COPELAND

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October 30, 2023

California Air Resources Board
1001 I Street
Sacramento, CA 95814

Re: Senate Bill 1206 Assessment Report for Transitioning Hydrofluorocarbons (HFCs) to Ultra-Low Global Warming Potential (GWP) and/or No-GWP Alternatives

To Whom It May Concern:

On behalf of Copeland LP, including its subsidiaries and affiliated entities (collectively, "Copeland"), I appreciate the opportunity to comment on California's Request for Information relating to transitioning HFCs to ultra-low or no-GWP alternatives. Copeland is a leading provider of heating, air conditioning, and refrigeration solutions for residential, industrial, and commercial applications. The group combines best-in-class leading technology with proven engineering, design, distribution, educational, and monitoring services to provide customized, integrated climate-control solutions for customers worldwide. Copeland's businesses include industry-leading brands such as Copeland™, Vilter™ and White-Rodgers™, that work to improve human comfort, safeguard food, and protect the environment.

We appreciate the Air Resources Board's role in helping to define the future roadmap to ultra-low and no-GWP alternatives by 2035. Regulation that provides transparency and future certainty typically allows for the smoothest transition. In general, however, we believe ultra-low GWP systems (HFO, CO_2, propane, and ammonia) are already in use where they can be applied safely, economically, and efficiently. Barriers in other sectors largely revolve around system and installation cost, operating cost, safety, challenges in higher ambient conditions, increased complexity in system design which further stresses an already struggling work force, etc. While incentives are always encouraged as an effective means to pull through new technology, offsetting the often higher first cost, incentives alone are not likely to resolve all of these barriers.

Commercial and Industrial Stationary Refrigeration (Retail Food, Cold Storage, Industrial Process Refrigeration, and Ice Rinks)

From a technology standpoint, commercial and industrial stationary refrigeration are already well positioned to adopt ultra-low GWP solutions (The Refrigeration, Air Conditioning and Heat Pumps Technical Options Committee report, defines this as <30 GWP). Small charge propane systems, CO_2 systems, and A2L low pressure systems meet the requirements today for ultra-low GWP in the commercial refrigeration space. Ammonia and CO_2 are largely prevalent in the industrial refrigeration space. The challenges associated with these systems range from installation, workforce development and training, startup/commissioning, maintenance, compliance with safety standards/codes, and total cost of ownership relative to legacy HFC systems.

Options to expand/accelerate the industry capacity to budget, plan, build, install, and operate Ultra-Low GWP systems:

- Provide additional case studies comparisons of Ultra-Low GWP systems vs traditional refrigeration systems to provide the confidence needed investments for future deployment.
- Rebates to offset Capital Expenditure premiums of Ultra-Low GWP systems.
- Industry Education throughout stakeholders: End Users, Consultants, OEMs, Contractors, etc.

From a codes and standards perspective ASHRAE 15 has an effort underway to develop a process to allow an existing installed system to undergo a refrigerant change to one with a different refrigerant safety group, which if enabled could significantly reduce the first cost of upgrading an existing system to low or ultra-low GWP. A supermarket system, for example, may be able to replace a high GWP A1 refrigerant with a low-GWP A2L refrigerant at a much lower cost than replacing the entire system. This could facilitate a much quicker transition of the current installed base to lower GWP alternatives.

Stationary Air Conditioning & Space Conditioning Heat Pumps

The Stationary Air Conditioning and Space Heating sector faces greater challenges when transitioning to ultra-low GWP systems. Codes and standards today limit the amount of flammable refrigerant that can be used, even in indirect systems. Lower pressure A1 solutions do not seem to be cost effective using today's technology. CO_2 has challenges in air conditioning, that can be overcome but often add significant complexity and higher first cost. The residential sector is particularly cost and complexity sensitive, and equity remains a primary concern.

Copeland remains committed to innovating and developing next generation technologies looking for opportunities to provide affordable efficiency and comfort. We are currently engaged with different DOE National Labs on several HVAC projects including:

1. Multi-Function HVAC with Modular Thermal Storage - Leveraging Propane and modular thermal storage to reduce applied cost and peak load reduction of 50% in Summer and 40% in Winter
2. Two projects on Industrial High Temp Heat Pump (One with Oak Ridge National Labs, and one with University of Maryland) – A low GWP replacement for Boilers
3. Modular HVAC system of the future – Propane secondary loop system for 16 SEER and 9.9 HSPF
4. Grid Interactive Micro-Distributed Display Case – Thermal Storage and radiant cooling to reduce a Ref Case Peak load by 80% for 2 hours, and overall efficiency improvement of 30%

Recovery and Reclamation

The Environmental Protection Agency recently release a proposed rule, "Management of Certain HFCs and Substitutes under Subsection (h) of the AIM Act" geared at tackling this very issue of recovery and reclamation of HFCs. We would encourage the Air Resources Board to evaluate the federal proposal and evaluate the benefits California would likely see under this federal plan. For manufacturers, retailers, wholesalers, distributors, contractors, and technicians doing business in more than one state, having one set of rules federally is a lot easier to manage than a state-by-state patchwork.

Not-In-Kind and Passive Cooling Technologies

Not-in-kind technology is an area of a lot of research, with potential for significant energy savings. However, the challenges tend to be more technical, with an inability to scale for applications where typically vapor compression systems provide highest efficiencies. One area that seems promising however are separate sensible and latent hybrid systems, with a non-vapor compression technology addressing the latent load. This reduces the vapor compression systems size and refrigerant charge levels, while enhancing efficiency and likely leading to lower operating cost. Incentives to offset higher first cost of these system together with field trials to further evaluate this approach could help accelerate this type of technology.

PFAS

Per- and poly-fluoroalkyl substances (PFAS) are a large family of chemicals characterized by their strong fluorine and carbon bond. Because of the large group of chemicals that fall within this PFAS definition and the broad number and types of applications in which they are found, it is impractical to categorize them all in the same manner. One should look at the specific chemical composition and end use to best understand the risk associated with use. Although Copeland and a number of manufacturers are looking into future PFAS-free-alternatives, at present we have not seen evidence that the PFAS used in these low-GWP systems pose a threat to human health or the environment. The primary concerns with PFAS relate to those chemicals that are water soluble, toxic, persistent, and/or bio-accumulative. Fluorinated refrigerants are none of these. Refrigerants do degrade over time, however, and some of these fluorinated refrigerants may yield Trifluoro acetic acid which is itself also a PFAS and water soluble and persistent. It's toxicity and bio-accumulative traits are currently in question and there is legitimate evidence that it is not toxic (EPEE's recent PFAS public consultation to ECHA for F-gases lists competent references that explain these conclusions). There is also ongoing study to determine if refrigerants have a substantial enough conversion to TFA in the atmosphere to be significant relative to other sources of TFA (including natural sources) which could prove the contribution from refrigerants is negligible. We believe additional research and data collection is needed to understand the role of refrigerants, as some of the synthetic refrigerants currently offer us the most predictable path to ultra-low GWP while ensuring systems can be applied safely, economically, and efficiently.

We appreciate the opportunity provide these comments and to further engage with the California Air Resources Board to help identify opportunities for collaboration between the Board and manufacturers regarding the transition to lower GWP solutions.

If you have any questions regarding this submission, please do not hesitate to contact me at jennifer.butsch@copeland.com.

Sincerely,

Jennifer Butsch

Jennifer Butsch
Director, Regulatory Affairs