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California Air Resources Board
1001 I Street, P.O. Box 2815
Sacramento, CA 95814

RE: Carrier Response to Request for Information for Senate Bill 1206 Assessment Report

Dear CARB Staff,

Carrier Global Corporation (Carrier) provides fire safety, security, building automation, heating, ventilation, air conditioning, and refrigeration systems and services to promote integrated, high-performance buildings that are safer, smarter, and more sustainable. Carrier is the founder of the modern HVAC industry and operates across the globe. Our range of products includes unitary residential and commercials products, including ducted and ductless, transport refrigeration products, chillers, and HVAC building services.

Carrier appreciates the opportunity to provide input for consideration in the assessment report. In the following sections, we have included information to the specific questions we have relevant information. In general, Carrier requests CARB give significant consideration to the federal HFC phasedown and align with EPA on any future actions. Alignment with federal regulations reduces complexity for manufacturers, distributors, retailers, and contractors, which ensures a better outcome for consumers. Additionally, Carrier request CARB to carefully consider the impact to equipment efficiency when evaluating refrigerant feasibility. If the resulting efficiency is much lower, it can negatively impact product cost, impact on the grid, or the environment. Lastly, we request CARB give consideration to the direction of PFAS regulation. Depending on the adopted definition of PFAS, it may limit the of use ultra-low GWP refrigerants.

Section 2: Stationary Air Conditioning & Space Conditioning Heat Pumps

6. What types of ultra-low GWP technologies for this sector are available in other markets globally, but not in the US? What do you see as the primary market barriers to the adoption of these technologies in the US?

Carrier Response: Propane, which is a highly explosive A3 refrigerant, is beginning to be used in stationary air conditioners and heat pumps in Europe. This is possible because the HVAC systems in Europe are different than in the U.S. Air-to-water indirect systems are more prevalent, whereas air-to-air direct systems are more common in the US. This represents a significant barrier to adoption in the U.S. There are significant costs and possible impacts to efficiency when replacing an air-to-air system with an air-to-water system. Additionally, replacing an air-to-air system using current refrigerants with one that uses greater than 114 grams of Propane is not allowed by current codes. The lengthy model code setting process in the U.S. – and their adoption by local jurisdictions – is a barrier to prompt adoption of A3, Ultra-low GWP refrigerants.

There is some use of CO_2 in comfort cooling in Europe. CO_2 is an A1 refrigerant, which is non-flammable and non-toxic. However, CO_2 operates at very high pressures, which creates unique design and safety risks that must be mitigated. Additionally, the efficiency of CO_2 is much lower than current refrigerants. For products with minimum efficiency requirements, the cost is increased significantly to regain the efficiency lost. Therefore, CO_2 also has challenges in the market.

7. How can centralized ducted AC systems be transitioned to ultra-low GWP or no-GWP technologies?

Carrier Response: Currently, there is not mature residential and light commercial air-to-air technologies available. To apply air-to-water equipment that is technologically ready, ASHRAE application standards and UL product standards must be updated. Then building codes need to incorporate these standards. Once complete, then HVAC systems could transition from air-to-air to air-to-water. However, that would likely require significant incentives to help homeowners and building owners offset the significant renovation costs.

11. What mechanisms, policies, and or incentives can be used to increase recovery and reuse of high-GWP HFCs from existing AC or HP systems, particularly in the residential sector?

Carrier Response: There are costs associated with the recovery, reclamation, and reuse of refrigerants. We recommend that CARB work closely with contractors, distributors, and reclaimers to understand the economics. This will help CARB take effective action.

12. What type of safety testing and safety standard updates are needed for the transition to ultra-low GWP (such as hydrocarbons) and/or no-GWP alternatives?

    Carrier Response: Both UL product standards and ASHRAE application standards need to be updated if Propane or CO_2 is used. These updates are informed by industry testing and research, which is on-going.

Section 5: Transport Refrigeration

20. What are the opportunities and barriers for transitioning existing TRUs to ultra-low-GWP and/or no-GWP alternatives?

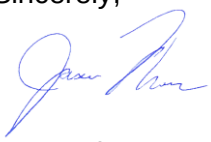
    Carrier Response: There are a few barriers for transitioning existing TRUs to ultra-low GWP or no GWP alternatives. One such barrier is potential replacements can be considered as PFAS chemicals depending on the definition of PFAS. A second consideration is the flammability of potential replacements and the safety implications of retrofitting an existing unit. Finally, potential replacements used in an existing TRU would not have equivalent performance.

21. What are the opportunities and barriers for transitioning new TRUs to ultra low-GWP and/or no-GWP alternatives?

    Carrier Response: Consideration of PFAS and flammability application requirements is needed for new TRUs as well because they are potential barriers. To address them, Carrier recommends CARB consider a <250 GWP level rather than <150. We recommend a feasible timeframe for <250 GWP is 2029-2030.

Carrier appreciates the opportunity to provide this feedback. If CARB staff has further questions, I can arrange a discussion with Carrier's product engineers to provide additional detail.

Sincerely,



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