日冷工 2020 第 450 号

JRAIA The Japan Refrigeration and Air Conditioning Industry Association
KIKAI SHINKO BLDG. 201. 3-5-8, SHIBAKOEN, MINATO-KU TOKYO 105-0011 JAPAN

2nd December 2020

Chair Mary Nichols
Mr. Richard Corey, Executive Officer
California Air Resources Board
1001 I Street PO Box 2815
Sacramento CA95812

c.c. Ms. Elizabeth Scheehle, Research Division Chief
Mr. Michael FitzGibbon, Branch Chief, Climate, Atmospheric Sciences and Climate Strategies Branch

Re: JRAIA's comment on CARB Proposed Regulation on HFC published on October 20, 2020

The Japan Refrigeration and Air Conditioning Industry Association (JRAIA) is an industrial organization to support the sound development of heating ventilation air conditioning and refrigeration industry (HVACR), particularly as to energy and climate change policy. We conduct activities with member companies not only in Japan, but also globally, to support the adoption of energy efficient HVAC equipment and lower GWP refrigerants to promote action on climate change.
JRAIA respectfully submits these comments to the California Air Resources Board (CARB) regarding the Public Hearing Notice and Proposed regulations published on October 20, 2020. We would like to comment in connection with the use of VRF systems that could support California's goal to reduce HFC emissions and achieve your state's environmental goals such as a 200% increase in building energy efficiency and building electrification.

ELECTRIFICATION OF BUILDING AND VRF SYSTEMS

JRAIA is closely following and supporting your efforts to shift to lower GWP refrigerants in the HVAC sector in California.
We understand that California climate policy aims to use 100% renewable energy, completely switch from fossil fuel combustion to electricity for water heating and double the energy savings for buildings. We believe that VRF systems will be a great help for California to achieve these targets.
VRF is a type of HVAC system and its energy efficiency is recognized globally. In the US, its benefits are increasingly becoming recognized by building designers and owners, utilities, environmental activists and policymakers as worthy of wide adoption. Unlike the traditional ducted systems that require ductwork throughout a building, VRF technology does not require ducts and can condition the air of each room separately. This feature ensures comfort of each room and saves energy at the same time. With these features, the energy efficiency of VRF systems is more than 30% better than conventional ducted HVAC systems.
Another benefit is its flexibility. Since it does not need ductwork, it can be installed not only in new buildings but also in any type of existing buildings in a flexible manner to expand the possibilities of HVAC systems.
VRF heat pumps also enable buildings to operate their HVAC systems without the use of fossil fuel combustion and are therefore a critical tool for building electrification. We understand that the California Energy Commission (CEC) is interested in the energy efficiency of VRF systems and acknowledges VRF as an effective solution for California's environmental policy.

JRAIA

TWO PROPOSALS FROM JRAIA

As JRAIA supports the California's environmental and climate policies in the fight against global warming, we would like to make the following two proposals that specifically address VRF systems – an important technology that is a key element to enable the state to meet its carbon reduction goals.

1. **We request that CARB provide a temporary exemption from GWP 750 regulation for VRF systems to at least 2026 or later.**

2. **We request that CARB reexamine its assumptions of the leakage rates for VRF systems, taking account the entire product lifecycle and through consideration of current data and studies.**

BACKGROUND OF PROPOSAL 1

Proposal for the Smooth Transition to the Low GWP Refrigerants

We would like to comment on the implementation date of the GWP regulation for VRF systems in the proposed HFC regulation. We believe that the introduction of lower flammable refrigerants needs to take step-by-step approach such as first to confirm the safety of each equipment and then to revise standards and codes accordingly. For applications that are not ready for the transition due to restrictions such as safety standards and building codes, it is necessary to consider the appropriate timing to start GWP regulations.

The US safety standards ASHRAE 15 and UL 60335-2-40 were recently amended to allow the use of lower flammable refrigerants for most HVAC equipment, but not for VRF systems yet. ASHRAE 15 limits the maximum allowable refrigerant charge limit and only ¼ of lower flammable refrigerants are allowed to be used compared to conventional refrigerants. Furthermore, shut off valves that meet UL 60335-2-40 requirements (e.g. valve leakage amount) do not meet the specifications for HVAC systems at this point, so it is technically impossible to utilize lower flammable refrigerants for VRF systems. If the California GWP regulation is imposed on VRF systems in 2023 without allowing more time for the amendment of the safety standards, VRF systems will be forced to exit from the market. This means that California will lose a critical solution for global warming and it will be a huge opportunity loss for the future.

In order to utilize low GWP refrigerants to VRF systems, a series of safety standard revisions – currently in progress – must be completed and reflected in the California building code. However, current safety standards cannot be revised in time for the current Triennial Code Change Cycle and the next opportunity, the Intervening Code Change Cycle process. Therefore, the earliest timing for VRF systems to transition to low GWP refrigerants is the next Triennial Code Change Cycle which is expected to be completed in January 2026. Based on the reason mentioned above, it is too early to apply GWP regulations to VRF systems before the completion of the code revision.

Additionally, according to equipment manufacturers, R466A, the A1 refrigerant, which is currently proposed as a low GWP option, is not ready for practical use. CF3I, one of the substances in R466A, is classified in health hazard class under GHS (Globally Harmonized System of Classification and Labelling of Chemicals), and further testing and research are needed. Although R466A is classified as "A" -low toxicity under ASHRAE standard-, it is publicly known that CF3I could be changed into toxic substance during its use process. Until the problem is solved, R466A cannot be considered as one of the alternatives to R410A, and it will take considerable time. It has some ozone depleting potential (ODP), although it is a negligible number.

JRAIA

BACKGROUND OF PROPOSAL 2

Need for proper evaluation of refrigerant leakage rates

Finally, we would like to comment on the refrigerant leak rates of the VRF systems.

The EIA proposal in ISOR Appendix D estimates that the annual refrigerant leakage rate for VRF systems is 25%, and the ISOR text also shows a very high annual refrigerant leakage rate of 7 to 10% for commercial air conditioners. According to a survey conducted by the Ministry of Economy, Trade and Industry of Japan in 2013, the annual refrigerant leakage rate for VRF systems in Japan was 3.5% (In fact, this figure includes the amount of refrigerant properly recovered, so the actual rate of refrigerant leakage is much lower.).

However, in EIA's proposal, they incorrectly note that the leakage rate of supermarket refrigeration should apply to VRF systems because the installation settings of VRF systems are the same as supermarket refrigeration systems. However, this is NOT a valid comparison. There is a big difference in installation settings, and the leakage rate of VRF systems is very low compared with that of refrigeration systems. Therefore, it is not accurate to estimate that the refrigerant leakage rate of VRF systems is at the same level as in refrigeration systems.

In general, many parts of supermarket refrigeration are installed in the field. For example, main components such as compressors are brazed in the field, so the level of the brazing skill significantly matters here. On the other hand, both the outdoor unit and the indoor unit of the VRF system are assembled in the factory, the airtightness inspection is carried out before shipment with a strict quality control. Therefore, units are considered to be leak free when shipped out. The only common issue is the piping work in the field. In case of refrigeration equipment, the layout of the showcase varies from store to store, the routing of the connecting piping is not uniform, and partial refurbishment is carried out regularly. The refrigeration cycle pipes need to be reconnected every time accordingly. Also, installers have a very limited time to stop equipment for repair or remodeling because of the perishable nature of food, which leads to insufficient airtightness inspection, hence, making equipment become leaky. These reasons result in the assumption of the high leakage rate of 25%. On the other hand, once a VRF system is installed, almost no reconnection work is necessary. There are few joints, and airtightness inspections can be sufficiently conducted during installation and repair, resulting in a leakage rate of 3.5% or less. Also, considering the fact that the same VRF systems are being sold in the U.S. as in Japan, we believe that the leakage rate in the U.S. does not differ significantly from the survey results in Japan.

ADOPTION OF LOWER GWP REFRIGERANTS IN JAPAN

As we noted in a letter submitted to CARB on July 15th, 2020, Japan was the first country that transitioned from high GWP refrigerants to lower GWP refrigerants for HVAC equipment.

The collaboration between industries, government and academia has allowed us to verify the safety of low-GWP refrigerants, establish standards for the safe manufacturing and safe handling of equipment, and then modify the regulation, which lead wider implementation in the society. Needless to say, safety standards need to be established before amending regulations, and they need to go hand-in-hand for a smooth transition.

As a result of this effort, nearly 100% of residential air conditioners have been converted to R32 - low GWP refrigerants – and now their use is gradually expanding to commercial air conditioners as well. Now about 40% of commercial systems except for VRF systems use R32.

Japan is also in the process of establishing safety standards and regulations to allow for the use of R32 in VRF systems by increasing the allowable refrigerant charge amount and adding safety requirements. More and more VRF systems are utilizing R32, but R32 is only available for systems up to 28kW in Japan and 34kW in Europe. The revision of safety standards and the implementation of revised regulations are required for the use of R32 in larger systems.

JRAIA

Commercial air-conditioning systems play a significant role for energy conservation. Utilization of low GWP, mildly flammable refrigerants for VRF systems could make a significant contribution to climate change policy. The same trend is apparent not only in Japan but also in Europe and other countries.

Best regards,

Tetsuji Okada
President
The Japan Refrigeration and Air Conditioning Industry Association

About JRAIA

The Japan Refrigeration and Air Conditioning Industry Association (JRAIA) was originally established in February 1949 as the Japan Refrigerating Machine Manufacturers Association which was thereafter reorganized in February 1969 to become an incorporated association and renamed as it is at present.

JRAIA is the industry association representing over 160 manufacturers of refrigeration and air conditioning equipment in Japan. We, the members of JRAIA, have so far been dedicated to offering quality products to global market. JRAIA aims to promote and improve production, distribution and consumption of refrigeration and air conditioning equipment and their applied products, as well as auxiliary devices and components, automatic controls and accessories and thereby contribute to the steady development of Japanese industry and the improvement in people's standard of living.

For more information, please see JRAIA's website: www.jraia.or.jp

Email: jraia-global@jraia.or.jp