment class delineations specified in Addendum t to ASHRAE Standard 90.1–2007. This action should mitigate manufacturers' concerns regarding the misclassification of non-standard equipment classes. DOE further discusses the equipment classes it is adopting today and the comments received from interested parties regarding equipment classes in section IV.A of today's rulemaking.

5. Impact of Any Lessening of Competition

DOE considers any lessening of competition likely to result from standards. As discussed in the NOPR (73 FR 18865, 18900), DOE requested that the Attorney General transmit to the Secretary a written determination of the impact of any lessening of competition likely to result from the proposed standards, together with an analysis of the nature and extent of such impact. (42 U.S.C. 6316(a); 42 U.S.C. 6295(o)(2)(B)(i)(V) and (B)(ii))

To assist the Attorney General in making such a determination, DOE provided DOJ with copies of the proposed rule and the TSD for review. (DOJ, No. 21 at p. 1–2) [5] The Attorney General's response is discussed in section IV.K.1, and is reprinted at the end of today's rulemaking.

6. Need of the Nation To Conserve Energy

In considering standards for PTACs and PTHPs, the Secretary must consider the need of the Nation to conserve energy. (42 U.S.C. 6316(a); 42 U.S.C. 6295(o)(2)(B)(i)(VI)) The Secretary recognizes that energy conservation benefits the Nation in several important ways. The non-monetary benefits of the standards will likely be reflected in improvements to the security and reliability of the Nation's energy system. Today's standards also will likely result in environmental benefits. As discussed in the proposed rule, DOE has considered these factors in adopting today's standards. See generally, 73 FR at 18860, 18865, 18888, 18900–02, 18912.

7. Other Factors

In determining whether a standard is economically justified, EPCA directs the Secretary of Energy 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)) In adopting today's standard, DOE considered (1) the impacts of setting different amended standards for PTACs and PTHPs, (2) the potential that amended standards could cause equipment switching (*i.e.*, purchase of PTACs instead of PTHPs) and the effects of any such switching, (3) the uncertainties associated with the impending phaseout in 2010 of R–22 refrigerant, and (4) the impact of amended standards on the manufacture of and market for non-standard size packaged terminal equipment (*e.g.*, impacts on small businesses). See generally, 73 FR at 18860, 18865–66, 18872–74, 18882, 18884–87, 18893–98, 18902, 18911–12.

IV. Analysis Methodology and Discussion of Comments on Analysis Methodology

DOE used several analytical tools that it developed previously and adapted for use in this rulemaking. The first tool is a spreadsheet that calculates LCC and payback period (PBP). The second tool calculates national energy savings and national NPV. DOE also used the Government Regulatory Impact Model (GRIM), among other methods, in its MIA. Finally, DOE developed an approach using the National Energy Modeling System (NEMS) to estimate impacts of PTAC and PTHP energy efficiency standards on electric utilities and the environment. The NOPR discusses each analytical tool in detail. 73 FR at 18866–89.

As a basis for this final rule, DOE has continued to use the spreadsheets and approaches described above and in the NOPR. DOE used the same general methodology as applied in the NOPR, but revised some of the assumptions and inputs for the final rule in response to comments from interested parties. The following paragraphs discuss these revisions.

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. DOE presented various subjects in the market and technology assessment for this rulemaking. (See the NOPR and Chapter 3 of the NOPR TSD.) These include equipment classes, manufacturers, quantities and types of equipment sold and offered for sale, retail market trends, and regulatory and nonregulatory programs. 73 FR 18866–69 and Chapter 3 of the NOPR TSD. In response to publication of the NOPR, DOE received comments from interested parties about the establishment of equipment classes for the rulemaking.

1. Equipment Classes—Generally

When evaluating and establishing energy conservation standards, DOE generally divides covered equipment into equipment classes by the type of energy used, capacity, or other performance-related features that affect efficiency. 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 that affect 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.

In the NOPR, DOE presented two alternative methods for defining PTAC and PTHP equipment classes. 73 FR 18866–18868. DOE explained the two alternative methods of defining the PTAC and PTHP equipment classes consistent with the delineations provided in ASHRAE Standard 90.1–1999 or Addendum t to ASHRAE Standard 90.1–2007 in the NOPR. *Id.* at 18867.

ASHRAE Standard 90.1–1999 refers to wall sleeve dimensions in two categories: ''New Construction'' and ''Replacement.'' Although ASHRAE Standard 90.1–1999 does not describe ''New Construction,'' Table 6.21D, footnote b of ASHRAE Standard 90.1–1999 states that ''replacement'' efficiencies apply only to units that are: (1) ''Factory labeled as follows: Manufactured for Replacement Applications Only; Not to be Installed in New Construction Projects''; and (2) manufactured ''with existing wall sleeves less than 16 inches high and less than 42 inches wide.'' Based on this

[5] ''DOJ, No. 21 at pp 1–2'' refers to (1) a statement that was submitted by the Department of Justice and is recorded in the Resource Room of the Building Technologies Program in the docket under ''Energy Conservation Program for Commercial and Industrial Equipment: Packaged Terminal Air Conditioner and Packaged Terminal Heat Pump Energy Conservation Standards,'' Docket Number EERE–2007–BT–STD–0012, as comment number 21; and (2) a passage that appears on pages 1 and 2 of that statement.

provision, DOE understands that the ''New Construction'' category under ASHRAE 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.

Addendum t to ASHRAE Standard 90.1–2007 includes a new definition for non-standard size PTACs and PTHPs in place of the ''replacement'' delineation in ASHRAE Standard 90.1–1999. The new definition reads as follows: ''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.''

2. Comments

In the NOPR, DOE stated that ASHRAE must adopt AHRI's [6] continuous maintenance proposal before DOE can officially use this definition as the basis for DOE's standard because AHRI's proposed definitions would effectively reclassify some equipment under ASHRAE 90.1–1999's delineations as non-standard size equipment. (42 U.S.C. 6313(a)(6)(A)(ii)) When the NOPR was published, AHRI's continuous maintenance proposal on PTACs and PTHPs had been approved by ASHRAE as Addendum t to ASHRAE Standard 90.1–2007. At the time of the NOPR, that Addendum was the subject of public review by ASHRAE. DOE stated in the NOPR that if ASHRAE were to adopt the Addendum before September 2008, which is the deadline by which DOE must issue a final rule for this rulemaking, DOE proposed to incorporate the modified definition specified by that version of the ASHRAE standard in its final rule. In the NOPR, DOE sought comment from interested parties on its proposal to adopt Addendum t to ASHRAE Standard 90.1–2007. 73 FR 18867.

AHRI commented that all standard and non-standard manufacturers who are AHRI members support adoption of Addendum t. AHRI had not received comments challenging the content in Addendum t during ASHRAE's formal comment period, and ASHRAE was planning to adopt the Addendum during the ASHRAE annual meeting in June 2008. AHRI added that manufacturers believe that the definitions in Addendum t are needed to deter against the reclassification of large numbers of non-standard size PTACs and PTHPs as standard equipment, which will not be able to meet the proposed standards. (Public Meeting Transcript, No. 12 at p. 31–32, AHRI, No. 23 at pp. 6–7) [7]

ECR, McQuay, Carrier, and Ice Air also commented that DOE should use the delineations within Addendum t to classify non-standard equipment. (Public Meeting Transcript (ECR and McQuay), No. 12 at p. 31; ECR, No. 15 at p. 4; Carrier, No. 16 at p. 1; Ice Air, No. 25 at p. 5) ECR also noted that if DOE used the delineations in ASHRAE Standard 90.1–1999 to define the equipment classes for PTACs and PTHPs, approximately 50 percent of their equipment would be eliminated from the market as a result of being reclassified into the standard size category. (ECR, No. 15 at p. 4)

ECR commented that non-standard equipment is burdened by space constraints that are more stringent than the constraints for standard size PTACs and PTHPs. ECR added that the delineations within ASHRAE Standard 90.1–1999, coupled with the proposed standards (TSL 4), would force manufacturers to include more heat exchanger surface area within the limited volumes of physical chassis of the equipment, to use compressors incorporating inverter technology, and to use variable speed motors, which would result in equipment switching. (ECR, No. 15 at p. 2)

AHRI, ECR, McQuay, Ice Air, and Cold Point also commented that non-standard size PTACs and PTHPs meet a specific demand that exists in the market, particularly for older buildings. These commenters stated that if DOE adopted the delineations in ASHRAE Standard 90.1–1999, which could further eliminate non-standard size PTACs and PTHPs from the market, this would decrease competition and limit customer choices. (Public Meeting Transcript, No. 12 at pp. 20 (ECR), 22 (AHRI), 38 (McQuay); AHRI, No. 23 at p. 7; ECR, No. 15 at p. 4; Ice Air, No. 25 at p. 4; Cold Point, No. 18 at p. 2)

DOE also received comments about the potential for creating a loophole by adopting Addendum t in the final rule. In this regard, these commenters supported DOE's adoption of an alternative definition for non-standard size PTACs and PTHPs.

Specifically, General Electric (GE) and the American Council for an Energy Efficient Economy (ACEEE) recommended that DOE modify the non-standard definitions and equipment classes to have the wall sleeve dimension requirements set significantly below the proposed dimensions, consistent with the non-standard size equipment currently on the market. (Public Meeting Transcript, No. 12 at pp. 16 (GE), 33–34 (GE), 36–37 (ACEEE), 208 (ACEEE); GE, No. 8 at p. 2; GE, No. 20 at pp. 2–3) GE asked DOE to make the difference in the wall sleeve dimensions of standard size and non-standard size PTACs and PTHPs large enough to prevent non-standard PTACs/PTHPs from being installed in standard size PTAC and PTHP openings. GE used the example of a PTAC (15.75×41.75 inches) that GE believes could easily fit inside a standard size PTAC wall sleeve, yet this unit would be classified as non-standard size equipment subject to less stringent energy conservation standards. (Public Meeting Transcript, No. 12 at pp. 16, 33–34; GE, No. 8 at p. 2)

GE stated that the wording in Addendum t might encourage the design of new PTAC and PTHP equipment that may circumvent the intent of DOE's regulations. (Public Meeting Transcript, No. 12 at pp. 16, 33–34; GE, No. 8 at p. 2) As an alternative, GE suggested DOE use the wall sleeve dimensions of the largest non-standard size PTAC and PTHP equipment currently on the market to define non-standard size PTACs and PTHPs. (Public Meeting Transcript, No. 12 at p. 33)

ECR, McQuay, and AHRI responded to concerns about the potential for a loophole for less efficient standard size equipment to enter the market if DOE adopts the delineations in Addendum t. (ECR, No. 15 at pp. 1, 4; Public Meeting Transcript, No. 12 at pp. 20 (ECR), 22 (AHRI), 31–32 (AHRI), 38 (McQuay)) AHRI stated that the same potential loophole exists in the delineations within ASHRAE Standard 90.1–1999 for standard size and non-standard size PTACs and PTHPs. AHRI commented that if manufacturers want to introduce less efficient standard size equipment with wall sleeve dimensions just shy of the standard size limitations, manufacturers would have introduced this type of equipment already because this loophole has been in existence since 1999. However, AHRI pointed out that none of the manufacturers in the PTAC and PTHP industry have taken

[6] 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.

[7] A notation in the form ''ECR, Public Meeting Transcript, No. 12 at pp. 30, 37, 182'' identifies (1) an oral comment that DOE received during the May 30, 2008, NOPR public meeting by ECR, which was recorded in the public meeting transcript in the docket for this rulemaking as comment number 12; and (2) a passage that appears on page 30 of that transcript.

advantage of this potential loophole. AHRI also noted that Addendum t requires non-standard size equipment to be labeled to prevent misapplications of less efficient non-standard equipment entering into newly constructed projects. (AHRI, No. 23 at pp. 6–7)

ECR also commented that it does not believe that non-standard size equipment will be used in newly constructed buildings. ECR stated that commercial customers would not purchase non-standard equipment because it is rated at lower efficiencies; rather, customers make purchases based on the characteristics and needs of the installation (*i.e.*, wall sleeve dimensions). Placing non-standard size equipment in newly constructed buildings does not make economic sense. (ECR, No. 15 at pp. 1, 4; Public Meeting Transcript, No. 12 at p. 20) McQuay pointed out that non-standard equipment is needed to meet a specific demand that exists in the market, particularly for older buildings, and that phasing out the market would decrease competition and limit customer choices. (Public Meeting Transcript, No. 12 at p. 38) If DOE were to adopt the delineations within ASHRAE Standard 90.1–1999, ECR believes building owners and commercial customers would keep their older, much less efficient units in place longer because replacements could become unavailable. (ECR, No. 15 at p. 1)

On June 22, 2008, ASHRAE Standard 90.1's committee voted to officially approve the publication of Addendum t to ASHRAE Standard 90.1–2007 for PTACs and PTHPs.[8] This action finalizes Addendum t, which means that DOE can officially use this delineation as the basis for amended energy conservation standards. (42 U.S.C. 6313(a)(6)(A)(ii))

DOE divides 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. 6295(q)) When installed, PTACs and PTHPs are fitted into a wall sleeve. There is a wide variety of wall sleeve sizes found in different buildings. Wall sleeve sizes 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 this factor requires 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, which could be very costly, and is, therefore, rarely done.

DOE believes that wall sleeve sizes are performance-related features that affect PTAC and PTHP efficiency. Manufacturers typically use various heat exchanger sizes in different wall sleeve size equipment, and the size of the heat exchanger directly affects the energy efficiency of the equipment. By examining the market data, DOE found that non-standard size PTACs and PTHPs typically are less efficient than standard size PTACs and PTHPs. Consequently, DOE is adopting the delineations in Addendum t to ASHRAE Standard 90.1–2007 to differentiate between standard size and non-standard size equipment.

DOE believes the delineations within Addendum t will help to mitigate the impacts on manufacturers of non-standard size equipment, and will not cause any equipment unavailability issues for commercial customers. DOE was concerned that, absent non-standard equipment, commercial customers could be forced to invest in costly building modifications to convert non-standard sleeve openings to standard size dimensions. Alternatively, customers may choose to use less efficient through-the-wall air conditioners or maintain their older, less efficient equipment longer in the absence of non-standard PTACs and PTHPs.

Although DOE acknowledges GE's and ACEEE's concern about the potential loophole in the definition, DOE believes that the effects of this loophole will be reduced due to the labeling requirements specified in Addendum t. DOE is not adopting the labeling requirement set forth in Addendum t, but believes that non-standard manufacturers will still be required to use this labeling through some of their State building code regulations, which require the use of such labels on PTAC and PTHP equipment. DOE believes ASHRAE's labeling requirement will deter less efficient equipment from entering into newly constructed buildings.

Additionally, DOE agrees with AHRI's assertion that if manufacturers wanted to introduce less standard size equipment with wall sleeve dimensions just shy of the standard size limitations they could have done this in today's market. DOE believes the market forces surrounding the standardized sleeve size have deterred standard size manufacturers from producing this type of equipment because of the unique non-standard size industry and the cost implications of producing customized equipment. Further, DOE believes these market forces will continue to deter standard size manufacturers from taking advantage of this potential loophole after the adoption of the delineations in Addendum t to ASHRAE Standard 90.1–2007.

In today's final rule, DOE incorporates the following definitions of standard size and non-standard size PTACs and PTHPs as presented in Addendum t to ASHRAE Standard 90.1-2007:

- *Standard size* refers to a PTAC or a PTHP 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 square inches.
- *Non-standard size* refers to a PTAC or a PTHP 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 square inches.

DOE added these two definitions of standard size and non-standard size to be codified at 10 CFR 431.2. Consistent with the definitions, DOE has defined the equipment classes for today's final rule for PTACs and PTHPs (as shown in Table IV.1).

[8] To obtain a copy of Addendum t to ASHRAE Standard 90.1–2007, contact the ASHRAE publications department at: *orders@ashrae.org* or 1–(800) 527–4723.

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

Equipment class		
Equipment	Category	Cooling capacity (Btu/h)
PTAC	Standard Size *	<7,000 7,000–15,000 >15,000
	Non-Standard Size **	<7,000 7,000–15,000 >15,000
PTHP	Standard Size *	<7,000 7,000–15,000 >15,000
	Non-Standard Size **	<7,000 7,000–15,000 >15,000

* Standard size refers to PTAC or PTHP equipment with wall sleevedimensions 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 square inches.
** 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 square inches.

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. In developing the screening analysis for the NOPR, 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 four screening criteria to determine which technologies are unsuitable for further consideration in the rulemaking (10 CFR part 430, subpart C, appendix A4.(a)(4) and 5.(b)). DOE presented its results of the screening analysis in the NOPR and in Chapter 4 of the NOPR TSD. In response to the NOPR, DOE received one comment about the technology options that it considered in the screening analysis.

ACEEE commented that DOE should not have screened out some of the technology options. Instead, DOE should have further considered these options in the engineering analysis. (Public Meeting Transcript, No. 12 at pp. 49–52, 64–65) ACEEE stated that DOE neglected to examine other types of compressors (such as scroll compressors), electronically commutated motor (ECM) fans, clutched fan motors, micro-channel heat exchangers, and thermostatic expansion valves (TXVs). According to ACEEE, the compressor choices for PTACs should not be different from those used for residential refrigerators because the loads are similar. ACEEE added that micro-channel heat exchangers allegedly cost less to implement, require less refrigerant and space, and have been used in air conditioning applications within automobiles. (Public Meeting Transcript, No. 12 at pp. 50–51)

1. Scroll Compressors

As presented in Chapter 4 of the NOPR TSD, scroll compressors are an alternative to rotary compressors in air-conditioning applications. Scroll compressors are more efficient than rotary compressors at higher cooling capacities than are typically found in packaged terminal equipment. Whereas rotary compressors use a rotating motion to compress refrigerant gases, scroll compressors use two nutating spirals—one fixed and the other rotating. Although scroll compressors can be more efficient than rotary compressors, they typically are more expensive, heavier, and larger than rotary compressors of the same cooling capacities.

After reviewing publicly available equipment literature and specifications for scroll compressors currently available on the market, DOE determined that manufacturers typically produce scroll compressors with cooling capacities of approximately 20,000 Btu/h or higher, and that the majority of equipment using scroll compressors is typically rated at capacities higher than 40,000 Btu/h. Manufacturers also produce scroll compressors with housings larger than those used for compressors found in PTACs and PTHPs. DOE found that scroll compressors are typically built to be 16 inches or higher in height and that capacity ratings do not impact scroll compressor heights significantly. For example, DOE found that the height of a scroll compressor only decreases by approximately 1.5 inches when capacity decreases from 80,000 to 20,000 Btu/h. However, significant improvements in efficiency, when compared to rotary compressors, are generally achieved with higher capacity models. DOE's market review also found that scroll compressors weigh more than PTAC and PTHP compressors. Scroll compressors typically weigh 50 pounds or more, compared with the 25 to 30 pounds for a PTAC/PTHP rotary compressor found in PTACs and PTHPs.

Ultimately, DOE screened out scroll compressors as a viable design option. As stated in the NOPR and subsequently confirmed by DOE using updated data, manufacturers do not produce scroll compressors for PTAC and PTHP applications, making it unlikely that this technology option could be readily applied to these products. DOE also screened out scroll compressors because their manufacturers have yet to produce a full line of scroll compressors that meet the size limitations, capacity requirements, and voltage requirements of packaged terminal equipment. The size limitation is particularly problematic when given the installation limitations of the sleeve sizes for PTACs and PTHPs.

2. ECM Motors

As presented in Chapter 4 of the NOPR TSD, there are multiple types of electric fan motors that manufacturers can choose from to blow air over the condenser and evaporator coils. Since the PTAC and PTHP industries have a relatively small number of annual shipments, manufacturers typically have to choose their motors from existing motor lines, rather than having motors customized for their specific needs. The type of motor and its power rating are typically indicative of its efficiency. For example, shaded pole motors are generally the lowest efficiency motors that are available, particularly at very low power levels. By contrast, the electronically commutated motors (ECM) or brushless permanent magnet motors (BPMs) are typically the most efficient motors for the low power levels.

DOE determined that the PTAC and PTHP industries have not adopted ECMs or similar high efficiency motors due to size and weight constraints. The size limitation is particularly problematic when given the installation limitations of the sleeve sizes for PTACs and PTHPs, particularly for non-standard PTACs. Ultimately, DOE screened out high efficiency motors as a viable design option. As stated in the NOPR and subsequently confirmed by DOE using updated data and through discussions with industry experts, DOE found high efficiency motors are not available in the full ranges of sizes needed for the PTAC and PTHP industries making it unlikely that this technology option could be readily applied to these products. DOE believes that, given these circumstances, it would not be practical to manufacture, install, and service this technology on the scale necessary to serve the relevant market at the time of the effective date of an amended standard.

3. Fan Motors

ACEEE commented on clutched fan motors, but DOE did not consider this technology. Although the automotive industry uses clutched fans to engage and disengage a vehicle's cooling fan from the belt driven by the engine, using a clutched fan would not provide appreciable benefits within the energy efficiency context. In theory, these devices would work with PTACs and PTHPs to reduce the load on a single fan motor used to drive both the evaporator and the condenser fan blades when the refrigerating system is not operating by disengaging the condenser fan. In this way, power input could be reduced during times when only the indoor blower is running to recirculate air, or when electric resistance heating is being provided. However, the measure of energy use for PTACs in cooling mode is based on full cooling operation, in which both the indoor blower and the condenser fan must operate. Hence, including a clutched condenser fan would not provide measurable energy efficiency benefits.

4. Micro-Channel Heat Exchangers

As presented in Chapter 4 of the NOPR TSD, micro-channel heat exchangers have a rectangular aluminum cross-section containing several small channels through which refrigerant passes. Aluminum fins with a corrugated shape are brazed at a 90-degree angle between the rectangular tubes. Micro-channel heat exchanger designs provide more heat transfer per volume of heat exchanger core and can provide more heat transfer per unit of face area. In addition, these designs have lower airside pressure drop than similarly performing conventional coils, which reduces the fan power requirement. The small size and lower airside pressure drop that results from micro-channel heat exchangers provide opportunities to reduce the size and weight of the heat exchanger. This explains the frequent use of micro-channel heat exchangers in automobile air-conditioning systems, where their small size and high performance allow car designers to minimize air resistance by lowering the leading edge of the car.

As stated in the NOPR TSD, DOE screened out micro-channel heat exchangers from the engineering analysis. 73 FR 18869–70. Through review of publicly available literature, product specifications, and discussions with manufacturers, DOE determined that micro-channel heat exchangers have inherent problems with performance and condensate removal when installed in PTAC equipment. In particular, manufacturers observed that the smaller airflow passages between plate fins are subject to clogging in installations where debris is present, which can affect both the heat exchanger and fan motor performance. Additionally, for PTACs and PTHPs operating in cooling mode, condensate buildup on the evaporator of the installation may result in icing, which is harder to remove from small horizontal micro-channel heat exchanger passages than from the vertical fins found in the currently used tube and fin heat exchangers.

For the reasons stated above, manufacturers have chosen not to install micro-channel heat exchangers in PTAC and PTHP designs. DOE determined that this technology has not yet penetrated the PTAC and PTHP industry and that design challenges still exist. At this time, DOE believes microchannel heat exchangers are technologically infeasible in PTAC and PTHP applications. DOE understands that manufacturers are conducting research into the use of micro-channel heat exchangers in their PTACs and PTHP design at this time. However, DOE does not have definite knowledge of whether their research efforts will be successful, of when mirco-channel heat exchangers could appear in either prototypes or equipment designs, and what the cost implications would be and the contribution to system performance would be. Because this technology is in the research stage for the PTAC industry, it is also not possible to assess whether it will have any adverse impacts on equipment utility to customers or equipment availability, or on customer health or safety.

5. Thermal Expansion Valves

Regarding ACEEE's comments about TXVs, DOE did not consider this technology for PTACs or PTHPs. TXVs are expansion devices that meter the flow of refrigerant from the condenser to the evaporator at a rate equivalent to the amount of refrigerant being boiled off in the evaporator. For example, when the evaporator is exposed to high temperatures, the TXV will open to allow faster flow of refrigerant to match the higher boiling rate caused by higher temperatures. Alternatively, for lower temperatures, the TXV will reduce the flow rate to match the lower boiling rate caused by cooler temperatures. Typically, TXVs are installed in central air conditioning applications where equipment is rated with the seasonal energy efficiency ratio (SEER) metric and testing occurs at various operating conditions and temperatures. In contrast, PTACs and PTHPs are measured using the EER metric, with testing occurring at a constant temperature of 95 degrees F. Therefore, the energy efficiency benefits of a TXV will not affect the EER rating of a PTAC because the orifice of the TXV and the flow of refrigerant would remain constant during testing. Therefore, DOE does not consider TXVs to be a technology for improving the EER of PTACs and PTHPs.

C. Engineering Analysis

The purpose of the engineering analysis is to establish the relationship between the cost and efficiency of PTACs and PTHPs and to show the manufacturing costs required to achieve that increased efficiency level. As detailed in the NOPR, DOE's engineering analysis for PTACs and PTHPs estimated the baseline manufacturer cost, as well as the incremental cost for equipment at efficiency levels above the baseline. 73 FR 18870–74. DOE presented its engineering analysis in the NOPR, which included a discussion on the approach, the equipment classes analyzed, the cost model, the baseline equipment, the alternative refrigerant analysis, the cost efficiency results, and mappings of the EER and COP values. In response to DOE's presentation of the engineering analysis in the NOPR, DOE received comments on the following topics: Standard size equipment performance in systems using R–410A refrigerant, max-tech efficiency levels analyzed for standard size equipment, energy-efficiency equations for standard size equipment, max-tech efficiency levels analyzed for non-standard size equipment, energy-efficiency for non-standard size equipment, compressor availability, and the manufacturer production cost increases with the introduction and use of R–410A. DOE discusses each of these topics and the updates to the cost model for the final rule in the subsections below.

1. Material Prices for the Cost Model

In the NOPR analyses, DOE used five-year average material prices from years 2002 through 2006. 73 FR 18871. For the final rule, DOE updated the five-year averages to include material price data from 2007 and 2008. DOE uses a five-year span to normalize the fluctuating prices experienced in the commodities market to screen out temporary dips or spikes. DOE believes a five-year span is the longest span that would still provide appropriate weighting to current prices experienced in the market.

DOE basis for its belief relies on updated commodity pricing data, which point to continued increases. For example, the 5-year time period ending in mid-2008 has higher commodity indices than a 5-year ending in mid-2006 by 10 percent, 28 percent, and 45 percent for All Commodities, Steel, and Copper, respectively.[9] Considering the significant amount of steel and copper in each PTAC or PTHP, incorporating commodity prices that reflect 5-year average prices as close to the current conditions best reflect the market conditions. DOE believes it is appropriate to use prices from 2007 and 2008 in the data span because it more closely represents current PTAC and PTHP material prices and manufacturing conditions. DOE calculated a new five-year average materials price for cold rolled steel, aluminized steel, galvanized steel, painted cold rolled steel, and stainless steel. DOE used the U.S. Department of Labor's Bureau of Labor Statistics (BLS) Producer Price Indices (PPIs) for various materials from 2004 to 2008 to calculate new averages, which incorporate the changes within each material industry and inflation. Finally, DOE adjusted all averages to 2007$ using the gross-domestic-product implicit-price deflator.

As was the case for the NOPR, DOE developed a material-price-sensitivity analysis. DOE used the annual average price for each of the raw materials from 2008 to calculate the current manufacturing product costs (MPCs). DOE expressed the material price sensitivity results in 2007$. The results for the material-price-sensitivity analysis are presented in Chapter 5 of the final rule TSD.

2. Impacts of the Refrigerant Phaseout on PTAC and PTHP Equipment Performance

a. Standard Size Equipment Performance in Systems Using R–410A Refrigerant

GE commented that R–410A refrigerant has been in use for years by the air conditioning industry. Even though GE believes switching to R–410A refrigerant in PTAC and PTHP equipment will have a negative impact on system efficiency, GE believes the difference can be made up with a combination of higher efficiency compressors, motors, as well as increases in heat exchanger size. GE stated that manufacturers have been aware of the future requirements and should be far along with developments and designs to meet both amended energy conservation standards and R–410A requirements. GE also pointed out that one manufacturer has produced an R–410A PTHP that exceeds the proposed energy conservation standard level in the NOPR (i.e., 11.5 EER for standard equipment) and is currently available on the market. (GE, No. 20 at pp. 2–3; Public Meeting Transcript, No. 12 at pp. 17–18, 66) GE noted that it is finishing the design and test phase for several models and is confident that it can manufacture standard size R–410A PTACs and PTHPs at TSL 4 efficiency levels (i.e., the proposed energy conservation standards for PTHPs in the NOPR). GE added that achieving an efficiency level that is 10 percent higher than the proposed standard for a potential ENERGY STAR category is also possible with existing technology. (GE, No. 20 at p. 3; Public Meeting Transcript, No. 12 at p. 66)

In addition to comments from manufacturers of standard size PTACs and PTHPs, DOE also received confidential performance test data that characterizes the equipment performance degradations in standard size PTACs and PTHPs using R–410A refrigerant. The confidential data DOE received regarding standard size equipment performance suggests the performance degradation can vary greatly depending upon the cooling capacity of the equipment. DOE further addresses comments from interested parties and its analysis of the variation in standard size equipment performance with changes in cooling capacity in DOE's discussion of the energy-efficiency equations, below.

DOE reviewed the data submitted by manufacturers and comments from interested parties and found, in general, the system performance degradations for PTAC and PTHP equipment with R–410A, as described in the NOPR, were in the middle of the range of the submitted data. For today's final rule, DOE used the same system performance degradations for PTAC and PTHP equipment with R–410A refrigerants as described in the NOPR. 73 FR 18873. Because standard size PTAC and PTHP equipment utilizing R–22 refrigerants exists at efficiency levels well above the efficiency levels in ASHRAE Standard 90.1–1999, DOE believes that manufacturers will be able to produce equipment utilizing R–410A at efficiency levels specified by ASHRAE Standard 90.1–1999 and higher efficiency levels in 2012. As GE noted, one standard size manufacturer is already producing R–410A equipment at efficiency levels above ASHRAE Standard 90.1–1999 efficiency levels. Lastly, the comments submitted by GE establishes that PTAC and PTHP prototypes utilizing R–410A refrigerant have been developed and will be able to meet the proposed efficiency levels, *i.e.*, TSL 4, for standard size PTACs and PTHPs.

As DOE reviewed the data submitted by interested parties, DOE generally found larger performance degradations at higher cooling capacities for standard size equipment. As a PTAC or PTHP increases in capacity, manufacturers typically increase the surface area or add a row to the heat exchanger in order to increase unit capacity. Even at larger cooling capacities, manufacturers have to maintain the same physical box sleeve, leaving little space for additional efficiency modifications (*e.g.*, adding heat exchanger area). DOE considered the effects of the R–410A refrigerant

[9] Bureau of Labor Statistics (BLS) for Copper (WPU102502), Cold Rolled Steel (WPU101707), and All Commodities (WPU00000000) as tracked in the Producer Price Index (PPI) database of the BLS. To download the data or to discover how it is gathered, please see *http://www.bls.gov.*

phaseout on the entire range of cooling capacities as part of the generation of the energy-efficiency equations that translates the results for the representative cooling capacities to the entire cooling capacity range. See section IV.C.2.c for additional details on how DOE extended the results for the representative cooling capacities to the full range of cooling capacities for standard size PTACs and PTHPs.

b. ''Max-Tech'' Efficiency Levels Analyzed for Standard Size Equipment

AHRI and the People's Republic of China, through its WTO/TBT National Notification and Enquiry Center (PRC), commented that the max-tech levels are inaccurate because they are based on R–22 refrigerant and there is no equipment in the 2008 AHRI Directory of Certified Product Performance (AHRI Certified Directory)[10] operating with R–410A refrigerant. AHRI and the PRC also commented about the difficulty in reaching the max-tech efficiency levels with R–410A refrigerant and assert that attaining those efficiency levels is not possible at this time. (Public Meeting Transcript, No. 12 at pp. 168–169; PRC, No. 17 at p. 3)

DOE agrees that with the prohibition on R–22 refrigerant, and the expected use of R–410A refrigerant as the most likely alternative, system performance will decline. The max-tech efficiency level should be based on the most likely refrigerant, which is R–410A. Accordingly, DOE revised the max-tech efficiency levels for standard size PTACs and PTHPs in the final rule analysis. DOE applied the system performance degradations described in the NOPR to the AHRI certified market data for standard size equipment. (See graphs in Chapter 5 of the final rule TSD.) DOE used the modified market data to estimate the max-tech efficiency levels corresponding to current models utilizing R–410A and has identified these efficiency levels in section III.B for the representative cooling capacities. DOE estimates that these performance degradations will fall within five to eight percent depending on cooling capacity when compared to an R–22 baseline.

c. Energy-Efficiency Equations for Standard Size Equipment

In response to the NOPR, DOE also received a comment on its approach for calculating the energy efficiency equations for standard size PTACs and PTHPs. Carrier commented that the engineering extrapolations might not provide an accurate view of the max-tech efficiency levels for larger size equipment. In particular, Carrier commented that the PTAC efficiency levels proposed in the NOPR are achievable, but the PTHP proposed efficiency levels in the NOPR may be unachievable in equipment with a cooling capacity of 12 kBtu/h and above. (Carrier, No. 16 at p. 2)

DOE further considered the effects of R–410A on system performance for larger cooling capacities in the engineering analysis. DOE found that as a standard size PTAC or PTHP increases in capacity, manufacturers typically increase the coil surface area or add a coil row to the heat exchanger in order to increase unit capacity. Manufacturers of standard size PTACs and PTHPs maintain the same physical box sleeve (*i.e.*, 42 inches by 16 inches) across all models regardless of cooling capacity. This sleeve size is an established common sleeve size that allows standardization across the industry. This common sleeve size allows end-users to simply slide replacement units into existing wall sleeve openings. However, the standard size wall sleeve imposes a limitation on the total volume available into which all components must fit. Manufacturers add heat exchanger coil area or coil volume to either increase the cooling capacity or to obtain higher efficiencies. This fixed volume limits the size of the box into which the unit's components must fit. In turn, this fixed volume limits the size of heat exchangers and other components that can be used to increase efficiency and there are accompanying decreases in thermodynamic returns when making such changes. Thus, higher capacity units often have lower energy efficiency potentials due to the size constraints of the box sleeve.

In order to consider the effects of the refrigerant phaseout on larger capacity units, DOE reviewed the market data for standard size equipment in the AHRI Certified Directory. DOE applied the efficiency degradations distinguished by cooling capacity ranges estimated in the engineering analysis to each of the models in the AHRI Certified Directory. DOE used these data to estimate the overall system performance of the models in the AHRI Certified Directory utilizing R–410A refrigerant. From these data, DOE plotted each TSL it considered as part of the final rule to see if there were models in the full range of cooling capacity with estimated performance utilizing R–410A refrigerant that would meet the TSL being considered.

For TSL A, which is the amended standard level for standard size PTACs and PTHPs, DOE adjusted the slope of the energy-efficiency equation from the revised slopes calculated in the NOPR for TSLs 1 through 7. This adjustment was based on manufacturer comment and DOE data pointing to the reduced opportunities for achieving greater efficiencies for larger capacity PTAC and PTHP equipment. By revising the slope in this manner, DOE could create and ultimately, adopt, a standard level that is more stringent for lower cooling capacities, where manufacturers have additional physical space to add efficiency improvements, but is less stringent for higher cooling capacities, where manufacturers are physically constrained by the physical dimensions of the box sleeve and less able to introduce efficiency improvements. See Chapter 9 of the final rule TSD for additional details and graphic demonstrations of the energy-efficiency equations for each TSL, including today's amended energy conservation standard for standard size PTACs and PTHPs.

d. Efficiency Levels Analyzed for Non-Standard Size Equipment

In the NOPR, DOE explicitly analyzed one cooling capacity of non-standard equipment (i.e., 11,000 Btu/h). Based upon this cooling capacity, DOE demonstrated a typical design option pathway a manufacturer could use to increase the efficiency of its non-standard PTAC and PTHP equipment. To account for the potential loss of system efficiency as a result of the R–22 refrigerant phaseout, DOE applied an overall system degradation of 6.8 percent, which effectively shifted the cost-efficiency curve to the left (in the direction of decreasing efficiency for the same cost). Thus, for any given efficiency level, the MPC increase will be greater when R–410A refrigerants are used. By degrading expected system performance, DOE accounts for the shift in the baseline performance that a system converted to R–410A use typically exhibits. Using the design option pathway described in the engineering analysis, the maximum efficiency level analyzed is 10.0 EER for non-standard equipment with a cooling capacity of 11,000 Btu/h using R–410A.

e. Energy-Efficiency Equations for Non-Standard Size Equipment

In response to the NOPR, DOE received several comments on its approach for calculating the energy-efficiency equations for non-standard

[10] The Air-Conditioning, Heating and Refrigerating Institute, *Directory of Certified Product Performance for Packaged Terminal Air Conditioners and Packaged Terminal Heat Pumps.* 2008. <*http://www.ahridirectory.org/ahriDirectory/pages/home.aspx*>.

size PTACs and PTHPs. Specifically, DOE retained the ASHRAE Standard 90.1–1999 slope from the energy-efficiency equation, which characterizes the relationship between EER and cooling capacity for non-standard PTACs and PTHPs in the NOPR. 73 FR 18890–91.

ECR and AHRI commented that they are particularly concerned about reaching the efficiency levels for the larger capacity, non-standard size equipment. (AHRI, No. 23 at pp. 4–5; Public Meeting Transcript (ECR), No. 12 at p. 170) ECR specifically commented that it is concerned about the methodology DOE used to develop the energy-efficiency equations for non-standard equipment. (ECR, No. 15 at p. 2) ECR and Ice Air commented that the proposed energy conservation standard for non-standard PTHPs is too high for all capacities considering the system performance degradations from switching to R–410A refrigerant. (Public Meeting Transcript, No. 12 at pp. 56–60; Ice Air, No. 25 at p. 2)

DOE further considered the effects of R–410A on system performance in the engineering analysis for larger cooling capacities of non-standard PTACs and PTHPs. As explained above, DOE found that as a non-standard size PTAC or PTHP increases in capacity, manufacturers typically increase the coil surface area or add a coil row to the heat exchanger in order to increase unit capacity. The fixed volume of the box sleeve imposes a physical limit on the size of heat exchangers and other unit components that can be used to increase efficiency. Thus, higher capacity units often have lower energy efficiency potential due to the size constraints of the box.

In order to consider the effects on larger capacity units, DOE reviewed the market data for non-standard size equipment in manufacturer equipment catalogs. DOE applied the efficiency degradations distinguished by cooling capacity ranges estimated in the engineering analysis to each of the non-standard models offered for sale and described in manufacturer equipment catalogs. DOE used this data to estimate the overall system performance of the models on the market utilizing R–410A refrigerant. DOE was able to plot each of the TSLs it considered as part of the final rule (i.e., TSL 1 through 5) to see if there were models in the full range of cooling capacities with estimated performance utilizing R–410A refrigerant that would meet the TSL being considered. These plots demonstrated the specific cooling capacities where the TSL or amended standard would be eliminating all of the models from the market using the estimated R–410A performance. See Chapter 9 of the final rule TSD for additional details and graphic demonstrations of the energy-efficiency equations for each TSL, including today's amended energy conservation standard for non-standard size PTACs and PTHPs.

DOE further considered the effects of the refrigerant phaseout on larger cooling capacities when weighing the benefits and the burdens for non-standard equipment. See section V.D for additional information.

f. Compressor Availability

AHRI, Carrier, Ice Air, ECR, and Goodman stated that the true impact on PTAC and PTHP equipment efficiency levels cannot currently be assessed because the lack of available components across the range of equipment capacities prevents comprehensive equipment testing. These manufacturers also stated that R–410A compressors are not available in all required capacities and voltages. Further, compressor manufacturers have not committed to improving compressor performance of rotary compressors. (Public Meeting Transcript (ECR), No. 12 at p. 68–69; Public Meeting Transcript (Goodman), No. 12 at p. 174; AHRI, No. 23 at p. 4; Carrier, No. 16 at p. 5; Ice Air, No. 25 at pp. 1–2)

As DOE presented in the NOPR, DOE found the availability of R–410A compressors in a wide range of efficiencies and voltages remains uncertain. Several compressor manufacturers make R–22 PTAC and PTHP compressors of different capacities, voltages, and efficiencies for standard and non-standard equipment. As the market transitions to the use of R–410A, manufacturers may only develop and offer one line of compressors for PTACs and PTHPs. In engineering interviews conducted for the NOPR, compressor manufacturers commented on the uncertainties surrounding R–410A compressors and their performance characteristics when compared to R–22 compressors. 73 FR 18874. DOE noted in the NOPR that compressor manufacturers stated in interviews that they expect to offer R–410A compressors at only one efficiency level in the initial stages of the R–22 refrigerant phaseout, which could further reduce compressor options for PTAC and PTHP manufacturers. *Id.*

In response to comments and the uncertainty surrounding compressor options for manufacturers, DOE gave 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. However, DOE notes that GE stated its working prototypes have experienced significantly less performance degradation due to R–410A conversion than was modeled in the engineering analysis. (GE, No. 20 at p. 2) Based on manufacturer feedback during interviews and historic precedent in other air-conditioning markets where similar refrigerant transitions have taken place, DOE acknowledges that the R–410A compressors available for use in PTAC and PTHP equipment could be less efficient than similar compressors that use R–22 refrigerant at the time of the R–22 phaseout. Even though DOE received comments during engineering interviews stating compressor manufacturers may only offer one rotary compressor line when the refrigerant phaseout occurs, DOE believes compressor manufacturers will continue their development efforts and eventually offer compressors in the full range of cooling capacities, voltages, and efficiencies as they do today. Similar market transformations have occurred in other industries and while the initial set of compressors were less efficient, the markets eventually matured to offer manufacturers a variety of compressors. See Chapter 5 of the TSD for additional information. In addition, DOE believes the amended energy conservation standards being adopted in today's final rule will aid the PTAC and PTHP industry and provide compressor manufacturers with target efficiencies for which they can concentrate their research and development efforts.

3. Manufacturer Production Cost Increases With R–410A

Goodman stated that DOE's estimate of a two percent manufacturing cost increase for converting standard size PTAC and PTHP equipment to utilize R–410A refrigerant is too low. (Public Meeting Transcript, No. 12 at pp. 46–47, 74)

Goodman misstates DOE's estimate. DOE did not use a two percent cost increase. To derive the baseline MPCs for the R–410A PTACs and PTHPs used in the NOPR, DOE estimated the R–410A refrigerant pricing, R–410A compressor pricing, as well as other design changes necessary to accommodate the alternative refrigerant, and incorporated them into the same cost model used for the R–22 engineering analysis. Based on technical journals and manufacturer interviews, DOE increased the tube wall thicknesses of all heat exchangers by 25 percent to account for the higher pressures associated with R–410A refrigerant. DOE also used a refrigerant price for R–410A based upon cost estimates from refrigerant suppliers and engineering interviews with manufacturers. During engineering interviews, PTAC and PTHP equipment and component manufacturers stated that compressor prices would increase between 10 percent and 20 percent from current R–22 compressor prices. To incorporate manufacturers' comments, DOE estimated that compressor costs would increase by 15 percent. Using the above estimates, DOE calculated the baseline manufacturer selling price (MSPs)[11] of R–410 standard size equipment to be at least 10 percent more than its' R–22 counterpart, on average. See Chapter 5 of the final rule TSD for additional details of the R–410A analysis and results. See TSD, Chapter 5, Section 5.8 (detailing representative capacities of standard size equipment using R–410A).

Accordingly, DOE believes Goodman's statement mischaracterizes the estimated manufacturing cost increases in the NOPR. DOE has continued to use the same methodology as presented in the NOPR to develop the R–410A manufacturer production costs for both standard size and non-standard size equipment. After DOE revised the cost model in response to comments from interested parties, DOE calculated the baseline MSPs to be at least 15 percent more than its R–22 counterpart, on average, for standard size PTAC and PTHP equipment. Additional details and results can be found in section 5.8 of Chapter 5 of the final rule TSD.

D. Energy Use Characterization

The building energy use characterization analysis assessed the energy savings potential of PTAC and PTHP equipment at different efficiency levels. The analysis estimates 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 building energy consumption, including lighting, plug loads, and air-conditioning and heating equipment. The analysis extracted the annual energy consumption of the PTACs and PTHPs for use in subsequent analyses, including the LCC, PBP, and NES.

DOE did not consider a rebound effect in the final rule analysis when determining the reduction in energy consumption of PTAC and PTHP equipment due to increased efficiency. The rebound effect occurs when a piece of equipment is made more efficient such that the operating costs come down to a point that either the use of the product increases or the market increases, resulting in lower than expected energy savings. Because the user of the equipment (*e.g.*, the customer in a hotel room) does not pay the utility bill, DOE assumed that increasing the efficiency of the equipment will not affect the usage or market for the equipment and, as a result, no rebound effect would occur. DOE requested comment on this assumption in the NOPR. 73 FR 18876. The commenters all agreed that there would be no rebound effect for PTACs and PTHPs. (Public Meeting Transcript (ECR), No. 12 at p. 138, GE, No. 8 at p. 2, Carrier, No. 16 at p. 2) Based on the above, DOE did not incorporate a rebound effect into the final rule analysis.

E. Life-Cycle Cost Analysis

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.2 summarizes the inputs and key assumptions used to calculate the customer economic impacts of all energy efficiency levels analyzed in this rulemaking. DOE also calculated 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 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). Unlike its calculation of the LCC, DOE's calculation of the PBP considered only the first year's operating expenses. 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 payback period. Aside from the installation cost, the primary change for the final rule analysis affecting PBP is the electricity price forecasted for 2012 based on the 2007 EIA State energy price data and the AEO2008 electricity price forecasts. Chapter 8 of the TSD discusses the PBP calculation in more detail.

TABLE IV.2—FINAL RULE INPUTS AND KEY ASSUMPTIONS USED IN THE LCC AND PBP ANALYSES

Inputs	NOPR description	Changes for final rule
	Overall	
LCC Reporting	All cost inputs and LCC analysis and reporting done in 2006 dollars (2006$).	Updated cost inputs and LCC reporting to 2007 dollars (2007$).
	Affecting Total Installed Cost	
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.	All MSPs updated to 2007. Updated wholesaler markup to use 2007 industry (Heating, Airconditioning and Refrigeration Distributors International (HARDI)) data. Sales tax data updated to 2008. Used State population weights to determine distribution of sales updated to 2007 census data.
Installation Cost	Includes installation labor, installer overhead, and any miscellaneous materials and parts, derived from *RS Means CostWorks 2007.*	Used *RS Means CostWorks 2008* data to update installation costs.

[11] This is the price at which the manufacturer can recover both production and non-production costs and earns a profit.

TABLE IV.2—FINAL RULE INPUTS AND KEY ASSUMPTIONS USED IN THE LCC AND PBP ANALYSES

Inputs	NOPR description	Changes for final rule
Affecting Operating Cost		
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.	No change.
Electricity Price	Calculated average commercial electricity price in each State, as determined from DOE Energy Information Administration (EIA) data for 2006. Used the AEO2007 forecasts to estimate the future electricity prices. Used the probability distribution for the electricity price.	Used EIA data for 2007 to update the analysis for average electricity price by state. Used the AEO2008 electricity price forecasts to calculate future prices.
Maintenance Cost	Annual maintenance cost did not vary as a function of efficiency.	Annual maintenance costs updated to use *RS Means CostWorks 2008* data.
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 (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.	No change.
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.	No change.
Discount Rate	Mean real discount rates ranging from 5.7% for owners of health care facilities to 8.2% for independent hotel/motel owners. Used the probability distribution for the discount rate.	Used 2008 financial data discount rate calculations to update discount rates. Mean real discount rates ranging from 5.53% for owners of large motel/hotel chains to 8.14% for offices.
Date Standards Become Effective.	September 30, 2012 (4 years after the publication of the final rule).	No change.
Analyzed Efficiency Levels		
Analyzed Efficiency Levels	Baseline efficiency levels (ASHRAE Standard 90.1–1999) and five higher efficiency levels above the baseline for six equipment classes. (DOE also considered levels that were combinations of efficiency levels for PTACs and PTHPs.)	No change for standard size PTAC and PTHP equipment classes. Only three efficiency levels above the baseline analyzed for non-standard size equipment classes.

For this final rule, DOE did not introduce changes to the life-cycle cost methodology described in the NOPR. However, as the following sections discuss in more detail, DOE revised the inputs to the LCC analysis.

1. 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 the NOPR. Modifications made for the final rule include using the latest MSP data in 2007$ and incorporating changes to the material prices discussed previously, updating the wholesale markups to use 2007 data available from the HARDI 2007 Profit Report, updating State sales tax data to 2008 data from the Sales Tax Clearing House Web site, and updating State population data (used for allocating national shipments to State-level shipments) to use 2007 information from the U.S. Census Bureau.

2. Installation Costs

For the NOPR, DOE derived installation costs for PTACs and PTHPs from data provided in *RS Means CostWorks 2007* (RS Means).[12] For the final rule, DOE updated the installation costs using the *RS Means CostWorks 2008* data. Several commenters gave their views on whether higher installation costs should be assumed for PTHP equipment compared with PTAC equipment. Goodman commented that drain systems for PTHP installations as required by several of the building codes might be fairly expensive, resulting in higher installation costs for PTHP compared to PTAC equipment. Goodman pointed out that the odds of replacing a PTAC with a PTHP are low because of the additional cost to add drains during equipment replacement. (Goodman, No 8.4 at p. 116) GE commented that DOE does not need to include a significant cost in the LCC for a drainage system because several manufacturers offer low cost kits and special models that remove moisture without the use of a drainage system. (GE, No. 20 at p. 3) Since there was differing opinion with regard to whether higher installation costs would be required for PTHP equipment and since these installation costs were held constant for all efficiency levels and would not affect the LCC savings or NPV figures calculated for higher

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

efficiency PTHP or PTAC standards, DOE did not further modify the installation costs beyond what was reflected in the RS Means CostWorks data.

3. Annual Energy Use

DOE estimated the electricity consumed in kilowatt hours per year (kWh/year) by the PTAC and PTHP equipment based on the whole-building energy use characterization as described in the NOPR. 73 FR 18876. DOE also used the same energy use data and characterization developed for the NOPR analysis in the final rule. See Chapter 7 of the NOPR and FR TSDs for additional information.

4. Electricity Prices

Electricity prices are needed to convert the electric energy savings into energy cost savings. DOE updated the State-by-State average electricity price information for the commercial sector to reflect 2007 data available from EIA. DOE further adjusted these prices to reflect average electricity prices for the four types of businesses DOE identified that use PTAC and PTHP equipment. DOE identified these businesses using Commercial Buildings Energy Consumption Survey (CBECS) 2003 data,[13] as described in the NOPR. To develop the LCC distributions, DOE continued to use a probability distribution to determine not only which State received the shipment of equipment, but also which business types would purchase the equipment and what electricity price they would pay. State populations formed the basis for allocating the equipment shipment distribution to different States. DOE updated these State-by-State population data with 2007 data published by the U.S. Census. The State-average effective prices (2007$) range from approximately 5.1 cents per kWh to approximately 28.0 cents per kWh. Chapter 8 of the TSD details the development and use of State-average electricity prices by business type.

The electricity price trend provides the relative change in electricity prices for future years to 2042. DOE applied the AEO2008 reference case as the default scenario and extrapolated the trend in values from 2020 to 2030 of the forecast to establish prices for 2030 to 2042, as in the NOPR. DOE provided a sensitivity analysis of the LCC savings and PBP results to future electricity price scenarios. Because EIA did not publish its high- and low-growth forecasts in time for incorporation into this final rule, DOE developed high- and low-growth electricity forecasts corresponding to the AEO2008 forecasts. DOE calculated the ratio of the AEO2007 high- or low-growth forecasted electricity price to the AEO2007 reference case forecast for each year. DOE then applied those ratios, respectively, to the AEO2008 reference case prices.

5. Maintenance Costs

Maintenance costs are the customer's costs to keep equipment in top operating condition. For the NOPR, DOE estimated annual routine maintenance costs for PTAC and PTHP equipment at $50 per year per unit. DOE explained that this estimate was based on statements made during informational interviews with manufacturers. 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. 73 FR 18879. For the final rule, DOE updated the maintenance costs to reflect data for packaged terminal equipment available in *RS Means Costworks 2008*.

In the NOPR, DOE specifically requested comments on its estimate for maintenance costs and whether the assumptions made would be the same under R–410A. GE commented that repair and maintenance costs (primarily cleaning) would be fixed costs and handled either in house or contracted out. GE's experience working with their customers is that maintenance costs are not a function of equipment efficiency, even though GE equipment efficiencies have increased nearly 10% in the past 5 years. (Public Meeting Transcript, No. 12 at p. 99) Goodman commented that third-party servicers or hoteliers themselves may be better sources of maintenance cost data than manufacturers. (Public Meeting Transcript, No. 12 at pp. 111–112) AHRI commented that maintenance costs will increase with heat exchanger surface area that is commensurate with higher efficiency equipment. (Public Meeting Transcript, No. 12 at pp. 97–98) Goodman expressed concerns over condenser maintenance if manufacturers use closer fin spacing or three or four row coils due to the slinger ring throwing water on the coil and dirt buildup. Goodman also pointed out that dirty condensers can degrade compressors through overheating. This compressor degradation is a long-term impact not improved by coil cleaning. (Public Meeting Transcript, No. 12 at pp. 111–112) ACEEE commented that equipment redesigns are likely to result in reduced repair costs, which would offset any additional maintenance costs. (Public Meeting Transcript, No. 12 at p. 98)

Although opinions were expressed that maintenance costs might increase as a function of efficiency level, this appears not to be the case in GE's experience. Accordingly, DOE decided to use the Means CostWorks 2008 estimate of preventive maintenance costs, which remain constant as equipment efficiency increases.

6. Repair Costs

The repair cost is the customer's cost of replacing or repairing components that have failed in the PTAC and PTHP equipment. DOE estimated annual repair costs for the final rule in the same way that it estimated annual repair costs for the NOPR. DOE estimated the annualized repair cost for baseline efficiency PTAC and PTHP equipment at $15, based on costs of extended warranty contracts for PTACs and PTHPs. After analyzing these data, DOE determined that repair costs would increase in direct proportion with increases in equipment prices. See Chapter 8 of the TSD for additional details.

In the NOPR, DOE specifically requested comment on its estimation for repair costs, as well as installation and maintenance costs. The comments DOE received addressed several areas. GE commented that it does not expect the compressor service call rate to increase for higher efficiency equipment because GE already has rotary compressors in service. (GE, No. 20 at p. 2) Carrier stated that it would expect to see slightly higher repair costs overall for R–410A refrigerant equipment because of the more hygroscopic nature of R–410A. (Carrier, No. 16 at p. 3) ECR warned that if efficiency standards are set too high, existing R–22 refrigerant equipment may be kept in place longer, which may result in increased repair costs. Although DOE recognizes that overall repair costs may increase under R–410A, commenters provided no data to refine DOE's repair cost estimate for equipment using R–410A refrigerant. Because no commenter expressed disagreement with DOE's methodology of scaling repair costs with efficiency level, DOE continued to use the same approach in the final rule. DOE recognizes that the extension of life for R–22 equipment is possible under any scenario, but has no data with which to refine its shipment or repair cost analysis. DOE believes that the impact of life extension for R–22 equipment would, if it occurs, primarily affect the energy savings estimate. However,

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

because extension of life generally increases the period over which a purchased product can provide services regardless of efficiency level or refrigerant, DOE does not expect a significant impact on the economics of higher-efficiency PTAC and PTHP equipment to the Nation.

7. Equipment Lifetime

DOE defines equipment lifetime as the age when a PTAC or PTHP unit is retired from service. For the NOPR, DOE used a typical lifetime of 10 years after reviewing available data sources and concluding that a 10-year life is appropriate for PTAC and PTHP equipment. DOE incorporated variability in lifetime in its LCC analysis using a Weibull [14] statistical distribution with an average lifetime of 10 years and a maximum lifetime of 20 years. In response to the NOPR, DOE received no comments on the lifetime assumptions for new equipment purchases that would affect the LCC analysis. DOE, therefore, retained the same lifetime assumptions and methodologies developed for the NOPR in the final rule analysis. See Chapter 8 of the TSD for additional information.

8. 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 weighted average cost of capital (WACC) for purchasers of PTAC and PTHP equipment based on weighting the cost of both debt and equity capital used to fund investments. For the NOPR, DOE used financial information from a sample of companies, including large hotel/motel chains and health-care chains drawn from a database of U.S. companies on the *Damodaran Online* Web site. See *http://pages.stern.nyu.edu/~adamodar.* The NOPR used the data available in 2007. The final rule's analysis relies on the same data source to develop discount rates, but was updated to reflect the data available in January 2008.

DOE calculated the weighted average after-tax discount rate for PTAC and PTHP purchases, adjusted for inflation, as 5.53 percent for large hotel chains and 5.64 percent for health care institutions (nursing homes and assisted living facilities). The cost of capital for independent hoteliers and small office companies is more difficult to determine because these business types are not explicitly identified in the Damodaran data. For the final rule, DOE used the same methodology that it used to determine the discount rates for these business types in the NOPR. Specifically, DOE developed an 8.03 percent after-tax discount rate for independent hoteliers and an 8.14 percent after-tax rate for small offices. These values vary only slightly from those presented in the NOPR. Chapter 8 of the TSD provides more detail on the calculation of discount rates.

[14] The Weibull distribution is a continuous probability distribution used to understand the failure and durability of equipment. It is popular because it is extremely flexible and can accurately model various types of failure processes. A two-parameter version of the Weibull was used and is described in chapter 8 of the TSD,

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

The National Impact Analysis (NIA) evaluates the impact of an amended energy conservation standard from a national perspective rather than from the customer perspective, which is 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 energy conservation standards for PTACs and PTHPs at specific efficiency levels. DOE followed the same analysis approach for the NIA as it used for the NOPR analysis, using a Microsoft Excel spreadsheet model to calculate the energy savings and the national economic costs and savings from amended energy conservation standards. 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 installed cost data from the LCC analysis. DOE forecasted the energy savings, energy cost savings, equipment costs, and NPV of benefits for each TSL from 2012 through 2042. The forecasts provided annual and cumulative values for all four output parameters.

For each TSL, DOE calculated the NES and NPV 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 equipment cost. Cumulative savings are the sum of the annual NPV over the specified period. DOE accounted for operating cost savings until 2062 (*i.e.*, until all the equipment installed through 2042 is retired).

DOE built up the NES analysis from a combination of unit energy savings for each class of PTAC or PTHP equipment analyzed and estimated shipments of units in this class at each efficiency level from 2012 through 2042. Unit energy savings for each equipment class are the weighted-average values calculated in the LCC and PBP spreadsheet. These calculations involved multiple steps. First, DOE 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). DOE used a site-to-source conversion factor developed from an analysis of the marginal impacts of changes in PTAC and PTHP energy use on the energy source energy inputs in DOE's Utility Impacts analysis. 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 and equipment class considered in this rulemaking.

Changes in inputs to the analyses and reporting drove the modifications to the NIA analyses and results. Changes to the NES results between the NOPR and final rule were due to a reduction in the TSL levels considered for non-standard PTAC and PTHP equipment classes and a change in the mix of equipment efficiencies used in the base case and standards case equipment efficiency forecasts. Although DOE used the same economic model for predicting the distribution of equipment efficiencies in both the final rule and the NOPR, these changes in the installed equipment prices and the lower R–410A max tech efficiency levels resulted in slight shifts to the overall efficiency distributions for each equipment class. In addition, the site-to-source energy conversion factor developed for the final rule used EIA's NEMS model consistent with AEO2008. The calculated conversion factors in the final rule differed from that calculated for the NOPR, which relied on EIA's AEO2007.

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 (including MSP, sales taxes, distribution chain markups, and installation cost). DOE calculated the NPV of each TSL over the life of the equipment by determining: (1) 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; (2) 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; and (3) 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 2008 for PTACs and PTHPs bought between 2012 and 2042, and summed the discounted values to provide the NPV of a TSL. DOE used discount rates of 7 percent and 3 percent in accordance with Office of Management and Budget (OMB) guidance to evaluate the impacts of regulations. 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 less than zero indicates that the TSL would result in a net increase in customer expenditures in present value terms.

Changes in inputs to the analyses and reporting drove modifications to the NPV analyses and results. Changes to the NES results were due to (1) a reduction in the number of TSL levels considered for non-standard PTAC and PTHP equipment classes, (2) a change in the mix of equipment efficiencies used in the base case and standards case equipment efficiency forecasts, and (3) the use of electricity price forecasts from the AEO 2008 reference case. As with the LCC analysis, DOE analyzed high- and low-growth energy price forecasts. Because EIA had not published actual high- and low-growth forecasts in time for the final rule analysis, DOE developed high- and low-growth scenarios based on the AEO2008 reference case forecast. DOE applied the ratio of the year-by-year energy prices from the AEO2007 high- and low-growth price forecasts, respectively, to the AEO2007 reference case forecast. Chapter 10 of the TSD provides a full discussion of the NIA. Table IV.3 summarizes the inputs and key assumptions used to calculate the national energy savings and national economic impacts of all energy efficiency levels analyzed in this rulemaking.

TABLE IV.3—SUMMARY OF NES AND NPV MODEL INPUTS

Inputs	NOPR description	Changes for final rule
Shipments	Annual shipments from shipments model (Chapter 10 of the TSD).	No change.
Effective Date of Standard	September 2012	No change.
Base Case Efficiencies	Distribution of base case shipments by efficiency level	Equipment costs and economic benefits for each TSL level come from final rule LCC analysis.
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.	Equipment costs and economic benefits for each TSL level come from final rule LCC analysis. Only three TSL levels considered for non-standard PTAC and PTHP equipment.
Annual Energy Use per Unit	Annual national weighted-average values are a function of efficiency level.	No change.
Total Installed Cost per Unit	Annual weighted-average values are a function of efficiency level.	Updated with values from final rule LCC analysis.
Repair Cost per Unit	Annual weighted-average values increase with manufacturer's cost level.	Updated with values from final rule LCC analysis.
Maintenance Cost per Unit	Annual weighted-average value equals $50 (Chapter 8 of the TSD).	Updated with values from final rule LCC analysis.
Escalation of Electricity Prices.	2007 EIA AEO forecasts (to 2030) and extrapolation beyond 2030.	2008 EIA AEO forecasts (to 2030) and extrapolation for beyond 2030.
Electricity Site-to-Source Conversion Factor.	Conversion factor varies yearly and is generated by EIA's NEMS * model for AEO2007. Includes the impact of electric generation, transmission, and distribution losses.	Developed conversion factor using EIA's NEMS model for AEO 2008.
Discount Rate	3% and 7% real	No change.
Present Year	Future costs are discounted to year 2008	No change.

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

1. Shipments Analysis

DOE developed shipments projections under a base case and each of the standards cases using the identical shipments model used in the NOPR analysis. The NOPR and Chapter 10 of the TSD describe this model in more detail.

The NES spreadsheet model contains a provision for a change in projected shipments in response to efficiency level increases, but DOE has no information with which to calibrate such a relationship. For the NOPR analysis, DOE assumed that the shipments do not change in response to the changing TSLs. ECR and Cold Point commented that if DOE sets a high or unrealistic efficiency level for non-standard PTAC or PTHP equipment, customers might choose to extend the life of existing equipment that uses R–22 refrigerant. (Public Meeting Transcript (ECR), No. 12 at pp. 100–101, Cold Point, No. 18 at p. 2) However, commenters provided no data to suggest specific changes that DOE could make to its shipments analysis to account for this possible impact. For the final rule analysis, DOE presumed that projected industry shipments by product class do not change in response to changing TSLs. See discussion of equipment lifetime in section IV.E.7.

GE, ECR, and Carrier commented that it was possible that customers could switch to a less efficient class of HVAC equipment than a packaged terminal unit, such as a through-the-wall air conditioner or a window air conditioner, which does not have a heat pump option for providing space heat. Carrier elaborated that this kind of equipment switch would occur mostly in small, independent, motel markets. (Public Meeting Transcript (GE), No. 12 at p. 141; Public Meeting Transcript (ECR), No. 12 at p. 141–141; Public Meeting Transcript (Carrier), No. 12 at p. 143)

Several interested parties commented that DOE's proposed standard level in the NOPR, TSL 4, had higher cooling efficiency requirements for PTHP equipment compared with PTAC equipment of the same capacity. This difference would mean higher proportional costs for PTHP equipment under the new energy conservation standard compared with PTAC equipment, and is likely to result in some current or future PTHP customers choosing to purchase PTAC equipment. If this occurs, there would be a decrease in overall equipment efficiency due to the much lower heating efficiency of PTAC compared with PTHP equipment. Several manufacturers expressed concern that people would be forced by cost or lack of products at the proposed standard levels to shift from PTHP to PTAC—forcing people into a less efficient product and negating much of the energy savings from the rule. (Public Meeting Transcript (ECR), No. 12 at pp. 141–142; ECR, No. 15 at p. 3; Ice Air, No. 25 at pp. 3–4; Public Meeting Transcript (Goodman), No. 12 at p. 142) AHRI and Carrier both agreed that higher efficiency levels for PTHPs will cause a shift to less efficient PTACs. (AHRI, No. 23 at p. 8; Carrier, No. 16 at p. 5)

In contrast, GE stated that the probability of users shifting to other product classes would be remote. GE pointed out that the case for a heat pump is compelling when the cost differential is $50. In almost all cases, the payback for choosing a heat pump is less than 1 year. In most cases, GE said, its customer base is composed of astute business people who are concerned about operating costs and efficiencies. (Public Meeting Transcript, No. 12 at pp. 145–146) AHRI questioned GE's assertion, given that the current market is almost evenly split between PTAC and PTHP equipment. (Public Meeting Transcript, No. 12 at p. 144)

To address concerns about equipment switching, DOE performed a sensitivity analysis on the possible impact on energy savings due to customers switching from PTACs to PTHPs for a case where a combined TSL resulted in a higher cooling efficiency (EER) might be set for PTHPs compared to PTACs of the same capacity. This sensitivity analysis examined what fraction of the future projected PTHP market would need to switch from PTHPs to PTACs with electric resistance heat to offset the energy savings from increased efficiency requirements for PTHPs relative to PTACs at TSLs 2, 4, and A. It also estimated the change in payback period for purchasers of PTHP versus PTAC equipment at the TSLs. DOE concluded that based on this analysis the increase in PTHP cost and the resulting change in PBP for these TSLs were both small and that it was unlikely that the savings from higher PTHP standards under these TSLs would be offset by customers switching to PTAC equipment. Section V.B. discusses the results of this sensitivity analysis.

2. Base Case and Standards Case Forecasted Distribution of Efficiencies

The annual energy consumption of a PTAC or PTHP unit relates directly to the efficiency of the unit. For the final rule, DOE used the same methodology that was used in the NOPR analysis to develop base case and standards case efficiency distributions for shipments. DOE developed shipment-weighted average equipment efficiency forecasts that enabled a determination of the shipment-weighted annual energy consumption values for the base case and each TSL analyzed by equipment class. DOE developed shipment estimates by 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. DOE used those market shares and projections of shipments by equipment class to determine future equipment efficiency forecasts 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 energy conservation standards. Although the methodology DOE used was identical to that in the NOPR, differences in equipment price and annual energy consumption established in the LCC analysis resulted in slight shifts in the estimated shipments by efficiency level.

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. The market shares for equipment at higher efficiency levels were assumed not to be affected as the market already has a choice of that equipment. DOE, thus, assumed that the new standard would not affect the relative attractiveness of equipment with efficiencies higher than the standard. For further discussion, see Chapter 11 of the TSD.

G. Manufacturer Impact Analysis

In determining whether a standard for a covered product is economically justified, the Secretary of Energy is required to consider ''the economic impact of the standard on the manufacturers and on the consumers of the products subject to such standard.'' (42 U.S.C. 6295(o)(2)(B)(i)(I)) EPCA also requires for an assessment of the impact of any lessening of competition as determined by the Attorney General. (42 U.S.C. 6295(o)(2)(B)(i)(V)) DOE performed the MIA to estimate the financial impact of energy conservation standards on the standard size and non-standard size PTAC and PTHP industries, and to assess the impact of such standards on employment and manufacturing capacity. DOE published the results in the NOPR. 73 FR 18883–87, 18893–99. For this final rule, while DOE did not introduce changes to the methodology described in the NOPR, it updated the R–410A-shipment forecast distribution of shipments based on the updated NIA results. (See TSD Chapter 13.) In response to DOE's NOPR presentation, interested parties provided comments on the cumulative regulatory burden, small business impacts, and employment.

1. GRIM Input Updates

The GRIM inputs consists of information regarding the standard size and non-standard size PTAC and PTHP industries' 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. In response to the presentation of the MIA analysis in the NOPR, DOE revised several key inputs to the GRIM based on more recent sources of data for both standard and non-standard size PTAC and PTHP industries.

a. Manufacturing Production Costs

The GRIM uses cost-efficiency curves derived in the engineering analysis to calculate the MPCs for each equipment class at each TSL. By multiplying different sets of markups with the MPCs, DOE derives the manufacturing selling prices (MSP) used to calculate industry revenues. For this final rule, DOE used the MPCs from the final rule engineering analysis as described in Chapter 5 of the TSD.

b. Shipments and Distributions of Efficiencies in the Base Case

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 the final rule analysis, DOE used only the NES shipments forecasts and the distribution of efficiencies in the base case for both standard size and non-standard size PTACs and PTHPs from 2007 to 2042. DOE continued to allocate the closest representative cooling capacity, within the appropriate equipment class, to 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. (See Chapter 13 of the final rule TSD.)

c. 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. In the NOPR, DOE described the two markup scenarios used to calculate the base case INPV after implementation of the R–22 refrigerant phaseout, and the standards case INPV at each TSL. (See Chapter 13 of the NOPR TSD.) For the final rule, DOE continued to analyze 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. Under the flat markup scenario, DOE applied a single uniform ''gross margin percentage'' markup across all TSLs that DOE believes represents the current markup for manufacturers in the standard and non-standard size PTAC and PTHP industries. The ''partial cost recovery'' scenario implicitly assumes that the industries can pass-through only part of their regulatory-driven increases in production costs to consumers in the form of higher prices. As presented in the NOPR, 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 phaseout and the amended energy conservation standards. See Chapter 13 of the TSD for additional details of the markup scenarios.

d. Capital and Equipment Conversion Expenses

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 that are 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.

For this final rule, DOE used the same capital expenses as presented in the NOPR calculated in 2007$ for both standard and non-standard size PTAC and PTHP industries. For equipment conversion expenses for the standard size PTAC and PTHP industry, DOE also used the same product expenses as presented in the NOPR calculated in 2007$. For equipment conversion expenses for the non-standard size PTAC and PTHP industry, DOE revised figures based on comments from interested parties on the NOPR. For more information on DOE's revision to the equipment conversion expenses for the non-standard size PTAC and PTHP industry, see section V.C. and Chapter 13 of the TSD.

2. Cumulative Regulatory Burden

As discussed in the NOPR, one aspect of manufacturer burden is the cumulative impact of multiple DOE standards and other regulatory actions that affect the manufacture of the same covered equipment. All PTAC and PTHP manufacturers believe that the EPA-mandated refrigerant phaseout will be the largest external burden on PTAC and PTHP manufacturers. DOE addressed the cumulative regulatory burden affecting manufacturers of PTACs and PTHPs as a result of the refrigerant phaseout by first examining impacts on INPV arising from converting R–22 to R–410A equipment production. DOE then examined the possible impacts of amended energy conservation standards on the R–410A base case. Thus, DOE examined the cumulative impacts of both R–410A conversion and compliance with the proposed energy conservation standards. (See Chapter 13 of the TSD.) 73 FR 18897–98.

In response to DOE's NOPR, ECR stated that manufacturers are forced to consider both the refrigerant phaseout and energy conservation standard levels due to the timing of the regulations. According to ECR, it is difficult to work on designs using R–410A knowing that the 2012 efficiency levels are not final and the efficiency levels proposed in the NOPR may change. (Public Meeting Transcript, No. 12 at pp. 63–64)

Similarly, Ice Air stated its concern about the cumulative regulatory burden placed on manufacturers by the refrigerant phaseout and the amended energy conservation standards. Ice Air warned that the burdens to comply with both of these regulatory actions could cause manufacturers of non-standard size equipment to go out of business and could also severely affect the standard size industry. (Ice Air, No. 25 at p. 2)

To assess the impacts on INPV due to both refrigerant phaseout and energy conservation standards, DOE first examined the changes in industry cash flows from 2007 to 2010 using only equipment with R–22 refrigerant (*i.e.*, before the refrigerant phaseout). DOE then examined the changes in industry cash flows from 2010 through 2042 using only equipment with R–410A refrigerant (*i.e.*, after the refrigerant phaseout). The sum of the cash flows discounted to the current year equates to the INPV used to quantify the impacts on the industries. DOE included equipment prices using both R–22 and R–410A refrigerant estimated in the engineering analysis and equipment conversion and capital conversion expenses related to both energy conservation standards and refrigerant phaseout in its manufacturer impact analysis. Investment estimates used in the analysis can be found in the NOPR, 73 FR 18893–96, and in Chapter 13 of the TSD. Although investments needed to meet the proposed energy conservation standards and refrigerant phaseout requirements could vary among manufacturers, the values DOE used in its analysis are an aggregate of information manufacturers provided. Given these variations in investment within the industry, DOE believes that the MIA captures the potential range of costs, investments, and impacts on manufacturers due to both energy conservation standards and the refrigerant phaseout.

AHRI commented that DOE did not account for the costs to phase out HCFCs from other air-conditioning equipment or to comply with other energy conservation standards produced by PTAC and PTHP manufacturers. (AHRI, No. 23 at p. 5)

For the NOPR, DOE examined other Federal regulations that could affect manufacturers of standard and non-standard size PTACs and PTHPs. Chapter 13 of the TSD presents DOE's findings. 73 FR 18897–98. These findings generally indicated that the refrigerant phaseout is the most significant other Federal regulation impending in the industry at this time. For this final rule, DOE also identified the other DOE regulations standard size and non-standard size PTAC and PTHP manufacturers are facing for other equipment they manufacture within three prior and three years after the effective date of the amended energy conservation standards for PTACs and PTHPs. DOE identified the costs of additional regulations when these estimates were available from other DOE rulemakings. Chapter 13 of the TSD presents additional information regarding the cumulative regulatory burden analysis.

3. Employment Impacts

In response to DOE's presentation of the direct employment impacts characterized in the MIA and presented in the NOPR TSD, EarthJustice commented that DOE's projection of employment impacts of standards on the regulated industry demonstrates an economic benefit in the form of increased employment on a global scale. Specifically, EarthJustice comments that the benefits from an increase in employment would be principally to other countries and that DOE does not take this into consideration in its analysis. (EarthJustice, No. 22 at p. 5)

DOE believes EarthJustice's assertion that DOE only considered the direct employment impacts on international manufacturers is incorrect. DOE calculated the total labor expenditures for the industry using the unit labor costs from the engineering analysis and the total industry shipments from the NES. DOE translated the total labor expenditures for the industry to the total number of jobs using the average labor rate for the industry and the annual worker hours. Finally, DOE multiplied the total number of jobs by the domestic market share to derive the domestic number of jobs for the base case and each TSL. The direct employment results characterized by the MIA represent U.S. production workers are impacted by this rulemaking in the standard and non-standard size PTAC and PTHP manufacturing industries. See section V.C.2 for the results of the direct employment impact analysis. Accordingly, DOE has considered all employment impacts in weighing the benefits and the burdens, including direct (as calculated by the MIA) and indirect (as calculated by the employment impact analysis).

In response to the increase in direct employment characterized by the MIA, ECR, a domestic manufacturer of non-standard size equipment, and McQuay, a domestic manufacturer of both standard and non-standard size equipment, commented that the adoption of the proposed amended energy conservation standards would have adverse impacts on employment and their businesses. Specifically, ECR commented that adopting TSL 4 from the NOPR might have an adverse impact on employment and customers in New York, where a large volume of equipment is produced and shipped. (ECR, No. 15 at p. 3; see also Public Meeting Transcript, No. 12 at p. 184) Similarly, McQuay stated that unlike the standard size equipment that is built overseas, the non-standard size equipment is unique because it is developed, manufactured, and supported by domestic facilities mainly located in the state of New York. Any impacts on its non-standard size equipment business would have an economic impact on McQuay. (Public Meeting Transcript, No. 12 at p. 184)

DOE calculated the potential impacts of amended energy conservation standards on domestic production employment for the non-standard industry by bounding the range of potential impacts. For the upper bound, the direct employment impact analysis conducted as part of the MIA estimates the number of U.S. production workers who are impacted by this rulemaking in the non-standard size PTAC and PTHP manufacturing industries, assuming that shipment levels and product availability remain at current levels. In this best case scenario, where shipments do not decrease and higher efficiency products require more labor, the direct employment impact analysis shows a net increase in the number of domestic jobs for the non-standard size industries. It is reasonable to assume that shipments and product availability will continue because consumers will continue to demand non-standard PTACs and PTHPs for their replacement needs. For these customers, modifications to their buildings to accommodate standard size PTACs and PTHPs is a large cost they will try to prevent. However, at higher standard levels, the product development costs are prohibitive for the small domestic manufacturers that produce PTACs and PTHPs. These domestic manufacturers may exit the industry rather than invest in new designs. This would result in a loss of domestic employment at these firms. The unmet demand could be satisfied by new domestic manufacturers or foreign manufacturers.

To calculate the lower bound of the range of potential impacts, DOE developed a scenario where either shipments drop or manufacturers respond to higher labor requirements by shifting production to lower-labor-cost countries. For the non-standard industry, DOE believes this scenario is a possibility because DOE noticed that the non-standard market currently offers over approximately 40 different equipment platforms, many of which are built in very low volumes. As a result, the non-standard market will incur a much higher impact due to fixed costs on a per unit basis. Since the non-standard PTAC and PTHP industry is composed chiefly of small businesses, any energy conservation standard for non-standard PTACs and PTHPs will impact mostly small businesses, which might choose to exit this industry rather than invest the necessary resources to convert existing equipment lines. Alternatively, manufacturers could choose to move their manufacturing facilities overseas as a method of reducing costs. Consequently, DOE assumed that the greater labor requirements displace all U.S. production workers in the non-standard industry and used this condition as a lower bound to the potential impacts of standards on domestic production employment.

H. Employment Impact Analysis

When developing a standard for adoption, DOE considers its employment impact. 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 changes in employment in the larger economy that occur due to the shift in expenditures and capital investment caused by the purchase and operation of more efficient PTAC and PTHP equipment. The MIA in this rulemaking addresses the employment impacts on manufacturers of PTACs and PTHPs (*i.e.*, the direct employment impacts) (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.

DOE estimated indirect national employment impacts using an input/output model of the U.S. economy called Impact of Sector Energy Technologies (ImSET). Developed by DOE's Building Technologies Program, the ImSET model estimates changes in employment, industry output, and wage income in the overall U.S. 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. DOE received no comments on the employment analysis during the NOPR, so it made no changes to the analysis and methodology in the final rule.

The ImSET input/output model suggests that the amended PTAC and PTHP efficiency standards could increase the net demand for labor in the economy as the net monetary savings from standards are redirected to other forms of economic activity. The gains would most likely be small relative to total national employment, primarily due to the small net monetary savings from amended PTAC and PTHP energy conservation standards available for transfer to other sectors, relative to the economy as a whole. Chapter 15 of the TSD provides more details on the employment impact analysis.

I. 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 AEO2008 Reference Case and forecasts for policy cases incorporating each of the PTAC and PTHP TSLs.

DOE analyzed the effects of amended 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, multisectoral, partial-equilibrium model of the U.S. energy sector. EIA uses NEMS to produce its AEO, a widely recognized baseline energy forecast for the United States. DOE used a variant of NEMS, referred to as NEMS–BT, to clarify that NEMS has been modified to take into account the energy savings from standards for PTAC and PTHP at different TSL levels.

DOE conducted the utility analysis as policy deviations from the AEO2008, applying the same basic set of assumptions. The NEMS–BT is run similarly to the AEO2008 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. Using these inputs, 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. Aside from the use of the AEO2008, DOE made no other changes to the methodology used for the utility impact analysis from the NOPR. Chapter 14 of the TSD provides details of the utility analysis methods and results.

J. 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)(B)(i)(VI) and 6316(a), to determine the environmental impacts of the amended standards. Specifically, DOE estimated the reduction in total emissions of carbon dioxide (CO_2) using the NEMS–BT computer model. DOE calculated a range of estimates for reduction in NO_X emissions and Hg emissions using current power sector emission rates. However, the Environmental Assessment (see Chapter 16 of the FR TSD accompanying this notice) does not include the estimated reduction in power sector impacts of sulfur dioxide (SO_2), because DOE has determined that due to the presence of national caps on SO_2 emissions as addressed 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 AEO2008 NEMS, except the energy use is reduced by the amount of energy saved due to the TSLs. DOE obtained the inputs of national energy savings from the NIA spreadsheet model. For the Environmental Assessment, the output is the forecasted physical emissions. The net benefit of the standard is the difference between emissions estimated by NEMS–BT and the AEO2008 Reference Case. The NEMS–BT tracks CO_2 emissions using a detailed module that provides results with a broad coverage of all sectors and inclusion of interactive effects.

The Clean Air Act Amendments of 1990 set an emissions cap on SO_2 all power generation. The attainment of this target, however, is flexible among generators and is enforced through the use of emissions allowances and tradable permits. Because SO_2 emissions allowances have value, they will almost certainly be used by generators, although not necessarily immediately or in the same year with and without a standard in place. In other words, with or without a standard, total cumulative SO_2 emissions will always be at or near the ceiling, while there may be some timing differences between year-by-year forecasts. Thus, it is unlikely that there will be an SO_2 environmental benefit from electricity savings as long as there is enforcement of the emissions ceilings.

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, which can decrease the need to purchase or generate SO_2 emissions allowance credits, and decrease the costs of complying with regulatory caps on emissions.

Like SO_2, future emissions of NO_X and Hg would have been subject to emissions caps under the Clean Air Interstate Act (CAIR) and Clean Air Mercury Rule (CAMR). As discussed later in section V.C.6, these rules have been vacated by a Federal court. But the NEMS–BT model used for today's final rule assumed that both NO_X and Hg emissions would be subject to CAIR and CAMR emissions caps. In the case of NO_X emissions, CAIR would have permanently capped emissions in 28 eastern States and the District of Columbia. Because the NEMS–BT modeling assumed NO_X emissions would be subject to CAIR, DOE established a range of NO_X reductions based on the use of a NO_X low and high emissions rates (in metric kilotons (kt) of NO_X emitted per terawatt-hours (TWh) of electricity generated) derived from the AEO2008. To estimate the reduction in NO_X emissions, DOE multiplied these emission rates by the reduction in electricity generation due to the standards considered. For mercury, because the emissions caps specified by CAMR would have applied to the entire country, DOE was unable to use NEMS–BT model to estimate the physical quantity changes in mercury emissions due to energy conservation standards. To estimate mercury emission reductions due to standards, DOE used an Hg emission rate (in metric tons of Hg per energy produced) based on AEO2008. Because virtually all mercury emitted from electricity generation is from coal-fired power plants, DOE based the emission rate on the metric tons of mercury emitted per TWh of coal-generated electricity. To estimate the reduction in mercury emissions, DOE multiplied the emission rate by the reduction in coal-generated electricity associated with standards considered.

In comments on the NOPR, NRDC asked if the monetization of carbon should have been included in the LCC and the NPV analyses and questioned DOE's selection of the $0 to $14 range for carbon prices in the NOPR analysis. The group recommended that DOE use new cost figures for monetizing carbon from the new EIA report. (Public Meeting Transcript No. 12 at pp. 110–111, 192–194) AHRI by contrast commented that DOE is acting appropriately by not speculating on carbon emission pricing. (AHRI, No. 23 at p. 9) EarthJustice stated that EPCA mandates that DOE consider the need for national energy conservation and determine whether a standard is ''economically justified'' require DOE to factor economic benefits that are shared by the nation as a whole, not just those benefits that accrue to PTAC and PTHP customers. EarthJustice commented that in the case of SO_2 emissions and NO_X emissions in states covered by the Clean Air Interstate Rule (CAIR)[15], DOE should monetize the values of total change in the value of the allowance credits for these emissions and incorporate this amount into the NPV analysis. In the case of CO_2, NO_X in non-CAIR states, and Hg, EarthJustice stated that DOE must consider the value of the environmental benefit resulting from reduced emissions of these pollutants in the NPV analysis. Finally, EarthJustice questioned the range of valuations for CO_2 emissions used in the NOPR, pointing out that the high end valuation used by DOE was consistent with the average value from the IPCC source cited by DOE. (EarthJustice, No. 22 at pp. 4–5)

DOE has made several additions to its monetization of environmental emissions reductions in today's rule, which are discussed in Section V.C.6, but has chosen to continue to report these benefits separately from the net benefits of energy savings. Nothing in EPCA, nor in the National Environmental Policy Act, requires that the economic value of emissions reduction be incorporated in the net present value analysis of the value of energy savings. Unlike energy savings, the economic value of emissions reduction is not priced in the marketplace.

SO_2 emissions, which, as discussed previously are not impacted by this rulemaking, have markets for emissions allowances. The market clearing price of SO_2 emissions is roughly the marginal cost of meeting the regulatory cap, not the marginal value of the cap itself. Further, because SO_2 (for the nation) is regulated by a cap and trade system, the effect of the need to meet these caps is already included in the price of energy or energy savings. With a cap on SO_2, the value of energy savings already includes the value of SO_2 control for those consumers experiencing energy savings. The economic cost savings associated with SO_2 emissions caps is approximately equal to the change in the price of traded allowances resulting from energy savings multiplied by the number of allowances that would be issued each year. That calculation is uncertain because the energy savings for PTAC and PTHP equipment are so small relative to the entire electricity generation market that the resulting emissions savings would have almost no impact on price formation in the allowances market and likely would be outweighed by uncertainties in the marginal costs of compliance with the SO_2 emissions caps.

For those emissions currently not priced (CO_2, Hg, and NO_X), only a range of estimated economic values based on environmental damage studies of varying quality and applicability is available. Consequently, DOE is reporting and weighing these values separately and is not including them in the NPV analysis.

K. Other Comments

1. Burdens on Small, Non-Standard Size PTAC and PTHP Manufacturers

In the MIA conducted for the NOPR, DOE determined the impacts on the non-standard size PTAC and PTHP industry separately from the standard size PTAC and PTHP industry due to their differences in equipment classes, shipment volumes, and equipment prices. DOE took into consideration the size, location, and specialization of the non-standard size PTAC and PTHP industry when calculating production costs (see Chapter 5 of the NOPR TSD) and capital and equipment conversion expenses (see Chapter 13 of the NOPR TSD) required to meet the proposed amended energy conservation standards. Due to the limited number of publicly owned manufacturers of non-standard equipment (i.e., the majority of non-standard equipment manufacturers are privately held companies), DOE relied on information provided by manufacturers during interviews for the NOPR MIA. DOE estimated the industry research and development (R&D) expenses needed to achieve each trial standard level. Details of the R&D expenses by equipment class are presented in Chapter 13 of the NOPR TSD. The TSD generally indicates that these equipment conversion expenses would be over 20 million dollars for the non-standard size industry to transform their equipment lines at TSL 1 and higher TSLs. In addition, the NOPR interviews suggested the kinds of impacts imposed by amended energy conservation standards on small businesses would not largely differ from impacts on larger companies within the non-standard size equipment industry.

In response to the presentation of the potential impacts on non-standard size manufacturers that DOE described in the NOPR, AHRI, Ice Air, and ECR each provided comments and public statements regarding this issue. AHRI commented that the relative impacts on non-standard size equipment manufacturers are greater than the impacts on standard size equipment manufacturers. (AHRI, No. 23 at p. 5) Ice Air commented that the non-standard size PTAC and PTHP industry is comprised of five or six smaller businesses (mainly located in New York State) that cannot afford to match the R&D spending of large, multi-national companies making standard PTACs and PTHPs at much higher volumes. Ice Air, being one of the smallest manufacturers, stated that smaller companies would be adversely impacted, with some companies forced to go out of business. Similarly, Ice Air stated that the proposed standards could potentially eliminate the ''non-standard'' segment of the industry, including a significant portion of its own product offerings of non-standard size PTACs and PTHPs. Ice Air also stated that the possible elimination of non-standard size equipment manufacturers may lead to a lessening of the competition and limit consumers' choices to the offerings of the larger size equipment manufacturers. (Ice Air, No. 25 at p. 2–4) ECR commented that small manufacturers of non-standard size PTAC and PTHP equipment would be negatively impacted at TSL 4 and that this proposed standard could impact the availability of products for its customers, particularly in concentrated

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

areas like New York City that have large shipments of non-standard equipment. (ECR, No. 15 at p. 3)

In response to comments from interested parties, DOE further reviewed the non-standard size PTAC and PTHP industry, the data gathered during manufacturing interviews, and manufacturer literature to determine if the amended energy conservation standards would disproportionately harm the small, non-standard manufacturers.

a. Non-Standard PTAC and PTHP Industry Characteristics

The non-standard PTAC and PTHP equipment industry is characterized by a wide scope of products being manufactured at low production rates. Most non-standard units are built-to-order and are commonly customized by the manufacturer to accommodate specific building requirements. DOE review of the non-standard PTAC and PTHP market suggests that the non-standard PTAC and PTHP industry supports nearly one hundred different legacy models that were formerly made under over 30 different brand names.

The six remaining manufacturers of non-standard PTACs and PTHPs manufacture approximately 40 different replacement model platforms (as determined by sleeve size and other equipment design requirements to allow them to be drop-in replacements) and 100 models between them in total. Most non-standard units are built-to-order and are commonly customized by the manufacturer to accommodate specific building requirements. The number of equipment families offered by a particular company ranges from seven to 40 units, though customization subsequently leads to thousands of stock-keeping-units (SKUs).

The wide range of non-standard sleeve sizes is the legacy of the early PTAC and PTHP industry when over 30 competitors made these units to suit the specific needs and different wall sleeve dimensions. Industry consolidation has reduced the number of competitors to six, though the scope of non-standard equipment for sale has not lessened significantly. The number of equipment platforms offered by any particular non-standard PTAC and PTHP manufacturer ranges from seven to 40 units, though multiple capacities per equipment platform and any customization options subsequently generates thousands of SKUs.

b. Non-Standard PTAC and PTHP Market Review

DOE conducted a market review and created a list of every manufacturer that produces standard and non-standard size PTACs and PTHPs for sale in the United States using manufacturer catalogs. During interviews and at the public meeting, DOE asked interested parties and industry representatives if they were aware of any other non-standard manufacturers. DOE reviewed publicly available data such as Dun and Bradstreet reports and contacted manufacturers, where needed, to determine whether they meet the SBA's definition of a small business in the PTAC and PTHP industry. Table IV.4 lists the number of all manufacturers that supply PTACs and PTHPs in standard and/or non-standard sizes, as well as the number of small businesses in each category.

TABLE IV.4—PTAC AND PTHP MANUFACTURER CHARACTERISTICS

Market served	Total number of manufacturers in each market segment	Total number of small businesses in each market segment
Standard	9	1
Non-Standard	2	2
Both Standard and Non-Standard	4	3

As Table IV.4 illustrates, there is a greater proportion of small businesses serving the non-standard market than the standard market. The standard market is characterized by high unit volumes and a significant degree of commoditization. The non-standard market offers significantly more sleeve sizes and/or equipment platforms to choose from, most of which are made to order for specific customers. The discrepancy between unit shipments and the number of platforms requiring significant product development to meet upcoming efficiency standards is the main reason that the non-standard PTAC and PTHP industry is expected to experience a greater relative impact for any given efficiency level than the standard PTAC and PTHP industry.

DOE found that most small businesses in the PTAC and PTHP industries focus primarily on manufacturing customized and/or non-standard equipment. For example, standard size units offered by manufacturers of both kinds of equipment feature customization features such as hydronic coil heating that differentiate them from common standard PTAC and PTHPs made by higher-volume competitors. According to interviewees, the higher value that customers associate with customized and/or non-standard equipment allows them to charge higher prices, which in turn makes their (higher cost) low-volume operations viable.

The much lower volumes and the greater number of equipment platforms distinguishes the standard from the non-standard PTAC and PTHP market. Whereas standard PTAC and PTHP manufacturers only have to modify one equipment platform to meet regulatory standards, non-standard manufacturers may have to update as many as 40 different equipment platforms in their portfolio. Many equipment development costs (such as testing, certification, etc.) are somewhat fixed, making manufacturing scale an important consideration in determining whether the equipment development investments are economically justified. Similarly, any capital expenditures, such as upgrading manufacturing and fabrication lines can be spread across much higher unit volumes by high-volume manufacturers. Due to the concentration of small businesses in the non-standard PTAC and PTHP industry, that particular industry segment is more vulnerable to impacts from amended energy conservation standards. For further illustration of the economic issues, please refer to the GRIM analysis in Chapter 13 of the final rule TSD.

c. Impacts on Small Businesses in the Non-Standard Size PTAC and PTHP Industry

The phaseout of R–22 refrigerant use in 2010 adds a two-fold fixed-cost burden on all manufacturers: (1) Equipment, manufacturing lines, and fabrication centers have to be converted to R–410A refrigerant use; and (2) all equipment platforms will have to undergo equipment development, testing, and certification. Achieving even baseline ASHRAE Standard 90.1–

1999 efficiency levels for all extant products is likely to be beyond the reach of some manufacturers since they lack the scale to maintain engineering departments with the time, equipment, and budget to address multiple equipment platform conversions.

DOE reviewed published efficiency ratings for non-standard PTACs and PTHPs to estimate the percentage of the units on the market that would require extensive redesign to achieve the baseline standard level once manufacturers switch from R–22 to alternate refrigerants. Table IV.5 illustrates the various nominal EERs that non-standard PTACs and PTHPs have to achieve and what percentage of the current models are projected to achieve that level despite efficiency losses due to a R–410A conversion. This table also includes the equipment conversion costs for standard PTAC and PTHP units made by manufacturers that build primarily non-standard equipment because these units share more characteristics with non-standard equipment (such as very low production volumes, extensive customization, etc.) than with the mass-market standard PTACs and PTHPs manufactured by high-volume manufacturers.

TABLE IV.5—CUMULATIVE EQUIPMENT DEVELOPMENT COST ESTIMATES FOR THE NON-STANDARD SIZE PTAC AND PTHP INDUSTRY

Equipment class	Baseline	TSL 1	TSL 2	TSL 3	TSL 4	TSL 5
Minimum EER for Non-Standard PTACs	8.6	9.4	9.4	9.7	9.4	10.0
Minimum EER for Non-Standard PTHPs	8.5	9.4	9.7	9.7	10.0	10.0
Percentage of Equipment Families to At or Above TSL Efficiency Levels	73%	25%	23%	23%	13%	13%
Number of Equipment Families Requiring Significant Equipment Development to Meet Standards	29	82	84	84	95	95
Aggregated Industry Burden *	7.25	20.50	21.00	21.00	23.75	23.75

* Millions of dollars.

As noted in Table IV.5, DOE identified six manufacturers of non-standard PTACs and PTHPs. DOE grouped equipment offered by manufacturers into platforms, reflecting how some equipment chassis' are sold with minimal modifications under different product names. Altogether, these six non-standard manufacturers offer over 100 different PTAC and PTHP equipment model families for sale, which represent approximately 40 different equipment platforms. In determining whether equipment platforms would be likely to require significant equipment development, DOE's estimates accounted for published EERs for equipment platforms, equipment capacity, and anticipated degradation factors as a result of adopting R–410A refrigerants. DOE took published EER ratings and degraded them according to factors from the engineering analysis. If one or more capacities within an equipment platform fell below the EER levels prescribed by a TSL (either for PTACs or PTHPs), then the equipment platform was marked for redesign. Accordingly, non-standard platforms that currently claim very high EERs are not expected to require extensive redesign except at very high TSLs.

During interviews with manufacturers, none of the non-standard PTAC and PTHP manufacturers were able to give estimates for their total equipment conversion costs by efficiency level. As a result, DOE estimated the investment requirements to upgrade an existing equipment platform for optimal R–410A operation on the basis of its more numerous standard size manufacturer responses and its own estimates.

Even in a best-case scenario ($0.25 million per equipment platform, regardless of efficiency level, based on feedback from engineering interview), the non-standard PTAC and PTHP industry would have great difficulty meeting any standards level above baseline. As Table IV.5 illustrates, the industry burden to upgrade its equipment families to meet TSL 1 would exceed $20 million or approximately 40 percent of its total annual revenue. Higher TSL levels would impose even greater economic burdens. However unsustainable this impact is in the aggregate, the impact on individual businesses could be even greater.

For example, based on Dun & Bradstreet reports, one small manufacturer of non-standard PTACs and PTHPs is estimated to have sales of less than $5 million per year and currently ships approximately 12 different non-standard equipment platforms. DOE estimates that the company would have to spend approximately $3 million to meet any efficiency level (including baseline) using R–410A refrigerants. A $3 million equipment development expense translates into more than 60 percent of annual revenues or about 35 years worth of equipment development budget for this manufacturer, assuming it spends the industry average of 1.6 percent of revenues on research and development.

DOE estimates that on average, small manufacturers of non-standard PTACs and PTHPs require 25 years worth of equipment development budget to reach any efficiency level above baseline (which in itself will require about 14 years worth of equipment development budget). Because small businesses lack the scale to afford the required investments for R–410A conversion, certification requirements, and the equipment development required for energy conservation standards, adopting an efficiency standard above baseline is likely to cause some small businesses to exit the market. This situation suggests that the non-standard industry would reduce the number of equipment families and capacities even at baseline efficiency levels to keep equipment development expenses within manageable limits.

Table IV.6 describes DOE estimates regarding the average equipment development cost per unit by manufacturing scale and equipment lifetime. Manufacturing scale was roughly defined as small vs. large businesses whereas equipment lifetime defines the number of years that a specific equipment platform will stay in production without major changes or revisions. In the standard PTAC and PTHP industry, the impact on the major manufacturers is relatively minor, regardless of whether they are small businesses or not, due to the scale at which they manufacture and because they only have one equipment platform to upgrade. However, in the non-standard industry the impact of scale and the number of equipment platforms is quite evident. The only large business operating in the non-standard industry segment offers fewer equipment platforms than any of its small business competitors, yet operates at a higher overall production volume than most of them. As a result, the per-unit conversion costs for the large business are significantly lower than those of its smaller competitors.

TABLE IV.6—IMPACT OF MANUFACTURING SCALE ON PER UNIT EQUIPMENT DEVELOPMENT COST

Per unit equipment development cost by industry segment versus equipment lifetime (years)		5	7	10	20
Standard PTAC and PTHP	Small Business	$6	$4	$3	$1
	Large Business Average	7	5	3	2
Non-Standard PTAC and PTHP	Small Business Average	136	97	68	34
	Large Business	45	32	22	11

The current wide scope of equipment families offered by the non-standard industry (over 100 equipment families from six manufacturers with thousands of SKUs) is thus likely to shrink dramatically in response to amended energy conservation standards by DOE. In particular, higher capacity units will be vulnerable for elimination since cabinet constraints may make required improvements to units infeasible to implement. Equipment manufacturers would be expected to cut their least popular equipment classes first, potentially eliminating multiple extant equipment platforms from the market altogether. However, cutting equipment classes by itself is difficult, since every equipment class (and its resultant enhancement and diversification of the revenue stream) adds some necessary manufacturing scale to the manufacturer. Once enough equipment classes are removed from its equipment offering, the manufacturer may lack the scale to operate.

A likely result of these market dynamics is that some manufacturers of non-standard PTACs and PTHPs will exit the market or consolidate with other small business manufacturers to meet even baseline efficiency requirements. At least in the initial years after the implementation date of the energy conservation standard, DOE estimates that most non-standard PTAC and PTHP equipment manufacturers will reduce their scope of equipment platforms by 50 percent or more in order to bring the required equipment development expenses down to more sustainable levels, which will be likely to affect consumer choices in the near term.

Whereas current equipment buyers benefit from being able to source non-standard equipment families from multiple manufacturers, the number of manufacturers for a specific type of non-standard PTAC or PTHP is likely to shrink as manufacturers cut back the equipment families they offer as a result of the R–410A conversion, certification requirements, and efficiency standards. Limited monopolistic or oligopolistic market conditions may result—limited only because consumers always have the option of modifying their building to allow the use of alternative cooling and heating equipment. Manufacturers also expect consumers to prolong the life of existing units via repairs and remanufacturing—and reduce demand for replacement units—if compliance with energy conservation standards results in higher replacement costs or the complete unavailability of replacement units.

2. PTAC and PTHP Labeling

In the NOPR, DOE stated that it believes that a label on PTAC and PTHP equipment that identifies the equipment class would be useful in enforcing both the energy conservation standards as well as the building codes and would assist States and other interested parties in determining which application correlates to a given PTAC or PTHP (based upon size). DOE invited public comment on the type of information and other requirements or factors, including format, it should consider in developing a proposed labeling rule for PTACs and PTHPs.

AHRI commented that it continues to support the ASHRAE Standard 90.1–1999 labeling requirements and believes that a label on the equipment identifying the equipment class would be useful. AHRI stated that it does not support a label similar to the EnergyGuide label used on consumer products and that such a label will do nothing to help commercial customers in making purchasing decisions. It asserted that product literature such as fact sheets and the AHRI Certified Directory are more effective in providing customers with energy efficiency information they need before purchasing PTACs and PTHPs. (AHRI, No. 23 at p. 7)

Carrier stated that the inclusion of an energy use information label for customers of PTAC and PTHP equipment would have little or no value since the purchasing entity will rely on the advice of the contractor or literature, not on ''labels''. The nameplates also provide an avenue for the performance information as necessary to confirm that they received what was requested. (Carrier, No. 16 at p. 6)

ACEEE and NRDC also commented that with regard to non-standard equipment, the path to a loophole-free standard requires adoption of labeling, code, and/or equivalent measures to prevent installation of non-standard PTAC and PTHP equipment in new construction. (ACEEE and NRDC, No. 26 at p. 3)

In developing the final rule, DOE considered the information identified by interested parties on the types of energy use or efficiency information commercial customers and owners of PTACs and PTHPs would find useful in making purchasing decisions. Before DOE can establish labeling rules, it must first ascertain whether the criteria outlined in the NOPR are met. 73 FR 18888–89. DOE will work with the Federal Trade Commission and other interested parties 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 continues to believe that a label on PTAC and PTHP equipment identifying the equipment class and efficiency level would be useful for enforcement of both the energy conservation standards as well as the building codes and would assist States and other interested parties in determining which application correlates to a given PTAC or PTHP (based upon size) because it would help commercial customers identify the efficiency associated with the PTAC and PTHP equipment being placed into commercial buildings. As DOE stated in the NOPR, DOE anticipates proposing labeling requirements for PTAC and PTHP equipment in a separate rulemaking and is not incorporating a labeling requirement as part of today's final rule. 73 FR 18889.

V. Analytical Results and Conclusions

A. Trial Standard Levels

In the NOPR, DOE examined seven TSLs for standard size and non-standard size PTACs and PTHPs at the representative cooling capacities. 73 FR 18889. Each TSL represented a set of efficiency levels that describe a possible amended energy conservation standard for each equipment class. For the final rule, DOE did not consider TSL 7 for standard size equipment (see section IV.C) because DOE determined that TSL 7 represented an efficiency level that potentially could not be attained in the full range of cooling capacities for standard size equipment utilizing R–410A. In addition, DOE analyzed a new TSL for standard size PTACs and PTHPs—TSL A—which is adopted in today's final rule. TSL A combines the efficiency levels in TSL 3 and TSL 1 for standard size PTACs at the representative cooling capacities and the efficiency levels in TSL 5 and TSL 3 for standard size PTHPs at the representative cooling capacities. DOE's inclusion of TSL A recognizes the challenge manufacturers encounter when increasing the efficiency of larger cooling capacity equipment. Table V.1 presents the TSLs analyzed for standard size PTACs and PTHPs in today's final rule and the efficiency levels within each TSL for each class and size of equipment analyzed.

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

Equipment class (cooling capacity)	Efficiency metric	Baseline (ASHRAE standard 90.1–1999)	TSL 1	TSL 2	TSL 3	TSL A	TSL 4	TSL 5	TSL 6 (Max-Tech)
Standard Size PTAC, 9,000 Btu/h	EER	10.6	10.9	10.9	11.1	11.1	10.9	11.3	11.5
Standard Size PTAC, 12,000 Btu/h	EER	9.9	10.2	10.2	10.4	10.2	10.2	10.6	10.8
Standard Size PTHP, 9,000 Btu/h	EER	10.4	10.9	11.1	11.1	11.3	11.3	11.3	11.5
	COP	3.0	3.1	3.2	3.2	3.3	3.3	3.3	3.3
Standard Size PTHP, 12,000 Btu/h	EER	9.7	10.2	10.4	10.4	10.4	10.6	10.6	10.8
	COP	2.9	3.0	3.1	3.1	3.1	3.1	3.1	3.1

Table V.2 presents the TSLs analyzed for non-standard size PTACs and PTHPs in today's final rule and the efficiency levels within each TSL for each class and size of equipment analyzed.

TABLE V.2—NON-STANDARD SIZE PTACS AND PTHPS BASELINE EFFICIENCY LEVELS AND TSLS

Equipment class (cooling capacity)	Efficiency metric	Baseline (ASHRAE standard 90.1–1999)	TSL 1	TSL 2	TSL 3	TSL 4	TSL 5 (Max-Tech)
Non-Standard Size PTAC, 11,000 Btu/h	EER	8.6	9.4	9.4	9.7	9.4	10.0
Non-Standard Size PTHP, 11,000 Btu/h	EER	8.5	9.4	9.7	9.7	10.0	10.0
		2.6	2.8	2.8	2.8	2.9	2.9

As stated in the engineering analysis (Chapter 5 of the final rule TSD), current Federal energy conservation standards and the efficiency levels specified by ASHRAE 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 Standard 90.1–1999 are based on equations that 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 (see Table II.1). For the NOPR, DOE derived the proposed standards (*i.e.*, efficiency level as a function of cooling capacity) by plotting 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. Chapter 9 of the NOPR TSD describes in detail how DOE determined the energy-efficiency equations for each TSL.

For the final rule, DOE used the energy-efficiency equations derived from the NOPR for TSLs 1, 2, 3, 4, 5, and 6 to extend the results from the representative cooling capacities to the entire range of cooling capacities of standard size PTACs and PTHPs. For TSL A, DOE calculated a new slope of the energy-efficiency equations using the methodology from the NOPR. Specifically, DOE 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. Table V.3 and Table V.4 identify the energy-efficiency equations for each TSL for standard size PTACs and PTHPs.

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

Standard size ** PTACs	Energy-efficiency equation *
Baseline ASHRAE Standard 90.1–1999	EER = 12.5 − (0.213 × Cap†/1000)

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

Standard size ** PTACs	Energy-efficiency equation *
TSL 1	EER = 13.0 − (0.233 × Cap †/1000)
TSL 2	EER = 13.0 − (0.233 × Cap †/1000)
TSL 3	EER = 13.2 − (0.233 × Cap †/1000)
TSL A	EER = 13.8 − (0.300 × Cap †/1000)
TSL 4	EER = 13.0 − (0.233 × Cap †/1000)
TSL 5	EER = 13.4 − (0.233 × Cap †/1000)
TSL 6	EER = 13.6 − (0.233 × 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 having an external wall opening greater than or equal to 16 inches high or greater than or equal to 42 inches wide, and a cross-sectional area greater than or equal to 670 square inches.
† Cap means cooling capacity in Btu/h at 95 °F outdoor dry-bulb temperature.

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

Standard size ** PTHPs	Energy-efficiency equation *
Baseline ASHRAE 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 A	EER = 14.0 − (0.300 × Cap †/1000) COP = 3.7 − (0.052 × 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)

* 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 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 having an external wall opening greater than or equal to 16 inches high or greater than or equal to 42 inches wide, and a cross-sectional area greater than or equal to 670 square inches.
† 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 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 in the NOPR. Chapter 9 of the NOPR TSD details how DOE determined the energy-efficiency equations for each TSL. For the final rule, DOE used the energy-efficiency equations presented in the NOPR for TSLs 1 through 5 to extend the results from the representative cooling capacities to the entire range of cooling capacities of non-standard size PTACs and PTHPs. Table V.5 and Table V.6 identify the energy-efficiency equations for each TSL for non-standard size PTAC and PTHP.

TABLE V.5—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 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)

* 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 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 existing wall sleeve dimensions having an external wall opening of less than 16 inches high or less than 42 inches wide, and a cross-sectional area less than 670 square inches.
† Cap means cooling capacity in Btu/h at 95 °F outdoor dry-bulb temperature.

TABLE V.6—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 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)

* 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 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 existing wall sleeve dimensions having an eternal wall opening of less than 16 inches high or less than 42 inches wide, and a cross-sectional area less than 670 square inches.

† Cap means cooling capacity in Btu/h at 95 °F outdoor dry-bulb temperature.

For PTACs and PTHPs with a cooling capacity of less than 7,000 Btu/h, DOE determined the EERs using a cooling capacity of 7,000 Btu/h in the energy-efficiency 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 energy-efficiency equations. This is the same method established in the Energy Policy Act of 1992 and provided in 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.

B. Significance of Energy Savings

To estimate the energy savings through 2042 due to amended standards, DOE compared the energy consumption of packaged terminal equipment under the base case (standards at the levels in ASHRAE Standard 90.1–1999) to energy consumption of this equipment under each standards case (i.e., each TSL, or set of amended standards, that DOE has considered). Table V.7 and Table V.8 summarize DOE's NES estimates, which are based on the *AEO2008* energy price forecast, for each TSL. Chapter 11 of the TSD describes these estimates in more detail. The tables provide both undiscounted and discounted values of energy savings from 2012 through 2042. Discounted energy savings at rates of 7 percent and 3 percent represent a policy perspective where energy savings farther in the future are less significant than energy savings closer to the present. Each TSL that is more stringent than the corresponding level in ASHRAE Standard 90.1–1999 results in additional energy savings, ranging from 0.015 quads to 0.068 quads for TSLs 1 through 6 for standard size PTAC and PTHP equipment classes, and from 0.004 to 0.009 quads for TSLs 1 through 5 for non-standard size PTAC and PTHP equipment classes.

TABLE V.7—SUMMARY OF CUMULATIVE NATIONAL ENERGY SAVINGS FOR STANDARD SIZE PTACS AND PTHPS

[Energy savings for units sold from 2012 to 2042]

Primary national energy savings (quads) (sum of all equipment classes)	Trial standard level		
	Undiscounted	3% Discounted	7% Discounted
1	0.015	0.007	0.003
2	0.024	0.012	0.006
3	0.031	0.016	0.007
A	0.032	0.016	0.007
4	0.033	0.017	0.008
5	0.049	0.025	0.011
6	0.068	0.035	0.015

TABLE V.8—SUMMARY OF CUMULATIVE NATIONAL ENERGY SAVINGS FOR NON-STANDARD SIZE PTACS AND PTHPS

[Energy savings for units sold from 2012 to 2042]

Primary national energy savings (quads) (sum of all equipment classes)	Trial standard level		
	Undiscounted	3% Discounted	7% Discounted
1	0.004	0.002	0.001
2	0.004	0.002	0.001
3	0.005	0.003	0.001
4	0.006	0.003	0.001

TABLE V.8—SUMMARY OF CUMULATIVE NATIONAL ENERGY SAVINGS FOR NON-STANDARD SIZE PTACS AND PTHPS—Continued

[Energy savings for units sold from 2012 to 2042]

Primary national energy savings (quads) (sum of all equipment classes)	Trial standard level		
	Undiscounted	3% Discounted	7% Discounted
5	0.009	0.004	0.002

Several commenters noted the potential for equipment switching where TSLs resulted in higher cooling efficiency requirements for PTHP and PTAC of the same cooling capacity. Higher cooling efficiency requirements would result in an increase in the price differential of minimum efficiency PTHP and PTAC equipment, causing some PTHP customers to shift to a PTAC with electric resistance heat.

From the perspective of assessing the energy savings achieved by a standard at a defined TSL, the primary concern from this anticipated equipment switching is the loss in energy savings that could result if some fraction of the PTHP market switches to the use of PTAC with electric resistance heat. While DOE recognizes that some PTHP customers might also switch to the use of fossil fuel (e.g. hydronic) heating, the relatively small fraction of the existing PTAC customers who currently use hydronic heat for the spaces served by PTAC (estimated at less than 1%), and the difficulty of retrofitting hydronic heating into buildings that do not use it suggests that the total fraction of the market that would opt for PTAC with hydronic heating is small. The majority of the total packaged terminal equipment market (PTAC and PTHP) currently uses PTAC with electric resistance heat, which supports the possibility that some purchasers would choose to switch from PTHPs to PTACs.

DOE did not have the information with which to assess the elasticity of the PTHP market with regards to this switching between PTHP and PTAC. To assess the significance of a shift from PTHP to PTAC purchases, DOE calculated the total fraction of the heat pump market that would need to shift to the purchase of PTAC equipment to negate the energy savings from increasing the PTHP cooling efficiency above that of the PTAC equipment. Two TSLs were first examined, TSL 2, and TSL 4. For standard size PTAC and PTHP equipment, TSL 2 has the same EER requirements for PTAC as TSL 1 but has a 0.2 EER increase for PTHP equipment as compared with TSL 1. For TSL 2, DOE calculated that a shift of 2.0 percent of the heat pump market to the use of PTAC with electric resistance would be sufficient to offset the energy savings difference between TSL 1 and TSL 2. If PTAC and PTHP standards were set at TSL 2, the purchase price differential between the two would increase on the order of $11, which would represent an increase of approximately 9.4 percent increase in the purchase price differential between PTAC and PTHP over TSL 1. This increase in the purchase price differential results from the increased PTHP efficiency at TSL 2. At TSL 1, the average annual payback in 2012 for a PTHP over a PTAC was calculated at approximately 2.10 years. At TSL 2, the average annual payback for a PTHP over a PTAC was 2.18 years. The average PBP for purchase of a PTHP over a PTAC increased 3.7 percent between TSL 1 and TSL 2.

Similarly, for TSL 4, DOE calculated that a shift of 3.8 percent of the heat pump market to the use of PTAC with electric resistance would offset the energy savings difference between TSL 1 and TSL 4. If PTAC and PTHP standards were set at TSL 4, the purchase price differential between the two would increase on the order of $22, or an 18.8 percent increase in the purchase price differential compared to that at TSL 1. This increase in price reflects the higher efficiency of the PTHP equipment at TSL 2 and TSL 4. At TSL 4, the average annual payback for purchase of a PTHP over a PTAC was 2.29 years. The average PBP for purchase of a PTHP over a PTAC increased approximately 9.2 percent between TSL 1 and TSL 4.

DOE also examined TSL A in light of potential equipment switching. In the case of TSL A, there is no comparable TSL considered by DOE that had a PTAC cooling efficiency level identical to TSL A but with PTHP cooling efficiencies at the same efficiency level. However, the nominal difference between PTHP and PTAC EER levels at TSL A, 0.2 EER, is identical to the nominal difference in EER levels at TSL 2 for all capacities. The difference in equipment price between a PTHP and PTAC at TSL A is $127 for a 9,000 Btu/h unit and $129 for a 12,000 Btu/h unit, which is virtually identical to the price differential at TSL 2, and represents a 9.2 percent increase in differential purchase price compared with TSL 1. DOE examined the energy savings at TSL A and TSL 1 for standard size PTAC and PTHP equipment only, and determined that under TSL A, it would take approximately 4.0 percent of standard size PTHP users to switch to a PTAC to negate the energy savings for TSL A over TSL 1. At TSL A, the estimated PBP for purchase of a PTHP over a PTAC under average use conditions was estimated at 2.15 years. Given the very small increase in differential purchase price between PTAC and PTHP at TSL A compared with standards set at identical efficiency levels (TSL 1) and the minimal difference in payback period at TSL A compared to TSL 1, DOE concludes that it is unlikely that an efficiency Standard set at TSL A would result in a significant number of standard size PTHP customers opting to instead purchase PTAC equipment with electric resistance heat.

C. Economic Justification

1. Economic Impact on Commercial Consumers

a. Life-Cycle Costs and Payback Period

Commercial consumers will be affected by the standards because they will experience higher purchase prices and lower operating costs. Generally, these impacts are best captured by changes in life-cycle costs and payback period. To determine these impacts, DOE calculated the LCC and PBP for the standard levels considered in this proceeding. DOE's LCC and PBP analyses provided five key outputs for each TSL, which are reported in Table V.9 through Table V.14. The first three outputs in each table are the proportion of PTAC or PTHP purchases in which the purchase of a design that complies with the TSL would create a net life-cycle cost, no impact, or a net life-cycle cost savings for the consumer. The fourth output is the average net life-cycle savings from purchasing a complying design compared with purchasing baseline equipment.

The fifth output is the average PBP for the consumer purchasing a design that complies with the TSL compared with purchasing baseline equipment. The PBP is the number of years it would take for the customer to recover, as a result of energy savings, the increased costs of higher-efficiency equipment based on the operating cost savings from the first year of ownership. The PBP is an economic benefit-cost measure that uses benefits and costs without discounting. TSD Chapter 8 details the LCC and PBP analyses.

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

	Trial standard level*						
	1	2	3	A	4	5	6
EER	10.9	10.9	11.1	11.1	10.9	11.3	11.5
PTAC with Net LCC Increase (%)	15	15	30	30	15	46	62
PTAC with No Change in LCC (%)	77	77	56	56	77	37	18
PTAC with Net LCC Savings (%)	7	7	14	14	7	17	21
Mean LCC Savings (2007$)	(1)	(1)	(3)	(3)	(1)	(6)	(10)
Mean Payback Period (years)	13.0	13.0	13.7	13.7	13.0	14.5	15.2

* Numbers in parentheses indicate negative LCC savings, *i.e.*, an increase in LCC. Detailed percentage changes may not sum to 100% due to rounding.

TABLE V.10—SUMMARY LCC AND PBP RESULTS FOR STANDARD SIZE PTHP WITH A COOLING CAPACITY OF 9,000 BTU/H

	Trial standard level*						
	1	2	3	A	4	5	6
EER	10.9	11.1	11.1	11.3	11.3	11.3	11.5
PTHP with Net LCC Increase (%)	7	10	10	13	13	13	24
PTHP with No Change in LCC (%)	78	57	57	37	37	37	18
PTHP with Net LCC Savings (%)	16	33	33	50	50	50	58
Mean LCC Savings (2007$)	11	20	20	28	28	28	24
Mean Payback Period (years)	5.1	4.5	4.5	4.4	4.4	4.4	5.1

* Numbers in parentheses indicate negative LCC savings, *i.e.*, an increase in LCC. Detailed percentage changes may not sum to 100% due to rounding.

TABLE V.11—SUMMARY LCC AND PBP RESULTS FOR STANDARD SIZE PTAC WITH A COOLING CAPACITY OF 12,000 BTU/H

	Trial standard level*						
	1	2	3	A	4	5	6
EER	10.2	10.2	10.4	10.2	10.2	10.6	10.8
PTAC with Net LCC Increase (%)	16	16	31	16	16	48	65
PTAC with No Change in LCC (%)	77	77	56	77	77	36	18
PTAC with Net LCC Savings (%)	7	7	13	7	7	16	17
Mean LCC Savings* (2007$)	(2)	(2)	(5)	(2)	(2)	(10)	(15)
Mean PBP (years)	13.1	13.1	14.0	13.1	13.1	14.9	15.9

* Numbers in parentheses indicate negative savings, *i.e.*, an increase in LCC. Detailed percentage changes may not sum to 100% due to rounding.

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

	Trial standard level*						
	1	2	3	A	4	5	6
EER	10.2	10.4	10.4	10.4	10.6	10.6	10.8
PTHP with Net LCC Increase (%)	7	10	10	10	21	21	35
PTHP with No Change in LCC (%)	77	57	57	57	37	37	18
PTHP with Net LCC Savings (%)	16	33	33	33	42	42	47
Mean LCC Savings (2007$)	13	24	24	24	20	20	14
Mean PBP (years)	5.1	4.6	4.6	4.6	5.5	5.5	6.4

* Numbers in parentheses indicate negative savings, *i.e.*, an increase in LCC. Detailed percentage changes may not sum to 100% due to rounding.

TABLE V.13—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
EER	9.4	9.4	9.7	9.4	10.0
PTAC with Net LCC Increase (%)	6	6	14	6	25
PTAC with No Change in LCC (%)	73	73	47	73	23
PTAC with Net LCC Savings (%)	22	22	39	22	52
Mean LCC Savings (2007$)	26	26	30	26	31
Mean PBP (years)	4.4	4.4	5.1	4.4	5.9

* Numbers in parentheses indicate negative savings, *i.e.*, an increase in LCC. Detailed percentage changes may not sum to 100% due to rounding.

TABLE V.14—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
EER	9.4	9.7	9.7	10.0	10.0
PTHP with Net LCC Increase (%)	1	3	3	5	5
PTHP with No Change in LCC (%)	73	47	47	23	23
PTAC with Net LCC Savings (%)	27	50	50	72	72
Mean LCC Savings (2007$)	62	66	66	80	80
Mean PBP (years)	2.2	2.8	2.8	3.0	3.0

* Numbers in parentheses indicate negative savings, *i.e.*, an increase in LCC. Detailed percentage changes may not sum to 100% due to rounding.

For PTACs and PTHPs with a cooling capacity of less than 7,000 Btu/h, DOE established the energy conservation standards using a cooling capacity of 7,000 Btu/h in the efficiency-capacity equation (see section VI.A). The LCC and PBP impacts for equipment in this category will be similar to the impacts for 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 energy conservation standards using a cooling capacity of 15,000 Btu/h in the efficiency-capacity equation. Further, for PTACs and PTHPs with a cooling capacity greater than 15,000 Btu/h, DOE established that the impacts will be similar for units with a cooling capacity of 12,000 Btu/h. Section V.A of today's final rule provides more details on how DOE developed the energy-efficiency equations based on the analysis results for the representative cooling capacities.

b. Commercial Consumer Subgroup Analysis

DOE estimated commercial consumer subgroup impacts by determining the LCC impacts at each TSL on small businesses, such as small independent hotels and motels. Table V.15 shows the mean LCC savings from the final energy conservation standards; Table V.16 shows the mean payback period (in years) for this subgroup of commercial consumers. DOE's analysis using the LCC spreadsheet model indicated that the LCC and PBP impacts on the small independent hotels and motels were similar to the corresponding impacts on the larger population of the commercial consumers. Chapter 12 of the TSD explains DOE's method for conducting the consumer subgroup analysis and presents the detailed results of that analysis.

TABLE V.15—MEAN LIFE-CYCLE COST SAVINGS FOR PTAC OR PTHP EQUIPMENT PURCHASED BY LCC SUBGROUPS (2007$)

Equipment class (cooling capacity)	Trial standard level						
Standard Size	TSL 1	TSL 2	TSL 3	TSL A	TSL 4	TSL 5	TSL 6
Standard Size PTAC (9,000 Btu/h)	(2)	(2)	(5)	(5)	(2)	(9)	(13)
Standard Size PTHP (9,000 Btu/h)	8	16	16	22	22	22	17
Standard Size PTAC (12,000 Btu/h)	(4)	(4)	(7)	(4)	(4)	(13)	(19)
Standard Size PTHP (12,000 Btu/h)	10	18	18	18	13	13	7
Non-Standard Size	TSL 1	TSL 2	TSL 3	TSL 4	TSL 5		
Non-Standard Size PTAC	22	22	24	22	23		
Non-Standard Size PTHP	54	56	56	68	68		

* Numbers in parentheses indicate negative savings.

TABLE V.16—MEAN PAYBACK PERIOD FOR PTAC OR PTHP EQUIPMENT PURCHASED BY LCC SUBGROUPS (YEARS)

Equipment class (cooling capacity)	Trial standard level						
Standard Size	TSL 1	TSL 2	TSL 3	TSL A	TSL 4	TSL 5	TSL 6
Standard Size PTAC (9,000 Btu/h)	13.0	13.0	13.6	13.6	13.0	14.4	15.1
Standard Size PTHP (9,000 Btu/h)	5.0	4.5	4.5	4.4	4.4	4.4	5.1
Standard Size PTAC (12,000 Btu/h)	13.1	13.1	13.9	13.1	13.1	14.8	15.8
Standard Size PTHP (12,000 Btu/h)	5.1	4.6	4.6	4.6	5.5	5.5	6.3
Non-Standard Size	TSL 1	TSL 2	TSL 3	TSL 4	TSL 5		
Non-Standard Size PTAC	4.4	4.4	5.1	4.4	5.9		
Non-Standard Size PTHP	2.2	2.8	2.8	2.9	2.9		

2. Economic Impact on Manufacturers

DOE described the qualitative economic impacts of today's standard on manufacturers in the NOPR. 73 FR 18893–99. This analysis is described in greater detail in Chapter 13 of the TSD.

As part of its NOPR analysis, DOE analyzed two distinct markup scenarios: (1) The flat markup scenario, and (2) the partial cost recovery markup scenario. 73 FR 18886. 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 its engineering and GRIM analyses 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.

Together, these two 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 phaseout and the amended energy conservation standards (See Chapter 13 of the TSD for additional details of the markup scenarios.). For this final rule, DOE also examined both of these scenarios.

a. Industry Cash-Flow Analysis Results

Using the two different markup scenarios described above, DOE estimated the impact of amended standards for PTACs and PTHPs on the INPV of the package terminal equipment industry. See 73 FR 18886–87 and 18893–94. The impact of new standards on INPV consists of the difference between the INPV in the base case and the INPV in the standards case. INPV is the primary metric used in the MIA, and represents one measure of the fair value of the industry in today's dollars. DOE calculated the INPV by summing all of the net cash flows, discounted at the industry's cost of capital or discount rate.

Table V.17 through Table V.20 show the estimated changes in INPV for manufacturers of standard size packaged terminal equipment and non-standard size packaged terminal equipment, respectively, that would result from the TSLs DOE considered for this final rule. The tables also present the equipment conversion expenses and capital investments that the industry would incur at each TSL. Equipment conversion expenses include engineering, prototyping, testing, and marketing expenses incurred by a manufacturer as it prepares to comply with a standard. Capital investments are the one-time outlays for equipment and buildings required for the industry to comply (*i.e.*, conversion capital expenditures).

TABLE V.17—MANUFACTURER IMPACT ANALYSIS RESULTS, INCLUDING INPV ESTIMATES, 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	A	4	5	6
INPV	(2007$ millions)	427	424	421	424	419	419	426	423
Change in INPV	(2007$ millions)	....	−3	−6	−3	−8	−8	−1	−4
	(%)	....	−0.8	−1.4	−0.8	−1.9	−1.9	−0.2	−0.9
Amended Energy Conservation Standards Equipment Conversion Expenses.	(2007$ millions)	....	4.5	7.4	6.3	9.1	10.6	7.2	13.5
Amended Energy Conservation Standards Capital Conversion Expenses.	(2007$ millions)	....	3.5	5.7	4.9	8.2	8.2	5.6	10.4

TABLE V.17—MANUFACTURER IMPACT ANALYSIS RESULTS, INCLUDING INPV ESTIMATES, FOR STANDARD SIZE PTACS AND PTHPS UNDER THE FLAT 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	A	4	5	6
Total Energy Conservation Standards Investment Required.	(2007$ millions)	....	8.0	13.2	11.2	17.3	18.7	12.8	23.9

TABLE V.18—MANUFACTURER IMPACT ANALYSIS RESULTS, INCLUDING INPV ESTIMATES, 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	A	4	5	6
INPV	(2007$ millions)	427	399	382	367	366	359	325	263
Change in INPV	(2007$ millions)	....	−28	−45	−60	−61	−68	−103	−164
	(%)	....	−6.6	−10.7	−14.0	−14.3	−16.0	−24.0	−38.3
Amended Energy Conservation Standards Equipment Conversion Expenses.	(2007$ millions)	....	4.5	7.4	6.3	9.1	10.6	7.2	13.5
Amended Energy Conservation Standards Capital Conversion Expenses.	(2007$ millions)	....	3.5	5.7	4.9	8.2	8.2	5.6	10.4
Total Energy Conservation Standards Investment Required.	(2007$ millions)	....	8.0	13.2	11.2	17.3	18.7	12.8	23.9

TABLE V.19—MANUFACTURER IMPACT ANALYSIS RESULTS, INCLUDING INPV ESTIMATES, FOR NON-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
INPV	(2007$ millions)	30	14	13	13	9	11
Change in INPV	(2007$ millions)	....	−16	−17	−17	−21	−20
	(%)	....	−53.6	−57.6	−56.3	−68.5	−64.8
Amended Energy Conservation Standards Equipment Conversion Expenses.	(2007$ millions)	....	20.5	21.0	21.0	23.8	23.8
Amended Energy Conservation Standards Capital Conversion Expenses.	(2007$ millions)	....	1.3	2.3	2.0	3.6	2.6
Total Energy Conservation Standards Investment Required.	(2007$ millions)	....	21.8	23.3	23.0	27.3	26.4

TABLE V.20—MANUFACTURER IMPACT ANALYSIS RESULTS, INCLUDING INPV ESTIMATES, 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
INPV	(2007$ millions)	30	13	11	10	7	6
Change in INPV	(2007$ millions)	....	−17	−19	−20	−23	−24
	(%)	....	−57.8	−63.8	−65.4	−78.0	−81.2
Amended Energy Conservation Standards Equipment Conversion Expenses.	(2007$ millions)	....	20.5	21.0	21.0	23.8	23.8

TABLE V.20—MANUFACTURER IMPACT ANALYSIS RESULTS, INCLUDING INPV ESTIMATES, FOR NON-STANDARD SIZE PTACS AND PTHPS UNDER THE PARTIAL COST RECOVERY MARKUP SCENARIO—Continued

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
Amended Energy Conservation Standards Capital Conversion Expenses.	(2007$ millions)	....	1.3	2.3	2.0	3.6	2.6
Total Energy Conservation Standards Investment Required.	(2007$ millions)	....	21.8	23.3	23.0	27.3	26.4

The NOPR provides a discussion of the estimated impact of amended PTAC and PTHP standards on INPV for each equipment class. 73 FR 18893–97. This qualitative discussion on the estimated impacts of amended PTAC and PTHP standards in INPV for each equipment class for the final rule can be found in Chapter 13 of the TSD.

b. Impacts on Employment

As discussed in the NOPR, DOE expects no significant, discernable direct employment impacts on both standard size and non-standard size PTAC and PTHP manufacturers under today's standards compared to the base case, or under any of the TSLs considered for today's rule. 73 FR 18898. Today's notice estimates the impacts on U.S. production workers in the standard size and non-standard size PTAC and PTHP industry impacted by the final rule. The estimated impacts are shown in Table V.21. For the standard size PTAC and PTHP industry, DOE does not expect negative direct employment impacts because the labor content of each unit produced is expected to be slightly higher and the total number of units produced is expected to be the same. Furthermore, based on interviews with domestic manufacturers, DOE expects the proportion of units produced domestically to remain unchanged. Therefore, DOE presents a scenario where employment increases as a function of increasing production costs.

For the non-standard size PTAC and PTHP industry, DOE reports a range of possible domestic employment impacts. Assuming shipment levels and product availability remain at the levels experienced in the current market, DOE expects a slight increase in domestic employment as characterized by the high-bound scenario. However, if either shipments drop or if manufacturers respond to higher labor requirements by shifting production to lower-labor-cost countries, DOE expects that there could be reductions in total domestic employment as characterized by the low-bound scenario. Further support for these conclusions is set forth in Chapter 13 of the final rule TSD.

TABLE V.21—CHANGE IN TOTAL NUMBER OF DOMESTIC PRODUCTION EMPLOYEES IN 2012 IN THE STANDARD SIZE AND NON-STANDARD SIZE PTAC AND PTHP MANUFACTURING INDUSTRY *

	Standard size PTAC and PTHP manufacturing industry						
	TSL 1	TSL 2	TSL 3	TSL A	TSL 4	TSL 5	TSL 6
Change in Total Number of Domestic Production Employees in 2012	1	2	3	3	3	6	9

	Non-standard size PTAC and PTHP manufacturing industry				
	TSL 1	TSL 2	TSL 3	TSL 4	TSL 5
Change in Total Number of Domestic Production Employees in 2012 ..	(106)—1	(106)—1	(107)—1	(107)—1	(108)—2

* Numbers in parentheses indicate a loss in domestic employment.

3. National Net Present Value and Net National Employment

The NPV analysis estimates the cumulative benefits or costs to the Nation that would result from particular standard levels. While the NES analysis estimates the energy savings from each standard level DOE considers, relative to the base case, the NPV analysis estimates the national economic impacts of each such level relative to the base case. Table V.22 and Table V.23 provide an overview of the NPV results for PTACs and PTHPs, respectively, using both a 7-percent and a 3-percent real discount rate. See TSD Chapter 11 for more detailed NPV results.

TABLE V.22—SUMMARY OF CUMULATIVE NET PRESENT VALUE FOR STANDARD SIZE PTACS AND PTHPS

Trial standard level	PTAC NPV * (million 2007$)		PTHP NPV * (million 2007$)		PTAC and PTHP NPV * (million 2007$)	
	7% Discount rate	3% Discount rate	7% Discount rate	3% Discount rate	7% Discount rate	3% Discount rate
1	($3)	($1)	$4	$18	$1	$17
2	(3)	(1)	12	44	8	43

TABLE V.22—SUMMARY OF CUMULATIVE NET PRESENT VALUE FOR STANDARD SIZE PTACS AND PTHPS—Continued

Trial standard level	PTAC NPV* (million 2007$)		PTHP NPV* (million 2007$)		PTAC and PTHP NPV* (million 2007$)	
	7% Discount rate	3% Discount rate	7% Discount rate	3% Discount rate	7% Discount rate	3% Discount rate
3	(9)	(6)	12	44	2	38
A	(5)	(3)	15	57	10	54
4	(3)	(1)	10	50	6	49
5	(20)	(20)	10	50	(11)	31
6	(38)	(43)	(3)	34	(41)	(10)

*Numbers in parentheses indicate negative NPV, *i.e.*, a net cost. Detail may not appear to sum to total due to rounding.

TABLE V.23—SUMMARY OF CUMULATIVE NET PRESENT VALUE FOR NON-STANDARD SIZE PTACS AND PTHPS

Trial standard level	PTAC NPV* (million 2007$)		PTHP NPV* (million 2007$)		PTAC and PTHP NPV* (million 2007$)	
	7% Discount rate	3% Discount rate	7% Discount rate	3% Discount rate	7% Discount rate	3% Discount rate
1	$2	$6	$3	$8	$5	$14
2	2	6	4	10	6	16
3	3	8	4	10	7	19
4	2	6	6	17	8	23
5	4	11	6	17	10	29

*Numbers in parentheses indicate negative NPV, *i.e.*, a net cost. Detail may not appear to sum to total due to rounding.

Using 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, using a 3-percent discount rate increases the NPV at most TSLs. (See TSD Chapter 11.)

DOE also estimated the national employment impacts that would result from each TSL. As discussed in the NOPR, 73 FR 18887, 18899–900, 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. As Table V.24 and Table V.25 illustrate, DOE estimates net indirect employment impacts—those changes of employment in the larger economy (other than in the manufacturing sector being regulated)—from PTAC and PTHP energy conservation standards to be positive but very small relative to total national employment, primarily due to the small net monetary savings from PTAC and PTHP standards available for transfer to other sectors, relative to the economy as a whole. This increase would likely be sufficient to fully offset any adverse impacts on employment that might occur in the packaged terminal equipment industry. For details on the employment impact analysis methods and results, see TSD Chapter 15.

TABLE V.24—NET NATIONAL CHANGE IN INDIRECT EMPLOYMENT, JOBS IN 2042, STANDARD SIZE PTACS AND PTHPS

Trial standard level	Net national change in jobs (number of jobs)	
	PTACs	PTHPs
1	14	27
2	14	56
3	31	56
A	20	71
4	14	82
5	56	82
6	86	104

TABLE V.25—NET NATIONAL CHANGE IN INDIRECT EMPLOYMENT, JOBS IN 2042, NON-STANDARD SIZE PTACS AND PTHPS

Trial standard level	Net national change in jobs (number of jobs)	
	PTACs	PTHPs
1	3	5
2	3	6
3	6	6
4	3	11
5	9	11

4. Impact on Utility or Performance of Equipment

DOE believes that the standards it is adopting today will not lessen the utility or performance of any PTAC or PTHP because of the steps DOE has taken to establish product classes and evaluate design options and the impact of potential standard levels, as indicated in section V.B.4 of the NOPR. 73 FR 18900. DOE stated in the NOPR, it was concerned about the potential misclassification of a portion of the non-standard size market if the delineations within ASHRAE Standard 90.1–1999 were adopted by DOE. 73 FR 18865. DOE has mitigated non-standard manufacturers' concerns by adopting the delineations within Addendum t to ASHRAE Standard 90.1–2007 for distinguishing various sleeve size equipment.

5. Impact of Any Lessening of Competition

As discussed in the NOPR, 73 FR 18865, 18900, and in section III.D.5 of this notice, DOE considered any lessening of competition likely to result from standards. The Attorney General determines the impact of any such lessening of competition.

In its comment on the NOPR, DOJ expressed concerns about whether the proposed standards would adversely affect competition. In particular, DOJ stated its belief that the efficiency levels for non-standard size PTACs and PTHPs in the NOPR may create a risk that is too strict for the manufacturers to satisfy given the state of the technology. DOJ further commented that non-standard customers could face the choice of incurring capital expenditures to alter the size of the wall opening to accommodate standard size PTACs and PTHPs if non-standard size units become unavailable. DOJ also stated its concerns regarding the efficiency levels for standard size PTHPs proposed in the NOPR, arguing the proposed levels would be too stringent for the manufacturers to achieve. (DOJ, No. 21 at p. 1–2) The Attorney General's response is reprinted at the end of today's rulemaking.

6. Need of the Nation To Conserve Energy

An improvement in the energy efficiency of PTACs and PTHPs, where economically justified, is likely to improve the security of the Nation's energy system by reducing overall demand for energy, and thus, reducing the Nation's reliance on foreign sources of energy. Reduced demand is also likely to improve the reliability of the electricity system, particularly during peak-load periods. As a measure of this reduced demand, DOE expects the amended standards covered under this rulemaking to eliminate the need for construction of between approximately 40 megawatts and 196 megawatts of new power by 2042.

Enhanced energy efficiency also produces environmental benefits. The expected energy savings from higher standards for the products covered by this rulemaking will reduce the emissions of air pollutants and greenhouse gases associated with energy production and building use of fossil fuels. Table V.26 and Table V.27 show cumulative CO_2, NO_X, and Hg emissions reductions for standard size and non-standard size PTACs and PTHPs by TSL over the rulemaking period. The expected energy savings from amended standards will reduce the emissions of greenhouse gases associated with energy production, and may reduce the cost of maintaining nationwide emissions standards and constraints.

TABLE V.26—SUMMARY OF EMISSIONS REDUCTIONS FOR STANDARD SIZE PTACS AND PTHPS (CUMULATIVE REDUCTIONS FOR EQUIPMENT SOLD FROM 2012 TO 2042)

	Trial standard levels						
	TSL 1	TSL 2	TSL 3	TSL A	TSL 4	TSL 5	TSL 6
Emissions Reductions for PTACs *							
CO_2 (Mt)	0.20	0.20	0.45	0.29	0.20	0.79	1.22.
NO_X (kt)	0.01 to 0.31	0.01 to 0.31	0.03 to 0.69	0.02 to 0.45	0.01 to 0.31	0.05 to 1.23	0.08 to 1.88.
Hg (t)	0 to 0.007	0 to 0.007	0 to 0.016	0 to 0.010	0 to 0.007	0 to 0.028	0 to 0.043.
Emissions Reductions for PTHPs *							
CO_2 (Mt)	0.29	0.61	0.61	0.77	0.88	0.88	1.12.
NO_X (kt)	0.03 to 0.63	0.05 to 1.33	0.05 to 1.33	0.07 to 1.68	0.08 to 1.94	0.08 to 1.94	0.10 to 2.46.
Hg (t)	0 to 0.010	0 to 0.021	0 to 0.021	0 to 0.027	0 to 0.031	0 to 0.031	0 to 0.039.
Emissions Reductions for PTACs and PTHPs *							
CO_2 (Mt)	0.49	0.81	1.05	1.06	1.09	1.68	2.34.
NO_X (kt)	0.04 to 0.94	0.07 to 1.64	0.08 to 2.02	0.09 to 2.13	0.09 to 2.25	0.13 to 3.17	0.18 to 4.34.
Hg (t)	0 to 0.017	0 to 0.028	0 to 0.037	0 to 0.037	0 to 0.038	0 to 0.059	0 to 0.082.

* Negative values indicate emission increases. Detail may not appear to sum to total due to rounding.

TABLE V.27—SUMMARY OF EMISSIONS REDUCTIONS FOR NON-STANDARD SIZE PTACS AND PTHPS (CUMULATIVE REDUCTIONS FOR EQUIPMENT SOLD FROM 2012 TO 2042)

	Trial standard levels				
	TSL 1	TSL 2	TSL 3	TSL 4	TSL 5
Emissions Reductions for PTACs *					
CO_2 (Mt)	0.06	0.06	0.10	0.06	0.16.
NO_X (kt)	0.004 to 0.10	0.004 to 0.10	0.006 to 0.16	0.004 to 0.10	0.010 to 0.24.
Hg (t)	0 to 0.002	0 to 0.002	0 to 0.004	0 to 0.002	0 to 0.005.
Emissions Reductions for PTHPs *					
CO_2 (Mt)	0.06	0.08	0.08	0.14	0.14.
NO_X (kt)	0.005 to 0.13	0.007 to 0.18	0.007 to 0.18	0.012 to 0.30	0.012 to 0.30.
Hg (t)	0 to 0.002	0 to 0.003	0 to 0.003	0 to 0.005	0 to 0.005.
Emissions Reductions for PTACs and PTHPs *					
CO_2 (Mt)	0.12	0.14	0.18	0.20	0.29.
NO_X (kt)	0.009 to 0.23	0.011 to 0.28	0.014 to 0.34	0.016 to 0.40	0.022 to 0.55.
Hg (t)	0 to 0.004	0 to 0.005	0 to 0.006	0 to 0.007	0 to 0.010.

* Negative values indicate emission increases. Detail may not appear to sum to total due to rounding.

The estimated cumulative CO_2, NO_X, and Hg emissions reductions for the amended energy conservation standards range up to a maximum of 2.34 Mt for CO_2, 0.04 to 4.34 kt for NO_X, and 0 to 0.08 t for Hg for standard size PTACs and PTHPs over the period from 2012 to 2042. In the Environmental Assessment (Chapter 16 of the FR TSD), DOE reports estimated annual changes in CO_2, NO_X, and Hg emissions attributable to each TSL. As discussion in section IV.J of this final rule, DOE does not report SO_2 emissions reduction from power plants because reductions from an energy conservation standard would not affect the overall level of SO_2 emissions in the United States due to the emissions caps for SO_2.

The NEMS–BT modeling assumed that NOX would be subject to the Clean Air Interstate Rule (CAIR) issued by the U.S. Environmental Protection Agency on March 10, 2005.[16] 70 FR 25162 (May 12, 2005). On July 11, 2008, the U.S. Court of Appeals for the District of Columbia Circuit (D.C. Circuit) issued its decision in *North Carolina* v. *Environmental Protection Agency,*[17] in which the court vacated the CAIR. 531 F.3d 896 (D.C. Cir. 2008). If left in place, the CAIR would have permanently capped emissions of NO_X in 28 eastern States and the District of Columbia. As with the SO_2 emissions cap, a cap on NO_X emissions would have meant that energy conservation standards are not likely to have a physical effect on NO_X emissions in States covered by the CAIR caps. While the caps would have meant that physical emissions reductions in those States would not have resulted from the energy conservation standards that DOE is amending today, the standards might have produced an environmental-related economic impact in the form of lower prices for emissions allowance credits, if large enough. DOE notes that the estimated total reduction in NO_X emissions, including projected emissions or corresponding allowance credits in States covered by the CAIR cap was insignificant and too small to affect allowance prices for NO_X under the CAIR.

Even though the D.C. Circuit vacated the CAIR, DOE notes that the D.C. Circuit left intact EPA's 1998 NO_X SIP Call rule, which capped seasonal (summer) NO_X emissions from electric generating units and other sources in 23 jurisdictions and gave those jurisdictions the option to participate in a cap and trade program for those emissions. 63 FR 57356, 57359 (Oct. 27, 1998).[18] DOE notes that the SIP Call rule may provide a similar, although smaller in extent, regional cap and may limit actual reduction in NO_X emissions from revised standards occurring in States participating in the SIP Call rule. However, the possibility that the SIP Call rule may have the same effect as CAIR is highly uncertain. Therefore, DOE established a range of NO_X reductions due to the standards being amended in today's final rule. DOE's low estimate was based on the emission rate of the cleanest new natural gas combined-cycle power plant available for electricity generated based on the assumption that energy conservation standards would result in only the cleanest available fossil-fueled generation being displaced. DOE used the emission rate, specified in 0.0341t of NO_X emitted per TWh of electricity generated, associated with an advanced natural gas combined-cycle power plant, as specified by NEMS–BT. To estimate the reduction in NO_X emissions, DOE multiplied this emission rate by the reduction in electricity generation due to the amended energy conservation standards considered. DOE's high estimate of 0.843 t of NO_X per TWh was based on the use of a nationwide NO_X emission rate for all electrical generation. Use of such an emission rate assumes that future energy conservation standards would result in displaced electrical generation mix that is equivalent to today's mix of power plants (*i.e.*, future power plants displaced are no cleaner than what are being used currently to generate electricity). In addition, under the high estimate assumption, energy conservation standards would have little to no effect on the generation mix. Based on AEO2008 for a recent year (2006) in which no regulatory or non-regulatory measures were in effect to limit NO_X emissions, DOE multiplied this emission rate by the reduction in electricity generation due to the standards considered. The range in NO_X emission changes calculated under using the low and high estimate scenarios are shown in Table V.26 and Table V.27 by TSL. The range of total NO_X emission reductions is from 0.04 to 4.34 tons for the range of TSLs considered. These changes in NO_X emissions are extremely small, with a range between 0.0001 and 0.009 percent of the national base case emissions forecast by NEMS–BT, depending on the TSL.

As noted above in section IV.J, with regard to Hg emissions, DOE is able to report an estimate of the physical quantity changes in these emissions associated with an energy conservation standard. As opposed to using the NEMS–BT model, DOE established a range of Hg rates to estimate the Hg emissions that could be reduced from standards. DOE's low estimate was based on the assumption that future standards would displace electrical generation from natural gas-fired power plants resulting in an effective emission rate of zero. The low-end emission rate is zero because virtually all Hg emitted from electricity generation is from coal-fired power plants. Based on an emission rate of zero, no emissions would be reduced from energy conservation standards. DOE's high estimate was based on the use of a nationwide mercury emission rate from AEO2008. Because power plant emission rates are a function of local regulation, scrubbers, and the mercury content of coal, it is extremely difficult to come up with a precise high-end emission rate. Therefore, DOE believes the most reasonable estimate is based on the assumption that all displaced coal generation would have been emitting at the average emission rate for coal generation as specified by AEO2008. As noted previously, because virtually all mercury emitted from electricity generation is from coal-fired power plants, DOE based the emission rate on the tons of mercury emitted per TWh of coal-generated electricity. Based on the emission rate for a recent year (2006), DOE derived a high-end emission rate of 0.0255 tons per TWh. To estimate the reduction in mercury emissions, DOE multiplied the emission rate by the reduction in coal-generated electricity due to the standards considered as determined in the utility impact analysis. The estimated changes in Hg

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

[17] Case No. 05–1244, 2008 WL 2698180 at *1 (DC Cir. July 11, 2008).

[18] In the NO_X SIP Call rule, EPA found that sources in the District of Columbia and 22 ''upwind'' states (States) were emitting NO_X (an ozone precursor) at levels that significantly contributed to ''downwind'' states not attaining the ozone NAAQS or at levels that interfered with states in attainment maintaining the ozone NAAQS. In an effort to ensure that ''downwind'' states attain or continue to attain the ozone NAAQS, EPA established a region-wide cap for NO_X emissions from certain large combustion sources and set a NO_X emissions budget for each State. Unlike the cap that CAIR would have established, the NO_X SIP Call Rule's cap only constrains seasonal (summer time) emissions. In order to comply with the NO_X SIP Call Rule, States could elect to participate in the NO_X Budget Trading Program. Under the NO_X Budget Trading Program, each emission source is required to have one allowance for each ton of NO_X emitted during the ozone season. States have flexibility in how they allocate allowances through their State Implementation Plans but States must remain within the EPA-established budget. Emission sources are allowed to buy, sell and bank NO_X allowances as appropriate. It should be noted that, on April 16, 2008, EPA determined that Georgia is no longer subject to the NO_X SIP Call rule. 73 FR 21528 (April 22, 2008).

emissions are shown in Table V.26 and Table V.27 for both the standard and non-standard size PTAC and PTHP equipment for the period from 2012 to 2042. The range of total Hg emission reductions is from 0 to 0.082 tons for the range of TSLs considered. These changes in Hg emissions are extremely small, with a range between 0 and 0.016 percent of the national base case emissions forecast by NEMS–BT, depending on the TSL.

The NEMS–BT model used for today's rulemaking could not be used to estimate Hg emission reductions due to standards as it assumed that Hg emissions would be subject to EPA's Clean Air Mercury Rule [19] (CAMR), which would have permanently capped 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 a system, energy conservation standards would have resulted in no physical effect on these emissions, but might have resulted in an environmental-related economic benefit in the form of a lower price for emissions allowance credits, if large enough. DOE estimated that the change in the Hg emissions from energy conservation standards would not be large enough to influence allowance prices under CAMR.

On February 8, 2008, the D.C. Circuit issued its decision in *New Jersey v. Environmental Protection Agency*, [20] in which the D.C. Circuit, among other actions, vacated the CAMR referenced above. In light of this development and because the NEMS–BT model could not be used to directly calculate the Hg emission reductions, DOE used the current Hg emission rates as discussed above to calculate the reductions in Hg emissions in Table V.26 and Table V.27.

In the NOPR, DOE stated that it was considering taking into account a monetary benefit of CO_2 emission reductions associated with this rulemaking. To put the potential monetary benefits from reduced CO_2 emissions into a form that is likely to be most useful to decisionmakers and stakeholders, DOE used the same methods used to calculate the net present value of consumer cost savings: The estimated year-by-year reductions in CO_2 emissions were converted into monetary values and these 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.

In the NOPR, DOE proposed to use the range $0 to $14 per ton. These estimates were based on an assumption of no benefit to an average benefit value reported by the IPCC.[21] It is important to note that the IPCC estimate used as the upper bound value was derived from an estimate of the mean value of worldwide impacts from potential climate impacts caused by CO_2 emissions, and not just the effects likely to occur within the United States. As DOE considers a monetary value for CO_2 emission reductions, the value should be restricted to a representation of those costs/benefits likely to be experienced in the United States. As DOE also explained in the NOPR, it expects that such values would be lower than comparable global values, however, there currently are no consensus estimates for the U.S. benefits likely to result from CO_2 emission reductions. However, DOE believes it is appropriate to use U.S. benefit values, where available, and not world benefit values, in its analysis.[22] Because U.S. specific estimates are not available, and DOE did not receive any additional information that would help serve to narrow the proposed range as a representative range for domestic U.S. benefits, DOE believes it is appropriate to use the global mean value as an appropriate upper bound U.S. value for purposes of sensitivity analysis.

DOE received several comments in response to the proposed estimated value of CO_2 emissions reductions. EarthJustice questioned both the upper and lower bounds of DOE's range of estimated CO_2 values, both of which EarthJustice argued were too low. EarthJustice also stated that it would be inappropriate to limit the consideration to the value of CO_2 to a domestic value. EarthJustice and the joint comment from ACEE and the Natural Resource Defense Council recommended that DOE consider relying on the estimate used in DOE's analysis of the America's Climate Security Bill of 2007 (S. 2191).[23] AHRI commented that DOE should not rely on the IPCC study or values under the European Union ''cap and trade'' program, but instead should consider a monetary value for CO_2 only once a U.S. ''cap and trade'' program has been established, stressing that DOE should consider only the domestic value of CO_2 emissions.

Given the uncertainty surrounding estimates of the SCC, relying on any single study may be inadvisable since its estimate of the SCC will depend on many assumptions made by its authors. The Working Group II's contribution to the Fourth Assessment Report of the IPCC notes that:

> The large ranges of SCC are due in the large part to differences in assumptions regarding climate sensitivity, response lags, the treatment of risk and equity, economic and non-economic impacts, the inclusion of potentially catastrophic losses, and discount rates.[24]

Because of this uncertainty, DOE relied on Tol (2005), which was presented in the IPCC's Fourth Assessment Report, and was a comprehensive meta-analysis of estimates for the value of SCC. Commenters did not provide a rationale for why it would be more accurate or reliable for DOE to use values based on the limited number of studies they cited. As a result, DOE continues to rely on the Tol study reported by the IPCC as the basis for its analysis.

DOE continues to believe that the most appropriate monetary values for consideration in the development of efficiency standards are those drawn from studies that attempt to estimate the present value of the marginal economic benefits likely to result from reducing greenhouse gas emissions, rather than estimates that are based on the market

[19] 70 FR 28606 (May 18, 2005).

[20] No. 05–1097, 2008 WL 341338, at * (DC Cir. Feb. 9, 2008),

[21] 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 CO_2 reductions likely to result from standards finalized in this rulemaking. According to IPCC, the mean social cost of carbon (SCC) reported in studies published in peer-reviewed journals was $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 were denominated. However, we understand this estimate was denominated in 1995 dollars. Updating that estimate to 2007 dollars yields a SCC of $15 per ton of carbon dioxide.

[22] In contrast, most of the estimates of costs and benefits of increasing the efficiency of PTACs and PTHPs include only 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 United States.

[23] EarthJustice, ACEEE, and the Natural Resource Defense Council noted that the analysis of the America's Climate Security Bill of 2007, used a value of $17 per ton of CO_2 with a 7.4 percent annual growth rate. EarthJustice also cited a study by the United Kingdom's Department for Environment, Food, and Rural Affairs, which recommended valuing carbon emissions at just over $25 per ton of CO_2.

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

value of emission allowances under existing cap and trade programs or estimates that are based on the cost of reducing emissions—both of which are largely determined by policy decisions that set the timing and extent of emission reductions and do not necessarily reflect the benefit of reductions. DOE also believes that the studies it relies upon generally should be studies that were the subject of a peer review process and were published in reputable journals.

In today's final rule, DOE is essentially relying on the range of values proposed in the NOPR, which was based on the values presented in Tol (2005), as proposed. However, DOE notes that in the proposed rule, DOE mistakenly assumed that the values presented in Tol (2005) were in 2000 dollars. In actuality, the values in Tol (2005) were indicated to be approximately 1995 values in 1995 dollars. Had DOE, at the NOPR stage, applied the correct dollar year of the values presented in Tol (2005), DOE would have proposed the range of $0 to $15 in the NOPR. Additionally, DOE has applied an annual growth rate of 2.4% to the value of SCC, as suggested by the IPCC Working Group II (2007, p. 822), based on estimated increases in damages from future emissions reported in published studies. As a result, for today's final rule, DOE is assigning a range for the SCC of $0 to $20 ($2007) per ton of CO_2 emissions.

EarthJustice questioned the use of the median estimated social cost of CO_2 as an upper bound of the range. However, the upper bound of the range used by DOE is based on Tol (2005), which reviewed 103 estimates of the SCC from 28 published studies, and concluded that when only peer-reviewed studies published in recognized journals are considered, ''that climate change impacts may be very uncertain but [it] is unlikely that the marginal damage costs of carbon dioxide emissions exceed $50 per ton carbon [comparable to a 2007 value of $20 per ton carbon dioxide when expressed in 2007 U.S. dollars with a 2.4% growth rate.]''

EarthJustice also questioned the use of $0 as the lower bound of DOE's estimated range. In setting a lower bound, DOE agrees with the IPCC Working Group II (2007) report that ''significant warming across the globe and the locations of significant observed changes in many systems consistent with warming is very unlikely to be due solely to natural variability of temperatures or natural variability of the systems'' (pp. 9), and thus tentatively concludes that a *global* value of zero for reducing emissions cannot be justified. However, DOE also believes that it is reasonable to allow for the possibility that the U.S. portion of the global cost of carbon dioxide emissions may be quite low. In fact, some of the studies looked at in Tol (2005) reported negative values for the SCC. As stated in the NOPR, DOE is using U.S. benefit values, and not world benefit values, in its analysis and, further, DOE believes that U.S. domestic values will be lower than the global values. Additionally, the statutory criteria in EPCA do not require consideration of global effects. Therefore, DOE is using a lower bound of $0 per ton of CO_2 emissions in estimating the potential benefits of today's final rule.

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.28.

TABLE V.28—ESTIMATES OF SAVINGS FROM CO_2 EMISSIONS REDUCTIONS UNDER PTAC AND PTHP TRIAL STANDARD LEVELS AT 7% DISCOUNT RATE AND 3% DISCOUNT RATE

	Estimated cumulative CO_2 (Mt) emission reductions	Value of estimated CO_2 emission reductions (million 2007$) at 7% discount rate	Value of estimated CO_2 emission reductions (million 2007$) at 3% discount rate
Standard Size TSL:			
1	0.49	$0 to $4.8	$0 to $9.0.
2	0.81	$0 to $8.0	$0 to $14.9.
3	1.05	$0 to $10.4	$0 to $19.4.
A	1.06	$0 to $10.5	$0 to $19.5.
4	1.09	$0 to $10.8	$0 to $20.0.
5	1.68	$0 to $16.5	$0 to $30.9.
6	2.34	$0 to $22.9	$0 to $43.0.
Non-Standard Size TSL:			
1	0.12	$0 to $1.2	$0 to $2.2.
2	0.14	$0 to $1.4	$0 to $2.7.
3	0.18	$0 to $1.8	$0 to $3.4.
4	0.20	$0 to $2.0	$0 to $3.7.
5	0.29	$0 to $2.9	$0 to $5.4.

DOE also investigated the potential monetary impact resulting from the impact of today's energy conservation standards on SO_2, NO_X, and Hg emissions. As previously stated, DOE's initial analysis assumed the presence of nationwide emission caps on SO_2 and Hg, and caps on NO_X emissions in the 28 States covered by the CAIR caps. In the presence of these caps, DOE concluded that no physical reductions in power sector emissions would occur, but that the lower generation requirements associated with energy conservation standards could potentially put downward pressure on the prices of emissions allowances in cap-and-trade markets. Estimating this effect is very difficult because of the factors such as credit banking, which can change the trajectory of prices. DOE has further concluded that the effect from energy conservation standards on SO_2 allowance prices is likely to be negligible, based upon runs of the NEMS–BT model. See Chapter 16 (Environmental Assessment) of the FR TSD for further details.

As discussed earlier, with respect to NO_X the CAIR rule has been vacated by the courts, so projected annual NO_X allowances from NEMS–BT are no longer relevant. In DOE's subsequent analysis, NO_X emissions are not controlled by a nationwide regulatory system. For the range of NO_X reduction estimates (and Hg reduction estimates), DOE estimated the national monetized benefits of emissions reductions from today's rule based on environmental damage estimates from the literature. Available estimates suggest a very wide range of monetary values for NO_X emissions, ranging from $370 per ton to $3,800 per ton of NO_X from stationary sources, measured in 2001 dollars[25] or a range of $432 per ton to $4,441 per ton in 2007 dollars.

DOE has already conducted research for today's final rule and determined that the basic science linking mercury emissions from power plants to impacts on humans is considered highly uncertain. However, DOE identified two estimates of the environmental damages of mercury based on two estimates of the adverse impact of childhood exposure to methyl mercury on IQ for American children, and subsequent loss of lifetime economic productivity resulting from these IQ losses. The high end estimate is based on an estimate of the current aggregate cost of the loss of IQ in American children that results from exposure to mercury of U.S. power plant origin ($1.3 billion per year in year 2000$), which works out to $32.6 million per ton emitted per year (2007$).[26] The low-end estimate was $664,000 per ton emitted in 2004$ or $729,000 per ton in 2007$), which DOE derived from a published evaluation of mercury control using different methods and assumptions from the first study, but also based on the present value of the lifetime earnings of children exposed.[27] The resulting estimates of the potential range of the present value benefits associated with the national reduction of NO_X and national reductions in Hg emissions are reflected in Table V.29 and Table V.30.

TABLE V.29—ESTIMATES OF SAVINGS FROM REDUCTIONS OF NO_X AND HG UNDER PTAC AND PTHP TRIAL STANDARD LEVELS AT A 7% DISCOUNT RATE

	Estimated cumulative NO_X (kt) emission reductions *	Value of estimated NO_X emission reductions (thousand 2007$)	Estimated cumulative Hg (tons) emission reductions*	Value of estimated Hg emission reductions (thousand 2007$)
Standard Size TSL:				
1	0.04 to 0.94	$4 to $1,091	0 to 0.017	$0 to $182.
2	0.07 to 1.64	$7 to $1,892	0 to 0.028	$0 to $299.
3	0.08 to 2.02	$9 to $2,335	0 to 0.037	$0 to $392.
A	0.09 to 2.13	$10 to $2,462	0 to 0.037	$0 to $393.
4	0.09 to 2.25	$10 to $2,599	0 to 0.038	$0 to $403.
5	0.13 to 3.17	$14 to $3,658	0 to 0.059	$0 to $624.
6	0.18 to 4.34	$20 to $5,014	0 to 0.082	$0 to $871.
Non-Standard Size TSL:				
1	0.01 to 0.23	$1 to $263	0 to 0.004	$0 to $45.
2	0.01 to 0.28	$1 to $319	0 to 0.005	$0 to $54.
3	0.01 to 0.34	$2 to $390	0 to 0.006	$0 to $69.
4	0.02 to 0.40	$2 to $463	0 to 0.007	$0 to $75.
5	0.02 to 0.55	$2 to $631	0 to 0.010	$0 to $110.

* Values in Table V.32 may not appear to sum to the cumulative values in Table V.26 due to rounding.

TABLE V.30—ESTIMATES OF SAVINGS FROM REDUCTIONS OF NO_X AND HG UNDER PTAC AND PTHP TRIAL STANDARD LEVELS AT A 3% DISCOUNT RATE

	Estimated cumulative NO_X (kt) emission reductions *	Value of estimated NO_X emission reductions (thousand 2007$)	Estimated cumulative Hg (tons) emission reductions *	Value of estimated Hg emission reductions (thousand 2007$)
Standard Size TSL:				
1	0.04 to 0.94	$9 to $2,250	0 to 0.017	$0 to $331.
2	0.07 to 1.64	$15 to $3,903	0 to 0.028	$0 to $544.
3	0.08 to 2.02	$19 to $4,815	0 to 0.037	$0 to $712
A	0.09 to 2.13	$20 to $5,079	0 to 0.037	$0 to $714.
4	0.09 to 2.25	$21 to $5,362	0 to 0.038	$0 to $732.
5	0.13 to 3.17	$30 to $7,545	0 to 0.059	$0 to $1,135.
6	0.18 to 4.34	$41 to $10,341	0 to 0.082	$0 to $1,582.
Non-Standard Size TSL:				
1	0.01 to 0.23	$2 to $542	0 to 0.004	$0 to $83.
2	0.01 to 0.28	$3 to $659	0 to 0.005	$0 to $98.
3	0.01 to 0.34	$3 to $805	0 to 0.006	$0 to $125.
4	0.02 to 0.40	$4 to $954	0 to 0.007	$0 to $136.
5	0.02 to 0.55	$5 to $1,301	0 to 0.010	$0 to $200.

* Values in Table V.33 may not appear to sum to the cumulative values in Table V.26 due to rounding.

[25] 2006 Report to Congress on the Costs and Benefits of Federal Regulations and Unfunded Mandates on State, Local, and Tribal Entities. Office of Management and Budget Office of Information and Regulatory Affairs, Washington, DC.

[26] Trasande, L., *et al.*, "Applying Cost Analyses to Drive Policy that Protects Children" 1076 ANN. N.Y. ACAD. SCI. 911 (2006).

[27] Ted Gayer and Robert Hahn, Designing Environmental Policy: Lessons from the Regulation of Mercury Emissions, Regulatory Analysis 05–01. AEI-Brookings Joint Center For Regulatory Studies, Washington, DC, 31 pp., 2004. A version of this paper was published in the *Journal of Regulatory Economics* in 2006. The estimate was derived by back-calculating the annual benefits per ton from the net present value of benefits reported in the study.

7. Other Factors

In developing today's standards, the Secretary took into consideration: (1) The impacts of setting different amended standards for PTACs and PTHPs; (2) the potential that amended standards could cause equipment switching (i.e., purchase of PTACs instead of PTHPs) and the effects of any such switching; (3) the uncertainties associated with the impending phaseout in 2010 of R–22 refrigerant; and (4) the impact of amended standards on the manufacturers of and market for non-standard size packaged terminal equipment (e.g., impacts on small businesses). To address the impact of setting different amended energy conservation standards for PTACs and PTHPs and the potential that amended energy conservation standards could cause equipment switching, DOE conducted a sensitivity analysis. The results of the sensitivity analysis are shown in section V.B. DOE discusses the uncertainties associated with the impending refrigerant phaseout in 2010 of R–22 refrigerant and the impact of amended energy conservation standards on the non-standard size industry in the conclusion section below.

D. Conclusion

EPCA contains criteria for prescribing new or amended energy conservation standards. For commercial HVAC and water heating equipment such as PTACs and PTHPs, DOE must adopt as national standards the levels in amendments to ASHRAE Standard 90.1 unless DOE determines, ''supported by clear and convincing evidence,'' that standards more stringent than those levels ''would result in significant additional conservation of energy and [be] technologically feasible and economically justified.'' (42 U.S.C. 6313(a)(6)(A)(ii)(II)) Any more stringent standard must be designed to achieve the maximum improvement in energy efficiency and be technologically feasible and economically justified. (42 U.S.C. 6316(a); 42 U.S.C. 6295(o)(2)(A)) Moreover, in determining whether an energy conservation standard is economically justified, DOE must weigh all seven factors specified in EPCA, and set forth above, to determine whether the benefits of the standard exceed its costs. (42 U.S.C. 6316(a); 42 U.S.C. 6295(o)(2)(B)(i))

In this rulemaking, DOE has evaluated whether standards more stringent than the efficiency levels in ASHRAE Standard 90.1–1999 for PTACs and PTHPs are justified under the above criteria. As stated in sections III.B.1 and C, DOE determined, based on clear and convincing evidence, that all of the more stringent standard levels considered in this rulemaking are technologically feasible and would save significant additional amounts of energy. To determine if these more stringent TSLs are economically justified, DOE compared the maximum technologically feasible levels with the base case, and determined whether those levels are 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.

In the NOPR, DOE weighed the benefits and burdens for standard size and non-standard size PTACs and PTHPs through TSL 1 through 7. In response to both the uniqueness of the two separate industries and comments from interested parties on the potential impacts of standards on the standard size and non-standard size equipment, DOE weighed the benefits and burdens separately in today's final rule.

In addition to the quantitative results, DOE also considered other factors that might affect economic justification. DOE took into consideration the EPA-mandated refrigerant phaseout 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 with its substantial number of manufacturers of non-standard size equipment. In particular, DOE considered the declining shipments of non-standard size 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 small businesses that could be affected by amended energy conservation standards.

1. Standard Size PTACs and PTHPs

Table V.31 summarizes DOE's quantitative analysis results for each TSL it considered for standard size PTACs and PTHPs in this final rule. 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 for industry impacts represents the results for the different markup scenarios that DOE used to estimate manufacturer impacts.

TABLE V.31—SUMMARY OF RESULTS FOR STANDARD SIZE PTACS AND PTHPS BASED UPON THE AEO2008 ENERGY PRICE FORECAST *

	TSL 1	TSL 2	TSL 3	TSL A	TSL 4	TSL 5	TSL 6
Primary energy saved (quads)	0.015	0.024	0.031	0.032	0.033	0.049	0.068
7% Discount rate (Standard Size)	0.003	0.006	0.007	0.007	0.008	0.011	0.015
3% Discount rate (Standard Size)	0.007	0.012	0.016	0.016	0.017	0.025	0.035
Generation capacity reduction (GW) (Standard Size) **	(0.040)	(0.062)	(0.086)	(0.082)	(0.082)	(0.139)	(0.196)
NPV (2007$ million) (Standard Size):							
7% Discount rate	1	8	2	10	6	(11)	(41)
3% Discount rate	17	43	38	54	49	31	(10)
Industry impacts (Standard Size):							
Industry NPV (2007$ million)	(3)–(28)	(6)–(45)	(3)–(60)	(8)–(61)	(8)–(68)	(1)–(103)	(4)–(164)
Industry NPV (% Change)	(0.8)–(7)	(1)–(11)	(0.8)–(14)	(2)–(14)	(2)–(16)	(0.2)–(24)	(0.9)–(38)

TABLE V.31—SUMMARY OF RESULTS FOR STANDARD SIZE PTACS AND PTHPS BASED UPON THE AEO2008 ENERGY PRICE FORECAST *—Continued

	TSL 1	TSL 2	TSL 3	TSL A	TSL 4	TSL 5	TSL 6
Cumulative emissions impacts (Standard Size) †:							
CO_2 (Mt)	(0.49)	(0.81)	(1.05)	(1.06)	(1.09)	(1.68)	(2.34)
NO_X (kt)	(0.04)–(0.94)	(0.07)–(1.64)	(0.08)–(2.02)	(0.09)–(2.13)	(0.09)–(2.25)	(0.13)–(3.17)	(0.18)–(4.34)
Hg (t)	0–(0.017)	0–(0.028)	0–(0.037)	0–(0.037)	0–(0.038)	0–(0.059)	0–(0.082)
Employment Impacts (Standard Size):							
Indirect Employment Impacts	41	70	87	91	96	138	190
Direct, Domestic Employment Impacts	1	2	3	3	3	6	9
Mean LCC savings (2007$) (Standard Size) *:							
Standard Size PTAC, 9,000 Btu/h	(1)	(1)	(3)	(3)	(1)	(6)	(10)
Standard Size PTHP, 9,000 Btu/h	11	20	20	28	28	28	24
Standard Size PTAC, 12,000 Btu/h	(2)	(2)	(5)	(2)	(2)	(10)	(15)
Standard Size PTHP, 12,000 Btu/h	13	24	24	24	20	20	14
Mean PBP (years) (Standard Size):							
Standard Size PTAC, 9,000 Btu/h	13.0	13.0	13.7	13.7	13.0	14.5	15.2
Standard Size PTHP, 9,000 Btu/h	5.1	4.5	4.5	4.4	4.4	4.4	5.1
Standard Size PTAC, 12,000 Btu/h	13.1	13.1	14.0	13.1	13.1	14.9	15.9
Standard Size PTHP, 12,000 Btu/h	5.1	4.6	4.6	4.6	5.5	5.5	6.4
LCC Results (Standard Size):							
Standard Size PTAC, 9,000 Btu/h.							
Net Cost (%)	15%	15%	30%	30%	15%	46%	62%
No Impact (%)	77%	77%	56%	56%	77%	37%	18%
Net Benefit (%)	7%	7%	14%	14%	7%	17%	21%
Standard Size PTHP, 9,000 Btu/h.							
Net Cost (%)	7%	10%	10%	13%	13%	13%	24%
No Impact (%)	78%	57%	57%	37%	37%	37%	18%
Net Benefit (%)	16%	33%	33%	50%	50%	50%	58%
Standard Size PTAC, 12,000 Btu/h.							
Net Cost (%)	16%	16%	31%	16%	16%	48%	65%
No Impact (%)	77%	77%	56%	77%	77%	36%	18%
Net Benefit (%)	7%	7%	13%	7%	7%	16%	17%
Standard Size PTHP, 12,000 Btu/h.							
Net Cost (%)	7%	10%	10%	10%	21%	21%	35%
No Impact (%)	77%	57%	57%	57%	37%	37%	18%

TABLE V.31—SUMMARY OF RESULTS FOR STANDARD SIZE PTACS AND PTHPS BASED UPON THE AEO2008 ENERGY PRICE FORECAST *—Continued

	TSL 1	TSL 2	TSL 3	TSL A	TSL 4	TSL 5	TSL 6
Net Benefit (%)	16%	33%	33%	33%	42%	42%	47%

* 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 AEO 2008 Reference Case.
† CO_2 emissions impacts are physical reductions from all sources. NO_X and Hg emissions impacts are physical reductions at power plants.

First, DOE considered TSL 6, the max-tech efficiency level for standard size PTACs and PTHPs. TSL 6 would likely save 0.068 quads of energy through 2042 for standard size PTACs and PTHPs, an amount DOE considers significant. Discounted at seven percent, the projected energy savings through 2042 would be 0.015 quads. For the Nation as a whole, DOE projects that TSL 6 would result in a net decrease of $41 million in NPV for standard size PTACs and PTHPs, using a discount rate of seven percent and a net decrease of $10 million for standard size PTACs and PTHPs, using a discount rate of three percent. The emissions reductions at TSL 6 for standard size PTACs and PTHPs are 2.34 Mt of CO_2, between 0.18 kt and 4.34 kt of NO_X, and between zero and 0.082 t of Hg. Total generating capacity needed in 2042 is estimated to decrease compared to the reference case by 0.196 gigawatts (GW) under TSL 6.

At TSL 6, DOE projects that the average PTAC customer will experience an increase in LCC for all standard size equipment classes. Purchasers of standard size PTACs are projected to lose on average −$12 (2007$) over the life of the product, and purchasers of standard size PTHPs would save on average $20 (2007$). DOE estimates LCC increases for 63 percent of customers in the Nation who purchase a standard size PTAC, and for 29 percent of customers in the Nation who purchase a standard size PTHP. The mean payback period of 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 the standard size industry value (INPV) ranges from a decrease of $4 million to a decrease of $164 million, in 2007$. For standard size 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 are equipment lines being manufactured with efficiency levels above TSL 6 utilizing R–22 refrigerant. Using the degradations estimated in the engineering analysis, DOE believes standard size equipment could be produced at TSL 6 in the lower range of cooling capacities. DOE believes manufacturers would not be able to manufacture standard size PTACs and PTHPs at TSL 6 at the high range of the cooling capacities (e.g., 15,000 Btu/h) within a given equipment class (i.e., standard size PTACs with a cooling capacity greater than or equal to 7,000 Btu/h and less than or equal to 15,000 Btu/h). 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 the availability of high efficiency compressors spanning the full range of cooling capacities. At TSL 6, 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 6 could result in a net loss of 38.3 percent in INPV to the standard size PTAC and PTHP industry.

After carefully considering the analysis and weighing the benefits and burdens of TSL 6, the Secretary has concluded that at TSL 6, even if manufacturers could overcome the barriers to produce R–410 equipment in the full range of cooling capacities 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 5. Primary energy savings is estimated at 0.049 quads of energy through 2042 for standard size PTACs and PTHPs, which DOE considers significant. Discounted at seven percent, the energy savings through 2042 would be 0.011 quads. For the Nation as a whole, DOE projects that TSL 5 would result in a net decrease of $11 million in NPV for standard size PTACs and PTHPs, using a discount rate of seven percent and an increase of $31 million for standard size PTACs and PTHPs, using a discount rate of three percent. The emissions reductions are projected to be 1.68 Mt of CO_2, between 0.013 kt and 3.17 kt of NO_X and between 0 and 0.082 t of Hg. Total generating capacity needed in 2042 under TSL 5 is estimated to decrease by 0.139 GW for standard size PTACs and PTHPs.

At TSL 5, 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 16 percent of customers of standard size PTHPs would likely have an LCC increase at TSL 5, 47 percent of customers of standard size PTACs would experience an 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 $25. At TSL 5, 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 5 is projected to be substantially longer than the mean lifetime.

At TSL 5, the projected change in INPV ranges between losses of $1 million and $103 million. For manufacturers of standard size equipment alone, DOE estimated a decrease in the INPV to range from 0.2 percent to 24.0 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 $103 million assumes that DOE's projections of partial cost recovery as described in Chapter 13 of the TSD remain valid. In addition, at TSL 5 the impending refrigerant phaseout could also have a significant impact on manufacturers. Currently, both standard size PTACs and PTHPs using R–22 refrigerant are available on the market at and above TSL 5 efficiency levels. However, at the performance degradations that DOE estimated in the engineering analysis for R–410A equipment, manufacturers would 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 5 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 5 than at TSL 6, DOE anticipates that manufacturers would not be able to produce standard size PTACs and PTHPs at TSL 5 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 5 for standard size PTACs and PTHPs, DOE concludes that the benefits of a Federal standard at TSL 5 would still be outweighed by the economic burden that would be placed upon PTAC customers. In addition, DOE believes at TSL 5, the benefits of energy savings and emissions impacts would be outweighed by the large impacts on standard size manufacturers' INPV. Finally, DOE is concerned that standard size 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 4. For TSL 4, DOE combined the efficiency levels in TSL 1 for PTACs and the efficiency levels in TSL 5 for PTHPs. This combination of efficiency levels serves to maximize LCC savings, while recognizing the differences in LCC results for standard size PTACs and PTHPs. DOE projects that TSL 4 for standard size PTACs and PTHPs would save 0.033 quads of energy through 2042, an amount DOE considers significant. Discounted at seven percent, the projected energy savings through 2042 would be 0.008 quads. For the Nation as a whole, DOE projects that TSL 4 would result in net savings in NPV of $6 million for standard size PTACs and PTHPs, using a discount rate of seven percent, and $49 million for standard size PTACs and PTHPs, using a discount rate of three percent. The estimated emissions reductions are 1.09 Mt of CO_2, between 0.09 kt and 2.25 kt of NO_X, and between 0 and 0.038 t of Hg. Total generating capacity needed in 2042 under TSL 4 would likely decrease by 0.082 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 $2 (2007$) over the life of the product and purchasers of PTHPs would save on average $25 (2007$). DOE estimates an LCC increase for 15 percent of customers in the Nation who purchase a standard size PTAC, and for 16 percent of customers in the Nation who purchase a standard size PTHP. For 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 $8 million and a loss of $68 million for the standard size PTAC and PTHP industry. Just as with TSLs 5 and 6, 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 PTACs at the efficiency levels in TSL 1 and standard size PTHPs at efficiency levels at TSL 5. For the larger cooling capacity range (*e.g.*, 15,000 Btu/h) of standard size PTACs with cooling capacities greater than or equal to 7,000 Btu/h and less than or equal to 15,000 Btu/h, DOE believes manufacturers would not be able to produce equipment in a given equipment class at the EER required by the TSL 4 energy-efficiency equation. Specifically, DOE is concerned that standard size manufacturers would be forced to eliminate larger cooling capacity equipment due to the stringency of the standard in the higher cooling capacity regions.

While DOE recognizes the increased economic benefits to the nation that could result from TSL 4 for standard size PTACs and PTHPs, DOE concludes that the benefits of a Federal standard at TSL 4 would still be outweighed by the economic burden that would be placed upon PTAC customers. In addition, DOE believes at TSL 4, the benefits of energy savings and emissions impacts would be outweighed by the large impacts on standard size manufacturers' INPV. Finally, DOE is concerned that standard size 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 A. TSL A is a modified version of TSL 3 and TSL 4 DOE used for the final rule. To generate the efficiency analyzed in TSL A for standard size equipment, DOE further investigated the slope of the energy-efficiency equation as discussed in section IV.C. DOE adjusted the slope of the energy-efficiency equation to make the curve steeper. In other words, DOE adjusted the energy-efficiency to require more stringent efficiency levels for lower cooling capacities, where manufacturers have more physical space inside the box sleeve to make efficiency improvements, while lessening the stringency for higher cooling capacities, where manufacturers are already using most of the physical space inside the box sleeve for capacity increases, leaving little room for efficiency improvements. For TSL A, DOE combined the efficiency levels in TSL 3 and TSL 1 for standard size PTACs depending on cooling capacity. For TSL A, DOE combined the efficiency levels in TSL 5 and TSL 3 for standard size PTHPs depending on cooling capacity. This combination of efficiency levels serves to maximize LCC savings, while recognizing the differences in LCC results for standard size PTACs and PTHPs and the differences in the energy efficiency potentials between the various cooling capacities of standard size equipment. (See Chapter 9 of the TSD for further explanation and a graphical representation of the energy-efficiency equations.)

DOE projects that TSL A for standard size PTACs and PTHPs would save 0.032 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 that TSL A would result in net savings in NPV of $10 million for standard size PTACs and PTHPs, using a discount rate of seven percent, and $54 million for standard size PTACs and PTHPs, using a discount rate of three percent. The estimated emissions reductions are 1.06 Mt of CO_2, between 0.09 kt and 2.13 kt of NO_X, and between 0 and 0.037 t of Hg. Total generating capacity needed in 2042 under TSL A would likely decrease by 0.082 GW.

At TSL A, DOE projects that the average PTAC or PTHP customer would experience LCC savings. Purchasers of standard size PTACs, on average, would experience an LCC increase of $3 (2007$) over the life of the product while purchasers of PTHPs would save on average $26 (2007$). DOE estimates LCC savings for 24 percent of customers in the Nation who purchase a standard size PTAC, and for 12 percent of customers in the Nation who purchase a standard size PTHP. For 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 A would be substantially longer than the mean lifetime of the equipment.

The projected change in INPV ranges between losses of $8 million and $61 million for the standard size PTAC and PTHP industry at TSL A. Just as with TSL 4, the projected impacts continue to be driven primarily by the manufacturers' ability to pass on increases in MPCs to the customer. However, TSL A requires efficiency levels for standard size PTHPs to be 0.2 EER higher than the efficiency levels for PTACs. DOE believes bringing these efficiency levels closer together will ultimately aid manufacturers in using one equipment platform to design their standard size PTAC and PTHP equipment offerings. The loss of $61 million assumes the continued validity of DOE's projections of partial cost recovery as described in Chapter 13 of the TSD. For the larger cooling capacity range (*e.g.*, 15,000 Btu/h), DOE believes manufacturers could produce equipment at the EER required by the TSL A energy-efficiency equation utilizing R–410A. Specifically, DOE believes manufacturers would not be forced to eliminate larger cooling capacity equipment since DOE modified the slope of the energy-efficiency equation at TSL A to accommodate the additional concerns regarding the physical constraints at larger cooling capacities.

After considering the analysis and weighing the benefits and the burdens, DOE concludes that the benefits of a TSL A standard outweigh the burdens. In particular, the Secretary concludes that TSL A saves a significant amount of energy and is technologically feasible and economically justified in the full range of cooling capacities for R–410A standard size PTACs and PTHPs. Therefore, DOE adopts the energy conservation standards for standard size PTACs and PTHPs at TSL A, as described by the energy-efficiency equations. Table V.32 sets out the energy conservation standards for standard size PTACs and PTHPs in the full range of cooling capacities that DOE is adopting.

TABLE V.32—FINAL ENERGY CONSERVATION STANDARDS FOR STANDARD SIZE PTACS AND PTHPS

Equipment class			Final energy conservation standards *
Equipment	Category	Cooling capacity	
PTAC	Standard Size **	<7,000	EER = 11.7
		7,000–15,000	EER = 13.8 − (0.300 × Cap †)
		>15,000	EER = 9.3
PTHP	Standard Size **	<7,000	EER = 11.9 COP = 3.3
		7,000–15,000	EER = 14.0 − (0.300 × Cap †) COP = 3.7 − (0.052 × Cap †)
		>15,000	EER = 9.5 COP = 2.9

* 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.

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

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

2. Non-Standard Size PTACs and PTHPs

Table V.33 summarizes DOE's quantitative analysis results for each TSL it considered for non-standard size PTACs and PTHPs in this final rule. 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 for industry impacts represents the results for the different markup scenarios that DOE used to estimate manufacturer impacts.

TABLE V.33—SUMMARY OF RESULTS FOR NON-STANDARD SIZE PTACS AND PTHPS BASED UPON THE AEO2008 ENERGY PRICE FORECAST *

	TSL 1	TSL 2	TSL 3	TSL 4	TSL 5
Primary energy saved (quads)	0.004	0.004	0.005	0.006	0.009
7% Discount rate (Non-Standard Size)	0.001	0.001	0.001	0.001	0.002
3% Discount rate (Non-Standard Size)	0.002	0.002	0.003	0.003	0.004
Generation capacity reduction (GW) (Standard Size) **	(0.009)	(0.010)	(0.013)	(0.014)	(0.021)
NPV (2007$million) (Non-Standard Size):					
7% Discount rate	5	6	7	8	10
3% Discount rate	14	16	19	23	29
Industry Impacts (Non-Standard Size):					
Industry NPV (2007$ million)	(16)–(17)	(17)–(19)	(17)–(20)	(21)–(23)	(20)–(24)
Industry NPV (% Change)	(54)–(58)	(58)–(64)	(56)–(65)	(69)–(78)	(65)–(81)
Cumulative Emissions Impacts (Non-Standard Size): †					
CO_2 (Mt)	(0.12)	(0.14)	(0.18)	(0.20)	(0.29)
NO_X (kt)	(0.01)–(0.23)	(0.01)–(0.28)	(0.01)–(0.34)	(0.02)–(0.40)	(0.02)–(0.55)
Hg (t)	0–(0.004)	0–(0.005)	0–(0.006)	0–(0.007)	0–(0.010)
Employment Impacts (Non-Standard Size):					
Indirect Employment Impacts	8	9	12	14	20
Direct, Domestic Employment Impacts	(106)–1	(106)–1	(107)–1	(107)–1	(108)–2
Mean LCC Savings (2007$) (Non-Standard Size): *					

TABLE V.33—SUMMARY OF RESULTS FOR NON-STANDARD SIZE PTACS AND PTHPS BASED UPON THE AEO2008 ENERGY PRICE FORECAST *—Continued

	TSL 1	TSL 2	TSL 3	TSL 4	TSL 5
Non-Standard Size PTAC, 11,000 Btu/h	26	26	30	26	31
Non-Standard Size PTHP, 11,000 Btu/h	62	66	66	80	80
Mean PBP (years) (Standard Size):					
Non-Standard Size PTAC, 11,000 Btu/h	4.4	4.4	5.1	4.4	5.9
Non-Standard Size PTHP, 11,000 Btu/h	2.2	2.8	2.8	3.0	3.0
LCC Results (Non-Standard Size)					
Non-Standard Size PTAC, 11,000 Btu/h:					
Net Cost (%)	6	6	14	6	25
No Impact (%)	73	73	47	73	23
Net Benefit (%)	22	22	39	22	52
Non-Standard Size PTHP, 11,000 Btu/h:					
Net Cost (%)	1	3	3	5	5
No Impact (%)	73	47	47	23	23
Net Benefit (%)	27	50	50	72	72

* Parentheses indicate negative values. For LCCs, a negative value means an increase in LCC by the amount indicated.
** Change in installed generation capacity by the year 2042 based on AEO2008 Reference Case.
† CO_2 emissions impacts are physical reductions from all sources. NO_X and Hg emissions impacts are physical reductions at power plants.

First, DOE considered TSL 5, the max-tech efficiency level for non-standard size PTACs and PTHPs. TSL 5 would likely save 0.009 quads of energy through 2042 for non-standard size PTACs and PTHPs, an amount DOE considers significant. Discounted at seven percent, the projected energy savings through 2042 would be 0.002 quads. For the Nation as a whole, DOE projects that TSL 5 would result in a net increase of $10 million in NPV for non-standard size PTACs and PTHPs, using a discount rate of seven percent, and $29 million for non-standard size PTACs and PTHPs, using a discount rate of three percent. The emissions reductions at TSL 5 for non-standard size PTACs and PTHPs are 0.29 Mt of CO_2, between 0.02 and 0.55 kt of NO_X, and between 0.0 and 0.01 t of Hg. Total generating capacity needed in 2042 is estimated to decrease compared to the reference case by 0.021 GW under TSL 5 for non-standard size equipment.

At TSL 5, DOE projects that the average PTAC customer will experience a decrease in LCC for all non-standard size equipment classes. Purchasers of non-standard size PTACs are projected to save on average $31 (2007$) over the life of the product and purchasers of non-standard size PTHPs would save on average $80 (2007$). DOE estimates LCC increases for 25 percent of customers in the Nation that purchase a non-standard size PTAC, and for 5 percent of customers in the Nation that purchase a non-standard size PTHP.

The projected change in the non-standard size industry value (INPV) ranges from a decrease of $20 million to a decrease of $24 million, in 2007$. For non-standard size 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 are very few equipment lines being manufactured that have efficiency levels at or above TSL 5 utilizing R–22 refrigerant. Using the degradations estimated in the engineering analysis, DOE believes non-standard size equipment could be produced at TSL 5 in the lower range of cooling capacities. DOE believes manufacturers would not be able to manufacture non-standard size PTACs and PTHPs at TSL 5 at the high range of cooling capacities (*e.g.*, 15,000 Btu/h) within a given equipment class for non-standard size PTACs and PTHPs with cooling capacities greater than or equal to 7,000 Btu/h and less than or equal to 15,000 Btu/h. In addition, DOE believes many small manufacturers of non-standard size equipment would be unable to recover the large investments needed to change over all of their existing equipment lines to the efficiency levels required by TSL 5. If some small non-standard manufacturers cannot invest the product and capital conversion costs necessary to comply with TSL 5, they would be forced to abandon their equipment lines and exit the business. Others could be forced to reduce their equipment offerings in order to reduce the magnitude of the investments required to meet TSL 5 efficiency levels for non-standard equipment.

After carefully considering the analysis and weighing the benefits and burdens of TSL 5, the Secretary has reached the following conclusion: At TSL 5, even if manufacturers overcome the barriers to produce R–410 equipment in the full range of cooling capacities 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 economic burden on manufacturers, the risks of small, non-standard manufacturers exiting from the market, and the reduction of equipment lines resulting from decreased equipment offerings.

Next, DOE considered TSL 4. For TSL 4, DOE combined the efficiency levels in TSL 1 for non-standard size PTACs and the efficiency levels in TSL 5 for non-standard size PTHPs. This combination of efficiency levels serves to maximize LCC savings, while recognizing the differences in LCC results for non-standard size PTACs and PTHPs. DOE projects that TSL 4 for non-standard size PTACs and PTHPs would save 0.006 quads of energy through 2042, an amount DOE considers significant. Discounted at seven percent, the projected energy savings through 2042 would be 0.001 quads. For the Nation as a whole, DOE projects that TSL 4 would result in net savings in NPV of $8 million for non-standard size PTACs and PTHPs, using a discount rate of seven percent, and $23 million for non-standard size PTACs and PTHPs, using a discount rate of three percent. The estimated emissions reductions are 0.20 Mt of CO_2, between 0.02 kt and 0.40 kt of NO_X, and between 0 and 0.007 t of Hg. Total generating capacity needed in 2042 under TSL 4 would likely decrease by 0.014 GW.

At TSL 4, DOE projects that the average PTAC or PTHP customer would experience LCC savings. Purchasers of non-standard size PTACs, on average, would experience an LCC decrease of $26 (2007$) over the life of the product and purchasers of non-standard size PTHPs would save on average $80 (2007$). DOE estimates an LCC increase for 6 percent of customers in the Nation who purchase a non-standard size PTAC, and for 5 percent of customers in the Nation who purchase a non-standard size PTHP. The remaining customers of non-standard size PTACs and PTHPs would experience either a decrease or no change in LCC.

The projected change in INPV ranges between losses of $21 million and $23 million for the non-standard size PTAC and PTHP industry. Just as with TSL 5, the projected impacts continue to be driven primarily by the manufacturers' ability to pass on increases in MPCs to the customer. The loss of $23 million assumes that DOE's projections of partial cost recovery as described in Chapter 13 of the TSD remain valid. TSL 4 requires the production of non-standard size PTACs at the efficiency levels in TSL 1 and non-standard size PTHPs at efficiency levels at TSL 5. Thus, TSL 4 requires the production of 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. For the larger cooling capacity range (*i.e.*, 15,000 Btu/h) within a given equipment class of non-standard size 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, DOE believes manufacturers would not be able to produce equipment at the efficiency levels provided by the TSL 4 energy-efficiency equations. At larger cooling capacities for non-standard equipment, manufacturers do not have the additional space within the box sleeve to add heat exchanger area to increase the efficiency of the equipment. Specifically, DOE believes non-standard manufacturers would eliminate equipment due to the stringency of the standard—and the costs associated with attaining them—at higher cooling capacity regions. In addition, DOE believes many small manufacturers of non-standard size equipment would be unable to recover the large investments needed to change over all of their existing equipment lines to the efficiency levels required by TSL 4. If some of these manufacturers cannot invest the product and capital conversion costs necessary to comply with TSL 4, they would be forced to abandon their equipment lines and exit the business. Others could be forced to reduce their equipment offerings in order to reduce the magnitude of the investments required to meet the TSL 4 efficiency levels, which will affect their ability to offer R–410A-compatible equipment in the full range of capacities currently being offered by the time the new standard would become effective.

Based on the reasons stated earlier, while DOE recognizes the increased economic benefits to the nation that could result from TSL 4 for non-standard size PTACs and PTHPs, DOE concludes that the benefits of a Federal standard at TSL 4 would still be outweighed by the economic burden that would be placed upon non-standard size PTAC and PTHP manufacturers.

Next, DOE considered TSL 3. TSL 3 includes the same efficiency levels for non-standard PTACs as non-standard PTHPs. DOE projects that TSL 3 for non-standard size PTACs and PTHPs would save 0.005 quads of energy through 2042, an amount DOE considers significant. Discounted at seven percent, the projected energy savings through 2042 would be 0.001 quads. For the Nation as a whole, DOE projects that TSL 3 would result in net savings in NPV of $7 million for non-standard size PTACs and PTHPs, using a discount rate of seven percent, and $19 million for non-standard size PTACs and PTHPs, using a discount rate of three percent. The estimated emissions reductions are 0.18 Mt of CO_2, between 0.01 and 0.34 kt of NO_X, and between 0 and 0.006 t of Hg. Total generating capacity needed in 2042 under TSL 3 for non-standard size PTACs and PTHPs would likely decrease by 0.013 GW.

At TSL 3, DOE projects that the average PTAC or PTHP customer would experience LCC savings. Purchasers of non-standard size PTACs, on average, would experience a decrease in LCC of $30 (2007$) over the life of the product and purchasers of non-standard size PTHPs would save on average $66 (2007$). DOE estimates an LCC increase for 14 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. The remaining customers would experience either a decrease or no change in LCC.

The projected change in INPV ranges between a loss of $17 million and a loss of $20 million for the non-standard size PTAC and PTHP industry. Just as with TSL 5, the projected impacts continue to be driven primarily by the manufacturers' ability to pass on increases in MPCs to the customer. The loss of $20 million assumes the continued validity of DOE's projections of partial cost recovery as described in Chapter 13 of the TSD. Even at TSL 3, DOE is concerned about the manufacturers' ability to produce and offer equipment in the full range of cooling capacities that would fit the wide variety of wall sleeves that currently exist. For the larger cooling capacity range (*i.e.*, 15,000 Btu/h) within a given equipment class of non-standard size 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, DOE believes manufacturers would not be able to produce equipment at the efficiency levels provided by the TSL 3 energy-efficiency equations. Specifically, DOE believes non-standard manufacturers would eliminate equipment due to the stringency of the standard at higher cooling capacity regions. In addition, TSL 3 requires a $23 million investment by the industry in order to transform all of the existing equipment lines available in the current non-standard market to TSL 3 efficiency levels. DOE believes many small non-standard manufacturers would not be able to recover these investments needed to change over all of their existing equipment lines to the efficiency levels required by TSL 3. If some small non-standard manufacturers cannot invest the product and capital conversion costs necessary to comply with TSL 3, they would be forced to abandon their equipment lines and exit the business. Others could be forced to reduce their equipment offerings in order to reduce the magnitude of the investments required to meet TSL 3 efficiency levels for non-standard equipment.

While DOE recognizes the increased economic benefits to the nation and the energy savings that could result from TSL 3 for non-standard size PTACs and PTHPs, DOE concludes that, based on the above, the benefits of an amended energy conservation standard at TSL 3 would be outweighed by the economic burden that would be placed upon non-standard size PTAC and PTHP manufacturers.

Next, DOE considered TSL 2. TSL 2 requires different efficiency levels for non-standard size PTACs and non-standard PTHPs at the same cooling capacity. DOE projects that TSL 2 for non-standard size PTACs and PTHPs would save 0.004 quads of energy through 2042, an amount DOE considers significant. Discounted at seven percent, the projected energy savings through 2042 would be 0.001 quads. For the Nation as a whole, DOE projects that TSL 2 would result in net savings in

NPV of $6 million for non-standard size PTACs and PTHPs, using a discount rate of seven percent, and $16 million for non-standard size PTACs and PTHPs, using a discount rate of three percent. The estimated emissions reductions are 0.14 Mt of CO_2, between 0.01 kt and 0.28 kt of NO_X, and between 0 and 0.005 t of Hg. Total generating capacity needed in 2042 under TSL 2 for non-standard size PTACs and PTHPs would likely decrease by 0.010 GW.

At TSL 2, DOE projects that the average PTAC or PTHP customer would experience LCC savings. Purchasers of non-standard size PTACs, on average, would have an LCC decrease of $26 (2007$) over the life of the product and purchasers of non-standard size PTHPs would save on average $66 (2007$). DOE estimates an LCC increase for 6 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. The remaining customers of non-standard size PTACs and PTHPs would experience either a decrease or no change in LCC.

The projected change in INPV ranges between a loss of $17 million and a loss of $19 million for the non-standard size PTAC and PTHP industry. Just as with other TSLs, the projected impacts continue to be driven primarily by the manufacturers' ability to pass on increases in MPCs to the customer. The loss of $19 million assumes DOE's projections of partial cost recovery as described in Chapter 13 of the TSD remain valid. Since TSL 2 requires non-standard size manufacturers to be produced at the efficiency levels in TSL 3, DOE is concerned about the manufacturer's ability to produce and offer equipment in the full range of cooling capacities to fit the wide variety of wall sleeves that currently exist for non-standard size PTHPs.

For the larger cooling capacity range (*i.e.*, 15,000 Btu/h) within a given equipment class of non-standard size 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, DOE believes manufacturers would be unable to produce equipment at the efficiency levels provided by the TSL 2 energy-efficiency equations. Specifically, DOE believes non-standard manufacturers would eliminate equipment due to the costs required to satisfy this level at higher cooling capacity regions. In addition, TSL 2 requires a 23.3 million dollar investment in order to transform all of the existing equipment lines available in the current non-standard market to TSL 2 efficiency levels. The investment required at TSL 2 is larger than at TSL 3 because manufacturers could be forced to design separate equipment platforms for non-standard size PTACs and non-standard size PTHPs because of the differences in efficiency level requirements. DOE believes many small manufacturers of non-standard size equipment would be unable to recover these investments needed to change over all of their existing equipment lines to the efficiency levels required by TSL 2. If some small, non-standard manufacturers cannot invest the product and capital conversion costs necessary to comply with TSL 2, they would be forced to abandon their equipment lines and exit the business. Others could be forced to reduce their equipment offerings in order to reduce the magnitude of the investments required to meet TSL 2 efficiency levels for non-standard equipment.

While DOE recognizes the increased economic benefits to the nation and the energy savings that could result from TSL 2 for non-standard size PTACs and PTHPs, DOE concludes, based on the reasons stated above, that the benefits of an amended energy conservation standard at TSL 2 would be outweighed by the economic burden that would be placed upon non-standard size PTAC and PTHP manufacturers.

Last, DOE considered TSL 1. TSL 1 requires the same efficiency levels for non-standard size PTACs and non-standard PTHPs at the same cooling capacity. DOE projects that TSL 1 for non-standard size PTACs and PTHPs would save 0.004 quads of energy through 2042, an amount DOE considers significant. Discounted at seven percent, the projected energy savings through 2042 would be 0.001 quads. For the Nation as a whole, DOE projects that TSL 1 would result in net savings in NPV of $5 million for non-standard size PTACs and PTHPs, using a discount rate of seven percent, and $14 million for non-standard size PTACs and PTHPs, using a discount rate of three percent. The estimated emissions reductions are 0.12 Mt of CO_2, between 0.01 kt and 0.23 kt of NO_X, and between 0 and 0.004 t of Hg. Total generating capacity needed in 2042 under TSL 1 for non-standard size PTACs and PTHPs would likely decrease by 0.009 GW.

At TSL 1, DOE projects that the average PTAC or PTHP customer would experience an LCC savings. Purchasers of non-standard size PTACs, on average would experience an LCC decrease of $26 (2007$) over the life of the product and purchasers of non-standard size PTHPs would save on average $62 (2007$). DOE estimates LCC increase for 6 percent of customers in the Nation that purchase a non-standard size PTAC, and for 1 percent of customers in the Nation that purchase a non-standard size PTHP. The remaining customers of non-standard size equipment would experience either a decrease or no change in LCC.

The projected change in INPV ranges between losses of $16 million and $17 million for the non-standard size PTAC and PTHP industry. Just as with other TSLs, the projected impacts continue to be driven primarily by the manufacturers' ability to pass on increases in MPCs to the customer. The loss of $17 million assumes DOE's projections of partial cost recovery as described in Chapter 13 of the TSD remain valid. Even at TSL 1, DOE estimates manufacturers of non-standard PTACs and PTHPs would experience over a 50 percent reduction in INPV as a result of amended energy conservation standards. TSL 1 requires a 22 million dollar investment by the industry in order to transform all of the existing equipment lines available in the current non-standard market to TSL 1 efficiency levels. DOE believes many small manufacturers of non-standard equipment would be unable to recover these investments needed to change over all of their existing equipment lines to the efficiency levels required by TSL 1. If some small non-standard manufacturers cannot invest the product and capital conversion costs necessary to comply with TSL 1, they would be forced to abandon their equipment lines and exit the business. Others could be forced to reduce their equipment offerings in order to reduce the magnitude of the investments required to meet TSL 1 efficiency levels for non-standard equipment.

While DOE recognizes the increased economic benefits to the nation and the energy savings that could result from TSL 1 for non-standard size PTACs and PTHPs, DOE concludes that the benefits of an amended energy conservation standard at TSL 1 would still be outweighed by the economic burden that would be placed upon non-standard size PTAC and PTHP manufacturers. DOE is especially concerned about the large investments required for non-standard size manufacturers to transform their entire equipment offerings to TSL 1 efficiency levels and with the likelihood that small non-standard size manufacturers would exit the market, causing some existing non-standard size PTACs and PTHPs to become unavailable to consumers.

After considering the analysis and weighing the benefits and the burdens, DOE concludes that the benefits of a standard at the efficiency levels specified by ASHRAE Standard 90.1–1999 outweigh the burdens.

Therefore based on the discussion above, DOE concludes that the efficiency levels beyond those in ASHRAE Standard 90.1–1999 are not economically justified and is adopting the efficiency level in ASHRAE Standard 90.1–1999. Table V.34 demonstrates the amended energy conservation standards for standard size PTACs and PTHPs in the full range of cooling capacities.

TABLE V.34—FINAL ENERGY CONSERVATION STANDARDS FOR NON-STANDARD SIZE PTACS AND PTHPS

Equipment class			Final energy conservation standards *
Equipment	Category	Cooling capacity	
PTAC	Non-Standard Size **	<7,000	EER = 9.4
		7,000–15,000	EER = 10.9 − (0.213 × Cap †)
		>15,000	EER = 7.7
PTHP	Non-Standard Size **	<7,000	EER = 9.3 COP = 2.7
		7,000–15,000	EER = 10.8 − (0.213 × Cap †) COP = 2.9 − (0.026 × Cap †)
		>15,000	EER = 7.6 COP = 2.5

* 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.

** 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 a cross-sectional area less than 670 square inches.

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

VI. Procedural Issues and Regulatory Review

A. Review Under Executive Order 12866

Section 1(b)(1) of Executive Order 12866, ''Regulatory Planning and Review,'' 58 FR 51735 (October 4, 1993), requires each agency to identify in writing the market failure or other problem that it intends to address that warrants agency action such as today's final rule, and to assess the significance of that problem in evaluating whether any new regulation is warranted.

DOE's 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 depends on the climate and equipment usage and, as such, is not readily available for the owners or operators to decide whether improving the energy efficiency of PTAC and PTHP equipment is cost effective.

PTACs and PTHPs are not purchased in the same manner as other 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 to be purchased through contractors and builders that perform the installation. (See Chapter 8 of the final rule TSD) The AHRI Certified Directory includes PTACs and PTHPs, and provides the energy efficiency and capacity information on PTACs and PTHPs produced by participating manufacturers.

To the extent that a lack of information may exist, DOE 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. DOE found that 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 concerned primarily 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 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 operating cost. For example, PTAC and PTHP equipment are also used in nursing homes (*i.e.*, assisted living) and medical office buildings. In these settings, the builder or complex owner often makes decisions about PTACs and PTHPs without input from tenants and typically does not offer tenants the option to upgrade that equipment. Furthermore, DOE believes that 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 that 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 without a cost. It may not be in the tenant's interest 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 regarding PTAC and PTHP efficiency. For example, all 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 with those where the tenant pays the utility bills separately. DOE did not receive any data that would enable it to conduct tests of market failure in response to the NOPR.

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 benefits include externalities related to environmental and energy security that are not reflected in energy prices, such as reduced emissions of greenhouse gases. Regarding environmental externalities, the emissions reductions in today's final rule are projected to be 1.06 million metric tons (Mt) of CO_2, between 0.09 kilotons and 2.13 kilotons (kt) of NO_X, and between 0 and 0.037 tons of Hg.

Because today's regulatory action is a significant regulatory action under section 3(f)(1) of Executive Order 12866, section 6(a)(3) of the Executive Order requires DOE to prepare and submit for review to OMB's Office of Information and Regulatory Affairs (OIRA) an assessment of the costs and benefits of today's rule. Accordingly, DOE presented to OIRA for review the draft final rule and other documents prepared for this rulemaking, including a regulatory impact analysis (RIA). These documents are included in the rulemaking record and are available for public review in the Resource Room of DOE's 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 NOPR contained a summary of the RIA, which evaluated the extent to which major alternatives to standards for PTACs and PTHPs could achieve significant energy savings at reasonable cost, compared with the effectiveness of the proposed rule. 73 FR 18907–10. The complete RIA (*Regulatory Impact Analysis for Proposed Energy Conservation Standards for Packaged Terminal Air Conditioners and Heat Pumps*), is contained in the TSD prepared for today's rule. 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 amended standards.

As explained in the NOPR, DOE determined that none of the alternatives that it examined would save as much energy or have an NPV as high as the proposed standards. That same conclusion applies to the amended standards in today's rule. In addition, several of the alternatives would require new enabling legislation, because authority to conduct those alternatives currently does not exist. The RIA report in the TSD provides additional detail on the regulatory alternatives.

B. Review Under the Regulatory Flexibility Act

The Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*) requires preparation of an initial regulatory flexibility analysis (IRFA) for any rule that by law must be proposed for public comment, and a final regulatory flexibility analysis (FRFA) for any such rule that an agency adopts as a final rule, unless the agency certifies that the rule, if promulgated, will not have a significant economic impact on a substantial number of small entities. A regulatory flexibility analysis examines the impact of the rule on small entities and considers alternative ways of reducing negative impacts. Also, 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 packaged terminal equipment manufacturing industry, are manufacturing enterprises with 750 employees or fewer. DOE used the small business size standards published on March 11, 2008, as amended, by the SBA to determine whether any small entities would be required to comply with the rule. 61 FR 3286 and codified at 13 CFR part 121. The size standards are listed by North American Industry Classification System (NAICS) code and industry description. PTAC and PTHP manufacturing is classified under NAICS 333415, which sets a threshold of 750 employees or less for an entity to be considered as a small business under the ''Air-Conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment Manufacturer'' category.

For the NOPR, DOE identified and interviewed two manufacturers of PTACs and PTHPs that are small businesses affected by this rulemaking. 73 FR 18910. DOE reviewed the proposed rule under the provisions of the Regulatory Flexibility Act and the procedures and policies published on February 19, 2003. *Id.* On the basis of this review, DOE determined that it could not certify that the proposed standards (TSL4), if promulgated, would have no significant economic impact on a substantial number of small entities. *Id.* DOE made this determination because of the potential impacts of the proposed standard levels on PTAC and PTHP manufacturers generally, including small businesses. *Id.*

Because of these potential impacts on small manufacturers, DOE prepared an IRFA during the NOPR stage of this rulemaking. DOE provided the IRFA in its entirety in the NOPR, 73 FR 18910–12, and also transmitted a copy to the Chief Counsel for Advocacy of the SBA for review. Chapter 13 of the TSD contains more information about the impact of this rulemaking on manufacturers.

The IRFA divided potential impacts on small businesses into two broad categories: (1) Impacts associated with standard size PTAC and PTHP manufacturers; and (2) impacts associated with non-standard size PTAC and PTHP manufacturers. The PTAC and PTHP industry is characterized by both domestic and international manufacturers. Standard size PTACs and PTHPs are primarily manufactured outside of the U.S. 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.

DOE has prepared a FRFA for this rulemaking, which is presented in the following discussion. Comments received in response to the IRFA regarding the impacts on small businesses in the non-standard industry are summarized in section IV.K.2. In addition, DOE further reviewed the non-standard size industry, in particular, the market for small businesses, and presented its finding in section IV.K.2. The FRFA below is written in accordance with the requirements of the Regulatory Flexibility Act, and addresses the comments received from interested parties in response to the IRFA.

1. Reasons for the Final 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). DOE publishes today's final rule pursuant to Part A–1. The PTAC and PTHP test procedures appear at 10 CFR 431.96.

EPCA established Federal energy conservation standards that generally correspond to the levels in ASHRAE Standard 90.1, as in effect on October 24, 1992 (ASHRAE 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 Standard 90.1 is amended, DOE must adopt an amended standard at the new level in ASHRAE 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 amending the energy conservation standards for PTACs and PTHPs by raising the efficiency levels for this equipment above the efficiency levels specified by ASHRAE Standard 90.1–1999 for standard size PTACs and PTHPs and adopting the efficiency levels in ASHRAE Standard 90.1–1999 for non-standard size PTACs and PTHPs.

2. Objectives of, and Legal Basis for, the Rule

To determine whether economic justification exists, DOE reviews comments received and conducts analysis to determine whether the economic benefits of the amended 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.

3. Description and Estimated Number of Small Entities Regulated

Through market research, interviews with manufacturers of all sizes, discussions with industry trade groups, and comments from interested parties on the IRFA, DOE identified six small manufacturers in the PTAC and PTHP industry. These six manufacturers can be further sub-categorized by their manufacturing scale: (1) One small business competes successfully making standard-size PTACs and PTHPs in high volumes; (2) the remaining five small businesses make PTACs and PTHPs at much lower volumes. While three of these five low-volume small businesses make PTACs and PTHPs that fit into standard-size sleeves, the customization options offered by these manufacturers suggests that these units have more in common with the non-standard size equipment that these manufacturers also offer than with the high-volume standard size PTAC and PTHP equipment on the market. DOE found one small manufacturer of standard size PTACs and PTHPs manufactures equipment outside the U.S. DOE found the five small manufacturers produce equipment domestically. None of the six firms are divisions of larger owned companies.

4. Description and Estimate of Compliance Requirements

Potential impacts on all manufacturers of PTACs and PTHPs vary by TSL. Margins for all businesses could be impacted negatively by the adoption of any TSL, since all manufacturers have expressed an inability to pass on cost increases to retailers and consumers. The six small domestic businesses under discussion differ from their competitors in that they are much smaller entities than their competitors in the standard PTAC and PTHP industry. Any rule affecting products manufactured by these small businesses will affect them disproportionately because of their size and their focus on non-standard PTAC and PTHP equipment. However, due to the low number of competitors that agreed to be interviewed, DOE was not able to characterize the small business industry segment with a separate cash-flow analysis due to concerns about maintaining confidentiality.

For all other TSLs concerning PTAC and PTHP equipment (which are not being considered in today's rule), the impact on small, focused business entities will be proportionately greater than for their competitors since these businesses lack the scale to afford significant R&D expenses and capital expansion budgets. The exact extent is hard to gauge since manufacturers did not respond to all proposed investment requirements by TSL during interviews. However, research associated with other small entities in prior rulemakings suggests that many costs associated with complying with rulemakings are typically fixed, regardless of production volume. Thus, given their focus and scale, any appliance rulemaking could affect these six small businesses disproportionately compared to their larger and more diversified competitors.

5. Significant Issues Raised by Public Comments

DOE summarized comments from interested parties in section IV.K.1.

6. Steps DOE Has Taken To Minimize the Economic Impact on Small, Non-Standard Size PTAC and PTHP Manufacturers

In consideration of the benefits and burdens of standards, including the burdens posed to small manufacturers, DOE concluded that the efficiency levels in ASHRAE Standard 90.1–1999 are the highest levels that can be justified for non-standard size PTAC and PTHP equipment. DOE discusses the potential impacts on small, non-standard manufacturers from higher TSLs in section IV.K.1. Since DOE has adopted the efficiency levels in ASHRAE Standard 90.1–1999, DOE believes it has taken the necessary steps to minimize the economic impact on small, non-standard size PTAC and PTHP manufacturers.

C. Review Under the Paperwork Reduction Act

DOE stated in the NOPR that this rulemaking would impose no new information and recordkeeping requirements, and that OMB clearance is not required under the Paperwork Reduction Act (44 U.S.C. 3501 *et seq.*). 73 FR 18912. DOE received no comments on this in response to the NOPR and, as with the proposed rule, today's rule imposes no information and recordkeeping requirements. DOE takes no further action in this rulemaking with respect to the Paperwork Reduction Act.

D. Review Under the National Environmental Policy Act

DOE prepared an environmental assessment of the impacts of today's standards, which it published as a chapter within the TSD for the final rule. DOE found the environmental effects associated with today's various standards levels for PTACs and PTHPs to be not significant, and therefore it is issuing a Finding of No Significant Impact (FONSI) 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 FONSI is available in the docket for this rulemaking.

E. Review Under Executive Order 13132

DOE reviewed this rule pursuant to Executive Order 13132, Federalism, 64 FR 43255 (August 4, 1999), which imposes certain requirements on agencies formulating and implementing policies or regulations that preempt State law or that have federalism implications. In accordance with DOE's statement of policy describing the intergovernmental consultation process that it will follow in the development of regulations that have federalism implications, 65 FR 13735 (March 14, 2000), DOE examined the proposed rule and determined that the rule would 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. 73 FR 18912. DOE received no comments on this issue in response to the NOPR, and its conclusions on this issue are the same for the final rule as they were for the proposed rule. DOE takes no further action in today's final rule with respect to 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 whether 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, the final regulations meet the relevant standards of Executive Order 12988.

G. Review Under the Unfunded Mandates Reform Act of 1995

As described in the NOPR, title II of the Unfunded Mandates Reform Act of 1995 (Pub. L. 104–4) (UMRA) imposes requirements on Federal agencies when their regulatory actions will have certain types of impacts on State, local, and Tribal governments and the private sector. 73 FR 18912–13. DOE concluded that, because this rule would contain neither an intergovernmental mandate nor a mandate that may result in expenditure of $100 million or more in any year, the requirements of UMRA do not apply to the rule. *Id.* DOE received no comments concerning the UMRA in response to the NOPR, and its conclusions on this issue are the same for the final rule as for the proposed rule. DOE takes no further action in today's final rule with respect to the UMRA.

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

DOE determined that, for this rulemaking, it need not prepare a Family Policymaking Assessment under Section 654 of the Treasury and General Government Appropriations Act, 1999 (Pub. L. 105–277). 73 FR 18913. DOE received no comments concerning Section 654 in response to the NOPR, and thus takes no further action in today's final rule with respect to this provision.

I. Review Under Executive Order 12630

DOE determined, under Executive Order 12630, Governmental Actions and Interference with Constitutionally Protected Property Rights, 53 FR 8859 (March 18, 1988), that today's rule would not result in any takings which might require compensation under the Fifth Amendment to the U.S. Constitution. 73 FR 18913. DOE received no comments concerning Executive Order 12630 in response to the NOPR, and thus takes no further action in today's final rule with respect to this Executive Order.

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

Section 515 of 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 final rule under the OMB and DOE guidelines and 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 at 28355 (May 22, 2001), requires Federal agencies to prepare and submit to the OIRA a Statement of Energy Effects for any significant energy action. DOE determined that the proposed rule was not a significant energy action within the meaning of Executive Order 13211. 73 FR 18913. Accordingly, it did not prepare a Statement of Energy Effects on the proposed rule. DOE received no comments on this issue in response to the NOPR. As with the proposed rule, DOE has concluded that today's final rule is not a significant energy action within the meaning of Executive Order 13211, and has not prepared a Statement of Energy Effects on the rule.

L. Review Under the Information Quality Bulletin for Peer Review

On December 16, 2004, the OMB, in consultation with the Office of Science and Technology, issued its Final Information Quality Bulletin for Peer Review (the Bulletin). 70 FR 2664 (January 14, 2005). The purpose of the Bulletin is to enhance the quality and credibility of the Government's scientific information. The Bulletin establishes that certain scientific information shall be peer reviewed by qualified specialists before it is disseminated by the federal government, and, as indicated in the NOPR, this includes influential scientific information related to agency regulatory actions, such as the analyses in this rulemaking. 73 FR 18913.

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.

M. Congressional Notification

As required by 5 U.S.C. 801, DOE will submit to Congress a report regarding the issuance of today's final rule prior to the effective date set forth at the outset of this notice. The report will state that it has been determined that the rule is a ''major rule'' as defined by 5 U.S.C. 804(2). DOE also will submit the supporting analyses to the Comptroller General in the U.S. Government Accountability Office (GAO) and make them available to Congress.

VII. Approval of the Office of the Secretary

The Secretary of Energy has approved publication of today's final rule.

List of Subjects in 10 CFR Part 431

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

Issued in Washington, DC, on September 29, 2008.

John F. Mizroch,

Acting 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 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 is amended by adding in alphabetical order new definitions for ''Non-standard size,'' and ''Standard size'' to read as follows:

§ 431.92 Definitions concerned commercial air conditioners and heat pumps.

* * * * *

Non-standard size means a packaged terminal air conditioner or packaged terminal heat pump with existing wall sleeve dimensions having an external wall opening of less than 16 inches high or less than 42 inches wide, and a cross-sectional area less than 670 square inches.

* * * * *

Standard size means a packaged terminal air conditioner or packaged terminal heat pump 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 a cross-sectional area greater than or equal to 670 square inches.

* * * * *

■ 3. Section 431.97 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 standard size 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. Each non-standard size packaged terminal air conditioner or packaged terminal heat pump manufactured on or after January 1, 1994, and before September 30, 2010, 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]

TABLE 1 TO § 431.97—MINIMUM COOLING EFFICIENCY LEVELS—Continued

Product	Category	Cooling capacity	Sub-category	Efficiency level[1]	
				Products manufactured until October 29, 2003	Products manufactured on and after October 29, 2003
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 <240,000 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 standard size packaged terminal air conditioner or packaged terminal heat pump manufactured on or after September 30, 2012 and each non-standard size packaged terminal air conditioner or packaged terminal heat pump manufactured on or after September 30, 2010, shall have an Energy Efficiency Ratio and Coefficient of Performance no less than:

Equipment class			Energy conservation standards*
Equipment	Category	Cooling capacity (British thermal units per hour [Btu/h])	
PTAC	Standard Size	<7,000	EER = 11.7
		7,000–15,000	EER = 13.8 − (0.300 × Cap**)
		>15,000	EER = 9.3
	Non-Standard Size	<7,000	EER = 9.4
		7,000–15,000	EER = 10.9 − (0.213 × Cap**)
		>15,000	EER = 7.7

Equipment class			Energy conservation standards*
Equipment	Category	Cooling capacity (British thermal units per hour [Btu/h])	
PTHP	Standard Size	<7,000	EER = 11.9 COP = 3.3
		7,000–15,000	EER = 14.0 − (0.300 × Cap**) COP = 3.7 − (0.052 × Cap**)
		>15,000	EER = 9.5 COP = 2.9
	Non-Standard Size	<7,000	EER = 9.3 COP = 2.7
		7,000–15,000	EER = 10.8 − (0.213 × Cap**) COP = 2.9 − (0.026 × Cap**)
		>15,000	EER = 7.6 COP = 2.5

* 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.

* * * * *

APPENDIX

[The following letter from the Department of Justice will not appear in the Code of Federal Regulations.]

DEPARTMENT OF JUSTICE,
Antitrust Division,
Main Justice Building,
950 Pennsylvania Avenue, NW.,
Washington, DC 20530–0001, (202) 514–2401/(202) 616–2645(f), *antitrust@justice.usdoj.gov*, *http://www.usdoj.gov*.

June 6, 2008

Warren Belmar, Deputy General Counsel for Energy Policy, Department of Energy, Washington, DC 20585.

Dear Deputy General Counsel Belmar:

I am responding to your April 3, 2008 letter seeking the views of the Attorney General about the potential impact on competition of two proposed energy conservation standards for packaged terminal air conditioners (''PTACs'') and packaged terminal heat pumps (''PTHPs''). Your request was submitted pursuant to Section 325(o)(2)(B)(i)(V) of the Energy Policy and Conservation Act, as amended, (''EPCA''), 42 U.S.C. 6295(o)(B)(i)(V), which requires the Attorney General to make a determination of the impact of any lessening of competition that is likely to result from the imposition of proposed energy conservation standards. The Attorney General's responsibility for responding to requests from other departments about the effect of a program on competition has been delegated to the Assistant Attorney General for the Antitrust Division in 28 CFR 0.40(g).

In conducting its analysis the Antitrust Division examines whether a proposed standard may lessen competition, for example, by placing certain manufacturers of a product at an unjustified competitive disadvantage compared to other manufacturers, or by inducing avoidable inefficiencies in production or distribution of particular products. In addition to harming consumers directly through higher prices, these effects could undercut the ultimate goals of the legislation.

We have reviewed the proposed standards and the supplementary information submitted to the Attorney General, including the transcript of the May 1 public meeting on the proposed standards. We have additionally conducted interviews with members of the industry.

What we have heard raises legitimate issues about whether the proposed standards may adversely affect competition. The proposed standard for non-standard PTACs and PTHPs may create a risk that is too strict for the manufacturers to satisfy, given the state of technology.

Customers that own older buildings with non-standard wall openings for air conditioning and heating units could face the choice of incurring capital expenditures to alter the size of the wall openings so that they could use standard sized units, or of not being able to replace their nonstandard sized units with units that are appropriately sized and meet the proposed energy conservation standards. Similarly, we have heard that the proposed standards for standard sized PTHPs may be too strict for manufacturers to satisfy. Since there are few manufacturers of standard PTHPs and of nonstandard PTACs and PTHPs, if some manufacturers cannot meet the proposed standards, consumers will have fewer competitive alternatives and may pay higher prices.

The Department of Justice is not in a position to judge whether manufacturers will be able to meet the proposed standards—we urge, however, the Department of Energy to take into account these possible impacts on competition in determining its final energy efficiency standard for PTACs and PTHPs.

Sincerely,

Deborah A. Garza,

Acting Assistant Attorney General.

[FR Doc. E8–23312 Filed 10–6–08; 8:45 am]

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