

**Appliance Standards Awareness Project
American Council for an Energy Efficient Economy
Northwest Energy Efficiency Alliance
Natural Resources Defense Council
Northeast Energy Efficiency Partnership
Alliance to Save Energy**

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Ms. Brenda Edwards
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Building Technologies Program
Mailstop EE-5B
1000 Independence Ave, SW
Washington, DC 20585-0121

Docket Number: EERE-2013-BT-STD-0040

RIN: 1904-AC83

Dear Ms. Edwards:

This following comprises the comments of the signatories in response to the Department of Energy's Notice of Proposed Rulemaking on Energy Conservation Standards for Compressors published May 19, 2016.

Summary

We commend DOE for advancing this rulemaking for compressors. However, we are concerned with several aspects of the proposed standards. In particular, we urge DOE to adopt standards at EL 3 for rotary lubricated compressors and also to evaluate standards for larger reciprocating compressors. Relevant to both of these items, we also recommend that DOE more completely review the benefits of harmonizing US energy efficiency standards for compressors with pending European compressor standards.

Comments

We recommend that DOE adopt efficiency levels at EL 3 for lubricated rotary air compressors. In the NOPR DOE proposes TSL 2, which includes EL 2 for lubricated rotary air compressor standards, yet the NOPR also states that DOE is "seriously considering the adoption of a more stringent energy efficiency standard in this rulemaking." TSL 3 includes EL 3 and in comparison to TSL 2 would more than double the energy savings from the proposed standards from 0.18 to 0.49 quads and the NPV of consumer benefits would increase from \$200 mil to \$600 mil (2015 \$ at 7% discount rate). TSL 3 would also reduce

CO₂ emissions from 10.6 to 29.2 million metric tonnes, providing better support the administration's climate change goals.

We appreciate the challenges facing manufacturers in complying with any new federal energy efficiency standard, but in this case industry has been preparing for a DOE ruling that is harmonized with the pending EU compressor standards. The NOPR states that TSL 3 would be more similar to the pending EU standards.

We recommend DOE redo part of its analysis of reciprocating compressors and evaluate the results to determine the potential for standards on larger reciprocating compressors. DOE's shipments analysis show that reciprocating compressors make up more than 97% of all compressors shipped in the US, with rotary compressors making up less than 3%. In the technical support document for this rulemaking (section 3.5.4) DOE describes how different classes of air compressors are deployed, noting that larger reciprocating compressors are common even in heavy commercial applications and that "compressors of multiple types may be employed in tandem" in industrial applications. DOE's analysis clearly suggests that reciprocating compressors are responsible for significant energy consumption, and that larger reciprocating compressors both complement and compete with rotary compressors in commercial and industrial applications.

Reciprocating compressors are sold in much larger volumes than rotary compressors and also experience a much wider range of duty cycles and annual energy consumption profiles. In general, the larger the reciprocating compressor, the more similar its annual hours of operation and annual energy consumption are to a rotary compressor of similar capacity. DOE's proposed rule would cover both rotary and reciprocating compressors powered by brushless electric motors rated between 1-500 hp. The majority of reciprocating compressors sold each year are low duty-cycle "hobby" compressors rated at 3 hp or below. DOE should redo its analysis of reciprocating compressors with annual shipments divided into bins delineated by rated motor power. We anticipate that this analysis will indicate that standards for larger reciprocating compressors exhibit significantly better cost-effectiveness than is shown in the current NOPR analysis.

A standard for larger reciprocating compressors would also address DOE's concerns about the testing burden for manufacturers by significantly reducing the number of reciprocating models that would otherwise be subject to the standards. We believe that the benefits that from conducting this additional analysis would justify the additional time and effort, even if it delays the issuance of a final rule.

DOE should not pre-empt potential state energy efficiency standards without establishing federal standards. We object to DOE's proposal to cover reciprocating compressors but not to establish energy efficiency standards for them. DOE's proposal would create a federal "no-standards standard" that would do nothing to improve the energy efficiency of this class of compressors while pre-empting potential future state level standards. DOE's rationale for not establishing a standard would be that the levels analyzed did not show evidence of cost effectiveness. But the failure of a proposed federal standard to demonstrate cost effectiveness does not necessarily imply that a state level standard will also not be cost effective. DOE should not limit a state's ability to protect its consumers with a standard that is cost effective within that state.

DOE's proposal to cover reciprocating compressors without establishing standards for them also means that compressor manufacturers would not be required to test or certify their reciprocating equipment. The NOPR notes the lack of available data for this product class, but DOE's proposal does nothing to address the problem.

Should DOE choose not to establish standards that increase the energy efficiency of reciprocating air compressors, we recommend that DOE either:

1. Cover the two classes of reciprocating compressors as proposed, and establish standards for them at EL 0 as DOE has proposed for lubricant-free rotary air compressors. This approach would require manufacturers to test their products and report the results to DOE providing valuable market information useful for both efficiency programs and for future rulemakings, or
2. Not cover reciprocating air compressors at all, leaving a path open for state level energy efficiency standards.

DOE should refine its analysis to include the cost effectiveness of full harmonization with the pending EU compressor energy efficiency standards. DOE's analysis does not adequately account for the costs to industry from US compressor energy efficiency standards that are not harmonized with the pending EU standards. As noted in the NOPR, "CAGI commented that it is important for regulations between the U.S. and EU to be similar given the global nature of the industry and many of its customers."

DOE based parts of the NOPR analysis on data obtained from the European Union's "Lot 31" analysis which recently yielded air compressors standards for both reciprocating and rotary air compressors that are pending implementation in the EU. However, DOE has proposed a less stringent standard for rotary compressors than the EU despite the fact that reciprocating compressors represent a larger share of the air compressors market in the US. DOE has also proposed a narrower scope of coverage than the European standards by not including reciprocating compressors in the proposed US standards. DOE should analyze the returns from the increased scale of production and a shared learning curve with international standards harmonization and consider the difference in the costs of development for products designed to comply with a harmonized standard and products designed to comply with a US-only standard.

DOE should adjust its analysis to be more consistent with typical practice regarding the construction of Trial Standards Levels (TSLs). DOE has diverged from typical practice in creating the TSLs for compressors by using only the baseline and max-tech efficiency levels for reciprocating air compressors. The NOPR concludes (FR Vol. 81, No. 97 pg 31736):

"For reciprocating equipment classes, the NPV of consumer benefits was negligible or negative for at least one of the classes at all efficiency levels; as such, DOE chose not to evaluate new standards for this equipment in TSLs 1 through 5, and evaluated new standards only at TSL 6, the max-tech level."

It is very unusual for DOE to fail to evaluate improved standards for **any** product class of a type of equipment or product because it finds that standards for **some** product classes are not cost-effective for purchasers. Typically, DOE constructs TSLs which include the efficiency levels that maximize NPV for all product classes. DOE also typically creates a TSL which incorporates the efficiency levels that maximize

energy savings with a positive NPV.

DOE should retain the proposed limit on maximum rated motor power for the proposed standards.

Manufacturers have requested that the scope of the proposed standards be limited to air compressors with brushless electric motors ranging from 1-200 hp, instead of DOE's proposed 1-500 hp range. DOE's analysis shows that rotary compressors greater than or equal to 200 hp represent almost 5% of the fixed-speed market, and over 7% of the variable-speed market, and therefore even larger shares of total energy consumption for all rotary compressors. As such, we find the greater-or-equal to 200 hp market significant and therefore recommend that DOE retain its original proposal to regulate 1-500 hp rotary compressors.

We support DOE's proposal regarding lubricant-free rotary compressors. In this NOPR DOE has proposed to cover lubricated, rotary compressors driven by both fixed and variable speed motors. We agree that lubricant-free rotary compressors serve more specialized applications than lubricated rotary compressors and that the total energy consumption of this product class is therefore small and difficult to quantify. We support DOE's proposal to issue "new standards at baseline" for lubricant-free compressors. The testing and reporting required under a baseline standard will generate important information for potential future rulemakings.

DOE should be wary of industry calls to remove equipment from the proposed test procedure.

Responding to CAGI's and manufacturers' specific request to remove "auxiliary equipment" (e.g., dryers) from the test procedure, we recommend that DOE obtain additional data on the amount of energy consumed by these auxiliary components before taking such action. Auxiliary equipment has a significant impact on air compressor energy efficiency and quantitative performance data is needed to better inform a decision.

We recommend that DOE work with industry to develop a test procedure for lubricant-free variable speed rotary compressors. Manufacturers noted that variable speed lubricant-free compressors often cannot reach the 40% minimum variable speed part-load test specified in DOE's test procedures for compressors, citing minimums typically closer to 50%. CAGI suggested using the "lowest stated efficiency." However, this could potentially be inflating efficiency ratings for less efficient equipment. As such, we recommend that instead of using the "lowest stated efficiency" as the minimum test that DOE work with CAGI to develop an alternative minimum test, such as a different part-load test range for lubricant-free compressors.

We support DOE's assumptions regarding air compressor operating hours as included in the NOPR.

Industry representatives called DOE's methodology for determining energy savings into question during the public meeting, including DOE's assumptions about air compressor operating hours. We encourage DOE to review typical operating hour assumptions cited in industry literature before adjusting its assumptions. We reviewed rotary compressor manufacturer's brochures for models typically sold for operation with three-phase motors (see below). In at least these three examples manufacturers estimated:

- 4,000 operating hours for a smaller unit of less than 100 hp ([example 1](#), page 3), and
- As high as 8,000 operating hours for a larger unit greater than or equal to 100 hp ([example 2](#), page 4 and [example 3](#), page 79).

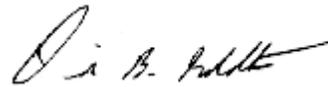
These industry estimates are similar to the high end of DOE’s assumptions from the NOPR, which range from 1,000 to 8,400 annual operating hours depending upon application (baseload, trim, and intermittent) and bin limits.

We appreciate the opportunity to provide these comments and look forward to the final rule.

Sincerely,



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