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Re: NAFEM Comments On – Energy Conservation Program: Energy Conservation Standards for Commercial Refrigerators, Freezers, and Refrigerator-Freezers, Notice of Proposed Rulemaking; Dkt. EERE-2017-BT-STD-0007 (88 Fed. Reg. 70196; Oct. 10, 2023)

Dear Mr. Dommu and Ms. Koernig:

The North American Association of Food Equipment Manufacturers (NAFEM)[1] submits the following comments on the Department of Energy's (DOE) Energy Conservation Program: Energy Conservation Standards for Commercial Refrigerators, Freezers, and Refrigerator-Freezers, Notice of Proposed Rulemaking; Dkt. EERE-2017-BT-STD-0007 (88 Fed. Reg. 70196; Oct. 10, 2023) (NOPR).[2] The NOPR sets forth DOE's proposal to amend energy conservation standards for various consumer equipment and certain commercial and industrial equipment, including commercial refrigerators, freezers, and refrigerator-freezers (CRE). Set

[1] NAFEM supports the Air-Conditioning, Heating, and Refrigeration Institute's (AHRI) and National Automatic Merchandising Association' (NAMA) comments on this NOPR, joins the same, and incorporates them by reference as if fully set forth herein. NAFEM, AHRI, and NAMA may comment on separate concerns with the NOPR. To the extent that NAFEM does not comment on any particular issue on which AHRI and/or NAMA provide comments, the absence of NAFEM's comments on the same should not be construed as NAFEM's lack of concern with the issue. NAFEM also submits the results of a CRE Technical Survey dated December 7, 2023 as **Appendix A** (2023 NAFEM Technical Survey).

[2] NAFEM also comments through this letter on various other documents on the above-referenced docket, such as the September 2023 Technical Support Document, EERE-2017-BT-STD-0007-0051 (2023 TSD), the transcript of the Nov. 7, 2023, DOE proceedings, EERE-2017-BT-STD-0007-0064 (Transcript), as well as other docket entries identified in the text of this comment letter below.

forth below we outline the interests of NAFEM and then NAFEM's comments specific to the NOPR for DOE's consideration.

I. INTERESTS OF NAFEM

NAFEM is a trade association of more than 500 commercial foodservice equipment and supply manufacturers – a $14.9 billion industry. These businesses, their employees, and the products they manufacture, support the food-away-from-home market – which includes more than one million locations in the U.S. and countless more around the world. NAFEM supports, and its members actively seek, opportunities to engage with DOE in the regulatory process to assure certainty and clarity to its regulated members that manufacture equipment relied upon by our society to safely provide food away from home.

NAFEM regularly participates with DOE in energy conservation standards rulemakings. NAFEM members include manufacturers of CRE that are the subject of this NOPR, and NAFEM has a direct interest in this matter. NAFEM previously submitted comments in this docket as to the Preliminary Technical Support Document and Request for Comment for Conservation Standards for Commercial Refrigerators, Freezers, and Refrigerator-Freezers (87 Fed. Reg. 38296; June 28, 2022) (Preliminary TSD).

II. NAFEM'S COMMENTS FOR DOE'S CONSIDERATION

NAFEM provides the following comments and hopes that DOE will entertain ongoing dialogue on these critical CRE issues. NAFEM and its membership have substantial concerns that DOE, in issuing the NOPR, has fallen short of its statutory obligation to ensure that the proposed standards are "technologically feasible and economically justified." 42 U.S.C. § 6295(o) and 42 U.S.C. § 6313(a)(6)(B)(iii).

NAFEM strongly urges DOE to issue a "no-new-standard" standard for the following reasons: (A) the NOPR's proposed standards are not technically feasible; and (B) the NOPR's proposed standards are not economically justified because they fail DOE's statutory factors under the Energy Policy and Conservation Act (EPCA).

NAFEM does not make this request lightly. NAFEM members relish their participation in the ENERGY STAR® program because they recognize that environmental stewardship and energy efficiency are positive attributes in the marketplace. Indeed, NAFEM members welcome energy and environmental standards as an opportunity to innovate and establish market value. However, NAFEM members have substantial concerns that continuing to proceed with the current standards will force NAFEM members to discontinue products or otherwise exit the CRE space, which will harm consumers, reduce competition, and may increase energy consumption.

If DOE elects to continue the path to issue a new standard for CRE, NAFEM respectfully requests that DOE provide additional time for compliance in recognition of the recent significant changes and substantial investments that the CRE industry has just made—and continues to make—to comply with the American Innovation and Manufacturing Act (AIM Act), 87 Fed. Reg. 76,738 (Dec. 15, 2022), in addition to the significant headwinds caused by other regulatory requirements and technical limitations that have also impacted the CRE industry.

A. The NOPR's Proposed Standards Are Not Technically Feasible For Several Significant Reasons

1. The Efficiency Gains Cited Are Illusory Because CRE Manufacturers Already Use Most of the "Screened-In" Technologies

In the 2023 TSD, the DOE identifies several technologies to further evaluate after conducting its Screening Analysis—*i.e.*, the "screened-in" technologies. However, as demonstrated further below, many of the purported gains that DOE states will occur, based upon these "screened-in" technologies, will not result in efficiency gains because many are already in use.

Specifically, DOE identifies the following "screened-in" technologies:

1. **Insulation** (improved resistivity);
2. **Lighting** (higher efficiency);
3. **Improved Transparent Doors** (low-emissivity coatings, inert gas, vacuum-insulated glass, additional panes, anti-sweat heater controls, and anti-fog designs);
4. **Compressor** (improved efficiency, alternative refrigerants, and variable-speed compressors);
5. **Evaporator** (increased surface area, evaporator coil design, and low-pressure differential evaporator);
6. **Condenser** (increased surface area, tube and fin enhancements, and microchannel heat exchanger);
7. **Fans** (fan motors, fan blades, and fan controls); and
8. **Other** (defrost systems, expansion valve improvements, night curtains, and liquid suction heat exchanger).

Prior to the 2023 TSD, however, in response to the Preliminary TSD, AHRI, NAMA, and NAFEM submitted a survey of CRE manufacturers as to the prevalence of the "screened-in" technologies identified in the Preliminary TSD.[3] (NOPR at 70234.) For example, as DOE recounted, the 2022 Survey indicated that "all members reported using LED lighting and are unaware of any higher efficiency lighting that could be incorporated into their equipment." (*Id.*)

While DOE, in this NOPR, glossed over these findings, the predominant response from the 2022 Survey as to why the "screened-in" technologies identified in the Preliminary TSD were not technologically feasible is because "the design options were already in use by manufacturers to meet the current ECS." (2022 Survey at 12.) To close out its purported review of the 2022 Survey, DOE stated that it "has considered the results of this survey as part of its NOPR

[3] This survey and associated documentation are located on the above-referenced docket as EERE-2017-BT-STD-0007-0050, Attachments 1-3 (2022 Survey).

engineering analysis." (NOPR at 70234.)

However, NAFEM members, and the CRE industry more widely, have substantial doubts that DOE did, in fact, meaningfully consider the widespread deployment of many of the "screened-in" technologies identified in the Preliminary TSD and now, the 2023 TSD.[4]

The CRE industry voiced its concerns at the Nov. 7, 2023, in-person meeting:

- "Many benefits that DOE believes will occur are based on the assumption that AHRI's members are not already using these technologies, which, in fact, they are using these technologies and include **high efficiency lighting, ECMs, adaptive defrost systems, increased insulation thickness, and improved evaporator coil design**." (Transcript 19:08-19:21 (emphasis added).)

- The 2023 TSD's technologies are "currently in place in the marketplace to achieve already established efficiency standards updated just six years ago and the recent update to the ENERGY STAR® standards for these products, including **enhanced foam insulation, LED lighting, variable speed compressor technology, fan motor technologies, evaporator and condenser configurations, and intelligent controls**, for example, to manage defrost cycles." (*Id.* 26:10-26:19 (emphasis added).)

- "Technology options that DOE proposes in this rulemaking would reduce energy consumption in the near future that they are proposing as new technology, such as **fan controls and high-efficiency fan motors**, are already in use by ourselves and by many other manufacturers." (*Id.* 32:14-32:19 (emphasis added).)

- "[M]uch of that data that's in that TSD is probably based on equipment that was produced around 2015, 2016. They don't represent today's equipment. . . . You know, looking at [several of] the activities in terms of **tube and fin enhancements, those have been done years ago**." (*Id.* 57:20-57:25 (emphasis added).)

- "We see also in the technology options **condenser fan controls** and also **evaporator fan controls**. Those Hoshizaki America actually put in place when we were changing over to R290, and that has been a lot of our decreases in energy." (*Id.* 60:16-60:21 (emphasis added).) This CRE industry participant confirmed that these technology upgrades were applied to all of their equipment classes. (*Id.* 61:01-61:20.)

- "[W]hen we did R290 conversions, . . . they were listed as new. . . . We had ENERGY STAR in for a tour a week ago. They saw we were using **ECM motors** in our products and basically the lowest, most efficient components we're able to find. And I understand we can kind of use whatever combinations, but I think **one of the challenges that**

[4] AHRI explicitly voiced this concern to DOE at the Nov. 7, 2023, in-person meeting. (Transcript at 20:01-20:13 ("AHRI collaborated with [NAFEM and NAMA] to survey our members about commercial refrigerant equipment technologies to share up-to-date information from the previous 2014 data relevant in response to the Department's preliminary Technical Support Document last year. **The survey data results were provided to DOE, and AHRI and its members are concerned that the survey data results were not considered or addressed in the NOPR at issue today.**" (emphasis added)).)

> **manufacturers are facing is, yeah, we don't have to do this or that, but we don't see anything else out there** . . . ." (*Id.* 61:22-62:13 (emphasis added).)

Since the Nov. 7, 2023, in-person meeting, CRE industry participants have continued to voice the same concern to NAFEM:[5]

- "[W]e **already employ almost all of the technologies [DOE has] identified** on our VCS equipment. Additionally, we know through competitive benchmark testing that a vast majority of our competitors also employ most of these technologies. **Hydrocarbon refrigerants, variable speed compressors, ECM and brushless DC fan motors, LED lighting, fan controls, improved heat exchanger tubing and fin design** are all technologies widely used in VCS equipment." (Emphasis added.)

- "The main fallacy in the NOPR is that the **DOE does not seem to understand how widespread the 'technologies' they have evaluated are already being used**. . . . [O]ur company routinely brings in competitor products for evaluation and benchmarking. When reviewing Table IV.4 of the NOPR which identifies the remaining technologies that the DOE considered, (not screened out), **most are already employed in CRE or are not applicable to the product class**. **Improvements to transparent doors with inert gas, low E coatings and additional panes, and improved frame design** are currently employed by us and most of our competitors. Most self-contained CRE today, in the commercial bar space, already uses **alternate refrigerants**, (almost exclusively R290), and variable speed compressors are common as well. The DOE NOPR estimates a 20% improvement going to R290. Since we already made the change to R290 from R134a more than 5 years ago, we only saw an energy efficiency improvement closer to 10%. Improvements to **heat exchangers, tube and fin enhancements** are widely already used. **ECM fan motors** are now the norm. And I am already seeing more CRE using fan control systems. **Liquid/suction line heat exchangers have been common for more than 30 years**. As we look at the technologies that the DOE NOPR have identified, there are **very few options left for us to explore since we either already employ them or they are not applicable** to the product category. From our assessment of our competitors, they are in the same situation as we are. We have experimented with microchannel condensers, and they provide very little energy savings in smaller, fractional HP CRE and are also prone to clogging." (Emphasis added.)

- "**Many of the proposed technology options have already been incorporated into our products**. Some technologies, such as **ECM and DC fans**, have so far shown to be as reliable as the shaded-pole motors that they replaced. More sophisticated technologies, such as **electronic controls**, have so far reduced product reliability and increased warranty costs compared to older mechanical controls, due to their complexity and tendency for servicers to replace these more expensive components, rather than trouble shoot them." (Emphasis added.)

[5] NAFEM and its leadership routinely engage with its members, including in formal and informal survey efforts and discussions of concerns specific to this NOPR. These comments are typically furnished on a confidential basis back to NAFEM leadership. Therefore, these quotations are sourced directly from NAFEM members (*i.e.*, CRE manufacturers), with no edits made to substance.

2. The Other "Screened-In" Technologies Have Substantial Shortcomings and Thus Are Not Technologically Feasible

Setting aside those "screened-in" technologies that are already being used, as identified above, there are other technologies that passed through the DOE "Screening Analysis." But these technologies have substantial shortcomings, which is why they are not current in widespread use. Examples of different categories of such technologies are listed below.

a) Occupancy-Based Lighting

Many NAFEM members report that their customers do not want this feature, which has been available for more than ten years but has not garnered material interest from customers. For example, occupancy sensors that are not activated may cause consumers to perceive that the appliance is malfunctioning, causing concern for food spoilage.

b) Microchannel Condensers

Many NAFEM members have reported significant concerns with microchannel condensers, including their potential safety risks:

- "Proposed technolog[ies], such as microchannel condenser coils, have so far proven to be **impractical or do not achieve the savings that are suggested** in the rulemaking." (Transcript 32:19-32:22 (emphasis added).)

- "[M]icrochannel condensers have been discussed for more than 10 years, certainly before even the last rulemaking in 2014, and I think it's probably even come up before that. . . . There are some companies that have experimented with microchannel. In our cases with particularly the VCT, SCM category, companies have tried these, they have experimented with them, they put units out in the field understanding that many of these units, many of these models that we produce, or our members produce are used in rather harsh environments to say the least. It's not a clean, nice grocery store but rather a small convenience store and that type of situation. **What we find is that they do clog. We see clogging that does occur regularly with these units.** The other situation is that they must be cleaned. I know DOE has allowed now an extremely small time period for cleaning the condenser coils, but it doesn't approximate what happens in the field where a company or a small owner of a grocery store has to pull a unit completely out of a bank of units and try and do cleaning on that situation. It's not so easy. Also, **we understand that DOE in the rulemaking for household refrigeration screened out microchannels in the last rulemaking as being not worth the energy efficiency and not worth the cost situation**, and yet those are categories in household refrigeration that have eight to 10 million units produced per year, well in advance of 1 million per company. If they can't make it efficient when you're shipping a million units a year at a minimum and, in some cases, some of those companies 2 and 3 million units a year, **I don't understand how we can be called upon to try and make it cost-efficient as well as energy-efficient in our categories of products**." (Transcript 86:07-87:24 (emphasis added).)

Since the Nov. 7, 2023, in-person meeting, CRE industry participants have continued to voice

the same concern to NAFEM:

- "As designs become more complex, reliability will almost always decrease. Additional electronics and sensors are also additional failure points. **Microchannel condensers are notorious for clogging, on smaller systems.**" (Emphasis added.)

- "Microchannel condensers **will require more maintenance** to make sure they are **not clogged** and hinder cooling." (Emphasis added.)

Finally, some NAFEM members report that microchannel condensers show a greater propensity for pin-hole leaks. As the CRE industry evaluates flammable refrigerants because of their lower global warming potential, the risks of pin-hole leaks are unacceptable to knowingly distribute into the marketplace.

c) Night Curtains

NAFEM members report that night curtains are often viewed as an unwanted "accessory" by their customers that, even if purchased, are not consistently used.

Furthermore, one NAFEM member reports that, even if used for a portion of any 24-hour period, the efficiency gains from night curtains are modest, at best:

> We do not require night curtains to meet the energy requirements. ASHRAE published a study completed by Southern California Edison concerning the effects of "night curtains" relating to CRE performance and power usage. Their findings showed a load reduction close to 50% if the curtains are drawn for 24-hours. Internal testing performed to **DOE guidelines of night curtains being drawn for 6 hours**, **resulted in only 12% reduction of energy usage over a 24-hour period**. Cost ranges from ~$50 for manual curtains to ~$500 for automatic curtains. (Emphasis added.)

NAFEM members report substantial customer resistance to using night curtains, including the fact that if they are used on a 24-hour or even regular basis, they make it difficult for the stores' customers to access items behind the curtains, especially for shoppers who are not using a basket or cart and are "juggling" multiple items. Even if CRE manufacturers provide night curtains with their products at no extra cost, NAFEM members report anecdotes of store staff cutting down or pulling off night curtains. And if they are used, they wear out within 1-2 years, requiring additional and continual investment over the life of the CRE product to ensure their continued benefit. In sum, it is difficult to imagine widespread use and acceptance of this technology, let alone instances where it would routinely be used 24 hours a day.

3. Deploying All "Screened-In" Technologies Cannot Deliver Sufficient Efficiency Gains to Meet the NOPR's Proposed Standards

Because so many of the NOPR's "screened-in" technologies are already in place, and many of the rest of the technologies have substantial shortcomings, as discussed above, NAFEM members, and the CRE industry, report that they, in essence, have no other available and feasible technologies to meet the NOPR's proposed standards.

As recounted in the Nov. 7, 2023, in-person meeting:

- "AHRI members also state that there is **no feasible combination of design options** that was identified by manufacturers that would make the higher efficiency Levels 4 through 6 feasible." (Transcript 19:22-19:25 (emphasis added).)

- "Any ability to meet additional energy efficiency reductions **beyond current equipment in the marketplace will require extensive engineering analysis and design** to determine achievability that cannot be done by December 11, 2023, or in the three years proposed as an effective date." (*Id.* 26:03-26:09 (emphasis added).)

- "To reach the proposed energy levels in the proposed rule, **CRE manufacturers and CRE component manufacturers would have substantial invention work ahead of them**. This effort will require much longer than the three years envisioned by the proposed rule." (*Id.* 26:20-26:24 (emphasis added).)

- "I understand we can kind of use whatever combinations [of technologies from the 2023 TSD], but I think **one of the challenges that manufacturers are facing is, yeah, we don't have to do this or that, but we don't see anything else out there** . . . ." (*Id.* 61:22-62:13 (emphasis added).)

In soliciting feedback from NAFEM members, this concern continues to be vocalized: "As we look at the technologies that the DOE NOPR have identified, there are **very few options left for us to explore since we either already employ them or they are not applicable** to the product category." (Emphasis added.)

4. The 2023 TSD Does Not Cite Its Teardown Data, Even Masked, And CRE Manufacturers Doubt Its Representativeness

DOE purports to base the NOPR, in part, on a "teardown analysis." (*See, e.g.*, NOPR at 70220 ("Additionally, based on information gathered from interviews, component data, and **teardowns**, DOE has reevaluated the cost associated with the switch to R–290 on self-contained units." (emphasis added)); *id.* at 70228 ("DOE has updated its baseline equipment costs to reflect current costs based on feedback received during manufacturer interviews, information collected during **CRE teardowns**, and market research." (emphasis added)); *id.* at 70234 ("The cost analysis portion of the engineering analysis is conducted using one or a combination of cost approaches," including where "DOE physically dismantles a commercially available equipment, component by component, to develop a detailed bill of materials for the equipment.").)

The NOPR goes on to state that "**[i]n support of this NOPR**, DOE tested 70 CRE models and reverse engineered 47 CRE models. These models consisted of all equipment families within the scope of this NOPR except pull-down temperature applications, and all temperature classes." (*Id.* at 70233 (emphasis added).)

However, NAFEM members, and the CRE industry, have substantial doubts that DOE tested recent models of CRE. **First**, many of the results appear to track the equipment that was designed before the prior round of energy conservation standards, which were issued in 2014

and went into effect in 2017. Furthermore, changes in new refrigerants have taken place, including from R134A and R404A to low global warming potential R290 in self-contained equipment, which has also caused the latest round of CRE to be materially different from those designed before the prior round of standards. **Second**, as identified above, many of the "screened-in" technologies identified in the 2023 TSD are already in use. **If in fact DOE did test recent models of CRE, it may not have made such a glaring error in its conclusion about the ability of the CRE industry to deploy many of the technologies and related energy efficiency gains.**

Concerned about the possibility of this fundamental error, at the Nov. 7, 2023, in-person meeting, industry representatives repeatedly questioned DOE about this oversight. DOE doubled down, stating repeatedly that it "tested" and/or "tore down" recent models of CRE, purportedly CRE that included R290:

- DOE stated that it "**tested 70 CRE models** and **reverse-engineered or tore down 47 CRE models**, which help support this analysis to show where design options were in the baseline or could be considered for future energy use reduction, as well as communicating with, you know, data received from public comments and manufacturer interviews." (Transcript 58:18-58:24 (emphasis added).)

- In response to a question concerning when the teardowns occurred and "how far back they go," because "manufacturers are very confused how some of the proposed technologies . . . are widely used in current products," DOE responded that "**these testing and teardowns were conducted during this rulemaking**. And in terms of the refrigerant, DOE tore down a range of CRE, including R290." (*Id.* 62:14-63:04 (emphasis added).)

- Another industry representative noted that "it appears that the teardowns all refer to the March 2014 rulemaking," and asked whether "there have been teardowns done recently, within the last [few] years to prepare for this [NOPR]." (*Id.* 64:25-65:08.) DOE replied that "DOE has torn down CRE models **during this rulemaking** in support of this NOPR." (*Id.* 65:09- 65:19 (emphasis added).) DOE did not respond to the representative's question on DOE sharing information about the CRE that was torn down. (*Id.*)

DOE's continued insistence that it tested recent models of CRE—**without providing any data or information about what was tested, even masked**—hamstrings the ability of NAFEM's members to discern whether the data flowing from such tests are representative, let alone comment in any meaningful way about the data. For the reasons described above, NAFEM's members have substantial doubts that it is representative.

NAFEM therefore joins AHRI's request dated Nov. 21, 2023, to release information concerning the physical teardowns that DOE purportedly undertook in connection with this NOPR. At the very least, DOE should be willing to share all data on a masked basis, and/or sharing individually with specific companies what model(s) of that company that DOE purportedly tore down that were subsequently employed in the analysis.

5. The NOPR's Proposed Standards Assume Use at 75.2 ºF, When CRE Must Be Designed for Much Higher Ambient Temperatures

DOE's test procedure for CRE currently adopts, through reference, certain provisions of AHRI 1200–2010, ASHRAE 72–2005, and AHAM HRF–1– 2008. 10 C.F.R. 431.63. In the September 2023 Test Procedure Final Rule, DOE amended the test procedures for chef bases or griddle stands to require a dry-bulb temperature of 86.0 °F and a wet-bulb temperature of 73.7 °F which differs from other CRE equipment which are tested at a dry-bulb temperature of 75.2 °F and wet-bulb temperature of 64.4 °F. 88 Fed. Reg. 66,152, 66,203 (Sept. 26, 2023).

NAFEM members, and the CRE industry, understand that even as a model, ASHRAE 72's parameters fall far short of what customers demand and what operating conditions require. As one representative testified at the Nov. 7, 2023, in-person meeting:

> **Remember that safe operating temperatures are between 33 and 40 degrees inside the cabinet.** DOE's current test standards for energy efficiency purposes envision CRE in given ambient temperature humidity and, most importantly, door opening conditions that fall short of actual field conditions. **The ASHRAE 72 test standard calls for six door openings per hour for eight hours over the span of 24 hours**. With each door opening lasting 10 seconds, the total door opening amounts to 0.6 percent of a commercial refrigerator's operating day. However, **based on ITW Traulsen's empirical application data taken from an example 24-hour quick service restaurant kitchen environment, a reach-in refrigerator opens [more than] 400 times per day and for [more than] 50 seconds per opening**. That translates to the refrigerator being opened nearly 25 percent of the time, and every time the system needs to quickly return to 33 to 40 degrees to maintain food safety. **For freezers, the situation is equally scary, nearly 500 openings per day for [more than] 20 seconds per opening, 12 percent of the time**. It goes without saying that every refrigerator or freezer opening is an opportunity for heat and moisture to enter, and quickly restoring safe operating temperatures inside the cabinet requires a sizable refrigeration system. Unfortunately, using existing and proven refrigeration technology, this workload requires more electricity than the proposed regulations would allow. (Transcript 28:12-29:15 (emphasis added).)[6]

Furthermore, most CRE is certified to NSF 7 for safe food storage, which requires passing a test at 100º F.[7] In addition, NSF 7 compliance is required by U.S. and Canadian food safety and sanitation inspectors, as well as local health inspectors. Food safety is a paramount concern, as NAFEM members and the CRE industry shared with DOE at the Nov. 7, 2023, in-person meeting. (*E.g.*, *id.* 68:06-68:15) ("[W]e've had products that we went to fan controls and such. And when we looked at them in the field and actually had some testing, **we actually came back**

[6] In response to the 2023 NAFEM Technical Survey, 75% of survey respondents agreed that the NOPR's proposed energy standards limit their ability to design compliant products intended for "heavy-duty applications," such as harsh ambient environments and/or high rates of door openings. (*See* 2023 NAFEM Technical Survey at Q8.)

[7] Certain other CRE may not require such certifications, such as floral coolers, chocolate coolers, produce coolers, and wine coolers, where products are not perishable.

and pulled that [technology] back out again because, again, food safety is the number one issue, and we have very high ambient conditions that we operate in." (emphasis added).)

NAFEM members have continued to share this concern with NAFEM:

- "**CRE must be designed to have enough capacity to meet the NSF and our customers' requirements.** This means large enough refrigeration systems, (compressors, heat exchangers, fans, etc), to operate in these environments. **If CRE manufacturers only had to design their equipment to operate at the ASHRAE 72 energy test environment, we would all design our equipment very differently, but this is not our reality.** Also, CRE manufacturers must design their equipment to have additional capacity to still operate when the state of the equipment is not as ideal as it is when brand new. Condenser coils are not always cleaned regularly and door gasket seals wear, polyurethane blown insulation can degrade by as much as 10% in the first year. All of these must be accounted for when designing CRE. **The DOE's proposed energy limits would likely force manufacturers to make the choice of a DOE compliant product with a smaller refrigeration system vs. a product designed with adequate capacity to maintain food safety in the many different environmental conditions and general product [preventative maintenance] conditions.** It will be commonplace that CRE will not be able to keep potentially hazardous food products at safe temperatures when conditions are more unfavorable. Most CRE users will not even be aware of these limitations on the new equipment, and the risk of providing people with potentially hazardous food product that is no longer safe for consumption will go up exponentially. **It also may mean that some manufacturers cannot achieve both compliance with DOE energy standards and compliance with NSF requirements for the storage of potentially hazardous food products.**" (Emphasis added.)

- "Significantly reducing energy usage at 75° ambient test conditions would be likely to negatively impact product performance in real-world commercial kitchens."

- "Compliance with the proposed energy regulations will cause CRE products to have minimal capabilities to maintain proper product temperature without exceeding energy requirements. For example, **meeting the proposed limits will decrease manufacturer's ability to incorporate broad ambient functionality in CRE designs which leads to poor performance in supermarkets that cannot maintain proper ambient control**. CRE products are typically tested and certified NSF and ASHRAE conditions (Type I = 75.2°F Dry Bulb and 64.4°F Wet Bulb or Type II = 80°F Dry Bulb and 68°F Wet Bulb) and can maintain product temperature in line with industry standards of 40°F for food safety. **Many customers specify unique product temperature requirements requiring manufacturers to adjust product design to accommodate the request.** In doing so, manufactures may have to implement larger compressors, controls, design features, etc., that increase energy usage to the exact limit set by the current DOE regulations." (Emphasis added.)[8]

[8] Similarly, in response to the 2023 NAFEM Technical Survey, 75% of survey respondents recommended that DOE consider energy standards that account for "heavy-duty applications," such as harsh ambient environments and/or high rates of door openings. (*See* 2023 NAFEM Technical Survey at Q9.)

6. Severe Capacity Limitations at Third-Party Testing Laboratories Hamstring CRE Manufacturers' Ability to Research and Develop New and/or Combinations of Technologies

Because so many of the NOPR's "screened-in" technologies are already in place, and many of the rest of the technologies have substantial shortcomings, as discussed above, NAFEM members, and the CRE industry, report that they, in essence, have no other available and feasible technologies to meet the NOPR's proposed standards. To attempt to comply with the NOPR's proposed standards, NAFEM members, and the CRE industry, must subject the portfolio of existing technologies, and combinations thereof, to testing. Unfortunately, capacity limitations at third-party testing laboratories are a bottleneck to testing and then deploying these potential new options or combinations of options.[9]

NAFEM members have substantial concerns about the ability to conduct meaningful testing on the timelines required by this NOPR:

- "While some products will be able to be redesigned to achieve a lower energy limit in the 3-year timeline, other products (primarily self-contained products) have unknown design challenges and the extent that variable speed evaporator and/or condenser fan motors and variable speed compressors and all the extra electronic controls required for these variable speed components may be able to achieve the extremely low energy threshold. Extensive testing would be required to accommodate the proposed limits which significantly increase energy efficiency. New technologies will have to be adapted to current offerings and proven through internal performance testing. **These changes would also require additional testing with 3rd party agencies where capacity is strained due to new and changing safety and environmental regulations.**" (Emphasis added.)

- "We will comply with all EPA AIM act requirements. The US EPA's regulations around refrigerants (the AIM Act) are a massive effort for all OEMs and will have an impact on energy performance of all CRE. In addition, there are many other changes underway such as a new UL Safety Standard 60335-2-89 that will have a multi-year impact on CRE manufacturers. These changes include regulations and standards driven by federal, state, local, and industrial safety authorities. Regulatory burden has drastically influenced the availability of options affecting energy efficiency and is narrowing manufacturers' ability to explore new technologies. All CRE must meet NSF sanitation, Electrical and Mechanical UL and ASHRAE safety requirement standards. **Each time a product changes, OEMs must retest to these regulations. There is substantial industry concern over the availability of [Nationally Recognized Testing Laboratories] to meet the evolving regulatory landscape.** A significant portion of engineering, supply chain, manufacturing, and marketing resources are being consumed just to meet these regulations. **Constraints consist of conforming to** multiple regulations, new technologies driven by regulations that may have supply chain

[9] Exacerbating this issue are supply-chain challenges. For example, if a CRE manufacturer researches and develops a solution that may be selected to work towards the energy efficiency standards in this NOPR, but later must source an alternative part, that manufacturer must test that alternative part to ensure that other applicable requirements are met.

limitations, current supply chain hardships (ex. foam, electronics including controllers and components, etc.), and **limited third party testing facilities**." (Emphasis added.)

- "[We] will be focused on the refrigerant and energy changes for commercial ice makers also. The tight timelines for both ACIM and DOE could make it tight with staffing to focus all energies on tight timelines. Limited staffing and test rooms [in addition to] backlogs at 3rd party test labs could cause issues with release timing."

7. Because the Applicable Test Procedure Rule Is So New, the 2023 TSD Is Nothing More Than an "Estimate of Estimates" for Chef Bases and Griddle Stands

On September 26, 2023, DOE published a Federal Register notice amending and establishing test procedures for CRE. 88 Fed. Reg. 66,152. In the September 2023 Test Procedure Final Rule, DOE amended the test procedures for chef bases or griddle stands to require a dry-bulb temperature of 86.0 °F and a wet-bulb temperature of 73.7 °F which differs from other CRE equipment which are tested at a dry-bulb temperature of 75.2 °F and wet-bulb temperature of 64.4 °F. 88 Fed. Reg. 66,152, 66,203 (Sept. 26, 2023).

DOE determined that the amendments adopted in the September 2023 Test Procedure Final Rule will not alter the measured efficiency of CRE currently subject to energy conservation standards. 88 Fed. Reg. 66152, 66,156.

Problematically, however, DOE has **no** empirical data in support of that conclusion. As recounted in the Nov. 7, 2023, in-person meeting:

- "DOE tested at the 75-degree ambient and . . . calibrated the engineering analysis to that condition and **cross walked that condition to the 86 degree condition**." (Transcript at 45:20-45:25 (emphasis added).)

- In response to a question as to whether DOE had "any test data at 86 degrees, which is what needs to be tested," DOE stated that "**DOE has not received any data for at that condition**." (*Id.* 46:01-46:10 (emphasis added).)

- When asked if there was is there an actual test report or test report showing how the unit was tested in the, for example, conditions, the actual probe temperatures, section line temperature, [or] liquid line temperature," DOE demurred, stating again that "**we crosswalked the standard level** in accordance with the calculations that [were] explained in order to arrive at the proposal." (*Id.* 47:24-49:10 (emphasis added).)

It is not clear how the CRE industry is to determine whether "cross-walking" is an appropriate substitute for empirical test data. Importantly, as one industry representative stated at the Nov. 7, 2023, meeting, given the newness of the standard, it is not clear whether "anybody has data to really support . . . the time period that DOE is looking to make the analysis." (*Id.* 47:01-47:04 (emphasis added).)

The concern that merely manipulating data in an Excel spreadsheet, instead of subjecting current products to actual testing, is not academic. As one NAFEM member shared: "[t]he

NOPR underestimated the cost for microchannel condensers, glass door replacements, variable speed condensers and brushless fan motors. The NOPR also over inflated the energy gains from these particular choices. **Testing should be done on current products to determine actual energy gains and actual costs for new products**."[10] (Emphasis added.)

B. The NOPR's Proposed Standards Are Not Economically Justified Because They Fail DOE's Statutory Factors Under EPCA

DOE is to determine whether a standard is "economically justified" using a benefit-cost standard, based on "whether the benefits of the standard exceed its burdens," taking into consideration the following:

i. "**the economic impact of the standard on the manufacturers** and **on the consumers of the products** subject to such standard";

ii. "the savings in operating costs throughout the estimated average life of the covered product in the type (or class) compared to any increase in the price of, or in the initial charges for, or maintenance expenses of, the covered products which are likely to result from the imposition of the standard";

iii. "**the total projected amount of energy**, or as applicable, water, savings likely to result directly from the imposition of the standard";

iv. "**any lessening of the utility or the performance of the covered 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 and water conservation"; and

vii. "**other factors** the Secretary considers relevant."

42 U.S.C. § 6295(o)(2)(B)(i) (emphasis added). The NOPR fails many of these requirements due largely to the erroneous technical assumptions outlined above.

1. The NOPR Has Substantially Underestimated Compliance Costs

NAFEM members have substantial concerns that the costs that DOE purportedly identified to comply with the NOPR fundamentally ignore the context of other significant changes impacting the CRE industry at this time. There are two primary reasons for this concern. **First**, DOE is not accounting for the significant capital and other investments that were made, and continue to be made, in the shift to new refrigerants under the AIM Act. **Second**, DOE is not accounting for the substantial and unprecedented inflation and cost-of-capital issues that are plaguing all private enterprise at this time, including the CRE industry.

[10] Some CRE manufacturers make specialized or custom equipment, further compounding DOE's erroneous assumption that any one "screened-in" technology can be standardized for all applications.

a) DOE Is Ignoring the CRE Industry's Substantial Investments to Shift to New Refrigerants Under the AIM Act

The U.S. Environmental Protection Agency (EPA) proposed refrigerant restrictions pursuant to the AIM Act affecting CRE on December 15, 2022. 87 Fed. Reg. 76,738. The proposal would prohibit manufacture or import of such CRE starting January 1, 2025, and would ban sale, distribution, purchase, receipt, or export of such CRE starting January 1, 2026. *Id.* at 76,809.

While the DOE "understands that it would be beneficial to CRE equipment manufacturers to align the compliance date of any DOE amended or established standards as closely as possible with the refrigerant prohibition dates proposed by" EPA, 88 Fed. Reg at 70,198, such a recognition is necessary, but it is not sufficient. NAFEM members, and the CRE industry, have expended significant, once-in-a-lifetime amounts of capital in order to overhaul their products to comply with the AIM Act. DOE's proposed alignment of timelines does nothing to account for the fact that the CRE industry is already trying to recover the costs of these substantial investments from AIM Act compliance.

As recounted in the Nov. 7, 2023, in-person meeting:

- "Contrary to the information in the NOPR, **the changeover to natural refrigerants is underway but is not complete in our industry**, mostly because the capital improvements that are necessary are **extremely expensive, far more than is written in the TSD**." (Transcript 16:20-17:02 (emphasis added).)

- "**CRE engineering resources must remain occupied in completing the Congressionally mandated EPA conversion to non-global warming potential refrigerants, for example, R290.** Many CRE equipment categories must be able to use the new final rule refrigerants by January 1, 2025, which requires re-engineering production lines. **Industry needs to complete this technology transition and then analyze any efficiency gain realized before a new engineering analysis on additional incremental energy savings can be contemplated.** In addition, the industry has been working to comply with the EPA phase-out of high GWP insulation boring agents and to offer products that meet the new ENERGY STAR 5.0 specifications. **Each change to minimum energy efficiency standards or an ENERGY STAR specification draws a substantial pull from industry engineering resources because of their serial and constant nature.** When each wave of change ends, the next begins. The cost comes in the form of reduced capacity for equipment innovation that would improve product performance and bring value to end users and eventually consumers." (*Id.* 27:06-28:03 (emphasis added).)

- "Commercial refrigeration equipment products must comply with numerous regulations for safety and sanitation, as well as DOE energy efficiency. The refrigerants and foam insulation that are critical components of these products must comply with EPA Global Warming Potential, or GWP, limits for the phase-down of hydrofluorocarbons, known as HFCs. **Our company has made significant investments in research, development, production changes, and training over the past six years to transition to extremely low GWP foam insulation and convert over 99 percent of our self-contained products to R290 refrigerant with the lowest GWP available for these types of**

> **products. Multimillion-dollar capital expenditures were made for production equipment**, including new temperature-controlled foam fixtures, to address issues with low GWP foam flow in our cabinets and new charging stations that are required to manage flammable refrigerants." (*Id.* 30:12-31:12 (emphasis added).)

- "[O]ur manufacturers are very interested in converting to R290. It is important, though, that the Department understand that **if a piece of equipment is used in a public space, it must meet ASHRAE 15, which limits the actual charge amount to 114 grams, not 150 grams**. That's what's in the TSD and in the actual NOPR. That's not correct. We're limited in size of equipment by that conversion. We can't convert if we can't sell the product. **The situation occurs also with a number of components. [Several of] the components that must be flame-resistant or spark-proof**, as some people call them, must be available in a number of the different kind of applications, particularly in fan motors and both the condenser and the evaporator fan motors, as well as other remote sensing type of equipment. Our manufacturers currently, especially the small manufacturers, they qualify under SME. They're not available and **their parts are not available for being spark-proof and being available at R290, and in the discussions that they've had with the manufacturers, they say the volumes are too low**. We don't ever intend to put those products in. **So DOE is making an assumption that everything in the world will convert to R290, especially in the self-contained units. It's just not the case, and we think that DOE needs to step back and look at this situation. I think it's one of the reasons why we're asking the Department to slow down this process until we have a better understanding of how we're all going to meet the EPA requirements**, because the EPA requirements don't say that you have to use R290." (*Id.* 73:01-74:17 (emphasis added).)

NAFEM members have shared substantial concerns about the ability to conduct meaningful testing on the timelines required by this NOPR because of the litany of different changes impacting the CRE industry:

> We will comply with all EPA AIM act requirements. **The US EPA's regulations around refrigerants (the AIM [A]ct) are a massive effort for all OEMs and will have an impact on energy performance of all CRE.** In addition, there are many other changes underway such as a new UL Safety Standard 60335-2-89 that will have a multi-year impact on CRE manufacturers. These changes include regulations and standards driven by federal, state, local, and industrial safety authorities. **Regulatory burden has drastically influenced the availability of options affecting energy efficiency and is narrowing manufacture's ability to explore new technologies.** All CRE must meet NSF sanitation, Electrical and Mechanical UL and ASHRAE safety requirement standards. Each time a product changes, OEMs must retest to these regulations. (Emphasis added.)

b) Cost of Capital and Inflation Issues

Compounding the problems of limited capital is the fact that the current macroeconomic environment, including interest rates and inflation, strains the ability for any private enterprise, including the CRE industry, to borrow. As recounted in the Nov. 7, 2023, in-person meeting: "The situation with interest rates right now is making **short-term or long-term borrowing for capital improvements impossible**." (Transcript 17:02-17:05 (emphasis added).)

In the 2023 TSD, DOE outlines the "payback period" (PBP) as "the amount of time it takes a consumer to recover the higher purchase price of a more energy efficient equipment through lower operating costs. DOE calculates a simple payback period which does not discount operating costs." (TSD at 8-1.) The Tables located at Section 8.5 of the TSD outline these different PBPs. As documented across the various equipment classes analyzed, as well as the different trial standard levels, these PBPs can fluctuate from under a year to more than **5 years** (*see, e.g.*, *id.* at Table 8.5.5), more than **10 years** (*see, e.g.*, *id.* at Table 8.5.7), more than **75 years** (*see, e.g.*, *id.* at Table 8.5.13), to a whopping **93.9 years** (*id.* at Table 8.5.41). With the average lifetime of these products estimated to be, at most, about 14 years (*see id.* at Tables 8.5.1-8.5.56), these PBPs mean that consumers will not come close to "enjoying" any of the purported economic benefits from owning the more-expensive CRE that DOE is mandating.

This concern was shared at the Nov. 7, 2023, in-person meeting, including the fact that no business enterprise can legitimately plan more than a few years out. Because of this short horizon, no PBP more than one or two years would ever be seriously considered by the procurement and/or investment decisions of business leaders. As demonstrated below, the effect of these egregious PBP timelines is that it means that customers in the market for CRE products will likely seek out older, less-efficient, refurbished products:

- When asked whether DOE had an opinion on "the correct . . . maximum payback [period] that the market will accept," DOE denied rendering an opinion on that. (Transcript 111:18-112:04.) One industry representative stated that even PBPs like 7.6 years or 5.7 years are "not acceptable in business," with 7.6-year PBP being "a very large number that's not an accepted one in corporate structure[s]." (*Id.* 112:05-112:24.)

- Another industry representative confirmed that "[i]n my experience, when you deal with customers, **if it's north of . . . three years' payback, forget it**. They're not interested. No matter how much they're going to save, they're just not interested. **And especially nowadays with the cost of capital, . . . that makes it even worse now**. . . . [T]hree-year is maybe even too much." (*Id.* 112:25-113:08 (emphasis added).)

- Many industry participants commented on how, in their experience, the marketplace has no appetite for or interest in PBPs that may take years, if not decades, to recoup:

    - "[T]he situation that we have seen over the last three and particularly over five years is that **as the price[s] . . . keep [going] upward . . ., what we're seeing is the tremendous increase in refurbishment of products**. . . . They only are cleaning the machine up. . . . **What is a company, a large company with hundreds of sites, what are they going to do[—] buy new equipment that meets the new energy standard, or are they going to refurbish an old piece**

> **of equipment and maybe get another four, five, six years out of it as opposed to brand new. . . . They're going to automatically default to refurbish**. . . . Those units are now going to use more energy than what the new units are[.] . . . We came out of the recession essentially of COVID, and companies now look at this situation and say, buy new? No way. **So at what point does this [analysis recognize that purchasing new products is] not reality?**" (*See, e.g.*, *id.* 114:02-115:15 (emphasis added).)

- "**It's not just the small mom-and-pops** that look at this. **You're starting to see some larger chains are looking at the refurb option**, if they could have a refurb case versus . . . a brand-new case. So, for our retailers, [refurbishment is] a very effective option." (*Id.* 116:03-116:18 (emphasis added).)

- "**The foodservice directors [who are evaluating these purchases] in many cases don't ever see the utility bill.** They don't care. What they're focused on is production and throughput, does the product perform as it's billed, and that's what they're concerned about. **All of this [PBP] information is great to justify a rule, but in the marketplace, it means absolutely nothing to some of these foodservice directors** because they expect it to perform. And if it doesn't perform as they expect it to perform, it reflects poorly on the brands around this table[.]" (*Id.* 116:21-117:22 (emphasis added).)

- "**[T]he people that are buying are not the ones that are paying the bills down the line**. . . . 7.6 years, and, obviously, as you're going out on the calendar, . . . it gets fuzzier and fuzzier and fuzzier[.]" (*Id.* 118:09-119:15 (emphasis added).)

2. Meeting the NOPR's Proposed Standards Will Substantially Increase Manufacturing Costs

Because so many of the NOPR's "screened-in" technologies are already in place, and many of the rest of the technologies have substantial shortcomings, as discussed above, NAFEM members, and the CRE industry, report that they, in essence, have no other available and feasible technologies to meet the NOPR's proposed standards. Compounding the lack of options is the fact that the industry has already spent considerable sums to retool their production lines in response to the obligations imposed by the AIM Act.

Therefore, manufacturing costs can and will go substantially up. As explained at the Nov. 7, 2023, in-person meeting:

> Proposed technologies such as variable speed compressors have shown some promises in certain applications to reduce energy consumption but **have not proven to be economically a viable option for many of our products** over the next few years in the time for the timeline in this rulemaking. **Due to added costs and complexity, we would have to increase our prices to adopt this type of technology.** This would impede our ability to compete against other products, particularly those from foreign manufacturers, who benefit from foreign government subsidies. (Transcript 32:23-33:08 (emphasis added).)

NAFEM members continue to share their concerns about the substantial manufacturing costs and investments necessary to incur to comply with this NOPR:

- "**Costs will increase on our products.** As stated previously, probably the most effective measure we can take to reduce energy is to increase insulation thickness,[11] (even though the DOE screened this out of their TSD). **This will require significant capital investment in new foaming fixtures. Each foam fixture can cost anywhere from $250,000-$750,000 based on size and complexity. This would be a multi-million-dollar investment in new foam fixtures for us.** Second, we will likely need to explore much more complex and sophisticated control systems. **These controls along with the associated wiring, sensors, and additional complexity in assembly will also add significant cost to our products.** Finally, we will need a team of engineers to explore any other viable technologies or design enhancements that could result in energy savings[.]" (Emphasis added.) None of this comes at little cost.

- "As a small business manufacturer, **a significant amount of our resources and time continues to be required** to review, evaluate, extensively research and comment on excessive rulemaking like the DOE NOPR. **Significant engineering research and development would be required** to identify, design, and implement potential changes required, diverting resources from other opportunities to develop new products to meet customer needs." (Emphasis added.)

3. Costs Will Be Passed on To Buyers, Many of Which Will Be Borne By Small Businesses

An increase in compliance costs for CRE manufacturers, and an increase in manufacturing costs, necessarily translate into an increased cost for CRE products and solutions. Many customers who are acquiring CRE products are the "classic" examples of small businesses: restaurants, bars, retailers, hotels, grocers, and schools, for example.

Because of the substantial length of the PBPs identified above, CRE buyers are in no position to recoup the costs of the drastic increases in CRE occasioned by this NOPR through energy savings alone. This is simple economics: as the cost of their inputs and doing business increase, such as through the NOPR, the price of their outputs must also increase for such an enterprise to render enough of a profit to stay in business.

NAFEM members, and the CRE industry, shared this concern at the Nov. 7, 2023, in-person meeting:

- "I just want to bring up a point that is not on [DOE's presentation] here and no one's discussed. **It's not been in the NOPR[:] the unintended consequences of this NOPR driving up food prices**, and yes, we can economically justify the energy savings versus

[11] Increasing insulation thickness is not a tenable option in all instances. For example, increasing insulation thickness would not improve any open cases. And with remote CRE, you either cut into the pack out space for food product or you increase the length of the lineup, which makes it difficult for an existing retailer to replace worn equipment.

whatever the option is that we're going to increase the costs and pay back that with the energy standard. We need to keep in mind that all these changes **will drive up the first cost of the equipment** to the end user. **And these end users are already paying well over a million dollars in equipment** for installation of a new supermarket as an example. So, **if we increase that cost to them, they're going to thus increase the cost of the foods that they're selling from these products, and all of us as consumers are going to pay for this increased cost in the food that we purchase**. We already have enough problems in the United States with excessive food prices and food deserts and people without access to reasonably priced foods." (Transcript 104:14-105:10 (emphasis added).)

- "**It depends on the customer. You can't broad brush it[.]** [A] few years ago there was . . . a sub way chain that was growing at a fast clip, and they were on a pace where they were opening, I think 200 restaurants a year, and their purpose was to buy the lowest common denominator piece of equipment just to get the doors open. **They didn't care about energy efficiency[.] They just wanted to get the doors open to start generating revenue.** . . . And this is the reality of the marketplace that we're dealing with. It is a very volatile market and it's not steady. And so, some of the information that we're sharing and talking about today, again, it's great numbers-wise, but **in terms of what happens out on the street and what happens in reality, it doesn't work this way.**" (*Id.* 128:17-129:13 (emphasis added).)

NAFEM members have continued to relay concerns about the increased cost of food because of standards like the NOPR: "**Consumers will experience an increase in food prices** due to the required increase in energy efficiency. **The cost of additional components and/or product design enhancements** (3 pane glass doors vs. 2 pane) **will be passed on to the consumer.**" (Emphasis added.)

4. Many Identified Technologies Have No Track Record of Reliability, Which Will Increase Operating, Maintenance, and Repair Costs

The increased number of components that are placed into a given CRE product, combined with the increased complexity of such components (without any fulsome track record of reliability), increases the possibility that any one component may fail. The increased likelihood of failures increases the need for service calls, increases downtime to the CRE consumer, and increases the number of component parts that may need servicing and/or replacing over the lifetime of any one CRE product.

As one industry representative stated at the Nov. 7, 2023, in-person meeting: **"[T]he biggest issue [contributing to new technologies failing when placed in the field was] on door openings.** You get a lot of air transfer. **We got . . . freeze-ups on coils and [that requires] a service call, which is obviously very costly to us**, and people are losing the product temperature. So that's one of the significant issues with trying to, I'll say, play with fan speeds and such. [T]he condenser side of it . . . can highly affect the performance if you're trying to reduce the fan speed on the condenser." (Transcript 69:05-69:15 (emphasis added).)

After the Nov. 7, 2023, in-person meeting, and in response to surveys on CRE manufacturers' concerns about the NOPR, NAFEM members shared substantial concerns about the long-term

cost impacts to themselves and their customers by rushing out new technologies (to meet the NOPR's timelines) without a full understanding of their long-term reliability:

- "Many of the proposed technology options have already been incorporated into our products. Some technologies, such as ECM and DC fans, have so far shown to be as reliable as the shaded-pole motors that they replaced. **More sophisticated technologies, such as electronic controls, have so far reduced product reliability and increased warranty costs compared to older mechanical controls, due to their complexity and tendency for servicers to replace these more expensive components, rather than trouble shoot them.** We have also found more **propensity for end users to 'play with' settings** in electronic controls, which results in '**nuisance service calls**' that are typically covered under warranty as good faith gestures." (Emphasis added.)

- "**As designs become more complex, reliability will almost always decrease.** Additional electronics and sensors are also additional failure points. Microchannel condensers are notorious for clogging on smaller systems." (Emphasis added.)

- "Similar to reliability, as designs become more complex with additional technologies, **there is additional PM that will be required and there will be more replacement parts that will need to be stocked**." (Emphasis added.)

- "Related to reliability, **as products become more complex there are more opportunities for failures in products**. This will result in additional warranty expenses. What exacerbates this problem is the quality of knowledgeable technicians repairing these products has been decreasing for several years. **The more complex the product the more complex the troubleshooting and repair of the product.**" (Emphasis added.)

- "**More complex technologies will mean more downtime. There will be more potential failure modes.** As manufacturers try to find opportunities to squeeze any energy out they can, they will almost certainly be adding a more complex control system with multiple sensors. Each of these represents an additional component that can fail and lead to equipment downtime." (Emphasis added.)

- "**Electronic controls, have so far tended to reduce product reliability compared to older mechanical controls**, due to their complexity and inclination for servicers tending to replace these more expensive components, rather than trouble shoot them." (Emphasis added.)

- "**The high technology components previously mentioned are more expensive and time consuming to troubleshoot, increasing after-warranty costs.** Additionally, equipment manufacturers utilize much more diverse and customized components for their products, including fans and controls previously mentioned, to minimize energy consumption. Servicers rarely carry the correct OEM custom components on their trucks, so they must order replacement parts from the factory, **increasing equipment down time for the customer, as well as added costs for a second service call** to replace the component and for shipping individual components from the manufacturer."

(Emphasis added.)

- "**CRE reliability directly relates to component reliability. When the market is forced to rush new higher efficient components, it is highly likely reliability will decrease until further testing and R&D can be completed.** In addition, the increase in energy efficiency will require new components such as variable speed motors and compressors. Additional components increase the initial purchase price, service and maintenance costs and reduce product reliability." (Emphasis added.)

- "**Maintenance and repair costs are affected by the various technologies utilized to make units more efficient.** For example, EEV controllers, lighting controllers and anti-sweat energy controllers will be required to attain high efficiency ratings. **These additional components will require maintenance and service during the life of the product.** Leak detection will also be required for some alternates such as A2L's or HC's that will impact maintenance and repair costs." (Emphasis added.)

- "It is already a well-known and accepted industry concern that a technician shortage exists in the United States. **These changes and technologies will exacerbate this issue and concern as fewer technicians will have the capability to properly diagnose and repair more advanced technologies and components.**" (Emphasis added.)

These reliability concerns translate into another cost concern for the CRE industry when considering the intersection of reduced reliability and competitive pressures to increase warranty timelines. For example:

- "Over the past several years, **competitive forces have increased manufacturer's warranty terms on commercial food service refrigeration equipment from 1 year, to 3 years, to 5- or 6-years coverage on parts and labor**. The high technology components previously mentioned are more expensive and time consuming to troubleshoot, increasing warranty costs. Additionally, equipment manufacturers utilize much more diverse and customized components for their products, including fans and controls previously mentioned, to minimize energy consumption. **Servicers rarely carry the correct OEM custom components on their trucks, increasing warranty costs for a second service call** to replace the component and for shipping individual components from the manufacturer. . . . The high technology components previously mentioned are more expensive and time consuming to troubleshoot, **increasing after-warranty costs and equipment down time for the consumer**." (Emphasis added.)

- "**Currently warranties were raised across the industry to 7 years.** If variable speed condensers and microchannel condensers are mandated to meet the standards, **warranties will probably be lowered for these products to reflect the actual life of these parts. This will be a detriment to the consumer.**" (Emphasis added.)

5. Meeting the NOPR's Proposed Standards May Force Reductions in the Capacity of Certain CRE Equipment, Which Reduces Its Utility and May Lead to Increased Energy Consumption

As identified above, earlier, less-efficient products may become more attractive (whether from cost savings over newer models, perceived better reliability, and/or more storage capacity for an existing space), all of which contribute to increased energy consumption. Many NAFEM members shared their concern that substantially bulking up insulation may be the only way to meet many of the standards outlined in the NOPR, which eats into the capacity of CRE products. Many NAFEM members shared the concern that customers may "tinker" with products to circumvent efficiency measures to achieve a better "performing" product. The end result, perversely, is the chance that DOE's purported energy-efficiency gains will never materialize in practice, and its standards may even cause an increase in energy consumption:

- "[B]ecause the energy limits proposed by the DOE are so unjustifiably stringent, **the net result is likely not less energy consumed by these products at the new proposed energy limits as a whole.** There are at least two reasons for this. **Increasing the wall insulation thickness is likely going to be needed to even approach the limits the DOE is proposing.** With less internal volume due to the increased insulation thickness (increasing the outer dimensions of our equipment is generally not an option), it will result in **customers just buying additional equipment to store the same amount of product.** The net result of this additional equipment needed (even more energy efficient equipment), is overall the same or perhaps even additional energy consumed. There is also an environmental aspect of this as well. **Every additional piece of equipment needed due to energy regulations is just an additional tangible product that has the environmental impact of all the parts and energy needed to produce it, packaging, and end of life disposal.** Secondly, the energy limits the DOE has proposed for VCS and HCS are so stringent that it will likely result in many of these products that many customers desire and enjoy today disappearing from the market due to manufacturers not able to meet the proposed energy limits. **The result of this will be customers will have no choice but to buy an inherently less energy efficient VCT and HCT product. The DOE is unwittingly steering customers to less efficient products.**" (Emphasis added.)

- "The DOE limits will reduce the utility of the units. Due to the unjustifiable stringent energy limits proposed, customers will be getting equipment that does not 'work like the old equipment.' **CRE products with less refrigeration capacity will not work well** in elevated ambient conditions, high volume applications with many door openings, and pulldown capacity. **What will consumers do? They will do what they need to do to get the equipment that meets their needs as well as their customers' needs. That can mean choosing to hang on to old equipment and choosing to repair vs buying new equipment.** It may mean **getting refurbished equipment** vs buying new equipment. It may mean **buying rogue CRE equipment** that does not meet the energy requirements." (Emphasis added.)

- "The cost to meet these standards will be increased at a higher rate than usual for energy efficiency changes. **This could lead to a tipping point for end users to decide not to take new products but to buy refurbished products or continue to repair existing products** if the prices go to high." (Emphasis added.)

- "**[C]ontractors may remove, or bypass controls and components mentioned above** that reduce energy with the new result being increased energy." (Emphasis added.)

6. Meeting the NOPR's Proposed Standards May Increase Food Safety Risks from the Inability of CRE to Maintain Safe Temperatures in Real-World Environments

Under EPCA, DOE is authorized to consider "other factors the Secretary considers relevant." 42 U.S.C. § 6295(o)(2)(B)(i)(VII); *see also Zero Zone, Inc. v. United States DOE*, 832 F.3d 654, 677 n.24 (7th Cir. 2016) ("DOE would have the authority to consider [other non-enumerated factors] under 42 U.S.C. § 6295(o)(2)(B)(i)(VII), which allows DOE to consider 'other factors the Secretary considers relevant.'").

NAFEM members, and the CRE industry, are driven by a commitment and obligation to ensure that their products are used to store food safely, commensurate with industry standards and their customers' expectations. It is thus appropriate—and specific to the foodservice industry, imperative—for DOE to consider the food-safety impacts from this NOPR.

As one industry representative testified at the Nov. 7, 2023, in-person hearing: "**food safety is the number one issue.**" (Transcript 68:13-68:14 (emphasis added).)

NAFEM members continue to share their substantial concerns with the food-safety impacts of widespread deployment of the technologies underpinning this NOPR, as well as the DOE's continued reliance on ASHRAE 72 without reference to NSF 7 and/or real-world evidence of the ambient conditions of the CRE industry's customers, including higher temperature and humidity:

- "One of the chief concerns I have with how the DOE does their analysis of CRE products in the TSD is they operate from the perspective that the only environmental condition that CRE manufacturers design to is the conditions of the ASHRAE 72 energy test, (75.2º F dry bulb/64.4º F wet bulb). All CRE manufacturers know this is false. The DOE in their TSD analysis optimizes the product for energy efficiency for just the ASHRAE 72 energy test conditions. **The reality is that CRE equipment is used in many dry bulb and wet bulb conditions that are significantly more extreme and our customers, (and in turn their customers), expect them to perform.** Many CRE is approved for outdoor use and can see dry bulb conditions more than 100º F. Many CRE are used in commercial kitchens or in establishments that use setbacks on their thermostats. **Additionally, most CRE is certified to NSF 7 for food storage which requires passing a test at 100º F. CRE must be designed to have enough capacity to meet the NSF and our customers' requirements.** This means large enough refrigeration systems, (compressors, heat exchangers, fans, etc.), to operate in these environments. If CRE manufacturers only had to design their equipment to operate at the ASHRAE 72 energy test environment, we would all design our equipment very differently, but this is not our reality. Also, CRE manufacturers must design their equipment to have additional capacity to still operate when the state of the equipment is not as ideal as it is when brand new. Condenser coils are not always cleaned regularly and door gasket seals wear, polyurethane blown insulation can degrade by as much as 10% in the first year. All of these must be accounted for when designing CRE. **The DOE's proposed energy limits would likely force manufacturers to make the choice of a DOE compliant product with a smaller refrigeration system vs. a product designed with adequate capacity to maintain food safety in the many different environmental conditions and general product PM condition. It will be commonplace that CRE will not be**

able to keep potentially hazardous food products at safe temperatures when conditions are more unfavorable. Most CRE users will not even be aware of these limitations on the new equipment, and **the risk of providing people with potentially hazardous food product that is no longer safe for consumption will go up exponentially.** It also may mean that some manufacturers cannot achieve both compliance with DOE energy standards and compliance with NSF requirements for the storage of potentially hazardous food products." (Emphasis added.)

- "Significantly reducing energy usage at 75° ambient test conditions would be likely to negatively impact product performance in real-world commercial kitchens."

- "Compliance with the proposed energy regulations **will cause CRE products to have minimal capabilities to maintain proper product temperature without exceeding energy requirements**. For example, meeting the proposed limits will decrease manufacturer's ability to incorporate broad ambient functionality in CRE designs which leads to poor performance in supermarkets that cannot maintain proper ambient control. CRE products are typically tested and certified NSF and ASHRAE conditions (Type I = 75.2°F Dry Bulb and 64.4°F Wet Bulb or Type II = 80°F Dry Bulb and 68°F Wet Bulb) and are able to maintain product temperature in line with industry standards of 40°F for food safety. **Many customers specify unique product temperature requirements requiring manufacturers to adjust product design to accommodate the request.** In doing so, manufactures may have to implement larger compressors, controls, design features, etc., that increase energy usage to the exact limit set by the current DOE regulations." (Emphasis added.)

- "**We cannot compromise food safety to meet these new energy limits.** The requirements for food safety contradict the effort to achieve the new energy limits because those requirements drive the need for more cooling capacity while energy reduction drive capacity decreases." (Emphasis added.)

- "If energy is lowered to a level that is ultra-low, this may bring into question whether refrigerators are able to meet the 40-degree threshold for NSF and whether freezers can keep items at the proper temperatures to keep items frozen. Whether it is food establishments or medical establishments, proper temperatures are key for not spoiling products. **Forcing refrigerators and freezers to use less energy could endanger the product temperature.**" (Emphasis added.)

III. CONCLUSION

For the reasons articulated above, NAFEM strongly urges DOE to issue a "no-new-standard" standard for the following reasons:

A) the NOPR's proposed standards are not technically feasible;

B) the NOPR's proposed standards are not economically justified because they fail DOE's statutory factors under the EPCA; and

C) a "no-new-standard" will provide an additional three years of lead time for manufacturers to complete the transition to low GWP refrigerants.

If DOE elects to continue the path to issue a new standard for CRE, NAFEM respectfully requests that DOE provide additional time for compliance in recognition of the recent significant changes and substantial investments that the CRE industry has just made—and continues to make—to comply with the AIM Act. 87 Fed. Reg. 76,738 (Dec. 15, 2022). NAFEM respectfully requests that that if DOE were to elect to continue issuing a new standard, DOE adjust the NOPR and its underlying analyses (the 2023 TSD) to address and rectify the litany of data gaps, erroneous assumptions, and technical concerns outlined in our comments above.

NAFEM looks forward to continuing to engage with DOE. Please contact the undersigned if NAFEM can provide any additional insight or assistance regarding the comments of this letter.

Respectfully submitted,

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APPENDIX A

CRE Technical Survey

Thursday, December 07, 2023

8

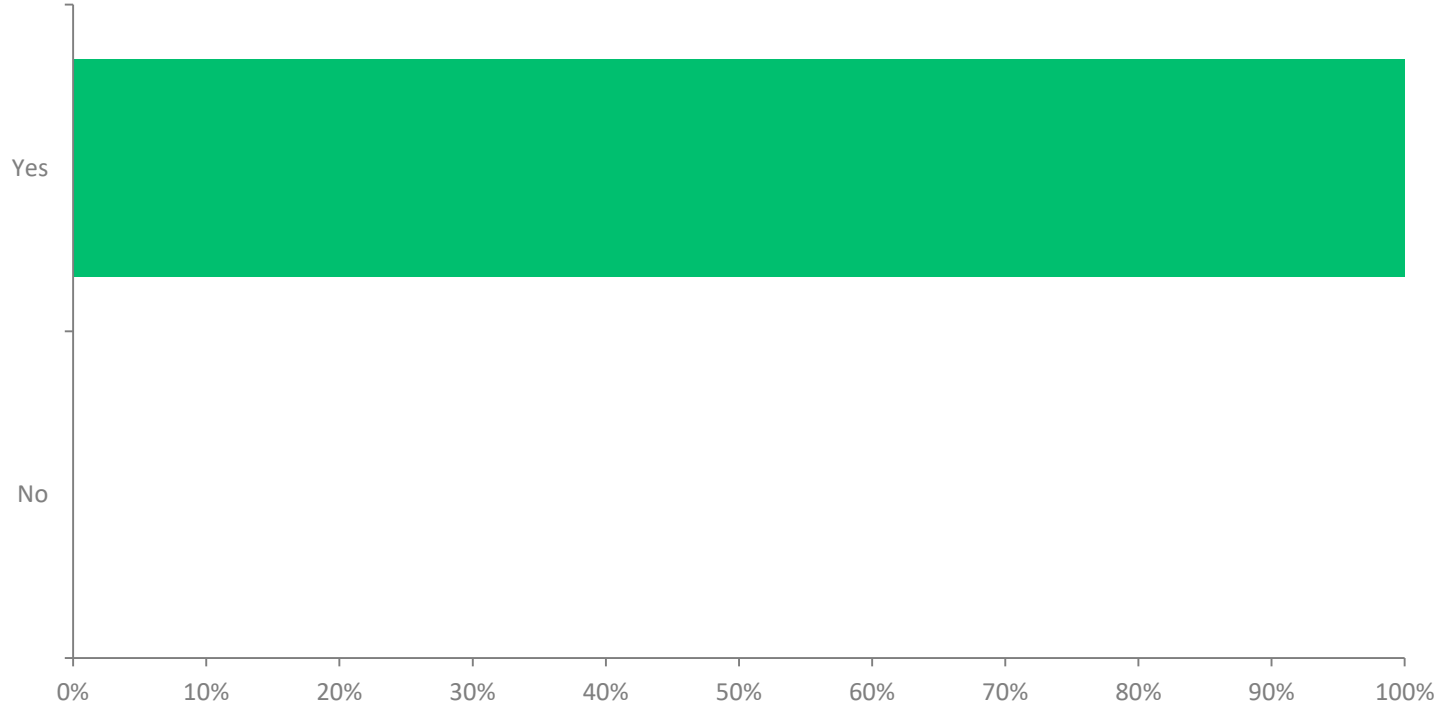
Total Responses

Date Created: Friday, November 17, 2023

Complete Responses: 8

Q1: Does your product use electronic controls?

Answered: 8 Skipped: 0



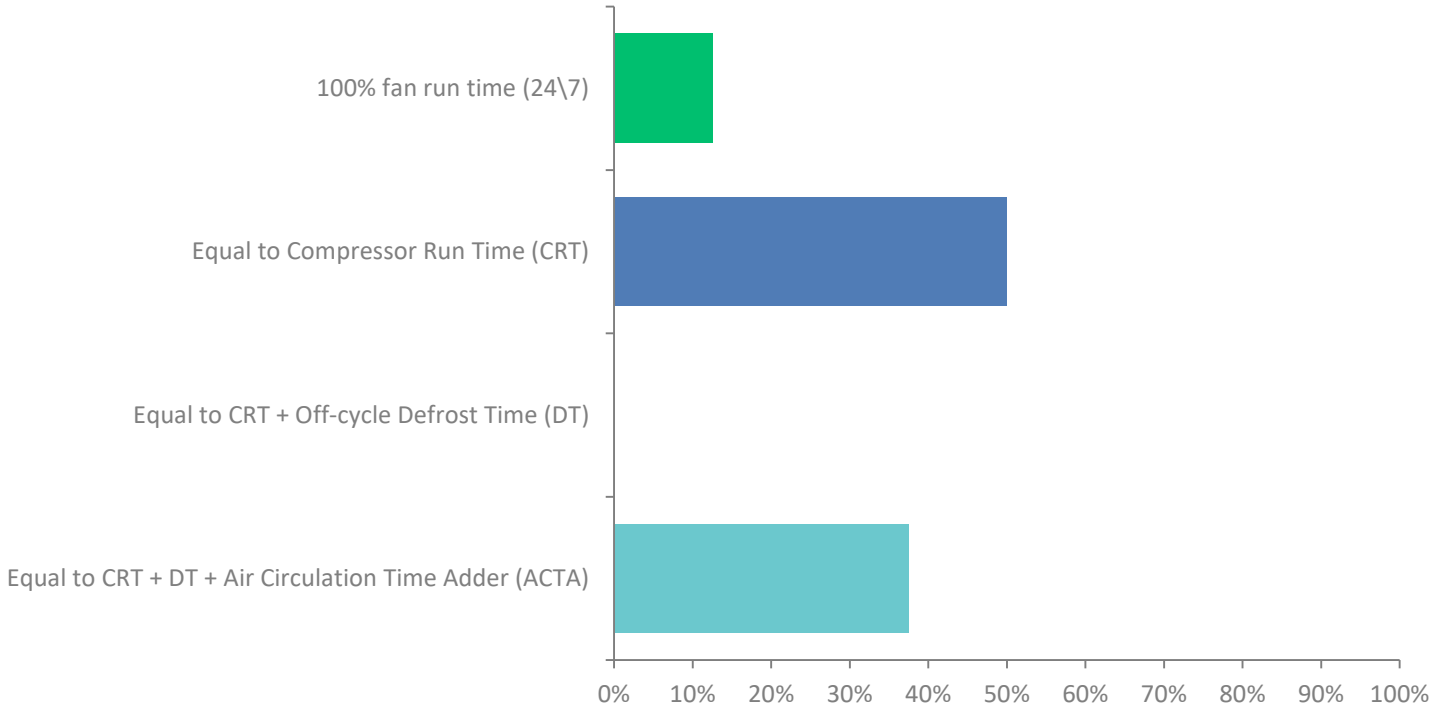
Q1: Does your product use electronic controls?

Answered: 8 Skipped: 0

ANSWER CHOICES	RESPONSES	
Yes	100%	8
No	0%	0
TOTAL		8

Q2: What fan control strategy best describes your product operation?

Answered: 8 Skipped: 0



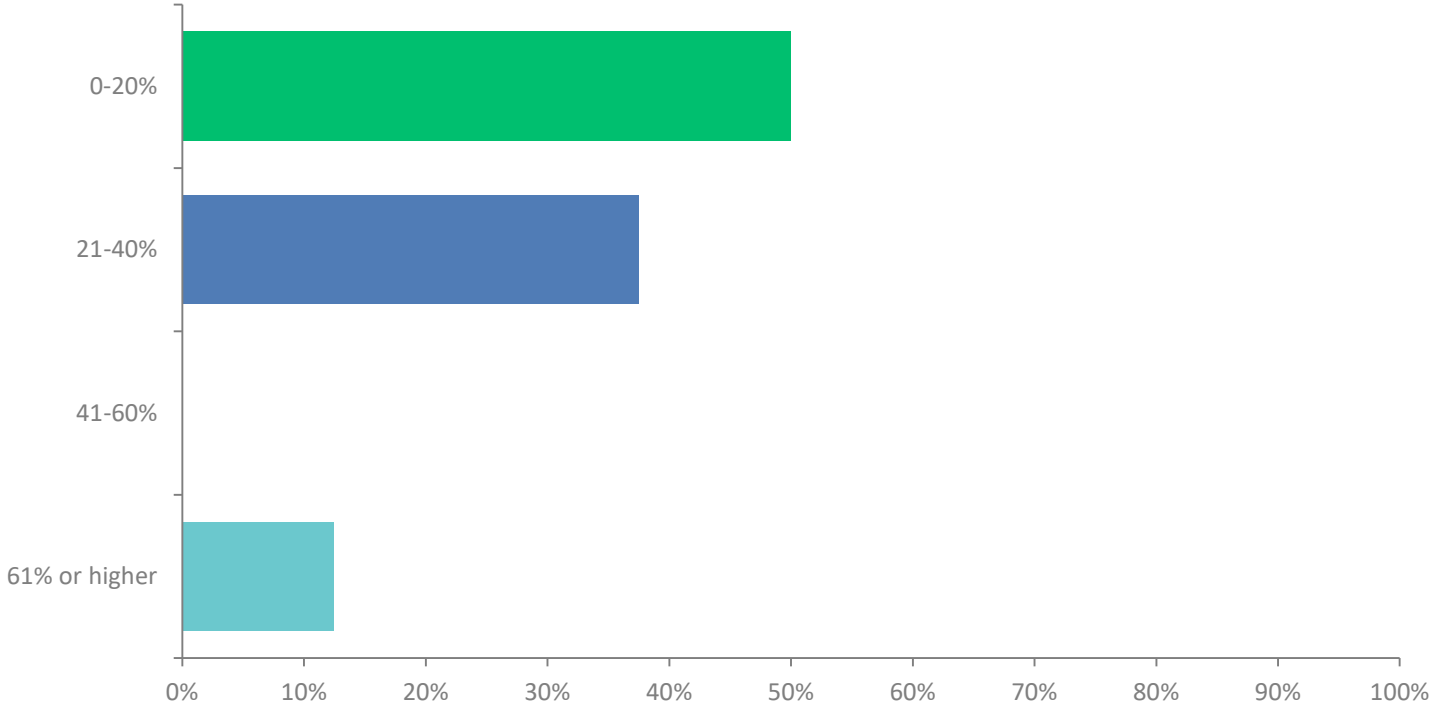
Q2: What fan control strategy best describes your product operation?

Answered: 8 Skipped: 0

ANSWER CHOICES	RESPONSES	
100% fan run time (24\7)	12.50%	1
Equal to Compressor Run Time (CRT)	50.0%	4
Equal to CRT + Off-cycle Defrost Time (DT)	0%	0
Equal to CRT + DT + Air Circulation Time Adder (ACTA)	37.50%	3
TOTAL		8

Q3: During off cycle, and not during defrost, what duty cycle best represents your fan control strategy?

Answered: 8 Skipped: 0



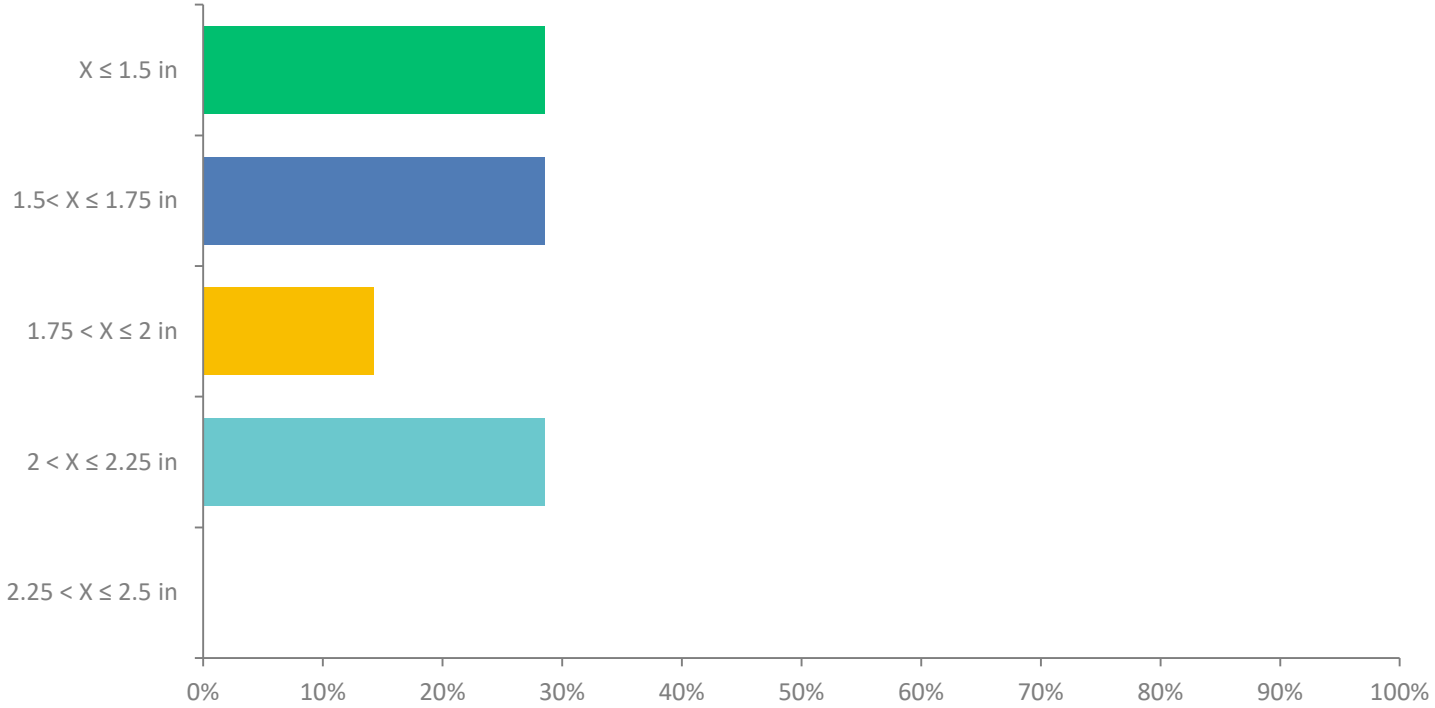
Q3: During off cycle, and not during defrost, what duty cycle best represents your fan control strategy?

Answered: 8 Skipped: 0

ANSWER CHOICES	RESPONSES	
0-20%	50.0%	4
21-40%	37.50%	3
41-60%	0%	0
61% or higher	12.50%	1
TOTAL		8

Q4: What range of insulation thickness best matches your average product for models in the 49-60 ft3 range?

Answered: 7 Skipped: 1



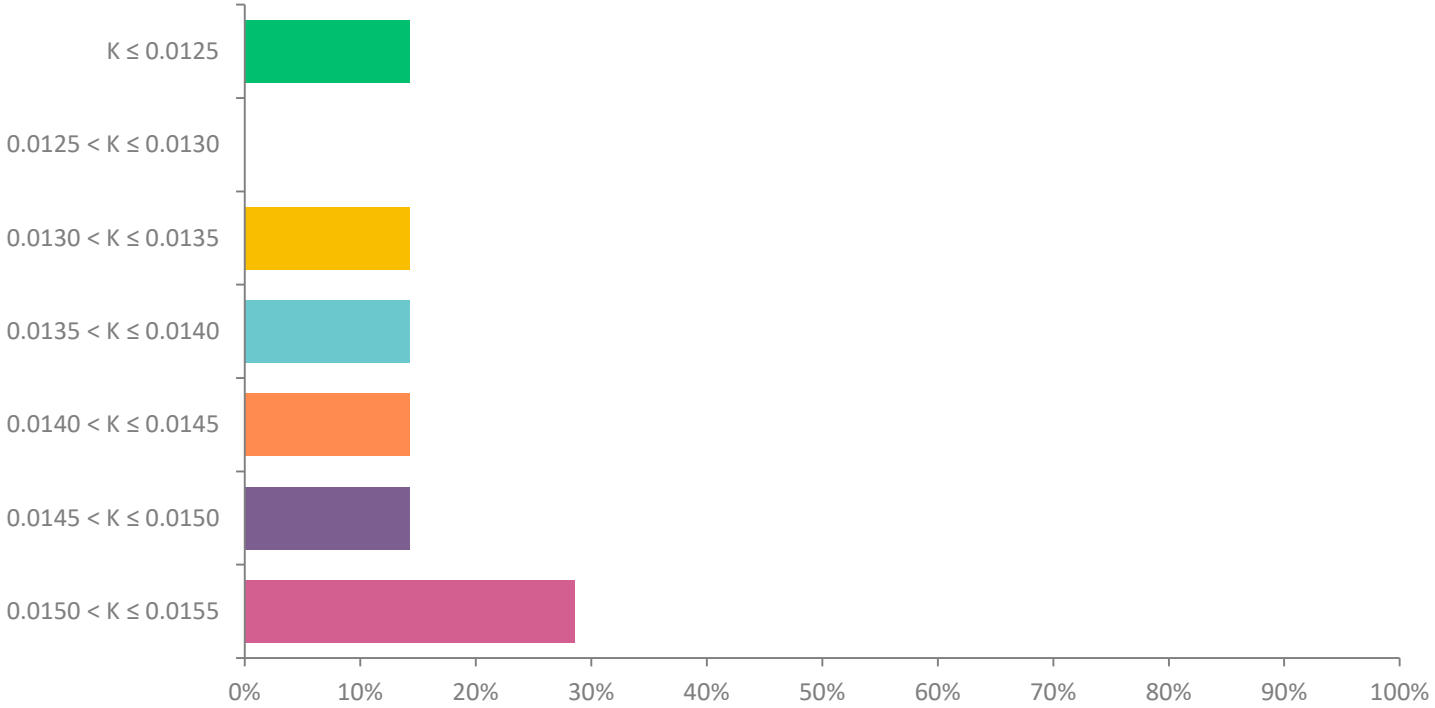
Q4: What range of insulation thickness best matches your average product for models in the 49-60 ft3 range?

Answered: 7 Skipped: 1

ANSWER CHOICES	RESPONSES	
X ≤ 1.5 in	28.57%	2
1.5< X ≤ 1.75 in	28.57%	2
1.75 < X ≤ 2 in	14.29%	1
2 < X ≤ 2.25 in	28.57%	2
2.25 < X ≤ 2.5 in	0%	0
TOTAL		7

Q5: What K factor range best matches the specifications for the PU foam insulation of your cabinets?

Answered: 7 Skipped: 1



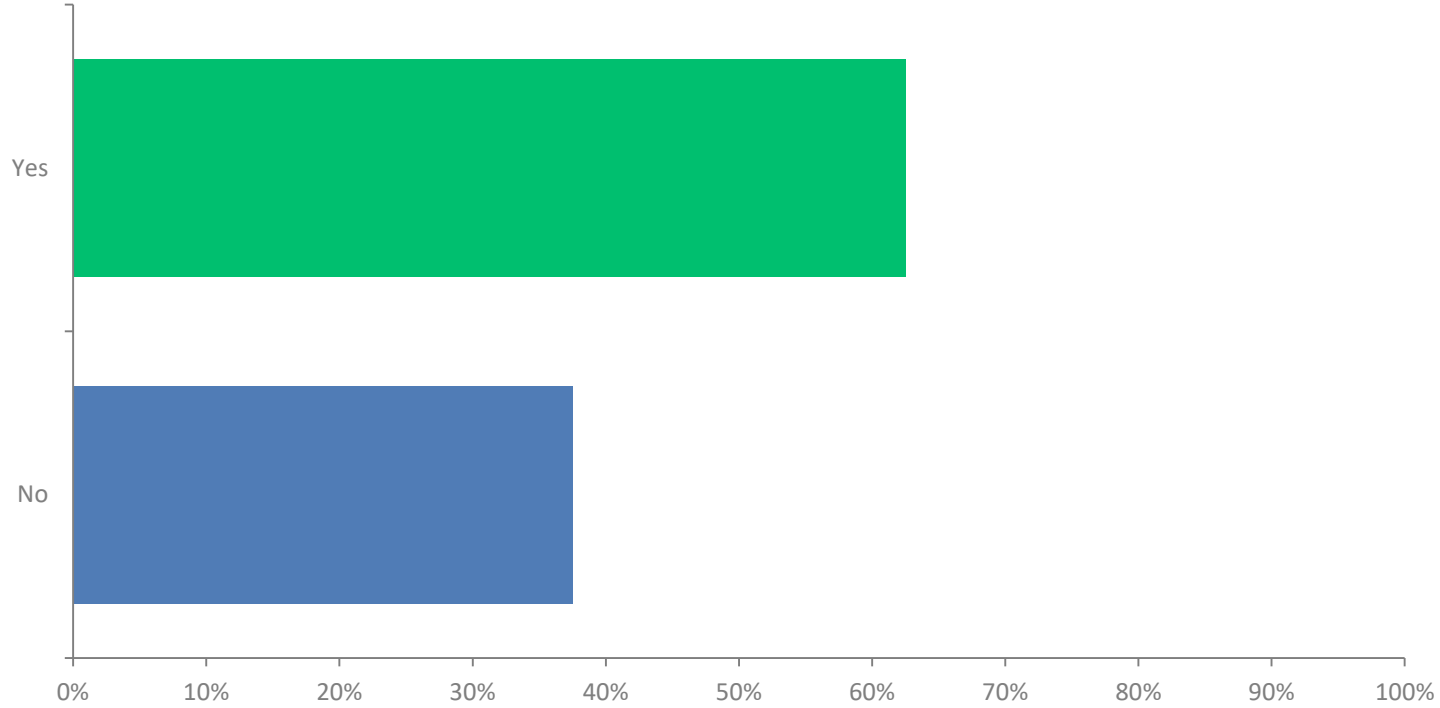
Q5: What K factor range best matches the specifications for the PU foam insulation of your cabinets?

Answered: 7 Skipped: 1

ANSWER CHOICES	RESPONSES	
K ≤ 0.0125	14.29%	1
0.0125 < K ≤ 0.0130	0%	0
0.0130 < K ≤ 0.0135	14.29%	1
0.0135 < K ≤ 0.0140	14.29%	1
0.0140 < K ≤ 0.0145	14.29%	1
0.0145 < K ≤ 0.0150	14.29%	1
0.0150 < K ≤ 0.0155	28.57%	2
TOTAL		7

Q6: When sizing the refrigeration system, does your product design strategy include losses through gaskets, breaker strips, copper tubing and wiring penetration?

Answered: 8 Skipped: 0



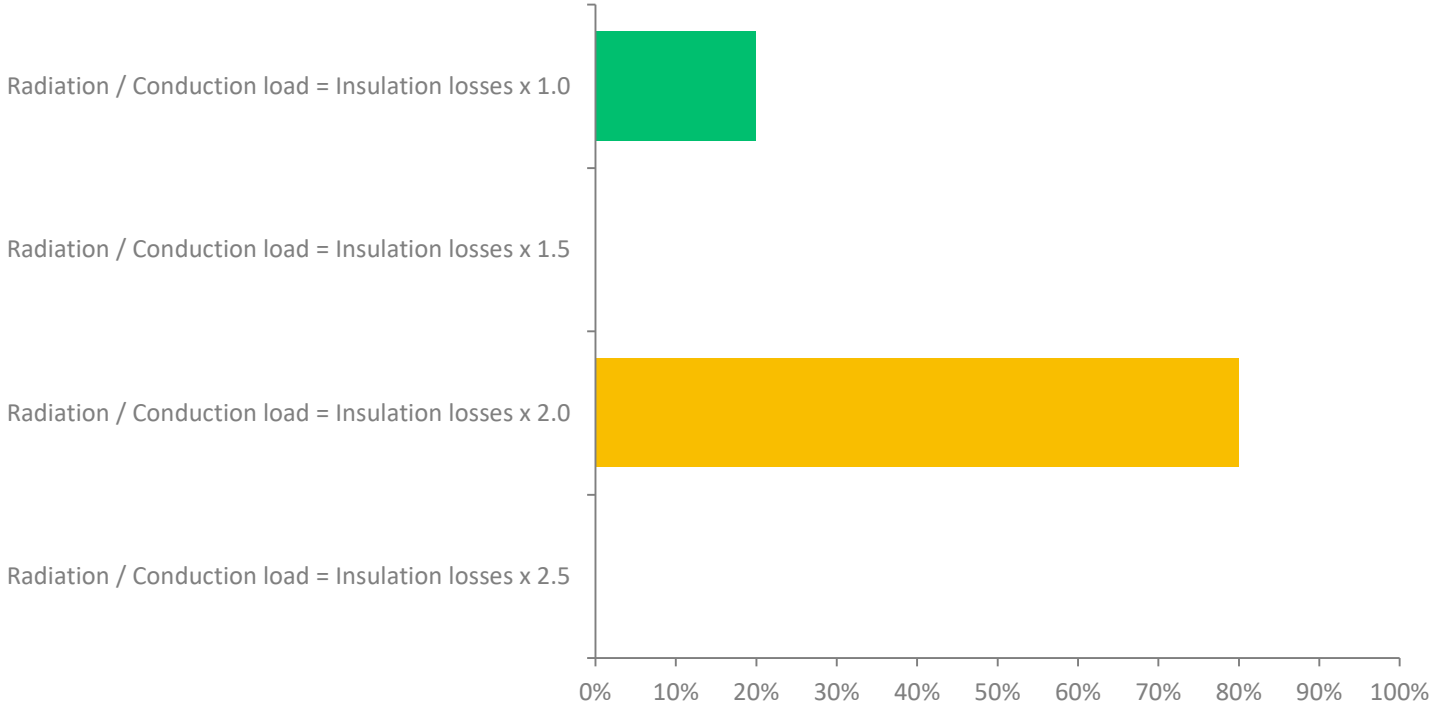
Q6: When sizing the refrigeration system, does your product design strategy include losses through gaskets, breaker strips, copper tubing and wiring penetration?

Answered: 8 Skipped: 0

ANSWER CHOICES	RESPONSES	
Yes	62.50%	5
No	37.50%	3
TOTAL		8

Q7: For product category VCS, if you use a multiplication factor to account for the above losses through insulation, what ratio most closely represents your products when sizing refrigeration system?

Answered: 5 Skipped: 3



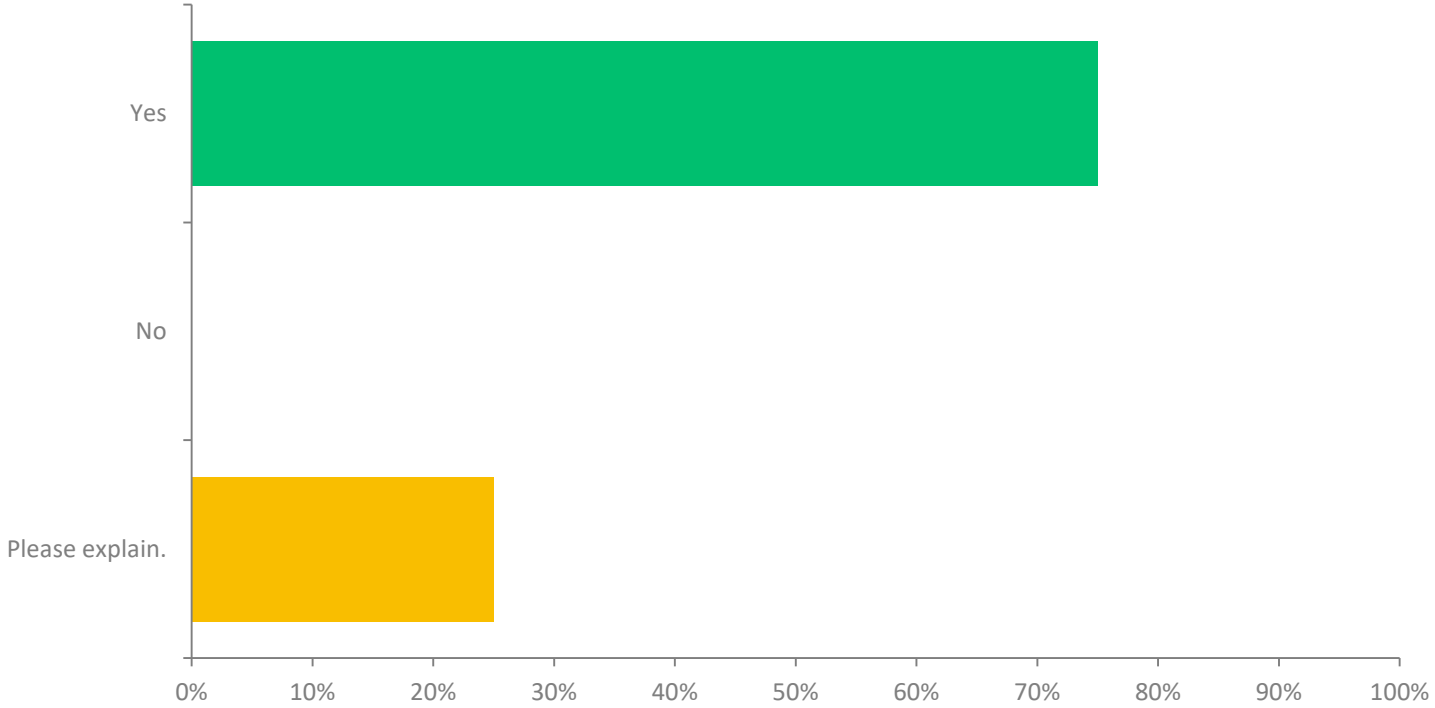
Q7: For product category VCS, if you use a multiplication factor to account for the above losses through insulation, what ratio most closely represents your products when sizing refrigeration system?

Answered: 5 Skipped: 3

ANSWER CHOICES	RESPONSES	
Radiation / Conduction load = Insulation losses x 1.0	20.0%	1
Radiation / Conduction load = Insulation losses x 1.5	0%	0
Radiation / Conduction load = Insulation losses x 2.0	80.0%	4
Radiation / Conduction load = Insulation losses x 2.5	0%	0
TOTAL		5

Q8: Would the proposed energy efficiency standards limit your ability to design compliant products intended for heavy duty application (harsh ambient and/or high rate of door openings)?

Answered: 8 Skipped: 0



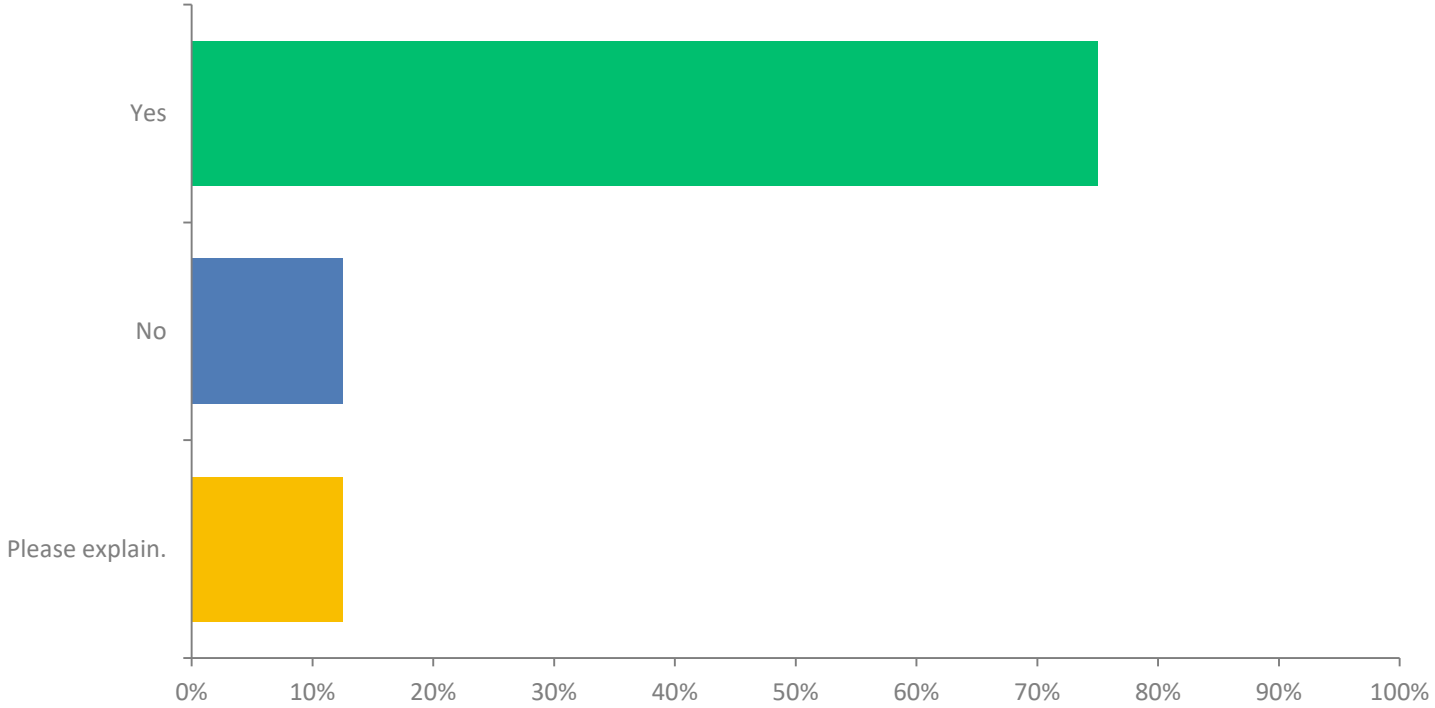
Q8: Would the proposed energy efficiency standards limit your ability to design compliant products intended for heavy duty application (harsh ambient and/or high rate of door openings)?

Answered: 8 Skipped: 0

ANSWER CHOICES	RESPONSES	
Yes	75.00%	6
No	0%	0
Please explain.	25.00%	2
TOTAL		8

Q9: Would you recommend DOE to have a provision for heavy duty application (harsh ambient and/or high rate of door openings) specific energy requirements?

Answered: 8 Skipped: 0



Q9: Would you recommend DOE to have a provision for heavy duty application (harsh ambient and/or high rate of door openings) specific energy requirements?

Answered: 8 Skipped: 0

ANSWER CHOICES	RESPONSES	
Yes	75.00%	6
No	12.50%	1
Please explain.	12.50%	1
TOTAL		8