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Ms. Brenda Edwards
U.S. Department of Energy
Building Technologies Program, Mailstop EE-2J
1000 Independence Avenue SW
Washington, DC 20585

Re: Energy Conservation Standards for Small, Large, and Very Large Air-Cooled Commercial Package Air Conditioning and Heating Equipment [Docket Number EERE-2013-BT-STD-0007]

Dear Ms. Edwards:

These comments are submitted by the Air-Conditioning, Heating, and Refrigeration Institute (AHRI) in response to the U.S. Department of Energy's (DOE) notice of proposed rulemaking (NOPR) on the Energy Conservation Standards for Small, Large, and Very Large Air-Cooled Commercial Package Air Conditioning and Heating Equipment appearing in the *Federal Register* on September 30, 2014. 79 Fed. Reg. 58,948 (proposed Sept. 30, 2014) (to be codified at 10 C.F.R. pt. 431).

AHRI is the trade association representing manufacturers of heating, cooling, water heating, and commercial refrigeration equipment. More than 300 members strong, AHRI is an internationally recognized advocate for the industry, and develops standards for and certifies the performance of many of the products manufactured by our members. In North America, the annual output of the HVACR industry is worth more than \$20 billion. In the United States alone, our members employ approximately 130,000 people, and support some 800,000 dealers, contractors, and technicians.

SUMMARY OF COMMENTS

As discussed in detail below, AHRI has several concerns with this proposed rulemaking, both in regards to DOE's failure to follow the statutorily mandated method for amending energy conservation standards for commercial equipment, and with unreasonable and inappropriate assumptions in the supporting technical analysis, both of which result in a proposed standard that is not technologically feasible and economically justified.

DOE has failed to meet the statutory obligations required in order to adopt a metric more stringent than amended American Society of Heating, Refrigeration, and Air-Conditioning Engineers (“ASHRAE”) 90.1-2013. In the NOPR, DOE is unquestionably adopting integrated energy efficiency (“IEER”) levels that are more stringent than those most recently amended in ASHRAE 90.1-2013. As a result, DOE is required to prove by clear and convincing evidence that the proposed standards would result in a significant amount of additional energy savings. DOE has failed to meet this burden in several key areas:

- DOE is ignoring clear congressional intent to rely primarily on the ASHRAE process to determine amended efficiency standards for commercial equipment, a process in which DOE is a participant, and for which DOE voted to accept the amended IEER levels in ASHRAE 90.1-2013 applicable to this equipment.
- By utilizing a “max tech” approach, DOE is inappropriately conducting a residential analysis to set commercial equipment standards, in violation of EPCA. As result, and by failing to use amended ASHRAE 90.1 as the baseline, DOE has failed to meet the requirement of showing levels above the amended ASHRAE standards are justified by clear and convincing evidence and is proposing an inappropriately shortened effective date.
- DOE has unreasonably and significantly overstated the benefits and understated the costs in the LCC and the National Impact Analysis by using data that conflicts with other recent data published by DOE. For example,
 - DOE relies on data regarding emission reductions that it recognizes is outdated and conflicts with its 2014 AEO Outlook published in the first half of 2014, and which significantly overstates the benefits from Social Cost of Carbon and other emission reductions.
 - DOE relies on data that conflicts with its Energy Information Administration and understates the average life of the equipment.
 - DOE relies on data published by the DOE Energy Information Administration that significantly underestimates the current retail and equipment costs associated with a 7.5-ton commercial rooftop air conditioner.
- DOE fails to consider the cumulative regulatory impact of multiple DOE and state rulemakings that will affect the equipment at issue in the immediate future, including the pending commercial furnace rulemaking, which will directly impact the efficiency standards for this equipment as well as state codes that have or will adopt the revised ASHRAE 90.1-2013 standards.
- In its analysis, DOE inappropriately includes the energy savings from ventilation, which are not included in the applicable test procedure, to overstate the benefits of trial standard level (“TSL”) 3 and TSL 4.
- DOE inappropriately includes variable speed fans during heating in efficiency level (“EL”) 3 and EL4, which overstates increases in COP.
- DOE modeling assumes variable speed supply fans operation at EL3 and EL4, and constant speed operation at EL1 and EL2. This is incorrect since a significant percentage of the market uses variable speed or staged supply fans currently.

- DOE incorrectly correlates IEER improvements with gains in COP.
- DOE assumes fan speed is controlled by outdoor air temperature which results in lower airflow during economizer operation and underestimates the energy savings of economizers.
- DOE does not include an uncertainty analysis in the modeling results.
- DOE unreasonably utilizes incremental, rather than average markups, which significantly understates the cost to manufacturers and end users of the proposed standards.

Due to these concerns, DOE has failed to meet the statutory burden of providing clear and convincing evidence of significant energy savings from a standard more stringent than ASHRAE 90.1-2013. DOE should therefore adopt the IEER levels set by ASHRAE in 90.1-2013, revise its analysis, and issue a supplemental notice of proposed rulemaking to enable stakeholders sufficient opportunity to comment on this regulatory action.

DOE's Rulemaking Approach for Commercial Equipment

(1) Insufficient Comment Period.

The NOPR affects three different capacity sizes of commercial equipment: small, large and very large unitary air conditioners and heat pumps. Due to the complexity of these products and sizes, they must be analyzed separately, which requires substantially more time and effort than a typical rulemaking. Furthermore, these products are some of the most complicated and complex products regulated by DOE, and to thoroughly analyze the efficiency improvement and economic justification analysis, additional time is needed to review the supporting documents and calculations.

On November 25, 2014, DOE issued an extension on the comment period to December 22, 2014, an additional three weeks, in response to requests from AHRI and others. AHRI does not believe that the last-minute extension was sufficient to provide adequate notice and time for the preparation of individual comments. Given the extent of DOE's analysis, as well as the transparency issues identified below, a three-week extension to the comment period issued at the last possible minute before the original comment deadline has not helped manufacturers greatly in preparing all necessary comments. DOE should have provided the 60-day extension as we originally requested.

DOE has also not addressed the request to hold a separate meeting to review its technical analysis for this rulemaking. It is not possible to provide detailed comments on life cycle costs (LCC), national impact analysis (NIA), and the government regulatory impact model (GRIM) without an understanding of where the values are sourced from, and how the calculations are performed. This information is not adequately available in the public rulemaking docket.

(2) DOE Repeatedly Fails to Construe Its EPCA Obligations in Proper Relationship to Amended ASHRAE 90.1-2013.

EPCA (as amended) provides in relevant part as follows:

(6) Amended energy efficiency standards

(A) In general

(i) Analysis of potential energy savings

If ASHRAE/IES Standard 90.1 is amended with respect to the standard levels or design requirements applicable under that standard to any small commercial package air conditioning and heating equipment, large commercial package air conditioning and heating equipment, very large commercial package air conditioning and heating equipment, packaged terminal air conditioners, packaged terminal heat pumps, warm-air furnaces, packaged boilers, storage water heaters, instantaneous water heaters, or unfired hot water storage tanks, not later than 180 days after the amendment of the standard, the Secretary shall publish in the Federal Register for public comment an analysis of the energy savings potential of amended energy efficiency standards.

(ii) Amended uniform national standard for products

(I) In general

Except as provided in subclause (II), not later than 18 months after the date of publication of the amendment to the ASHRAE/IES Standard 90.1 for a product described in clause (i), the Secretary shall establish an amended uniform national standard for the product at the minimum level specified in the amended ASHRAE/IES Standard 90.1.

(II) More stringent standard

Subclause (I) shall not apply if the Secretary determines, by rule published in the Federal Register, and supported by clear and convincing evidence, that adoption of a uniform national standard more stringent than the amended ASHRAE/IES Standard 90.1 for the product would result in significant additional conservation of energy and is technologically feasible and economically justified.

42 U.S.C. § 6313(a)(6).

DOE Cannot Ignore Amended ASHRAE 90.1 Standards Based on Its Proffered April 2014 Rating Metric Rationale. On October 9, 2013, ASHRAE issued ASHRAE Standard 90.1-2013. In partial compliance with Section 6313(a)(6)(A)(i), DOE determined that ASHRAE 90.1-2013 would save energy. See Energy Conservation Program for Certain Industrial Equipment: Energy Conservation Standards for Commercial Heating, Air-Conditioning, and Water-Heating Equipment, 79 Fed. Reg. 20,114 (proposed Apr. 11, 2014) (to be codified at 10 C.F.R. pt. 431). However, DOE refused to analyze the energy savings associated with “small, large, and very large air-cooled and water-cooled air conditioners and heat pumps” — the categories of equipment at issue in this proposed rulemaking. *Id.* at 20,118. DOE stated that it could lawfully refuse to perform this analysis “because Federal energy conservation standards for this equipment do not use IEER as a rating metric, [so] DOE is not triggered to review this equipment.” *Id.*

This conclusion violates the statute. Section 6313(a)(6)(A)(i) (emphasis added) provides that if the applicable ASHRAE 90.1 standard is amended:

with respect to the standard levels or design requirements applicable ***under that standard*** to any small commercial package air conditioning and heating equipment, large commercial package air conditioning and heating equipment, very large commercial package air conditioning and heating equipment, . . . not later than 180 days after the amendment of the standard, the Secretary shall publish in the Federal Register for public comment an analysis of the energy savings potential of amended energy efficiency standards.

Clearly, the ASHRAE 90.1-2013 amendment changed “standard levels or design requirements applicable ***under that standard***” as to the relevant equipment types. DOE conceded as much in the April 2014 *Federal Register* Notice: “DOE notes that ASHRAE 90.1-2013 also increased integrated energy efficiency ratio (IEER) levels for additional equipment not listed in Table I.1, including small, large, and very large air-cooled and water-cooled air conditioners and heat pumps.” 79 Fed. Reg. at 20,118. Hence, DOE was plainly obligated to analyze the energy savings for those types of equipment pursuant to Section 6313(a)(6)(A)(i).

DOE appears to be arguing that in order for Section 6313(a)(6)(A)(i) to apply, ASHRAE must amend the equivalent of a federal standard, and that such an ASHRAE amendment must use the same rating metric (*i.e.*, EER vs. IEER) or DOE’s obligations under that provision of the statute are not triggered. But this misreads the statute. The statute does not say, for instance, “If ASHRAE/IES Standard 90.1 is amended with respect to the standard levels or design requirements applicable under [the analogous standard prevailing under federal law and only so long as the amended ASHRAE/IES Standard 90.1 utilizes the same rating metric as to the relevant equipment types, then]

not later than 180 days after the amendment of the standard, the Secretary shall publish in the Federal Register for public comment an analysis of the energy savings potential of amended energy efficiency standards.” Accordingly, DOE lacks the authority to read the “under that standard” language to reference a DOE standard and not an ASHRAE standard. This flatly violates step one of *Chevron, U.S.A., Inc. v. Natural Res. Def. Council, Inc.*, 467 U.S. 837, 842-43 (1984).

DOE’s Rating-Metric Rationale Also Fails Chevron Step Two. The text of Section 6313(a)(6)(A)(i) is clear in referring not to comparisons between amended ASHRAE 90.1 standards and existing DOE standards, but rather to comparisons between amended ASHRAE 90.1 standards and the prior applicable 90.1 standard, pre-amendment. But even if that were not true, the sleight-of-hand DOE engages in to argue that the rating metrics (IEER for ASHRAE vs. EER for the DOE standards presently in place) must be the same between existing DOE regulations and any amended ASHRAE 90.1 standard in order for the obligations of Section 6313(a)(6)(A)(i) to be triggered must be rejected under *Chevron* step two. *Chevron* at 843.

Most probably, DOE knew in April 2014 that it intended in September 2014 to propose this rulemaking to adopt the IEER rating metric. Months of analysis are obviously required to produce the proposed rulemaking and Technical Support Document now under consideration. (Indeed, as AHRI notes below, DOE is taking the incongruous position that the release of the Annual Energy Outlook in May 2014 did not give it sufficient time to update the analysis in this September 30, 2014, rulemaking.) And, at the very least, DOE must have known in April 2014 that its adoption of an IEER rating metric was possible. See also 79 Fed. Reg. 58,948, 58,982 (Sept. 30, 2014) (DOE noting in this proposed rulemaking that it was originally expecting to issue this rule by December 2013, which is before its April 2014 statements). And yet DOE refused to estimate the energy savings for the relevant equipment types on the rationale stated above. This is a rather transparent attempt to circumvent the strong presumption Congress established in favor of adopting amended ASHRAE standards in this area as opposed to allowing DOE ordinary less fettered sphere of discretion under EPCA to devise a own standard of its own making in-house and without use of the collaborative ASHRAE process.

As such, DOE’s statement earlier this year that it need not look at an amended ASHRAE standard because it uses the IEER rating metric instead of the EER metric, when the agency was planning to roll out a new efficiency standard of its own devising that also uses the IEER rating metric a short five months later, is plainly *ultra vires*. This maneuver is reminiscent of one EPA attempted and saw unanimously rejected by the Supreme Court. See *Whitman v. Am. Trucking Ass’ns, Inc.*, 531 U.S. 457, 484-86 (2001) (reversing an agency’s attempt to render obsolete Subpart I of the Clean Air Act, which established a schedule for compliance with existing ozone standards, because EPA asserted that it was issuing new ozone standards not enforcing existing ozone standards). Here, DOE is attempting to render superfluous EPCA Section 6313(a)(6)(A)(i) regarding amended ASHRAE standards and Section 6313(a)(6)(A)(ii)(I)’s interrelated preference for adopting an amended ASHRAE 90.1

standard. DOE is basing this on the purportedly technical ground that the amended ASHRAE 90.1 standard uses IEER as its rating metric. And DOE is, startlingly, still attempting to do so despite the fact that it has now concluded in the proposed rule that IEER is the better rating metric to use and is adopting it accordingly.

Congress would surely be surprised to learn that amended ASHRAE standards somehow become *easier* for DOE to ignore based on a rating-metric difference that DOE itself is now proposing to erase. And even if EPCA's presumption in favor of adopting ASHRAE standards hinged on the particular rating metric used (and, as shown above, textually it does not), it would violate *Chevron* step two, as it did in *American Trucking*, for DOE to act to eliminate entirely the important constraints imposed in Section 6313(a)(6)(A)(ii)(I) vs. (II). See *Am. Trucking*, 531 U.S. at 484-86 (noting that congressional instructions that were "obviously written to govern implementation for some time" must be given special attention and were not to be deemed overridden lightly). The structure of the standard-setting analysis imposed by Congress on DOE in Section 6313(a)(6)(A) was also obviously written "to govern for some time." Indeed, there is no indication at present that Congress intended Section 6313(a)(6)(A) to cease governing at any point in the future.

DOE Contravenes the Text and Structure of Section 6313(a)(6)(A) by Largely Ignoring the Clear-and-Convincing Standard Congress Erected. Furthermore, Section 6313(a)(6)(A)(i) is structurally linked to Section 6313(a)(6)(A)(ii). Specifically, Section 6313(a)(6)(A)(ii) requires DOE to, in essence, treat an amended ASHRAE standard as referenced in Section 6313(a)(6)(A)(i) as presumptively the very standard that DOE should adopt as a matter of federal law, unless DOE can conclude by clear and convincing evidence that "adopt[ing] . . . a uniform national standard more stringent than the amended ASHRAE/IES Standard 90.1 for the product would result in significant additional conservation of energy and [thus such a standard] is technologically feasible and economically justified." Compare 6313(a)(6)(A)(ii)(I) (adoption of a presumptively correct ASHRAE amended standard), with 6313(a)(6)(A)(ii)(II) (adoption of a more stringent federal standard if but only if the clear-and-convincing hurdle can be surmounted). Because of this structural linkage, DOE, by purporting to say that its obligations under Section 6313(a)(6)(A)(i) were never triggered, appears to be arguing that it is not burdened by the need to show that the present proposed rulemaking, which is significantly more stringent than ASHRAE 90.1-2013, meets the clear-and-convincing standard. That conclusion constitutes its own distinct violation of *Chevron* step one.

Note, however, that DOE does from time to time intone the "clear and convincing" standard, although only at a few junctures. See 79 Fed. Reg. at 58,953 (simply referencing the existence of the standard). The only place that the "clear and convincing" standard is analyzed in any way appears in the following passage:

As discussed in section II.A, DOE is typically obligated either to adopt those standards developed by ASHRAE or to adopt levels more stringent than the ASHRAE levels if there is clear and convincing evidence in

support of doing so. (42 U.S.C. 6313(a)(6)(A)) DOE notes that ASHRAE Standard 90.1-2010 specifies minimum efficiency requirements using both the EER and IEER metrics. As discussed in the RFI, DOE evaluated the relationship between EER and IEER by considering models that are rated at the current DOE standard levels based on the EER metric for each equipment class (as presented in section II.B.1). DOE then analyzed the distribution of corresponding rated IEER values for each equipment class. DOE notes that the lowest IEER values associated with the current DOE standards for EER generally correspond with the ASHRAE Standard 90.1-2010 minimum efficiency requirements. 78 FR 7296, 7299 (Feb. 1, 2013); EERE-2013-BT-STD-0007-0001. Based on this evaluation, because DOE is considering energy conservation standards based on the IEER metric, DOE proposes to use the ASHRAE Standard 90.1-2010 minimum IEER requirements to characterize the baseline cooling efficiency for each equipment class. DOE also notes that equipment is available on the market that is at or near the ASHRAE Standard 90.1-2010 minimum IEER requirements. As a result, DOE is not considering higher IEER levels for the baseline.

79 Fed. Reg. at 58,971-72.

Respectfully, this analysis is seriously deficient under the statute. *First*, note that in contrast to the reasoning DOE deployed just a few months ago in April 2014, suggesting that it had no obligations at all under Section 6313(a)(6)(A) as to the relevant forms of covered equipment because the existing standards use the EER metric whereas the amended ASHRAE 90.1-2013 standard is rooted in the IEER metric, in this proposed rulemaking DOE appears to be arguing that it is bound by the “clear and convincing” instruction by Congress in Section 6313(a)(6)(A)(ii)(II). This creates its own problem for the agency. See *FCC v. Fox Television Stations, Inc.*, 556 U.S. 502, 515 (2009) (“[T]he requirement that an agency provide reasoned explanation for its action would ordinarily demand that it display awareness that it *is* changing position. An agency may not, for example, depart from a prior policy *sub silentio* or simply disregard rules that are still on the books.”) (italics in original).

Second, what DOE has done in the passage quoted immediately above is adopt ASHRAE 90.1-2010 as the baseline for its analysis. But this impermissibly ignores ASHRAE 90.1-2013. Since that is the most recent amended standard and since DOE itself now proposes to establish governing standards based on the IEER metric, just like ASHRAE 90.1-2013, DOE must use ASHRAE 90.1-2013 as its baseline. Failure to do so not only results in arbitrary and capricious analysis by purporting to contrast changes induced by regulation against the wrong baseline, but DOE also violates the text of EPCA Section 6313(a)(6)(A). That provision does more than require DOE to analyze whether to adopt a new energy efficiency standard against a given baseline; it plainly imposes special constraints on DOE not to depart from consensus amended ASHRAE levels unless it is absolutely clear that doing so is technologically feasible and economically justified. Moreover, Section 6313(a)(6)(A) focuses the agency on

analyzing whether it is sufficient to adopt as a matter of federal law the amended ASHRAE standard that would be effective if DOE did not adopt a more stringent standard, not the older ASHRAE standard that has been replaced. Adoption of ASHRAE 90.1-2013 as the baseline is also required in order to avoid overstating the additional energy savings from each TSL, as compared to the amended ASHRAE standard, as well as to accurately reflect the costs to manufacturers of complying with the increased efficiency standards that are required due to the amended ASHRAE standards. DOE's approach in the NOPR also directly contradicts other recent commercial energy efficiency standards rulemaking, in which DOE used the amended ASHRAE standard levels as the baseline in its technical analysis.¹

Third, even if DOE were correct that “the lowest IEER values associated with the current DOE standards for EER generally correspond with the ASHRAE Standard 90.1-2010 minimum efficiency requirements,” as it argues above, 79 Fed. Reg. at 58,972, that point is irrelevant. Once again, DOE is imagining that Section 6313(a)(6)(A) states something that it did not. As a functional matter, the agency now appears to recognize that the fact that ASHRAE 90.1-2013 uses IEER is no longer an absolute bar to it triggering its Section 6313(a)(6)(A)(i) obligations (in contrast to its position in April 2014). But the agency is still reading the statute, counterfactually, as if it said something like the following: “If ASHRAE/IES Standard 90.1 is amended with respect to the standard levels or design requirements applicable **under [the analogous standard prevailing under federal law]** then] not later than 180 days after the amendment of the standard, the Secretary shall publish in the Federal Register for public comment an analysis of the energy savings potential of amended energy efficiency standards.” But Section 6313(a)(6)(A)(i) says no such thing. As a result, DOE has no business trying to devise a rationale that changes the actual prevailing amended ASHRAE 90.1 baseline (whatever that may be) into a baseline that relies on a prior ASHRAE 90.1 standard baseline. This violates the statute and is arbitrary and capricious. Additionally, DOE's approach is highly misleading because it allows DOE to give the impression that its proposed actions will be responsible for achieving emissions reductions by going back artificially to the ASHRAE 90.1-2010 baseline, and ignoring the emissions reductions already obtained in the move from ASHRAE 90.1-2010 to ASHRAE 90.1-2013. See *also* Shorey Consulting Report at 2-4, 7-8 (attached). That departure from the statute will likely not be countenanced by the courts.

Finally, the failure to analyze the proposed standards against the correct ASHRAE 90.1-2013 baseline is light years from harmless error. Shorey Consulting estimates the effect of this error as causing “the incremental national NPV at Energy Level 3 [to] decline[] by approximately 28%, and the savings in quads by 25%.” *Id.* at 15-16. Moreover, as the Shorey Consulting Report indicates, a complete do-over of the TSD as to TSL 3 will also be required. See *id.* at 16 (“None of these effects [of using an ASHRAE 90.1-2013 baseline] can be understood fully or assessed carefully without a complete review and resubmission of the TSD, including a reanalysis using a combined

¹ Energy Conservation Program: Energy Conservation Standards for Packaged Terminal Air Conditioners and Packaged Terminal Heat Pumps, 79 Fed. Reg. 55,538 (proposed Sept. 16, 2014) (to be codified at 10 C.F.R. pt. 431).

ASHRAE 90.1-2013 and non-ASHRAE 90.1-2013 base cases [because manufacturers will also be required in many cases to continue to produce equipment meeting older ASHRAE standards]. Absent such a review, the negative effects on end users of an Energy Level 3 standard should guide DOE to reject that level and default to the ASHRAE 90.1-2013 consensus approach.”).

DOE Ignores the Structural Differences Between Part A-1 of the Codified EPCA Statute, Which Is Applicable Here Vs. Part A of EPCA as Codified, Which Is Not Applicable Here.

DOE fails to recognize that Part A of EPCA as codified (concerning residential equipment) and Part A-1 (concerning commercial equipment) reflect important differences in congressional intent. The commercial provisions were adopted separately from and five years after the residential provisions. Only the commercial provisions emphasize use of the ASHRAE regulatory baseline and the presumption that the ASHRAE standard should be adopted federally. In part, this is a recognition of the complexity of setting industrial standards.

The ASHRAE process is open and collaborative because, among others, both manufacturers and DOE participate in it. The premise underlying EPCA’s industrial standards program is that through the ASHRAE process, all stakeholders (DOE included) can determine the appropriate standard levels. ASHRAE 90.1-2013 includes key energy savings over previous rulemakings. It required stakeholders such as manufacturers, energy advocates, regulators, academia, and utilities to work together to develop a standard that is fair and representative of the current state of the industry and technology. ASHRAE 90.1 is reviewed every three years and with each review the current minimum efficiency levels are analyzed by all the stakeholders involved. The minimum efficiency levels set forth by ASHRAE 90.1 are the levels most representative of what are both economically and technologically feasible at the time of revision. Increasing levels beyond what is stated in ASHRAE 90.1 greatly limits the effectiveness of the standard which is followed industry-wide. This is the basis for section 6313(a)(6)(A)(ii)(III)’s strong presumption that ASHRAE amendments should be adopted federally. This provision makes clear that “adoption of a uniform national standard more stringent than the amended ASHRAE/IES Standard 90.1 for the product” can occur only where the “Secretary determines, by rule published in the Federal Register, and supported by clear and convincing evidence, that [such a rule] would result in significant additional conservation of energy and is technologically feasible and economically justified.”

In short, DOE is empowered to adopt a more stringent standard than ASHRAE where the ASHRAE process reaches a defective conclusion for some reason (though given its collaborative consensus nature, it is hard to see how this would be possible). And, in any event, there is no evidence that such an unfortunate outcome occurred here. The addendum to increase the IEERs to ASHRAE 90.1-2013 was addendum CL to the ASHRAE 90.1-2010 standard. During this process, there were two public meetings in which interested parties had the opportunity to submit comments. The

voting record from these meetings shows that DOE voted to adopt the new minimum efficiency levels, which are labeled as EL1 in the current rulemaking. DOE should have raised objections to the acceptance of this level to set the minimum efficiencies at these meetings or submitted comments. As a result, there are no grounds to adopt anything above EL1 in this rulemaking as DOE agreed that EL1 should be the accepted level when ASHRAE 90.1-2013 becomes effective.

The ASHRAE process that Congress wanted elevated to regulatory status in most cases — even in preference to unilateral DOE rulemaking — would be eviscerated if DOE could just sit on the sidelines and wait for an outcome it intended to come along later and trump. That would turn the statutory regime in Section 6313(a)(6)(A)(ii)(I)-(II) on its head. No, the statute presupposes that DOE has worked through the ASHRAE process first and that unilateral DOE rules in this area will be the exception and not the rule.² DOE has acknowledged this congressional intent in prior rulemakings, noting that EPCA “clearly requires DOE to participate in the ASHRAE process,” and that since ASHRAE standards must be technologically feasible and economically justified, “it appears that Congress assumed that these concerns would be worked out by stakeholders, with DOE participating in the ASHRAE process itself.” Building Energy Standards Program: Determination Regarding Energy Efficiency Improvements in the Energy Standard for Buildings, Except Low-Rise Residential Buildings, ASHRAE/IESNA Standard 90.1-1999, 67 Fed. Reg. 46,464, 46,467 (July 15, 2002). This is exactly what in fact happened with the IEER standards amended in ASHRAE 90.1-2013.

Notably, the language in Section 6313(a)(6)(A)(ii)(II) is very different from the comparable language concerning setting residential equipment standards. *Compare* 42 U.S.C. § 6313(a)(6)(A)(ii)(II), *with* 42 U.S.C. § 6295(o)(2)(A). This residential standard includes language regarding “the maximum improvement in energy efficiency that is economically justified.” 42 U.S.C. § 6295(o)(2)(A). Section 6313(a)(6)(A)(ii)(II) does not include that language and instead imposes a decisional rule that heavily favors the status quo of any ASHRAE amended standard. DOE concludes, contrary to the commercial provisions in the statute, that it can follow an energy savings maximization approach, starting by evaluating EL4, and that the rebuttal presumption applicable to consumer products is at issue. See, e.g., 79 Fed. Reg. at 58,954 (“As indicated above, any amended standard for covered equipment must be designed to achieve the maximum improvement in energy efficiency that is technologically feasible and economically justified.” Additionally, DOE references to EPCA’s rebuttable presumption for consumer products and states “[f]or this rulemaking, DOE considered the criteria for rebuttable presumption as part of its analysis.”)

Moreover, Section 6313(a)(6)(B)(ii) does provide a maximizing instruction of a different kind concerning industrial equipment standard-setting, but that instruction

² The intent is also supported by the Executive branch via Revised OMB Circular No. A-119 (Feb. 10, 1998), which “directs agencies to use voluntary consensus standards in lieu of government-unique standards except where inconsistent with law or otherwise impractical.” DOE has made neither showing here.

directs DOE to consider all the factors to the maximum extent possible. The relevant provision states as follows:

In determining whether a standard is economically justified for the purposes of subparagraph (A)(ii)(II), the Secretary shall, after receiving views and comments furnished with respect to the proposed standard, determine whether the benefits of the standard exceed the burden of the proposed standard by, **to the maximum extent practicable**, considering—

- (I) the economic impact of the standard on the manufacturers and on the consumers of the products subject to the standard;
- (II) the savings in operating costs throughout the estimated average life of the product in the type (or class) compared to any increase in the price of, or in the initial charges for, or maintenance expenses of, the products that are likely to result from the imposition of the standard;
- (III) the total projected quantity of energy savings likely to result directly from the imposition of the standard;
- (IV) any lessening of the utility or the performance of the products likely to result from the imposition of the standard;
- (V) the impact of any lessening of competition, as determined in writing by the Attorney General, that is likely to result from the imposition of the standard;
- (VI) the need for national energy conservation; and
- (VII) other factors the Secretary considers relevant.

42 U.S.C. § 6313(a)(6)(B)(ii) (emphasis added). In other words, the instruction Congress gave DOE is to maximize benefits over costs and consider all seven factors above to the maximum extent practicable in doing so.

Reinforcing the fact that Congress wanted industrial standard setting and residential standard setting to proceed very differently, EPCA Section 6316(a) specifically states that “[t]he provisions of . . . subsections (l) through (s) of section 6295 of this title [which, of course, include Section 6295(o)] . . . shall apply with respect to this part (other than the equipment specified in subparagraphs (B), (C), (D), (I), (J), and (K) of section 6311(1) of this title) to the same extent and in the same manner as they apply in part B [*i.e.*, part A-1 as codified] . . .” And Section 6311(1)(B), (C), and (D) reference small, large, and very large commercial package air conditioning and heating

equipment. Thus, Section 6295(o) standards applicable to residential equipment plainly do not govern Section 6311(1)(B), (C), and (D) covered industrial equipment.

DOE ignores these distinctions and in the process makes serious errors in this proposed rulemaking. *First*, nowhere does DOE attempt to explain how it reached the conclusion that this proposed rulemaking “would result in significant additional conservation of energy [that] is technologically feasible and economically justified” by clear and convincing evidence. 42 U.S.C. § 6313(a)(6)(A)(ii)(II). Instead, DOE’s analysis is functionally identical to how it proceeds to set standards under Section 6295(o). It is not enough for DOE to intone that this rulemaking is governed by a higher burden. DOE must instead take the statutory compromise to heart that Congress imposed here. *See, e.g., Am. Hosp. Ass’n v. NLRB*, 899 F.2d 651, 657 (7th Cir. 1990), *aff’d*, 499 U.S. 606 (1991) (cautioning that “Courts must be careful not to . . . upset a legislative compromise” when interpreting a statute, and upholding a NLRB process in part because it comported with legislative intent); *see also Int’l Bhd. of Teamsters v. United States*, 431 U.S. 324, 352-53 (1977) (interpreting Title VII to give effect to the “Mansfield-Dirksen” legislative compromise); *Moore v. Sunbeam Corp.*, 459 F.2d 811, 829-30 (7th Cir. 1972), *opinion modified on denial of reh’g*, (7th Cir. June 27, 1972) (similar). Congress could have given DOE the full panoply of powers it possesses in the residential standard-setting context but it did not do so. Accordingly, DOE’s analysis falls far short of this elevated requirement of proof, and DOE has failed to show, clearly and convincingly, that the establishment of standards more stringent than ASHRAE 90.1-2013 should be adopted.

Second, the fact that DOE is wrongly engaged in a Section 6295(o)(2) energy-savings maximization exercise explains why it starts with evaluating TSL 4 and then descends to TSL 3, stopping at that point and doing no comparative analysis of TSLs 1 and 2. *See* 79 Fed. Reg. at 59,007-08 (“First, DOE considered TSL 4, the most efficient level (max tech) Next, DOE considered TSL 3”). DOE then concludes that TSL 3 should be selected. *See id.* But this turns the proper statutory order of consideration on its head. Instead of starting with the max-tech standard level, DOE was obliged by Section 6313(a)(6)(A)(ii) to first consider an amended ASHRAE standard for adoption, *see* subparagraph (II) therein, and consider a higher level only based on clear and convincing evidence. As shown above, DOE did not even purport to apply the “clear and convincing” standard. As a result, and worse yet, DOE did not even give the amended ASHRAE 90.1-2013 standard the proper place Congress designated for it — for it to be considered as the first regulatory option.

Accordingly, DOE is headed toward violating Section 6313(a)(6)(A) in numerous ways in this proposed rulemaking. EL1, as established in ASHRAE 90.1-2013, should instead be set as the minimum efficiency level. The industry is currently redesigning their product lines to meet these standard requirements. Increasing the minimum efficiency level to EL3 will negatively impact the market and stakeholders, as well as consumers who may not be able to afford more expensive and complex units to purchase, maintain, and operate. This is precisely the outcome that Section 6313(a)(6)(A) was intended to avoid.

DOE Misreads the Lead-Time Rules in the Statute. DOE argues as follows in this proposed rulemaking:

EPCA also states that amended standards prescribed under this subsection shall apply to products manufactured after a date that is the later of—(I) the date that is 3 years after publication of the final rule establishing a new standard; or (II) the date that is 6 years after the effective date of the current standard for a covered product. (42 U.S.C. 6313(a)(6)(C)(iv)) The date under clause (I), currently projected to be December 2018, is later than the date under clause (II). For purposes of its analysis, DOE used 2019 as the first year of compliance with amended standards.

79 Fed. Reg. at 58,982.

At this point it is helpful to review the relevant statutory terms governing the lead and stability time periods to be provided to manufacturers to see where the analysis above is deficient. Section 6313(a)(6)(D) (emphasis added) provides as follows:

A standard amended by the Secretary under this paragraph shall become effective for products manufactured—

- (i) with respect to small commercial package air conditioning and heating equipment, packaged terminal air conditioners, packaged terminal heat pumps, warm-air furnaces, packaged boilers, storage water heaters, instantaneous water heaters, and unfired hot water storage tanks, on or after a date which is **two years** after the effective date of the applicable minimum energy efficiency requirement in the amended ASHRAE/IES standard referred to in subparagraph (A); and
- (ii) with respect to large commercial package air conditioning and heating equipment and very large commercial package air conditioning and heating equipment, on or after a date which is **three years** after the effective date of the applicable minimum energy efficiency requirement in the amended ASHRAE/IES standard referred to in subparagraph (A);

except that an energy conservation standard amended by the Secretary pursuant to a rule under subparagraph (B) shall become effective for products manufactured on or after a date which is **four years** after the date such rule is published in the Federal Register.

Additionally, 42 U.S.C. § 6313(a)(6)(C)(iv) (emphasis added) provides as follows:

Application to products

Notwithstanding subparagraph (D), an amendment prescribed under this subparagraph shall apply to products manufactured after a date that is the later of—

- (I) the date that is **3 years** after publication of the final rule establishing a new standard; or
- (II) the date that is **6 years** after the effective date of the current standard for a covered product.

Nowhere does DOE explain its theory for how Section 6313(a)(6)(C)(iv) fits together with Section 6313(a)(6)(D). By focusing on Section 6313(a)(6)(C)(iv) alone, however, DOE appears to have concluded that this provision, as applied here, trumps Section 6313(a)(6)(D). That is not correct. The purpose of Section 6313(a)(6)(C)(iv) is to **extend** and not to contract lead time for manufacturers (by also providing as well for a period of stability time). To see this, consider Section 6313(a)(6)(C)(iv) vs. Section 6313(a)(6)(D). From this perspective, it is clear that Section 6313(a)(6)(D) provides the basic rules and that Section 6313(a)(6)(C)(iv) provides the exceptions. This structural point is clear from the fact that Section 6313(a)(6)(C)(iv) begins with the word “[n]otwithstanding.” To understand such a clause, one must understand that an exception is being created to a set of rules enunciated elsewhere — here, in Section 6313(a)(6)(D).

The basic lead time rule in Section 6313(a)(6)(D) is that if an amended ASHRAE standard becomes federal law, then two years of lead time are provided to small commercial package air conditioning and heating equipment manufacturers under Section 6313(a)(6)(D)(i), whereas manufacturers of large or very large commercial package air conditioning and heating equipment are given three years of lead time in such a situation, pursuant to Section 6313(a)(6)(D)(ii). On the other hand, if DOE adopts a standard of its own devising more stringent than the amended ASHRAE standard for these equipment types, then four years of lead time is to be extended to manufacturers. This scheme is entirely coherent. Meeting the design challenges required to comply with a more-stringent DOE rule than an amended ASHRAE baseline inherently requires additional lead time and Congress recognized as much.

Section 6313(a)(6)(C)(iv) must be read to complement and not trump that regime. In other words, if the current standard within the meaning of 6313(a)(6)(C)(iv)(II) has not been in place for six years or more, then the lead times established by 6313(a)(6)(D) would have to be extended, in effect, so that manufacturers were given at least a six-year breathing period before a new standard took effect. Put differently, Section 6313(a)(6)(C)(iv) provides for a stability time add-on (or exception) to the lead time provisions of 6313(a)(6)(D) that would otherwise control. See, e.g., Greenhouse Gas Emissions Standards and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles, 76 Fed. Reg. 57,106, 57,131 (Sept.

15, 2011) (discussing lead vs. stability times). At that point, all of the preceding analysis helps to put Section 6313(a)(6)(C)(iv)(I)'s reference to three years of lead time into proper perspective. Its purpose is not to render superfluous the provision of four years of lead time in Section 6313(a)(6)(D) governing when standards more stringent than ASHRAE are adopted (that would make no sense). Instead, Section 6313(a)(6)(C)(iv)(I)'s purpose is to ensure that at least six years of stability time and possibly more (*i.e.*, when three years of additional time provided after the publication of a final rule would exceed the six years of stability time) are granted to manufacturers. This is the meaning of the “later of” language in Section 6313(a)(6)(C)(iv).

Instead of reading Sections 6313(a)(6)(C)(iv) and 6313(a)(6)(D) to harmonize together as a structural matter and in recognition of the fact that the latter provision is the lead-time provision, whereas Section 6313(a)(6)(C)(iv) is focused on providing a minimum stability time backstop, DOE appears to read Section 6313(a)(6)(C)(iv) to trump 6313(a)(6)(D). In a situation like this one where at least six years will have elapsed since the effective date of the current applicable standards before DOE's new standards become effective, the effect of DOE misreading the lead- and stability-time provisions is to eliminate one year of lead time in situations where manufacturers face the need to comply with DOE standards that are more stringent than an amended ASHRAE standard. DOE's reading of the statute therefore flunks *Chevron* step one in this respect as well. See *Chevron*, 467 U.S. at 843 n.9 (“If a court, employing traditional tools of statutory construction, ascertains that Congress had an intention on the precise question at issue, that intention is the law and must be given effect.”); *Cal. Metro Mobile Commc'ns, Inc. v. FCC*, 365 F.3d 38, 44-45 (D.C. Cir. 2004) (traditional “tools” include not only text but **structure**) (citation and internal quotation marks omitted).

At the very least, DOE must set forth some interpretation of the statute that tries to harmonize Section 6313(a)(6)(C)(iv) and 6313(a)(6)(D). DOE has not even tried to do so. That is an independent violation of administrative law because in so doing, DOE is ignoring an important aspect of the problem. See *SecurityPoint Holdings, Inc. v. TSA*, 769 F.3d 1184, 1187 (D.C. Cir. 2014) (“An agency's action is arbitrary and capricious if it has ‘entirely failed to consider an important aspect of the problem’ it faces.”) (quoting *Motor Vehicle Mfrs. Ass'n of U.S., Inc. v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983)). Anticipating an argument that DOE might make, DOE might point to the phrase “[n]otwithstanding subparagraph (D)” in Section 6313(a)(6)(C)(iv). That cannot be read to mean that Section 6313(a)(6)(C)(iv) trumps all of the time periods carefully framed out in 6313(a)(6)(D). On that reading, the shorter two-year lead time period established as to DOE adoptions of amended ASHRAE standards for small equipment manufacturers would be stillborn because in every case manufacturers would be entitled to the three years referenced in Section 6313(a)(6)(C)(iv)(I). Thus, that cannot be the right way to read Sections 6313(a)(6)(C)(iv) and 6313(a)(6)(D) together.

In other words, trying to read too much significance into the “notwithstanding” clause in 6313(a)(6)(C)(iv) would have the effect of rendering Section 6313(a)(6)(D) entirely superfluous. That, too, would violate an important rule of statutory construction. See, *e.g.*, *Colautti v. Franklin*, 439 U.S. 379, 392 (1979) (invalid to construe provisions

of a statute in such a way as to leave them entirely redundant); *see also United States v. Menasche*, 348 U.S. 528, 538-39 (1955) (“It is our duty ‘to give effect, if possible, to every clause and word of a statute,’ *Inhabitants of Montclair Tp. v. Ramsdell*, 107 U.S. 147, 152, rather than to emasculate an entire section, as the Government’s interpretation requires.”). The only way to interpret Section 6313(a)(6)(C)(iv) together with Section 6313(a)(6)(D) in a way that does not render the latter entirely superfluous is to interpret the latter as a lead time provision and the former as a stability time provision. And that way of interpreting the statute does not render the word “notwithstanding” superfluous for it reads Section 6313(a)(6)(C)(iv) as providing additional time before regulations take effect on top of the lead times provided in 6313(a)(6)(D).

Because DOE is adopting IEER, which is the standard revised and adopted in ASHRAE 90.1-2013, it must follow the effective dates set forth in 6313(a)(6)(D), including, if DOE adopts efficiency levels more stringent than amended ASHRAE 90.1, an effective date of January 1, 2019, in order to effectuate the clear congressional intent. If DOE disagrees with this reading of the statute to accord with structure and governing canons, it is incumbent upon the agency to explain why.

(3) DOE Must Explain How It Can Include Fan Power in Its Lifecycle Cost Analysis Given the Applicable Test Procedure.

DOE recognizes its burdens concerning testing procedures:

Manufacturers of covered equipment must use the prescribed DOE test procedure as the basis for certifying to DOE that their equipment comply with the applicable energy conservation standards adopted under EPCA and when making representations to the public regarding the energy use or efficiency of those equipment. (42 U.S.C. 6314(d)) Similarly, DOE must use these test procedures to determine whether the equipment comply with standards adopted pursuant to EPCA. *Id.* The DOE test procedures for small, large, and very large air-cooled CUAC and CUHP currently appear at 10 CFR 431.96.

Moreover, DOE may not prescribe a standard for certain equipment, if . . . no test procedure has been established for the equipment

79 Fed. Reg. at 58,954.

It appears from AHRI’s analysis of the DOE worksheets that fan power-related changes (indoor air) is a very large if not the largest factor in the analysis in terms of the energy produced. In many cases, the fan power is much more than the cooling power in the lifecycle costs (LCC) analysis. But fan power out of cooling operation is not

covered by the IEER rating metric or the current test procedure. See AHRI 340/360; Shorey Consulting Report at 7-8.

Given these problems, DOE must explain how its reliance on energy savings from indoor air fan operation comports with the relevant provisions of EPCA regarding the use of prescribed test procedures by manufacturers in certifications and representations, and by DOE in enforcement. A mismatch between the substantive rules and the test procedures would make any ensuing final rule arbitrary and capricious. See, e.g., *Int'l Harvester Co. v. Ruckelshaus*, 478 F.2d 615, 648 (D.C. Cir. 1973) (environmental standards must be based on the actual test procedures that control as a matter of law and not on a “reliance on [a purported] technological methodology to offset the actual tests[, which] raised serious doubts and failed to meet the burden of proof which in our view was properly assignable to [EPA], in the light of accepted legal doctrine”); accord Shorey Consulting Report at 14 (“The responsibility for estimating the magnitude of these effects [concerning ASHRAE and regulatory standard compliance] belongs to DOE, not commenters, particularly since DOE’s calculation models are not readily accessible.”).

(4) DOE Must Use the Most Recently Available Data and Thus Must Now Issue a Supplemental Notice of Proposed Rulemaking.

DOE repeatedly references the fact that it relied in the proposed rulemaking on the Annual Energy Outlook 2013 (“AEO 2013”), not on the Annual Energy Outlook 2014 (“AEO 2014”). See, e.g., 79 Fed. Reg. at 58,950 n.7, 58,951 n.10 (there must be 20 other places where DOE includes nearly identical footnotes). DOE argues that this occurred because the AEO 2014 was not available earlier. See 79 Fed. Reg. at 58,950 at n.7 (referring to “[e]missions factors based on the Annual Energy Outlook 2014 (AEO 2014), which became available too late for incorporation into this analysis”). But this proposed rule was issued in September 2014 whereas the AEO 2014 became available (depending on the section involved) between April and May 2014. See AEO 2014, available at [http://www.eia.gov/forecasts/aeo/pdf/0383\(2014\).pdf](http://www.eia.gov/forecasts/aeo/pdf/0383(2014).pdf) (dated on its cover “April 2014”); AEO 2014 website, <http://www.eia.gov/forecasts/aeo/> (website for the publication listing some sections as available on various dates in April 2014 and other sections as available on May 7, 2014). DOE nowhere explains why four months was an insufficient time period for it to update the numerical analysis based on the latest operative AEO publication. (Contrast this with the fact that regulated manufacturers are expected to digest without complaint all of DOE’s complex analysis (even without being given access to all of it) in less than three months, 83 days to be precise — this is the time between the proposed rule’s publication on September 30, 2014, and the extended comment deadline of December 22, 2014.)

By DOE’s own concessions, use of the AEO 2014 data would significantly reduce the environmental benefits resulting from reductions of CO₂, SO₂, and Hg, among other emissions:

Emissions factors based on the Annual Energy Outlook 2014 (AEO 2014) . . . indicate that a significant decrease in the cumulative emission reductions of carbon dioxide, methane, nitrous oxide, sulfur dioxide, nitrogen oxides and mercury from the proposed standards can be expected if the projections of power plant utilization assumed in AEO 2014 are realized. For example, the estimated amount of cumulative emission reductions of CO₂ are expected to decrease by 36% from DOE's current estimate (from 1,085 Mt to 697Mt) based on the projections in AEO 2014 relative to AEO 2013. The monetized benefits from GHG reductions would likely decrease by a comparable amount.

79 Fed. Reg. at 58,950 n.7. Despite this, DOE indicates that it will simply act to change the analysis in the final rule. See *id.* (“DOE plans to use emissions factors based on the most recent AEO available for the next phase of this rulemaking, which may or may not be AEO 2014, depending on the timing of the issuance of the next rulemaking document.”).

This is not consistent with the theory or practice of notice and comment rulemaking. “[One] purpose of notice-and-comment provisions under the APA . . . is ‘to ensure that affected parties have an opportunity to participate in and influence agency decision making at an early stage, when the agency is likely to give real consideration to alternative ideas.’” *Nat’l Ass’n of Clean Water Agencies v. EPA*, 734 F.3d 1115, 1148 (D.C. Cir. 2013) (quoting *N.J., Dep’t of Env’tl. Prot. v. EPA*, 626 F.2d 1038, 1049 (D.C. Cir. 1980)).³ DOE’s proposed course of action denies stakeholders the ability to adequately review and comment on DOE’s analysis. We know that DOE’s benefits will drop by more than one third in the case of the most important greenhouse gas and we know that DOE will need to revise the analyses it built on top of that analytical foundation. But what AHRI does not know is the precise impact of those changes on the analysis. AHRI must see the ensuing analysis using the most up-to-date inputs so that they can frame their comments around it. Undeniably, AHRI’s and its members’ rights to comment cannot be effectively eliminated by shunting them away from the only stage where the opportunity for filing comments matters, which is now — at the proposed rule stage.

It is thus incumbent on DOE to issue a supplemental notice of proposed rulemaking that revises the analysis based on AEO 2014 data so that AHRI may comment upon the analysis done using the most up-to-date inputs. Once DOE issues a final rule, it will prove too late to file such comments and AHRI’s only option will be litigation, where the rule will (if a supplemental notice is not issued) at that point be

³ APA Section 553 concerning notice-and-comment rulemaking is “one of Congress’s most effective and enduring solutions to the central dilemma it encountered in writing the APA reconciling the agencies’ need to perform effectively with the necessity that ‘the law must provide that the governors shall be governed and the regulators shall be regulated, if our present form of government is to endure.’” *Am. Bus Ass’n v. United States*, 627 F.2d 525, 528 (D.C. Cir. 1980) quoting S. Doc. No. 248, 79th Cong., 2d Sess. 244 (1946).

infected with a fatal procedural error. The right outcome — for DOE, for AHRI, and for other members of the public — is to issue a revised analysis based on AEO 2014 now.

(5) DOE Should Stop Its Recent Practice of Locking Important Spreadsheet Cells, Using Proprietary Models, and Otherwise Acting in Non-Transparent Ways in EPCA Rulemakings.

As AHRI noted above, one of the main benefits of the ASHRAE process is that it is open and transparent. For this very reason, AHRI objects to the use by DOE of proprietary software such as Crystal Ball to conduct its analysis in a public notice and comment rulemaking. See also Shorey Consulting Report at 3 n.2. While large manufacturers or trade associations may be able to afford such software, AHRI is concerned that other stakeholders such as consumer advocacy groups and the small business people that DOE recognizes this rulemaking will injure (even putting aside economic ripple effects through the secondary contractor and vendor industries) could find this method of proceeding to be cost-prohibitive.

DOE's supporting analysis also does not meet the transparency requirements of DOE's Process Rule (10 C.F.R. pt. 430, Subpt. C, App. A), which states that DOE "seeks to use qualitative and quantitative analytical methods that are fully documented for the public and that produce results that can be explained and reproduced, so that the analytical underpinnings for policy decisions on standards are as sound and well-accepted as possible."⁴ For example, using the "drop-down menu" to change Standard Levels in the Government Regulatory Impact Model (GRIM) has no effect on the calculations. The model seems to be permanently set at TSL 4 so that stakeholders cannot understand the effects at other standard levels and the model output as shown is not even for the proposed standard. Additionally, the Lifecycle Cost Calculation (LCC) has a spreadsheet "Forecast Cells" in which column J reveals a formula that is not traceable to any spreadsheet or cell in the LCC. The function of these cells, how DOE devised the values, and how they impact the LCC which feeds into the National Impact Analysis (NIA) is unknown. If stakeholders cannot fully access the models that DOE uses for its analysis and assumptions, they are denied the ability to thoroughly evaluate how the standard levels are affected by different costs and other types of assumptions. See, e.g., *Chamber of Commerce of the U.S. v. SEC*, 443 F.3d 890, 899 (D.C. Cir. 2006) ("Among the information that must be revealed for public evaluation are the 'technical studies and data' upon which the agency relies" to issue a rule.) (quoting *Solite Corp. v. EPA*, 952 F.2d 473, 484 (D.C. Cir. 1991) (per curiam)); *Allina Health Servs. v. Sebelius*, 746 F.3d 1102, 1110 (D.C. Cir. 2014) ("Still, we have held for many years that an agency's failure to disclose *critical* material, on which it relies, deprives commenters of a right under § 553 'to participate in rulemaking.'") (citing *Air Transp. Ass'n of Am. v. FAA*, 169 F.3d 1, 7 (D.C. Cir. 1999)).

For these reasons, all of DOE's models, processes, software, and elements thereof, as used in this rulemaking, must be made fully accessible to AHRI and to the public more broadly.

⁴ 10 C.F.R. pt. 430, Subpt. C, App. A(1)(g).

(6) DOE Must Act to Remedy Serious Problems in Its Social Cost of Carbon (SCC) Analysis.

First, the SCC's time period for analysis renders its applicability here suspect. The overwhelming majority of benefits claimed by DOE are speculative and tangential at best, such as full fuel cycle and global social cost of carbon extrapolated out globally over nearly a 100-year period. This reliance on the global impact of SCC and other emissions, over a time period greatly exceeding that used to measure the economic costs, is to effectively render the other required factors that DOE must consider meaningless. In doing so, DOE is ignoring the clear congressional intent in including the seven factors in the statutory text. See 42 U.S.C. § 6313(a)(6)(B)(ii). Congress could have made global climate change effects into a variable to weigh but it did not do so.

Second, DOE itself acknowledges the uncertainty of its SCC claims repeatedly in this notice of proposed rulemaking, including that the SCC estimates are “provisional and revisable,” and that even the interagency group that developed the SCC recognized that the underlying models were “imperfect and incomplete.” 79 Fed. Reg. at 58,991 One of the main reasons the analysis is uncertain is that it relies on IPCC analysis concerning climate sensitivity. But the IPCC has conceded that “[n]o best estimate for equilibrium climate sensitivity can now be given because of a lack of agreement on values across assessed lines of evidence and studies.” *IPCC, 2013: Summary for Policymakers* at 16 n.16, available at http://www.climatechange2013.org/images/report/WG1AR5_SPM_FINAL.pdf.

Third, EPCA's focus is exclusively on benefits accruing within this nation. Hence, it is unlawful for DOE to report SCC figures at the global level. Global analysis is entirely foreign to EPCA Section 6313(a)(6)(B)(ii); see especially *id.* § 6313(a)(6)(B)(ii)(VI) (referencing weighing of “the need for **national** energy conservation”) (emphasis added). Note as well that EPCA originally arose out of the 1970s oil embargo and nothing in its subsequent amendments suggests a different statutory focus other than trying to improve the energy economics of the United States. To try to reframe EPCA into a globally oriented statute is to ignore that legislative history and evolution. DOE also begs the question when it focuses on global values in this way:

Although combining the values of operating savings and CO₂ emission reductions provides a useful perspective, two issues should be considered. First, the national operating savings are domestic U.S. consumer monetary savings that occur as a result of market transactions while the value of CO₂ reductions is based on a global value.

79 Fed. Reg. at 58,952. Precisely, yet DOE takes no action based on this observation to scale back what it reports in the *Federal Register* about SCC calculations to domestic impacts alone.

Fourth, while DOE bases its manufacturer impact analysis (“MIA”) and industry net present value (“INPV”) analysis on a 30-year period, it notes that the benefits from SCC extend to the year 2100. This is more than five times the expected lifetime of this equipment. In the NOPR, DOE also argues that costs and benefits include benefits to customers which accrue after 2048 from equipment purchased in 2019-2048, see 79 Fed. Reg. at 58,951 n.9, and accounts for incremental variable and fixed costs incurred by manufacturers due to amended standards, some of which may be incurred in preparation for the rule. What benefits can possibly accrue to customers for equipment that is no longer expected to be in use and does not account for the additional costs of purchasing and installing new equipment? While it makes sense to include the R&D and other costs manufacturers will incur in order to comply with the amended standards, DOE provides no justification for the exclusion of any costs that manufacturers might incur after 2048, in measured harmony with the manner and time period that DOE uses to measure the benefits.

Fifth, DOE wrongly assumes that SCC values will **increase** over time. This is contrary to historical experience and to economic development science. The more economic development that occurs, the more adaptation and mitigation efforts are both undertaken by humanity and that a population living in a growing economy can afford to undertake. Adaptation and mitigation analysis is well known in climate science circles and we see no indication in this rulemaking that DOE paid any separate mind to this issue. See, e.g., IPCC, *Supplementary material to Chapter 18: Inter-relationships between adaptation and mitigation*, Climate Change 2007: Impacts, Adaptation and Vulnerability, available at <https://www.ipcc.ch/pdf/assessment-report/ar4/wg2/ar4-wg2-chapter18sm.pdf>. Adaptation/mitigation is treated in the Interagency Working Group analysis but one of the three models used does “propagate forward” damage, though the other two do not. Compare Interagency Working Group on SCC, *Technical Support Document: Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866* at 5-6 (Feb. 2010), available at <http://www.whitehouse.gov/sites/default/files/omb/infoereg/for-agencies/Social-Cost-of-Carbon-for-RIA.pdf> with *id.* at 7 (indicating that developed countries can eliminate 90% of the economic impacts of climate change and that developing countries can eventually eliminate 50% of the economic impacts of climate change). Indeed, air-conditioning is an important adaptation technology that can be used to adapt to and mitigate for climate change, an irony that DOE also has not considered.

Sixth, and most importantly, DOE is again violating Section 6313(a)(6)(A)(ii)(II) and Section 6313(a)(6)(B)(ii)(I)-(VII) by purporting to give energy savings disproportionate weight. EPCA requires that DOE consider seven different factors in determining whether the benefits of a proposed standard exceed its burdens. There is no indication in the statute or otherwise that Congress intended this to be anything other than a roughly equal weighting of factors where no particular factor is king over all the

others. Yet through DOE's inclusion of energy efficiency savings tied to indirect emissions and SCC reductions that are provisional, revisable, imperfect, and incomplete, and that extend well beyond the life of the equipment and even the relevant period for measuring benefits relative to costs, it has formulated an amount of energy savings that is unsupported, difficult to believe, and insurmountable for those who would question the rule. And this is true even if all of the other factors point in the direction of significant or even extreme burdens to customers and manufacturers. This is not the kind of sensitive balancing of factors that Congress envisioned, and nothing in Executive Order No. 12866 is to the contrary — costs and benefits of intended regulation must be considered *to the extent permitted by the law* — which in this case is the statutory seven-factor analysis in which no one factor is given weight over the others.

In sum, AHRI agrees with other stakeholders who have commented that in order for DOE's analysis to be accurate and provide a meaningful comparison the timeframes for cost benefit analysis should be the same for all costs and benefits analyzed, and this should be for a realistic timeframe that will clearly and convincingly show realistic costs and benefits to manufacturers and consumers, and the energy savings that will directly result during that same time period. The analysis proposed by DOE in this proposed rule not only fails to meet the requirements of 42 U.S.C. § 6313, its use of different timeframes and assumptions for costs and benefits is clearly arbitrary and capricious.

(7) DOE May Not Adopt a Final Rule with Energy Conservation Standards It Has Determined in the NOPR are Not Economically Justified.

As demonstrated above, adopting TSL 3 based on a top-down methodology that begins with TSL 4 and moves downward (stopping as soon as possible) is arbitrary and capricious since it represents an approach drawn from residential standard setting that is not applicable in this commercial standards rulemaking. AHRI also believes DOE's view that it may adopt more stringent energy efficiency levels in a final rule, even if in the NOPR DOE determined they are not economically justified, is without merit. See, e.g., 79 Fed. Reg. at 58,953-54. If based on the LCC, NIA, and GRIM analysis DOE has concluded that a standard level is not economically justified, it cannot change its analysis on such a threshold issue without issuing a supplemental NOPR providing stakeholders the ability to review and comment on any revised analysis reaching a fundamentally different conclusion. Any action otherwise would only compound the legal problems with the rule. It would also violate DOE's Process Rule, in which DOE states that it seeks to provide opportunities for public input early in the rulemaking process. Adopting efficiency standards that DOE has determined at the NOPR stage to be neither technologically feasible or economically justified would necessarily involve significant additional or revised data and analysis that at this point stakeholders could only guess at, and provides no ability for stakeholder review and comment. DOE could only take such action after issuing a supplemental notice and comment period to allow stakeholders to review, evaluate, and comment on DOE's revised analysis.

(8) DOE Offers No Direct Evidence of a Market Failure That Could Act as an External Validity Check on Its Calculations of Energy Saving Benefits Vs. Costs.

DOE recognizes that under Executive Order 12866 it is required to analyze whether there are market failures. DOE states, in relevant part, as follows:

- 1) There is a lack of customer information in the commercial space conditioning market, and the high costs of gathering and analyzing relevant information leads some customers to miss opportunities to make cost-effective investments in energy efficiency.
- 2) In some cases the benefits of more efficient equipment are not realized due to misaligned incentives between purchasers and users. An example of such a case is when the equipment purchase decision is made by a building contractor or building owner who does not pay the energy costs.

79 Fed. Reg. at 59,010.

But these two statements are conclusory. No evidence to support these conceptual surmises is presented by DOE. Nor does DOE consider their plausibility given well-known facts and basic economy theory. Those who purchase and rent commercial buildings (and their tenants) are typically sophisticated consumers. This is not a situation in which the regulated party is producing a low-cost appliance or a commodity that everyday consumers may have little incentive to seek information about before buying. The climate control aspects of a building are, at the very least, an important amenity and selling point. Finally, the energy consumption of a building is a matter of increased focus by environmentally conscious consumers and often by all types of consumers. Witness the rise in LEED certification. See U.S. Green Building Council, *LEED Overview*, <http://www.usgbc.org/leed> (last visited Dec. 22, 2014) (“LEED certification is recognized across the globe as the premier mark of achievement in green building.”). In this kind of setting, it is difficult to think that consumers are truly unaware of the energy costs of the buildings that they own or rent. Given this, it is hard to conceive of any market failure in this area being particularly large. Yet, even putting aside the externality driven benefits purportedly quantified in the SCC analysis, DOE reaches implausible conclusions that the avoided energy costs associated with its proposed mandate here would well offset the costs of such standards.

More plausible is the assertion that building contractors or owners may make choices that are disconnected from the better assessment of operational costs for heating and cooling equipment that building tenants might make. But again, no empirical evidence is offered to define the magnitude of such a conceptual surmise. And with the rise of LEED certification, green building practices more generally, and the reputational effects that tenants can perceive from being housed in energy-efficient buildings, even this purported market failure starts to look questionable. See, e.g., Carr Properties, *Engineering Overview*, http://www.carrprop.com/get_page.php?lnkid=25

(last visited Dec. 22, 2014) (touting as an advantage that Carr engages in “Energy Management – Our engineers strive to achieve maximum levels of energy conservation by incorporating ‘Green Design’ and Energy Star features in new development properties, existing building retrofits and day-to-day operational protocols.”).

DOE must do better than simply assert purely conceptual, empirically untested market failures. It must demonstrate that such market failures actually exist in the real world and that once quantified, DOE’s assessment of costs and benefits for its rules in this area align with such an important external validity check on its analysis.

(9) DOE Is Not Engaging in the Kind of Rigorous Balancing Analysis That EPCA Section 6313(a)(6)(B)(ii) Requires.

DOE’s application of the seven statutory balancing factors in this proposed rulemaking leaves much to be desired. In essence, DOE examines only two TSLs in a comparative fashion, and in the course of so doing reviews only a few of the statutory factors. Finally, DOE tentatively chooses TSL 3 over TSL 4 because TSL 3 appears to do a better job of fitting the multiple factors to be weighed than TSL 4 does. But at no point does DOE analyze whether TSL 2 or TSL 1 could do an even better job still of satisfying the seven factors than TSL 3.

Above, AHRI explained why DOE rejected TSL 4 — it was neither technologically nor economically feasible. DOE concludes that TSL 3 is technologically and economically feasible. Its analysis of the factors then boils down to the following paragraphs:

Next, DOE considered TSL 3, which would save an estimated total of 11.8 quads of energy, an amount DOE considers significant. TSL 3 has an estimated NPV of customer benefit of \$16.5 billion using a 7 percent discount rate, and \$50.8 billion using a 3 percent discount rate.

The cumulative emissions reductions at TSL 3 are 1,085 million metric tons of CO₂, 1,021 thousand tons of NO_x, 2,934 thousand tons of SO₂, and 3.57 tons of Hg. The estimated monetary value of the CO₂ emissions reductions at TSL 4 ranges from \$6 billion to \$96 billion.

At TSL 3, the average LCC savings is \$4,779 for small CUAC, \$3,469 for large CUAC, and \$16,477 for very large CUAC. The median PBP is 3.9 years for small CUAC, 6.6 years for large CUAC, and 2.5 years for very large CUAC. The share of customers experiencing a net LCC benefit is 99 percent for small CUAC, 93 percent for large CUAC, and 92 percent for very large CUAC.

At TSL 3, the projected change in INPV ranges from a decrease of \$311.58 million to decrease of \$88.55 million. If the larger decrease is realized, TSL 3 could result in a net loss of 24.71 percent in INPV to

manufacturers of covered small, large, and very large air-cooled commercial package air conditioning and heating equipment. Conversion costs are expected to total \$120.90 million. 19% of industry product listings meet this standard level today.

After considering the analysis and weighing the benefits and the burdens, DOE has tentatively concluded that at TSL 3 for small, large, and very large air-cooled commercial package air conditioning and heating equipment, the benefits of energy savings, positive NPV of customer benefit, positive impacts on consumers (as indicated by positive average LCC savings, favorable PBPs, and the large percentage of customers who would experience LCC benefits), emission reductions, and the estimated monetary value of the emissions reductions would outweigh the potential reductions in INPV for manufacturers. The Secretary of Energy has concluded that TSL 3 would save a significant amount of energy and is technologically feasible and economically justified.

79 Fed. Reg. at 59,008 (footnotes omitted).

DOE could perhaps argue that the discussion above discharges some of its assessment obligations under Section 6313(a)(6)(B)(ii)(I) (economic impact on producers and consumers), (II) (lifecycle operating cost savings), (III) (total projected quantity of energy savings), and (VI) (need for national energy conservation). But again, DOE still should be required to analyze the other TSLs before settling on TSL 3, especially given that the energy savings maximization goal it is pursuing is not contained in the provisions for commercial standard setting that DOE faces.

Moreover at no point does DOE explain how it weighed Section 6313(a)(6)(B)(ii)(IV) (impacts on utility and product performance) or (V) (the impact of a lessening of competition) in the process of deciding which TSL to select. DOE does discuss competition effects, for instance. But it fails to consider whether the negative concentration effects it finds associated with TSL 3 can be averted if TSL 2 or TSL 1 are selected. That is an error. It is true that the Attorney General opines on competitive effects, but AHRI submits that failing to secure those views in advance of the proposed rule so that such conclusions can be reported to the public and thereby provide an informed basis for public comment on economic overconcentration concerns is also an error. Since DOE has structured its proposed rule to be seeking public comment now that the proposed rule has already been released, it will effectively deprive AHRI of the ability to comment on those views. This is another reason that should impel DOE to issue a supplemental proposed rule before attempting to take TSL 3 final.

(10) DOE Is Also Not Engaging in the Complete Cost-Benefit Analysis That EPCA Section 6313(a)(6)(B)(ii) Requires.

DOE is not performing the full cost-benefit analysis that EPCA Section 6313(a)(6)(B)(ii) requires. The statute states in relevant part as follows: “In determining whether a standard is economically justified for the purposes of subparagraph (A)(ii)(II),

[in other words for determining whether it is economically justified to adopt a standard that exceeds amended ASHRAE 90.1 levels,] **the Secretary shall**, after receiving views and comments furnished with respect to the proposed standard, **determine whether the benefits of the standard exceed the burden of the proposed standard** by, to the maximum extent practicable, considering . . .” 42 U.S.C. § 6313(a)(6)(B)(ii) (emphasis added).

DOE performs cost-benefit considerations at various points of its analysis yet never fully reconciles those analyses or the assumptions and scope of coverage underlying them. We have already pointed out the inaccuracies of the cost-benefit analysis for end customers. The cost-benefit analyses to the nation, to manufacturers, and on employment take very different geographic scopes, ignore the immediately apparent effects on employment, and rely on unsupported analyses for effects on the general economy. DOE must reconcile these various approaches and their assumptions and also make available any models or inputs/outputs it relies upon.

DOE is performing only a partial cost-benefit analysis relative to manufacturers and others directly involved in the HVAC industry by focusing almost exclusively on the burdens imposed on manufacturers. (DOE must, of course, consider these impacts, but those effects are not the full universe of burdens created by DOE’s energy-efficiency regulations.) DOE’s current approach ignores the ripple effects throughout the national economy caused by the burdens imposed on manufacturers. Increased manufacturer costs and decreased manufacturer shipments hurt not only manufacturers of EPCA-regulated equipment, but also their employers, their suppliers, the suppliers of their suppliers, the employees and investors in such suppliers, etc. Indeed, as a general matter, stringent DOE standards like the ones proposed here that may destroy, by DOE’s own calculations, as much as about 25% of the net present value of the relevant equipment manufacturers only contribute to the significant and extensive costs faced by American manufacturers. The American manufacturing sector is cumulatively burdened by numerous regulatory mandates that constrain growth, retard innovation by eating up limited sources of R&D capital, incentivize the exportation of jobs to foreign nations, and impose significant social costs on the general public. See 79 Fed. Reg. at 59,007 (Table V.21 at line 2, TSL 3).

DOE should remedy this shortcoming by performing an integrated, full cost-benefit analysis considering all factors including the effects on all directly related domestic industries, which is what the statute requires. Resort to an aggregate input/output model (ImSET)⁵ with the claim that benefits accrue without a full recognition of the effects on sub-industries and sub-sectors is not sufficient. Analyses of benefits or burdens cannot be analyzed in a one-sided fashion. See, e.g., *Am. Trucking Ass’ns, Inc. v. EPA*, 175 F.3d 1027, 1052 (D.C. Cir.) (per curiam) (“[I]t seems bizarre that a statute intended to improve human health would, as EPA claimed at argument, lock the agency into looking at only one half of a substance’s health effects in determining the maximum level for that substance. At oral argument even EPA counsel seemed

⁵U.S. Dept. of Energy, Technical Support Document (“TSD”) in Support of DOE’s Notice of Proposed Rulemaking, Chapter 16.

reluctant to claim that the statute justified disregard of the beneficial effects of a pollutant [ozone at ground level, which protects against cancers] bearing directly on the health symptoms that accounted for its being thought a pollutant at all”), *modified per curiam on irrelevant grounds*, 195 F.3d 4 (D.C. Cir. 1999), *rev’d on irrelevant grounds sub nom. Whitman v. Am. Trucking Ass’ns, Inc.*, 531 U.S. 457 (2001); *National Renderers Ass’n v. EPA*, 541 F.2d 1281, 1288-89 (8th Cir. 1976) (“This failure of the EPA to give the consultants an opportunity to reconsider the impact of the cost of controls on economic viability or to reconsider the impact itself was arbitrary and capricious. The error was compounded by failing to include the cost of some of the pollution control equipment necessary to achieve the standards.”).

It is true that the statute requires the benefits and burdens to be assessed in light of a listed set of factors. But this list of factors concludes at Section 6313(a)(6)(B)(ii)(VII), which is essentially a more general or catch-all factor. Presumably it is this factor that DOE hinges its inclusion of purported social cost of carbon benefits on in this rulemaking. Note that none of the more specific, non-catch-all factors in Section 6313(a)(6)(B)(ii)(I)-(VI) refer to environmental matters. DOE should consider whether that means that environmental benefits cannot be considered at all under the *ejusdem generis* canon. See, e.g., *Hall Street Assocs., L.L.C. v. Mattel, Inc.*, 552 U.S. 576, 586 (2008) (“[T]he old rule of *ejusdem generis* has an implicit lesson to teach here. Under that rule, when a statute sets out a series of specific items ending with a general term, that general term is confined to covering subjects comparable to the specifics it follows.”). EPCA is an energy-conservation statute, not an environmental statute. See, e.g., 42 U.S.C. § 6312 (failing to list environmental objectives among the purposes of this EPCA program).

Nevertheless, DOE not only considers environmental benefits in its SCC analysis, it does so on a global basis. As noted elsewhere in these comments, AHRI maintains that it is error for DOE to consider environmental benefits on a global scale given the statute’s plain focus on domestic costs and benefits alone. For that reason, it would be arbitrary and capricious for DOE to refuse to consider costs on an equally holistic, albeit properly confined **domestic** basis. Put differently, DOE cannot construct an artificial analysis in which it looks at macroeconomic-level environmental benefits outside the sphere of the regulated equipment transactions between manufacturers, their intermediaries, and the consumers of CUAC and CUHP equipment but refuses to look at the macroeconomic-level costs and negative ripple effects caused by imposing regulatory mandates on manufacturers. See, e.g., *Cnty. of L.A. v. Shalala*, 192 F.3d 1005, 1022 (D.C. Cir. 1999) (“A long line of precedent has established that an agency action is arbitrary when the agency offer[s] insufficient reasons for treating similar situations differently.”) (brackets in original) (citation and internal quotation marks omitted).

Relatedly, and as noted in the discussion of the *ejusdem generis* canon above, DOE must clarify precisely why and how it believes that it has the statutory authority to begin with under Section 6313(a)(6)(B)(ii) to consider SCC issues in any fashion, and, if so, under what sub-provision (*i.e.*, which of the seven factors) such analysis comes. This will help to clarify whether the agency possesses the authority it claims and also

whether based on such a claim, if sustainable, DOE can establish that it is acting consistently in terms of analyzing how it analyzes benefits and burdens pursuant to the mandate in Section 6313(a)(6)(B)(ii).

(11) The Shorey Consulting Report Included as Attachment [1] to AHRI's Comments Raises Numerous Additional Legal Problems, as Well as Factual Problems That Threaten to Turn Into Arbitrary and Capricious DOE Action.

By focusing on some of the problems that the Shorey Consulting Report identifies here, AHRI does not mean to recede from advancing each and every one of the Shorey Consulting critiques of the proposed rule. Particularly serious legal issues; however, are raised by the following problems that Shorey Consulting has identified and they are worth spotlighting with references to legal authority here:

First, DOE has significantly underestimated the costs of complying with the proposed rules. This is attributable in part to DOE's artificial catalog teardown methodology that has not been validated in the real world as well as to differential design elements, inaccuracies of other kinds of DOE cost data, and other problems. See Shorey Consulting Report at 4-5. See, e.g., *Appalachian Power Co. v. EPA*, 251 F.3d 1026, 1035 (D.C. Cir. 2001) ("EPA has not fully explained the bases upon which it chose to use one set of growth-rate projections for costs and another for budgets, nor has it addressed what appear to be stark disparities between its projections and real world observations.") (citation and internal quotation marks omitted).

Second, DOE has developed an unrepresentative analysis of incremental markups that does not comport with empirical observations of markups in the air-conditioning or heating equipment industries. See Shorey Consulting Report at 5-7 & n.5; Shorey Consulting, *Incremental Markups – A Critical Review of Theory and Practice: Comments on An Analysis of Price Determination and Markups in the Air Conditioning and Heating Equipment Industry - LBNL-52791* (attached). See, e.g., *Columbia Falls Aluminum Co. v. EPA*, 139 F.3d 914, 923 (D.C. Cir. 1998) (when "the model is challenged, the agency must provide a full analytical defense." (citing *Eagle-Picher Indus., Inc. v. EPA*, 759 F.2d 905, 921 (D.C. Cir. 1985); see also *NRDC v. Herrington*, 768 F.2d 1355, 1385 (D.C. Cir. 1985)).

Third, DOE is relying on secret inputs concerning back-up calculations regarding energy savings that manufacturers do not have access to. See Shorey Consulting Report at 8. This is impermissible for the same reasons described above as to locked spreadsheet cells, use of proprietary models, etc. See *id.* at 10-11 (noting that the "GRIM [model] published by DOE will not accept changes in standard levels"). Similarly, DOE has not provided its shipments model. See *id.* at 9-10 & n.10. See *Conn. Light & Power Co. v. NRC*, 673 F.2d 525, 530-31 (D.C. Cir. 1982) ("In order to allow for useful criticism, it is especially important for the agency to identify and make available technical studies and data that it has employed in reaching the decisions to propose particular rules. To allow an agency to play hunt the peanut with technical information, hiding or disguising the information that it employs, is to condone a practice

in which the agency treats what should be a genuine interchange as mere bureaucratic sport.”).

Additionally, without the shipments model, AHRI cannot assess whether DOE has accounted properly for the equipment turnover effects and how those may change when DOE’s equipment costs estimates are corrected. See Shorey Consulting Report at 11 (“A decrease in shipments will tend to reduce the national NPV because older, less efficient equipment will remain in the building stock longer.”). This is the same conceptual economic issue well known under the automobile corporate average fuel economy standards program (housed in a different part of EPCA) where it is known as the “fleet turnover effect.” See, e.g., 76 Fed. Reg. 57,106, 57,331-32 (Sept. 15, 2011). This effect goes by other names as well — the vintage effect or “differentiated regulation.” See Robert N. Stavins, *The Effects of Vintage-Differentiated Environmental Regulation*, John F. Kennedy School of Government Faculty Research Working Paper RWP05-031 (Mar. 2005), available at <https://research.hks.harvard.edu/publications/getFile.aspx?Id=176>; Howard K. Gruenspecht, *Differentiated Regulation: The Case of Auto Emissions Standards*, 72(2) *American Economic Review* 328-31 (1982).

Fourth, properly revising the LCC analysis, as Shorey Consulting has done here, results in the 15-ton revised cost recovery turning negative at the proposed standard level, which eliminates end user benefit entirely and results in overly long payback periods for other classes. See Shorey Consulting Report at 8-9, 11, 15 (table). This should weigh heavily against the adoption even of TSL 3 under 42 U.S.C. § 6313(a)(6)(B)(II).

Fifth, DOE’s employment analysis is defective. See Shorey Consulting Report at 10. At one place, DOE argues implausibly that the proposed rule will increase employment. 79 Fed. Reg. at 58,992. It is difficult to see how this could be true and is tantamount to assuming that the imposition of government mandates is costless. Indeed, the Shorey Consulting Report indicates that the agency has not even accounted for second-order and other ripple-effect employment losses that would be caused by adoption of the TSL 3 standard. See Shorey Consulting Report at 10.

Sixth, even putting aside that DOE must consider ASHRAE 90.1-2013 to be the baseline from which it analyzes the costs and benefits of this rule, DOE failed to account for the fact that given how ASHRAE 90.1-2013 will feed into local business codes, this will multiply burdens for manufacturers in complying with multiple standards over the next decade or more. See Shorey Consulting Report at 11-13; see also *id.* at 14-15 (noting that the burdens of complying with the multiple ASHRAE 90.1 standards must be considered as additive to the costs of complying with the standard adopted by DOE in these proceedings).

Seventh, the proposed regulation does not fully consider the prospect for regulatory overload on manufacturers. As noted below, DOE has unleashed an unprecedented torrent of energy efficiency rules affecting the same basic industry or manufacturers that are horizontally integrated to produce similar types of equipment.

As the Shorey Consulting Report puts it on page 15, “[i]n addition, and not quantified in the GRIM, manufacturers will be in a constant product redesign process, which will put strain on engineering, testing and other resources that may not be available or must be diverted from other product development activities.”

Any one of the problems Shorey Consulting has identified would prove highly problematic for DOE’s proposed rule. But the rule is literally riddled with such problems, to say nothing of the pure statutory construction errors reflected in the proposed rule.

TECHNICAL ANALYSIS

(12) Regulatory Burden of Cumulative Rulemakings.

To be in compliance with the ASHRAE standard 90.1-2013 effective in 2016, equipment manufacturers are currently redesigning their units to achieve new minimum IEER levels. These new minimum efficiency levels are designated as TSL1 or EL1 in the current NOPR.

DOE is proposing to surpass these levels and adopt EL3 in this rulemaking, which will require another major redesign of all equipment models. To further complicate matters, another forthcoming rulemaking on Commercial Warm Air Furnaces currently in the Office of Management and Budget (OMB) overlaps with these products and may necessitate a third major redesign in a very short timeframe. The products in this rulemaking are multi-functional and affected by more than one rulemaking simultaneously. Therefore, the statement that “DOE is not aware of any rules or regulations that duplicate, overlap, or conflict with the rule being considered today”⁶ is incorrect. DOE’s own Commercial Warm Air Furnaces rulemaking directly overlaps and will impact the equipment at issue in this rulemaking, and DOE must consider the impact of that rulemaking on the equipment at issue in this rulemaking and coordinate the timeframe for both these efficiency standard amendments going forward. Additional design changes will also be required as the industry works towards implementing lower global warming potential (GWP) refrigerants.

Ultimately, these rulemakings represent only a fraction of what the industry is currently facing. Additional rulemakings also affecting the industry are shown below:

- DOE Central Air Conditioner Regional Standards Enforcement
- DOE Energy Conservation Standards for Commercial Air Conditioning and Heating Equipment
- DOE Energy Conservation Standards for Residential Furnace Product
- DOE Energy Conservation Standards for Residential Furnace Fans
- DOE Energy Conservation Standards for Residential Air Conditioners and Heat Pumps
- DOE Energy Conservation Standards for Commercial Warm Air Furnaces

⁶ 79 Fed. Reg. at 59,012.

- DOE Energy Conservation Standards for SPVAC and SPVHP
- SCAQMD Rule 1111 – Ultra Low NOx
- California Title 24
- EPA SNAP (listing and delisting)
- EPA Energy Star program

The cumulative effect of these rulemakings is that manufactures will incur substantial cost to be in compliance, and this is not economically justified. DOE fails to recognize consider that the products in this NOPR are affected by more than one rulemaking, each of which has financial repercussions. Successive redesigns will also slow the rate of technological innovation as manufacturers are required to focus on maintaining compliance with minimum efficiency levels. Small manufacturers will not be able to remain competitive. This could eliminate many of their product offerings and ability to remain economically viable as shipment levels decrease.

(13) Inappropriate Use of Energy Modeling to Justify Increases in Minimum Efficiency.

The modeling used to establish increases in minimum efficiency is not appropriate. The equipment affected by this rulemaking represents the most technologically advanced products regulated by the DOE. Assumptions that were made do not accurately reflect the equipment's operating conditions in the field and are not in agreement with current testing standards, such as the disabling of economizers, inclusion of ventilation air, and IEER/COP correlation. The following section discusses this in greater detail.

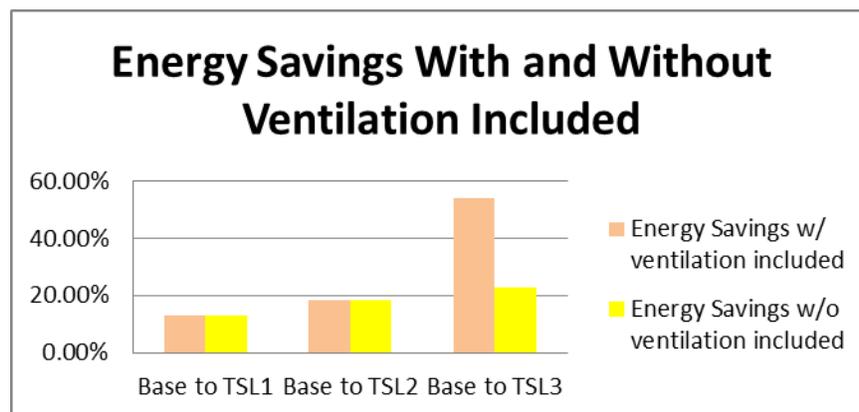
IEER and COP Correlation

The IEER and COP correlation is not appropriate to use in this rulemaking. Increases in IEER do not correspond to increases in COP, which is determined at full load operation, not part load operation. As coil size increases for IEER improvements, COP may also be negatively affected due to design tradeoffs. It is therefore not acceptable to assume that increasing IEER will also raise COP, and demonstrates that the correlation assumed is incorrect.

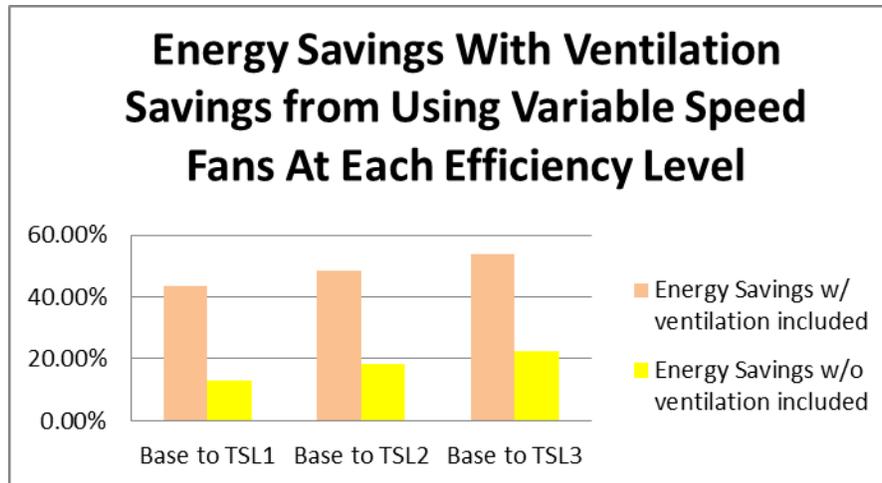
Fan and Ventilation Modeling

- The base efficiency levels are assumed to all be fixed speed fans, with the higher efficiency equipment being variable speed and/or electronically commutated motors (ECM). The energy analysis assumes that variable speed fans are used in heating mode, which is not correct. If the fan speed is set too low in heating, the unit may become disabled due to high temperature safety devices if present. The unit may also need to run longer to satisfy zone temperature requirements due to issues with poor air distribution and stratification.

- Fan speed is controlled in the modeling using ambient temperature and the controls associated with variable speed fans are not included. The negative impact on mechanical efficiency from high load and low fan speed is not considered.
- The energy used for ventilation or when the fan runs constantly is driving energy savings and establishing bias for more efficient products. The products in this category can provide ventilation air; however, as discussed above this is not covered in the Federal test procedure (AHRI 340/360 standard). DOE is including ventilation at each efficiency level, but because they did not use a variable speed fan motor at EL1 or EL2, energy saving at EL3 and EL4 is calculated incorrectly. A comparison of energy savings with and without ventilation included is shown below.



- ASHRAE 90.1-2013 requires multiple speed blowers on equipment in this capacity range. Because ASHRAE contains this requirement, DOE's failure to include it in the modeling means that DOE's analysis is of equipment that is not in fact, and will not be, the equipment sold in the relevant markets. If the DOE modeling included this design feature at EL1 and EL2, the energy analysis changes dramatically and the energy savings from EL1 to EL3 does not change substantially. The costs associated with EL3 are much more significant; however, and the benefit does not outweigh the cost. A comparison of energy savings using variable speed blowers at each efficiency level is shown below.



- The assumptions made by the DOE on fan power depend on the design approach to increase IEER. There are many other ways to increase IEER other than through variable speed indoor fans, which is an effective approach, however, the timeline order with which the DOE includes them as an option on equipment may not be representative of how manufacturers design their units.

Heat Exchanger Modeling

The modeling of the heat exchangers used in the energy analysis of the equipment is very dependent upon the precision and accuracy of the dimensions and parameters entered. Many higher efficiency units utilize micro channel heat exchangers (MCHE) which also lower the required refrigerant charge, which is not evaluated in the energy analysis properly. Additionally, internal tube enhancements and fin geometry parameters are not included in the DOE analysis. The modeling of these units is extremely complex and without having access to the program and files used in the analysis, there is little confidence in the accuracy of the results. The tested units compared to within 5% of the results predicted by the model, but there is no uncertainty study provided in the engineering analysis. It is also unknown how the 5% tolerance was obtained, or if this was the average of multiple tests.

Overall Results of DOE Energy Modeling

An analysis of energy use suggests that DOE has overstated the efficiency ratings for EL3 and EL4 by ~10%, at the minimum, if averaged across all equipment capacities. When the equipment is divided into the three capacity sizes, the energy savings from ventilation on the 7.5 ton unit double the total energy savings. For the 15 ton unit, ventilation is 10-15% of the energy savings. For the 30 ton unit, ventilation is 30-40% of the energy savings. This is due to the items mentioned previously in this section where the effects of variable air volume and economizers relative to existing test procedures are overstated.

(14) Analysis and Assumptions for 7.5 Ton Models.

DOE’s analysis and modeling of the 7.5 ton units is not consistent with the current market trends. Nearly 90% of all units sold in this size have multiple compressors, which comply with ASHRAE 90.1 standards. DOE’s decision to analyze this unit size with only a single stage compressor and not multiple stages is not representative of current industry trends.

The increase in heat transfer area for baseline to EL1 and EL2 is not consistent with lean design principles. The increase in heat transfer area for the evaporator and condenser from baseline to EL1 is only 19% for a 13% increase in IEER. In order to move from EL1 to EL2, the evaporator area is increased by 66% and the condenser is increased by 22%, along with the addition of a second compressor stage for only an 8% increase in IEER.

The baseline model also appears to use coils that were downsized from EL1. Downsizing the coils will result in an EER below current DOE minimum levels. As a result of these assumptions, it is clear that DOE does not have an accurate model for units in this capacity range. The economic and energy analysis is therefore flawed and not representative of the industry.

(15) Incremental Markups.

DOE’s use of incremental markups overstates the benefits of the proposed standard levels and cannot support its conclusion that the EL3 levels are economically justified. There is no basis for the DOE to continue to use incremental markups in its cost analysis. In using this technique, the DOE is stating what *should* be happening in the market. This does not accurately reflect what is actually occurring. The document *Incremental Markups – A Critical Review of Theory and Practice* by Shorey Consulting, which is included in the docket, explains the fundamental flaws of using incremental markups as opposed to average markups.

Average markups should be used in the DOE analysis as these are representative of the real-world HVAC marketplace. Using average markups and cost data gathered by Shorey Consulting from equipment manufacturers in response to this rulemaking shows that DOE has significantly understated the costs, as shown below. The values reported represent the delta, or difference between the recalculated values using average markups and the values in the DOE NOPR.

Increase in Manufacturer's Estimated Factory Cost				
	EL1	EL2	EL3	EL4
7.5	\$151	\$876	\$1,420	\$2,299
15	\$545	\$1,190	\$2,227	\$2,797
30	\$705	\$1,944	\$3,301	\$4,955
Increase in DOE Shipping Costs				

	EL1	EL2	EL3	EL4
7.5	\$0	\$0	\$0	\$103
15	\$0	\$193	\$193	\$193
30	\$0	\$0	\$0	\$444
Increase in Total Cost Before Markups				
	EL1	EL2	EL3	EL4
7.5	\$151	\$876	\$1,420	\$2,402
15	\$545	\$1,383	\$2,420	\$2,990
30	\$705	\$1,944	\$3,301	\$5,399
Increase in Average Customer Price with Baseline Markup				
	EL1	EL2	EL3	EL4
7.5	\$416	\$2,418	\$3,920	\$6,628
15	\$1,547	\$3,926	\$6,872	\$8,492
30	\$2,107	\$5,813	\$9,871	\$16,144
Increase in DOE Installation				
	EL1	EL2	EL3	EL4
7.5	\$183	\$782	\$807	\$1,690
15	\$433	\$1,466	\$1,547	\$2,229
30	\$588	\$1,546	\$1,599	\$2,641
Increase in Total Installed Cost with Baseline Markup				
	EL1	EL2	EL3	EL4
7.5	\$599	\$3,200	\$4,727	\$8,318
15	\$1,980	\$5,392	\$8,419	\$10,721
30	\$2,695	\$7,359	\$11,470	\$18,785
Increase in Average Total Installed Price at Revised Cost and Markup				
	EL1	EL2	EL3	EL4
7.5	\$8,755	\$11,356	\$12,883	\$16,474
15	\$15,738	\$19,150	\$22,177	\$24,479
30	\$30,480	\$35,144	\$39,255	\$46,570
Increase in Total Installed Cost from Revisions				
	EL1	EL2	EL3	EL4
7.5	\$220	\$1,433	\$2,560	\$4,308
15	\$803	\$2,292	\$4,424	\$5,504
30	\$1,095	\$3,766	\$6,427	\$10,370

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The end result of using incremental vs. average markups is that the costs associated with manufacturing, shipping, installation, and purchase are greatly underestimated. The costs shown above are representative of what is realistically occurring in the marketplace, and not what should be occurring hypothetically in the future. DOE should revise its analysis to reflect the much more accurate and realistic costs reflected by average markups.

(16) Conversion Period and Costs.

The conversion costs are underestimated in the DOE analysis. Substantially more cost will be incurred to re-design the 80% of units in the market that are currently not in compliance. The assumptions used by the DOE to reach the new efficiency goals also impact the conversion costs. There are many ways to increase IEER, and the order that is assumed in the engineering analysis will not be representative of all equipment manufacturers.

Manufacturers are currently redesigning their equipment to meet ASHRAE 90.1-2013 minimum efficiency levels. As such, requiring another major design change in a very short time frame places undue burden on manufacturers, a burden that was not accounted for in the DOE analysis. DOE is proceeding as if the cost to redesign to ASHRAE 90.1-2013 is not real and is irrelevant to this rulemaking. We strongly disagree.

It is not possible to re-design an entire product line multiple times in the current conversion period. While AEDM's may allow manufacturers to avoid testing every unit for ratings, they do not remove any testing burden for performance and safety.

The DOE does not adequately breakdown the costs associated with modifying or replacing a piece of equipment into its constituent components. For instance, the costs associated with replacing a compressor vary significantly depending on the design options that are included as part of the change. The DOE does not take into consideration the design options in their analysis. Without a detailed description of the options included as part of the conversion cost, it is impossible to determine if the values DOE assumes in the life-cycle spreadsheet are accurate. It is also not possible to modify these values without purchasing an extra software add-in called "Crystal Ball" which was described previously in the comments.

(17) Manufacturing Costs.

In the Shorey Report, manufacturers reported that the cost to meet efficiency levels are approximately 80% higher than the DOE estimate for higher levels and 30-50% higher for lower levels. This is likely due to the differences in equipment costs when the units are broken down into their design options as stated above. The use of catalog teardowns to justify overall equipment cost is not an accurate representation of

manufacturing cost. There are differences in material sourcing, vendor pricing, plant design, labor costs, and production volume affecting actual costs that do not seem to be captured in the DOE analysis. Data gathered from equipment manufacturers by Shorey Consulting on incremental ex-plant manufacturing costs, illustrating the extent to which DOE has understated the manufacturing costs is shown below.

Increase in DOE Manufacturing				
	EL1	EL2	EL3	EL4
7.5	\$116	\$584	\$789	\$1,277
15	\$419	\$793	\$1,237	\$1,554
30	\$542	\$1,296	\$1,834	\$2,753
Increase in Manufacturers' Estimate				
	EL1	EL2	EL3	EL4
7.5	\$151	\$876	\$1,420	\$2,299
15	\$545	\$1,190	\$2,227	\$2,797
30	\$705	\$1,944	\$3,301	\$4,955

The end result is that the cost to increase efficiency levels to EL3 has been greatly understated and, as such, is not economically feasible.

(18) Life Cycle Costs and Payback.

An analysis of the payback period for the efficiency levels determined that for all levels except EL1, the payback period is longer than seven years. This analysis was conducted by Shorey Consulting using corrected manufacturing costs, average channel markups, and taking into consideration that the DOE has overestimated the energy savings for EL3 and EL4 by more than 10% as described previously. A comparison of the DOE and revised estimated lifecycle costs and payback period is shown below.

Median Payback (DOE in Black, Revised in Red)								
	EL1		EL2		EL3		EL4	
7.5	2	3.2	8	14.5	3.9	9.5	4.7	10.8
15	6	10.1	7.2	12.5	6.6	15.5	5.1	11.6
30	2.6	4.4	5.5	10.2	2.5	6.3	3.5	8.6
Life Cycle Savings at Revised Costs and 10% Reduction in Energy Savings for EL3&4 (DOE Lifecycle Savings in Black, Revised in Red)								
	EL1		EL2		EL3		EL4	
7.5	\$1,094	\$874	\$937	-\$496	\$4,779	\$709	\$6,711	\$1,313
15	\$1,038	\$235	\$2,214	-\$56	\$3,469	-	\$7,508	-\$363
						\$3,912		

30	\$4,103	\$3,008	\$4,801	\$1,491	\$16,477	\$4,978	\$19,842	\$5,240
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In August 2013, the DOE Energy Information Administration published a report, Updated Buildings Sector Appliance and Equipment Cost.⁷ On page 78 of this report, DOE analyzes the current retail and equipment costs associated with a 7.5 ton commercial rooftop air conditioner. This is the same equipment currently affected by this NOPR in the small unit capacity range. The table included in this report is shown below.

DATA	2003	2007	2010	2010			2020		2030		2035	
	Installed Base		Current Standard	Typical	Mid-Range	High	Typical	High	Typical	High	Typical	High
Typical Capacity (kBtu/h)*	90	90	90	90	90	90	90	90	90	90	90	90
Efficiency (EER)	9.2	10.1	11.2	11.2	12	13.9	11.5	13.9	11.5	13.9	11.5	13.9
Average Life (yrs)	15	15	15	15	15	15	15	15	15	15	15	15
Retail Equipment Cost (\$)	3300-4500	4000-5100	5500-6500	5500-6500	7000-8000	20000-21000	5500-6500	20000-21000	5500-6500	20000-21000	5500-6500	20000-21000
Total Installed Cost (\$)	5000-6200	5700-7000	7500-8500	7500-8500	9000-10000	22000-24000	7500-8500	22000-24000	7500-8500	22000-24000	7500-8500	22000-24000
Annual Maintenance Cost (\$)	150-300	150-300	150-300	150-300	150-300	150-300	150-300	150-300	150-300	150-300	150-300	150-300

The life-cycle spreadsheet included in the NOPR calculates the values below for retail and total installed cost for a 7.5 ton unit, which is the same piece of equipment analyzed in the table above. This unit is assumed to be purchased in 2019.

iPrd	(ton)	Line #	Eff. Level	IEER	(kWh)	(\$)	(\$)	(\$)
	Size				Annual Elec Use	Retail Price	Installation Cost	Total Installed Price
1	7.5	1	0	11.4	11379	\$5,219	\$2,730	\$7,949
1	7.5	2	1	12.9	9901	\$5,393	\$2,918	\$8,310
1	7.5	3	2	14.0	9304	\$6,211	\$3,517	\$9,728
1	7.5	4	3	14.8	5258	\$6,498	\$3,564	\$10,062
1	7.5	5	4	19.9	2418	\$7,249	\$4,625	\$11,874

A comparison of the average retail and total equipment cost of year 2019 from the NOPR LCC spreadsheet, and 2020 from the DOE building sector report show significantly different values. The table below summarizes the values presented in the NOPR and DOE report. The 2020 DOE costs are considered for a typical efficiency and high efficiency unit.

⁷ EIA, *Updated Buildings Sector Appliance and Equipment Costs and Efficiency* (Aug. 2013), available at <http://www.eia.gov/analysis/studies/buildings/equipcosts/pdf/full.pdf>.

Analysis of 7.5 Ton Units vs. TSL Levels in NOPR for Unit Purchase in 2019-2020		
	Average Retail Equipment Cost	Average Total Installed Cost
Baseline	\$ 5,219.00	\$ 7,949.00
TSL 1	\$ 5,393.00	\$ 8,310.00
TSL 2	\$ 6,211.00	\$ 9,728.00
TSL 3	\$ 6,498.00	\$ 10,062.00
TSL 4	\$ 7,249.00	\$ 11,874.00
Typical Efficiency Unit	\$ 6,000.00	\$ 8,000.00
High Efficiency Unit	\$ 20,500.00	\$ 23,000.00

The DOE building sector report provides significantly higher values for equipment cost and the total installed cost than those in the NOPR and LCC spreadsheet. This is assuming the same equipment is purchased in the years 2019-2020 in both cases. A breakdown of these increases is shown in the following table.

Increase in Retail Equipment Cost from "DOE Building Sector Appliance and Equipment Cost-August 2013" vs. NOPR		
	Typical Efficiency Unit	High Efficiency Unit
Baseline	-13%	75%
TSL 1	-10%	74%
TSL 2	8%	70%
TSL 3	8%	68%
TSL 4	21%	65%

Increase in Total Installed Cost from "DOE Building Sector Appliance and Equipment Cost-August 2013" vs. NOPR		
	Typical Efficiency Unit	High Efficiency Unit
Baseline	-1%	65%
TSL 1	4%	64%
TSL 2	22%	58%
TSL 3	26%	56%
TSL 4	48%	48%

It is evident from the table above, that there are major discrepancies present in the DOE LCC analysis, model, and assumptions. If a high efficiency unit purchased in 2020 from the DOE building sector report is compared to a TSL 3 unit in the NOPR purchased in 2019, the result is that DOE underestimated equipment cost by 68% and total installed cost by 56%. The underestimation of costs is consistent across the other TSLs.

The DOE has overstated the lifecycle savings and understated the costs associated with each efficiency level. As a result, the payback period is significantly longer than stated in the NOPR. The differences in equipment cost and total installed cost from two different DOE analyses suggest that the LCC data presented in the NOPR is incorrect and needs to be updated.

(19) Incorrect Assumptions of Equipment Lifetime and Maintenance.

As efficiency levels increase and the corresponding cost of equipment increases, consumers will likely repair equipment for a longer period rather than replace it. Consumers will also evaluate the replacement of equipment depending on the return on investment (ROI).

Components that are used to achieve higher efficiencies may require more frequent replacement due to their design limitations and application use. The DOE assumptions that unit lifetime resets after a compressor is replaced is incorrect. There are many other components that may require replacement more frequently, due to more efficient designs and the need for added electronics.

The first failure of a unit will likely be repaired; however, repairs will not occur sequentially afterwards. The component that has failed along with the required cost and difficulty to replace it will be evaluated on a case-by-case basis. It may not be feasible to replace an entire unit due to the installation and location. Modifications to a building's structure and ductwork, for example, may necessitate that a unit be repaired and not replaced.

DOE's assumption that the average age of equipment is 18.7 years is also overstated. The typical average lifetime of the equipment covered in this rulemaking is 12-15 years as reported in DOE's Energy Information Administration.⁸ This age varies significantly, however, based on where the equipment is installed geographically.

(20) Shipments and Employment Forecast.

DOE projects that shipments will decline 40% for small equipment, 25% for large equipment, and 80% for very large equipment under EL3. These estimated shipment levels do not take into consideration the revisions to the cost model stated previously, which will raise equipment costs substantially. The projected greater increase in cost will further lower shipments as existing equipment is repaired and not replaced.

Lower shipment volume and fewer units produced will lead to a greater job loss than the 10-12% the DOE projects will occur for EL3. This affects individuals employed in the manufacturing of the equipment, and also those in the distribution and wholesale end, which DOE did not consider in its analysis. DOE should recalculate its

⁸ EIA, *Updated Buildings Sector Appliance and Equipment Costs and Efficiency* (Aug. 2013), available at <http://www.eia.gov/analysis/studies/buildings/equipcosts/pdf/full.pdf>.

employment forecast to include all jobs associated within the equipment channel and not only the manufacturing portion.

In addition to the issues noted above, AHRI appreciates the opportunity to comment on the list of issues as to which the DOE has expressed special interest.

ISSUES ON WHICH DOE SEEKS COMMENT

1. Use of the IEER as the cooling efficiency metric and COP as the heating efficiency metric (for CUHP) for the proposed energy conservation standards, including additional data and input regarding the uncertainty of IEER test measurements. (See section III.A of this notice for additional information.)

AHRI RESPONSE: AHRI supports the use of IEER as the cooling efficiency metric and COP as the heating metric. EER will however continue to be an important metric for utilities as management of peak load.

2. Comment on whether the test procedure for air-cooled CUAC and CUHP should be amended to revise the weightings for the IEER metric to place a higher weighting value on the full-load efficiency. DOE also requests data to determine appropriate weighting factors for the full-load test condition and part-load test conditions (75 percent, 50 percent, and 25 percent of capacity). (See section III.A of this notice for additional information.)

AHRI RESPONSE: The test procedure should not be changed to place higher weighting value on full-load efficiency. Since most units operate outside of full load for most of the year, the part-load efficiencies are more relevant. Furthermore, test procedure changes should not be proposed or even considered in the middle of a notice of proposed rulemaking amending energy conservation standards. See, e.g., DOE's Process Rule ("Final, modified test procedures will be issued prior to the NOPR on proposed standards.").

3. DOE requests comments and detailed information regarding any design features, including dual-duct air conditioners, that DOE should consider for establishing separate equipment classes in this rulemaking. DOE requests that such information provide test data illustrating the additional challenges faced by models having such design features and a discussion of the customer utility aspects of the design feature. In particular, DOE requests detailed comments regarding the definition of such equipment classes, and any detailed information, such as test data, test conditions, key component design details, as well as other relevant information (e.g., fan power consumption) that may help DOE evaluate potential alternative equipment class standard levels. See section IV.A.2 of this notice for additional information.)

AHRI RESPONSE: AHRI does not believe a separate equipment class should be established for dual-duct air conditioners in this rulemaking. Dual-duct air

conditioners are not a significant part of the market and can be treated within the current standard.

5. The incremental and max-tech efficiency levels identified for the analyses, including whether the efficiency levels identified by DOE can be achieved using the technologies screened-in during the screening analysis (see section IV.B), and whether higher efficiencies are achievable using technologies that were screened-in during the screening analysis. Also, DOE seeks comment on the approach of extrapolating the efficiency levels from the small, large, and very large CUAC with electric resistance heating or no heating equipment classes to the remaining equipment classes using the IEER differentials in ASHRAE Standard 90.1-2010 draft addendum CL. In addition, input and data on the approach for determining the COP levels for the heat pump equipment classes using the relationship between IEER and COP. (See section IV.C.3 of this for additional information.)

AHRI RESPONSE: As discussed above, AHRI does not believe that DOE has adequately analyzed the energy savings and economic assumptions of these products. Equipment that is currently in the market which meets max-tech levels is very limited and cost prohibitive for most end-users. Because the requirement that any amended standard be designed to achieve the maximum improvement in energy efficiency that is technologically feasible and economically justified is inapplicable to commercial equipment, see 42 U.S.C. § 6316(a), DOE should not begin its analysis at max-tech levels, but rather, because DOE must show by clear and convincing evidence that levels more stringent than an amended ASHRAE standard will save significant energy, see *id.* § 6313(a)(6)(A)(ii)(II), at baseline levels which are representative of the current market trends. By first conducting the energy and efficiency analysis examining the most efficient products on the market, there were errors in the assumptions made such as variable speed fans, multi-stage compressors, and ventilation air.

6. Comments, information, and data that would inform adjustment of energy modeling input and/or results that would allow more accurate representation of the energy use impacts of design options using the modeling tools developed by the Center for Environmental Energy Engineering from the University of Maryland College Park. (See section IV.C.4 of this notice for additional information.)

AHRI RESPONSE: As discussed above, fan power in ventilation mode should not be factored into the energy saving calculations. It significantly changes the results of the energy analysis and undermines the economic justification to increase to more efficient units. DOE needs to revise their energy analysis without fan power in ventilation only mode.

7. Input and data on the estimated incremental manufacturing costs, including the extrapolation of incremental costs for equipment classes not fully analyzed, in particular for heat pump equipment classes. (See section IV.C.4 of this notice for additional information.)

AHRI RESPONSE: As addressed above, it is evident that DOE does not have accurate and reliable information on manufacturing costs by using the catalog teardown method. It is not appropriate to execute a parametric analysis of heat pump costs since there was no engineering analysis performed.

8. Comments, information, and data that could be used to modify the proposed method for using laboratory and modeled IEER test data, which were developed in accordance to AHRI Standard 340/360–2007, to calculate the performance of CUAC equipment at part-load conditions. (See section IV.E.1 of this notice for additional information.)

AHRI RESPONSE: The power input that DOE used for the condenser fans and indoor blower in the modeling does not appear realistic across the efficiency levels. The high speed indoor blower power on the 7.5 ton model at EL3 and EL4, and 15 ton model at all efficiency levels is unrealistically low. The condenser fan power for TSL 4 is unrealistically low.

9. Comments on the use of a “generalized building sample” to characterize the energy consumption of CUAC equipment in the commercial building stock. Specifically, whether there are any data or information that could improve the method for translating the results from the 1,033 simulated buildings to the generalized building sample. (See section IV.E.2 of this notice for additional information.)

AHRI RESPONSE: A generalized building sample may not accurately represent the energy consumption of equipment in the commercial building stock. Benchmarked buildings are more effective in estimating actual energy use, but these were not utilized in the analysis. As stated in AHRI’s general comments, including fan power during ventilation mode in the energy analysis is incorrect. This assumption greatly affects the energy savings that are claimed, and misinterprets the value of selecting EL3 over EL1. There is no uncertainty study included in the analysis and the results of the modeling vs. test results cannot be compared without this.

10. Whether using RS Means cost data to develop maintenance, repair, and installation costs for CUAC and CUHP equipment is appropriate, and if not, what data should be used. (See section IV.F.6 of this notice for additional information.)

AHRI RESPONSE: DOE’s analysis on maintenance costs does not reflect the normal amounts incurred by consumers. AHRI believes, based upon input from its manufacturer members, that typical maintenance costs are double DOE’s estimated RS Means. Therefore, DOE should re-evaluate the services and amounts included in its analysis by interviewing manufacturers and determining a more appropriate estimate of these costs. For example, DOE states that as part of maintenance, refrigerant should be added as needed, but doesn’t take into consideration the labor involved in finding and repairing leaks to comply with EPA guidelines.

11. Comments, information and data on the equipment lifetimes developed for CUAC and CUHP equipment. Specifically, any information that would indicate whether the retirement functions yielding median lifetimes of 18.7 years and 15.4 years for CUAC and CUHP equipment, respectively, are reasonable. (See section IV.F.7 of this notice for additional information.)

AHRI RESPONSE: DOE's evaluation of the average equipment lifetime is incorrect. 12-15 years in service is more representative of the average than 18.7 years. As previously stated, DOE's own research supports AHRI claims (see footnote 1). DOE should take into consideration that many factors greatly affect the overall equipment lifetime. Location where the equipment is installed greatly determines how long it will remain in service. Equipment near coastal environments has a significantly shorter lifetime as the salt water destroys the coils and components more rapidly. The level and quality of routine service and maintenance also impacts equipment lifetime. Well maintained equipment by qualified personnel may last longer or fail significantly sooner than the national average. Taking into consideration these factors, as well as others, indicates that the national average of the equipment lifetime is closer to 12-15 years.

16. Comments on its decision to not include a rebound effect for more-efficient CUAC and CUHP. (See section IV.H of this notice for additional information.)

AHRI RESPONSE: AHRI agrees with the DOE that a rebound effect is not relevant to this type of product.

17. Comments, information, and data that would inform adjustment of the DOE's estimate of \$12.7M in conversion costs that occur in the base case. (See section IV.J.2.a of this notice for additional information.)

AHRI RESPONSE: The conversion costs listed in the NOPR represent only a small portion of those that will be incurred by manufacturers. Manufacturers estimate that actual conversion costs will be three times higher than in the DOE analysis. AEDM's allow manufacturers to rate units more quickly, but this does not reduce any testing burden for safety or reliability. Significantly higher costs will be incurred for engineering and manufacturing, as well as other capital costs resulting from a complete product redesign from EL1 to EL3.

19. Comments, information, and data on capacity constraints at each TSL – including production capacity constraints, engineering resource constraints, and testing capacity constraints that are directly related to an amended standard for small, large, and very large CUAC and CUHP. In particular, DOE requests comment on whether the proposed effective allows for a sufficient conversion period to make the equipment design and facility updates necessary to meet an amended standard. (See section V.B.2.c of this notice for additional information.)

AHRI RESPONSE: The timeframe to comply with EL3 is too short for manufacturers to make the necessary product portfolio changes. Engineering units to meet EL3 is only one component of a product re-design. There is significant time required to revise all literature, train technicians on more complex equipment and controls, as well as revising sales and marketing strategies. AHRI believes that EL1 should be adopted as the minimum efficiency standard as it will not be feasible to comply with EL3 under the current conversion period.

20. DOE requests comment on the identified regulations and their contribution to cumulative regulatory burden. Additionally, DOE requests feedback on product-specific regulations that take effect between 2016 and 2022 that were not listed, including identification of the specific regulations and data quantifying the associated burdens. (See section V.B.2.e of this notice for additional information.)

AHRI RESPONSE: As AHRI noted above, there are at least 10 ongoing rulemakings, in addition to DOE's Commercial Warm Air Furnace rulemaking, that will affect manufacturers of the equipment at issue in this rulemaking during the time that research, retooling, and product redesign will be necessary to comply with the amended standards. Importantly, this is in addition to the similar efforts that will be required with the revised IEER standards adopted in ASHRAE 90.1-2013. This is precisely the regulatory burden that Congress sought to avoid through the presumption that DOE would participate in the ASHRAE process and adopt revised ASHRAE standards as federal minimums, reflected in 42 U.S.C. § 6313. The end result of the increased regulatory burden is that manufacturers will be forced to make difficult decisions to remain competitive in the industry and compliant with all the regulations. This may result in the relocation of production facilities and/or the sourcing of components and materials abroad instead of domestically.

25. DOE also seeks comment on whether there are features or attributes of the more energy-efficient CUAC and CUHP that manufacturers would produce to meet the standards in this proposed rule that might affect how they would be used by consumers. DOE requests comment specifically on how any such effects should be weighed in the choice of standards for the final rule. (See section IV.A.3 of this notice for additional information.)

AHRI RESPONSE: The DOE analysis does not include economizers or hybrid systems. Units become much more complex as efficiency levels increase. Higher efficiency equipment is also difficult for the consumers to use and maintain properly as operation and user interfaces may be more complex compared to what is currently used in the market.

26. Input on regulatory alternatives to consider that would lessen the impact of the rulemaking on small business.

AHRI RESPONSE: DOE acknowledges that small manufacturers will be significantly impacted by the adoption of EL3. Manufacturers are designing equipment currently

to comply with ASHRAE 90.1-2013. Increasing the minimum efficiency level to EL3 will not allow smaller manufacturers to remain sustainable.

Summary

In this rulemaking on commercial equipment, DOE is required to follow the statutory framework that establishes amended ASHRAE 90.1 standards as the presumptive means of updating energy efficiency standards for commercial equipment. DOE must therefore revise its analysis to reflect this requirement, as well as to use the most recently available data in its analysis, and issue a supplemental notice of proposed rulemaking in order to allow stakeholders sufficient notice and opportunity to comment. A supplemental rulemaking with notice is also required in order to adequately account for the impact on the manufacturers of the cumulative regulatory burden of other overlapping rulemakings, to remove assumptions and factors that are not part of the applicable test procedure, and to correct the significantly underestimated costs to manufacturers in DOE's analysis. DOE should also make all data and models fully accessible and available, and hold a public meeting to explain its analysis and the justification for any locked, inoperable, or inaccessible spreadsheets or cells in its supporting documents.

AHRI does not believe that increasing the minimum efficiency level to EL3 is economically or technologically justified, and believes that a revised analysis will illustrate that the minimum efficiency level should be set as EL1, in agreement with ASHRAE 90.1-2013.

AHRI appreciates the opportunity to provide these comments. If you have any questions regarding this submission, please do not hesitate to contact me.

Sincerely,



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Attached Documents Referenced in the Comments:

- (1) Commercial Unitary Comments – Shorey Consulting
- (2) Incremental Markups – A Critical Review of Theory and Practice