State of California
AIR RESOURCES BOARD

PUBLIC HEARING TO CONSIDER THE PROPOSED REGULATION FOR PROHIBITIONS ON USE OF CERTAIN HYDROFLUOROCARBONS IN STATIONARY REFRIGERATION AND FOAM END-USES

STAFF REPORT: INITIAL STATEMENT OF REASONS

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EXECUTIVE SUMMARY

Climate change is one of the most serious environmental threats facing the world today. California is experiencing the effects of climate change and has committed to take action. Beginning with Assembly Bill 32 (AB 32),[1] the California Global Warming Solutions Act of 2006, California created a comprehensive, multi-year program to reduce greenhouse gas (GHG) emissions in California. To further the goals of AB 32, in 2016 the Legislature enacted Senate Bill 32 (SB 32)[2] requiring a 40 percent reduction in GHG emissions below 1990 levels by 2030.

Short-lived climate pollutants (SLCPs), such as hydrofluorocarbons (HFCs), are among the most harmful pollutants as they are powerful climate forcers. While they remain in the atmosphere for a much shorter time than carbon dioxide (CO_2), their relative climate forcing (how effectively they heat the atmosphere) can be tens, hundreds or even thousands of times greater than CO_2. Recognizing the importance of reducing HFCs, the Legislature enacted Senate Bill 1383 (SB 1383)[3] in 2016, which requires a 40 percent reduction of HFC emissions below 2013 levels by 2030.

To meet California's mandates under AB 32, SB 32, and SB 1383, the California Air Resources Board (CARB or Board) was relying, in substantial part, on the United States Environmental Protection Agency's (U.S. EPA) Significant New Alternatives Policy (SNAP) Program, Rules 20 and 21 (SNAP Rules). However, on August 8, 2017, in *Mexichem Fluor. v. U.S. EPA*, the D.C. Circuit Court of Appeals (D.C. Circuit) published a decision limiting U.S. EPA's ability to require replacement of HFCs under the SNAP Rules. Although respondents and amicus curiae, including CARB, several states, and a group of administrative law professors are actively defending these rules in court, immediate action is necessary to maintain and enforce prohibitions for certain end-uses of HFCs to achieve California's HFC emissions reduction goal.

In this rulemaking, CARB staff proposes to adopt into state regulations specific prohibitions on the use of high-global warming potential (GWP) refrigerants in new and retrofit stationary refrigeration equipment and certain HFCs used as blowing agents in foam end-uses. The first stationary refrigeration equipment category is retail food refrigeration, which includes stand-alone equipment, refrigerated food processing and dispensing equipment, remote condensing units, and supermarket systems. New and retrofit vending machines are the second stationary refrigeration category. The third category is foam end-uses, which include rigid polyurethane and polyisocyanurate laminated boardstock, flexible polyurethane, integral skin polyurethane, polystyrene extruded sheet, and phenolic insulation board and bunstock. CARB staff are also proposing to adopt a record-keeping requirement that would require the production of these documents if CARB requests them, and a disclosure requirement on the invoice produced by the manufacturer for these end-uses.

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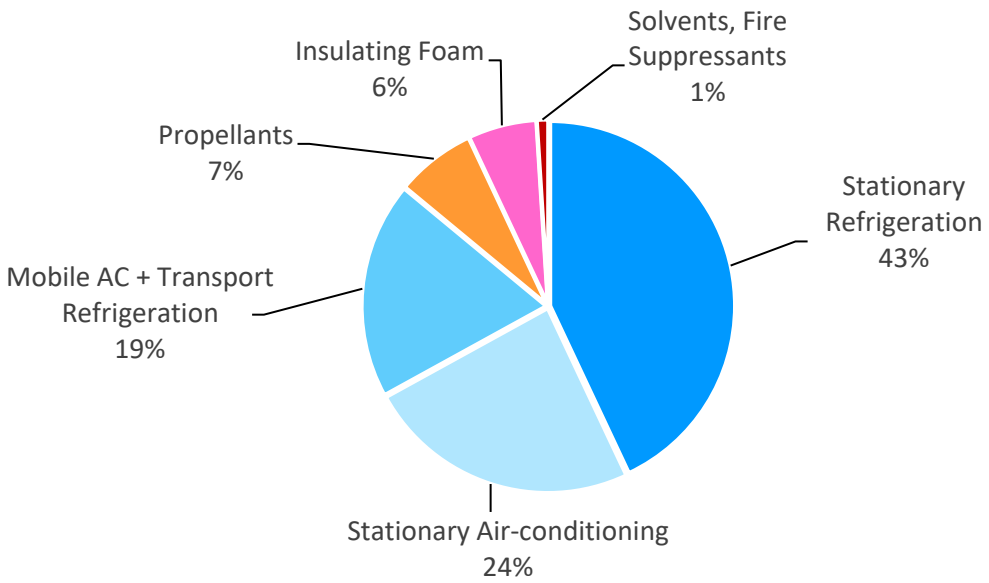
[1] AB 32 (Núñez, Stat. 2006, Ch. 488).
[2] SB 32 (Pavley, Stat. 2016, Ch. 249).
[3] SB 1383 (Lara, Stat. 2016, Ch. 395).

I. INTRODUCTION AND BACKGROUND

A. What are Hydrofluorocarbons?

HFCs are synthetic gases that are used in a variety of applications, including refrigeration, air-conditioning, foam blowing, solvents, aerosols, and fire suppression (Figure 1). HFCs are SLCPs which are powerful climate forcers that remain in the atmosphere for a much shorter period of time than longer-lived climate pollutants, such as CO_2, but are more potent when measured in terms of global warming potential (GWP),[4] which can be tens, hundreds, or even thousands of times greater than CO_2.

FIGURE 1. CALIFORNIA HFC EMISSIONS BY SECTOR (2013)



California HFC emissions (in CO_2-equivalents) by sector in 2013 using the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment (AR4) 100-year GWP values (IPCC 2007). Source: California's High Global Warming Potential Gases Emission Inventory, 2015 (CARB 2016a).

[4] The Intergovernmental Panel on Climate Change (IPCC) developed the concept of GWP as an index to evaluate the climate impacts of different GHGs, including SLCPs. This metric provides a comparison of the ability of each GHG to trap heat in the atmosphere relative to CO_2 over a specified time horizon. GWP accounts for the lifetime of different GHGs in the atmosphere, and the amount of energy they absorb on a per-kilogram basis, relative to CO_2, to represent the relative climate forcing of a kilogram of emissions when averaged over a time period of interest (for example, 20 years or 100 years). Current practice in most of the world for developing GHG emission inventories, including California's inventory, is to use GWP values from the 4th Assessment Report of the IPCC (AR4), which was released in 2007 (IPCC 2007). The SLCP Strategy uses 20-yr GWP values from AR4. However, this proposed rulemaking and ISOR uses 100-yr GWP values from AR4 to be consistent with current industry practices.

HFCs are the primary substitutes for ozone-depleting substances, such as chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs). These substances are controlled under the 1987 Montreal Protocol on Substances that Deplete the Ozone Layer (Montreal Protocol)—the international treaty governing the protection of the stratospheric ozone. Under the Montreal Protocol, CFCs have been completely banned for new production and consumption, and HCFCs are currently being phased out of new production and consumption in the United States, with a complete ban beginning January 1, 2020 (U.S. EPA 2016).

A major concern with respect to HFCs is that their contribution to climate forcing is expected to increase rapidly in the future as they continue to replace ozone-depleting substances and demand for air-conditioning and refrigeration grows (Velders et al. 2009, 2014). Currently, HFCs are two percent of the total global climate forcing (IPCC 2014a). HFCs are the fastest growing source of GHG emissions in California and the world. A lack of action to prevent the growth of HFCs would greatly undermine efforts to address climate change.

B. Why Regulate Stationary Refrigeration End-Use Sectors?

Stationary refrigeration is the largest source of HFC emissions in California, comprising more than 40 percent of all HFC emissions from all sources. Refrigerants with much lower GWPs are available, equivalent in cost to high-GWP HFCs, and commonly used today in stationary refrigeration and air-conditioning equipment.

C. Why Regulate Foam End-Use Sectors?

The foam end-use sectors in this regulation traditionally used foam expansion agents that were ozone-depleting or high-GWP fluorinated gases (F-gases). Although the end-use sectors do not currently use ozone-depleting or high-GWP foam expansion agents, they are included in the regulation to maintain industry consistency and prevent the use of high-GWP HFCs in future foam production.

D. Which End-Use Sectors Will Be Covered By This Regulation?

CARB proposes to adopt the HFC refrigerant and foam expansion agent prohibitions in regulation section 95374 “List of Prohibited Substitutes” for three end-use sectors that were previously included in SNAP Rules 20 and 21. Below is a short non-exhaustive description (used by U.S. EPA) of each end-use sector included in the regulation:

- Retail Food Refrigeration (new and retrofit). This end-use category, also known as commercial refrigeration, includes equipment designed to store and display chilled or frozen goods for commercial sale. This end-use includes the following categories of equipment, as described below:
    - *Stand-alone Equipment (new and retrofit).* This equipment category includes refrigerators, freezers, and reach-in coolers (either open or with doors), where

all refrigeration components are integrated and, for the smallest types, the refrigeration circuit is entirely brazed or welded. These systems are fully charged with refrigerant at the factory and typically require only an electricity supply to begin operation.

- *Refrigerated Food Processing and Dispensing Equipment (new and retrofit).* This equipment category dispenses and often processes a variety of food and beverage products. This equipment will process the product by combining ingredients, mixing and preparing it at the proper temperature, while others function mainly as a holding tank to deliver the product at the desired temperature or to deliver chilled ingredients for the processing, mixing, and preparation. Some may use a refrigerant in a heat pump, or utilize waste heat from the cooling system to provide hot beverages. Some may also provide heating functions to melt or dislodge ice or for sanitation purposes. This equipment can be self-contained or can be connected via piping to a dedicated condensing unit located elsewhere. Equipment within this end-use category include chilled and frozen beverages (carbonated and non-carbonated, alcoholic and nonalcoholic); frozen custards, gelato, ice cream, Italian ice, sorbets and yogurts; milkshakes, ‘‘slushies’’ and smoothies, and whipped cream.

- *Remote Condensing Units (new and retrofit).* This equipment category typical has refrigerating capacities from 1 kW to 20 kW (0.3 to 5.7 refrigeration tons) and are composed of one (sometimes two) compressor(s), one condenser, and one receiver assembled into a single unit, which is normally located external to the sales area. The condenser (and often other parts of the system) is located outside the space or area cooled by the evaporator, typically ejecting heat to the outdoor ambient environment. They are commonly installed in convenience stores, specialty shops (e.g., bakeries, butcher shops), supermarkets, restaurants, and other locations where food is stored, served, or sold.

- *Supermarket Systems (new and retrofit).* This equipment category includes multiplex or centralized systems, which operate with racks of compressors installed in a machinery room. There are two main design classifications: direct and indirect systems. For direct systems, the refrigerant circulates from the machinery room to the sales area, where it evaporates in display-case heat exchangers, and then returns in vapor phase to the suction headers of the compressor racks. Another direct supermarket design, often referred to as a distributed refrigeration system, uses an array of separate compressor racks located near the display cases rather than having a central compressor rack system. Indirect supermarket designs include secondary loop systems and cascade refrigeration. Indirect systems use a “chiller” (not to be confused with the “chiller” end-use) or other refrigeration system to cool a secondary fluid that is then circulated throughout the store to the cases.

- Vending Machines (new and retrofit). This end-use category covers self-contained units that dispense goods that must be kept cold or frozen.

- Foams. This end-use category is manufactured with foam blowing agents and encompasses a wide variety of applications, including refrigerators, buildings, automobiles, furniture, packaging, and many more. The blowing agent is used to create a cellular structure from liquid plastic resin, and in the case of foam used for insulation it functions as an insulating component of the foam. For purposes of this regulation, the following foams are included:

    - *Rigid Polyurethane and Polyisocyanurate Laminated Boardstock.* This includes insulation for roofing and walls. For purposes of this proposed regulation, it does not include rigid polyurethane appliance foam, rigid polyurethane commercial refrigeration and sandwich panels, rigid polyurethane marine flotation foam, rigid polyurethane spray foam, and rigid polyurethane one-component foam sealants.

    - *Flexible Polyurethane.* This includes foam furniture, bedding, chair cushions, and shoe soles.

    - *Integral Skin Polyurethane.* This includes car steering wheels, dashboards, and shoe soles.

    - *Polystyrene: Extruded Sheet.* This includes foam for packaging and buoyancy or floatation. It is also made into food-service items, including hinged polystyrene containers (for "take-out" from restaurants); food trays (meat and poultry) plates, bowls, and retail egg containers.

    - *Phenolic Insulation Board and Bunstock.* This includes insulation for roofing and walls. Bunstock or bun stock is a large solid box-like structure formed during the production of polystyrene insulation.

TABLE 1. GWP VALUES OF PROHIBITED SUBSTITUES BY SECTOR AND END-USE

General End-Use	Specific End-Use	Substitute	Effective Date	GWP Values of Prohibited Substitutes
Retail Food Refrigeration	Supermarket Systems (new)	HFC-227ea, R-404A, R-407B, R-421B, R-422A, R-422C, R-422D, R-428A, R-434A, R-507A	Prohibited as of September 1, 2018	2,729 to 3,985
Retail Food Refrigeration	Supermarket Systems (retrofit)	R-404A, R-407B, R-421B, R-422A, R-422C, R-422D, R-428A, R-434A, R-507A	Prohibited as of September 1, 2018	2,729 to 3,985

General End-Use	Specific End-Use	Substitute	Effective Date	GWP Values of Prohibited Substitutes
Retail Food Refrigeration	Remote Condensing Units (new)	HFC-227ea, R-404A, R-407B, R-421B, R-422A, R-422C, R-422D, R-428A, R-434A, R-507A	Prohibited as of September 1, 2018	2,729 to 3,985
Retail Food Refrigeration	Remote Condensing Units (retrofit)	R-404A, R-407B, R-421B, R-422A, R-422C, R-422D, R-428A, R-434A, R-507A	Prohibited as of September 1, 2018	2,729 to 3,985
Retail Food Refrigeration	Stand-alone Medium-Temperature Units - with a compressor capacity below 2,200 Btu/hr and not containing a flooded evaporator (new)	FOR12A, FOR12B, HFC-134a, HFC-227ea, KDD6, R-125/290/134a/600a (55.0/1.0/42.5/1.5), R-404A, R-407A, R-407B, R-407C, R-407F, R-410A, R-410B, R-417A, R-421A, R-421B, R-422A, R-422B, R-422C, R-422D, R-424A, R-426A, R-428A, R-434A, R-437A, R-438A, R-507A, RS-24 (2002 formulation), RS-44 (2003 formulation), SP34E, THR-03	Prohibited as of January 1, 2019	900 to 3,985
Retail Food Refrigeration	Stand-alone Medium-Temperature Units - with a compressor capacity below 2,200 Btu/hr and containing a flooded evaporator (new)	FOR12A, FOR12B, HFC-134a, HFC-227ea, KDD6, R-125/290/134a/600a (55.0/1.0/42.5/1.5), R-404A, R-407A, R-407B, R-407C, R-407F, R-410A, R-410B, R-417A, R-421A, R-421B, R-422A, R-422B, R-422C, R-422D, R-424A, R-426A, R-428A, R-434A, R-437A, R-438A, R-507A, RS-24 (2002 formulation), RS-44 (2003 formulation), SP34E, THR-03	Prohibited as of January 1, 2020	900 to 3,985

General End-Use	Specific End-Use	Substitute	Effective Date	GWP Values of Prohibited Substitutes
Retail Food Refrigeration	Stand-alone Medium-Temperature Units - with a compressor capacity equal to or greater than 2,200 Btu/hr (new)	FOR12A, FOR12B, HFC-134a, HFC-227ea, KDD6, R-125/290/134a/600a (55.0/1.0/42.5/1.5), R-404A, R-407A, R-407B, R-407C, R-407F, R-410A, R-410B, R-417A, R-421A, R-421B, R-422A, R-422B, R-422C, R-422D, R-424A, R-426A, R-428A, R-434A, R-437A, R-438A, R-507A, RS-24 (2002 formulation), RS-44 (2003 formulation), SP34E, THR-03	Prohibited as of January 1, 2020	900 to 3,985
Retail Food Refrigeration	Stand-alone Low-Temperature Units (new)	HFC-227ea, KDD6, R-125/290/134a/600a (55.0/1.0/42.5/1.5), R-404A, R-407A, R-407B, R-407C, R-407F, R-410A, R-410B, R-417A, R-421A, R-421B, R-422A, R-422B, R-422C, R-422D, R-424A, R-428A, R-434A, R-437A, R-438A, R-507A, RS-44 (2003 formulation)	Prohibited as of January 1, 2020	1,800 to 3,985
Retail Food Refrigeration	Stand-alone Units (retrofit)	R-404A, R-507A	Prohibited as of September 1, 2018	3,922 and 3,985
Vending Machines	Vending Machines (new)	FOR12A, FOR12B, HFC-134a, KDD6, R-125/290/134a/600a (55.0/1.0/42.5/1.5), R-404A, R-407C, R-410A, R-410B, R-417A, R-421A, R-422B, R-422C, R-422D, R-426A, R-437A, R-438A, R-507A, RS-24 (2002 formulation), SP34E	Prohibited as of January 1, 2019	1,100 to 3,985

General End-Use	Specific End-Use	Substitute	Effective Date	GWP Values of Prohibited Substitutes
Vending Machines	Vending Machines (retrofit)	R-404A, R-507A	Prohibited as of September 1, 2018	3,922 and 3,985
Retail Food Refrigeration	Refrigerated Food Processing and Dispensing Equipment (new)	HFC-227ea, KDD6, R-125/290/134a/600a (55.0/1.0/42.5/1.5), R-404A, R-407A, R-407B, R-407C, R-407F, R-410A, R-410B, R-417A, R-421A, R-421B, R-422A, R-422B, R-422C, R-422D, R-424A, R-428A, R-434A, R-437A, R-438A, R-507A, RS-44 (2003 formulation)	Prohibited as of January 1, 2021	1,770 to 3,990
Foam	Rigid Polyurethane and Polyisocyanurate Laminated Boardstock	HFC-134a, HFC-245fa, HFC-365mfc and blends thereof	Acceptable subject to narrowed use limits for military or space and aeronautics related applications and prohibited for all other uses as of September 1, 2018.* Prohibited for all uses as of January 1, 2022	794 to 1,430
Foam	Flexible Polyurethane	HFC-134a, HFC-245fa, HFC-365mfc, and blends thereof		794 to 1,430
Foam	Integral Skin Polyurethane	HFC-134a, HFC-245fa, HFC-365mfc, and blends thereof; Formacel TI; and Formacel Z-6		777 to 1,500
Foam	Polystyrene Extruded Sheet	HFC-134a, HFC-245fa, HFC-365mfc, and blends thereof; Formacel TI; and Formacel Z-6		777 to 1,500
Foam	Phenolic Insulation Board and Bunstock	HFC-143a, HFC-134a, HFC-245fa, HFC-365mfc, and blends thereof		794 to 4,470

*Foam Sectors: Under the narrowed use limit, use is limited to military or space- and aeronautics-related applications where reasonable efforts have been made to ascertain that other alternatives are not technically feasible due to performance or safety requirements.

Additional end-use sectors in SNAP Rules 20 and 21 will not be included in this regulation; these end-use sectors will be covered through additional rulemaking for end-use sectors identified in the SLCP Strategy, or through other CARB measures.

Section I, Subsection O “California Adaptation of HFC Prohibitions Listed in Federal Rules” and Section IX, Alternative 2, “Evaluation of Regulatory Alternatives” provides the rationale for the exclusion of certain HFC end-use sectors listed in the SNAP Rules.

E. What Are the Requirements of the Proposed Regulation?

The proposed regulation would adopt certain HFC prohibitions from U.S. EPA’s SNAP Rules 20 and 21, which prohibit certain high-GWP HFCs in new equipment and in retrofits of existing equipment, and used as blowing agents in specific foam end-uses. A retrofit here means changing the type of refrigerant used in equipment. Specifically, new and retrofitted retail food refrigeration and vending machine equipment could no longer use refrigerants that are prohibited by this regulation. Additionally certain HFCs would be prohibited in specific foam end-use sectors. The proposed regulation also requires record-keeping, and invoice disclosure language for equipment or materials sold or entered into commerce in the State of California and provides an enforcement mechanism if a regulated party violates the proposed regulation.

F. What Are the Emissions and Expected Reductions?

The estimate for current business-as-usual (BAU) emissions from the end-use sectors regulated by the proposed regulation is 5.9 million metric tons CO_2 equivalents per year ($MMTCO_2E$/yr). With the proposed regulation in place, annual reductions are estimated at up to 3.4 $MMTCO_2E$ by the year 2030. CARB does not expect any increase in the indirect CO_2 emissions from increased energy usage, as the lower-GWP replacement refrigerant technologies that would be chosen are either more energy efficient or equal in energy efficiency to the baseline high-GWP refrigerants.

G. Who Will be Impacted by the Regulation?

The proposed regulation would apply to any person who sells, installs, uses, or enters into commerce, in the State of California, any substitute in end-uses listed in Table 1. The end-use is the equipment and the substitute is the refrigerant, which are listed in Table 1.

The impacts of the regulation will be borne primarily by foam manufacturers and refrigeration equipment manufacturers who have either developed, or will develop compliant materials and equipment. Contractors, installers of equipment, and service technicians would be impacted by the requirement to design, purchase, install, and service only compliant equipment. The impact to end-users of the foam and refrigeration equipment will be negligible, as their main responsibility will be to purchase only compliant foam products or refrigeration equipment (non-compliant foam and equipment would be illegal to sell or provide, allowing the regulation to have a minimal impact on business owners and small-businesses).

H. What Are the Expected Costs?

Total statewide costs of the regulation over 20 years are estimated to be $4.25 million. The U.S. EPA estimated the cumulative 20-year total cost of the refrigerant portions of SNAP Rules 20 and 21 in the proposed regulation to be $23.5 million for the entire nation, for the end-use sectors covered by California's proposed regulation. California's share of the national cost was estimated by scaling to California's 12.1 percent share of the U.S. population (Census 2016), along with manufacturer's mark-up amounted $4.12 million if the SNAP Rules are vacated. The estimated costs are likely to be on the high side because some refrigerant equipment manufacturers have already complied with the SNAP rules. Since foam end-use manufacturers had already complied with the SNAP Rules that became effective January 1, 2017, no additional manufacturing costs were attributable to this proposed regulation.

The proposed regulation for California would require record-keeping, and a one-time update, to include a disclosure statement on invoices by manufacturers of refrigeration equipment and foam end-uses. The affected businesses already keep all the records that will be required for the record-keeping provision, thus there is no additional record-keeping cost. The total costs of providing records and the one-time cost to update the invoice language amount to $130,000. Reports would not be routinely required, rather only on an as-requested basis.

The initial cost for small businesses for all affected sectors except stand-alone equipment for retail food sector are expected to be zero. The stand-alone equipment sector is the only affected sector in which small business impacts have been identified. The initial cost for small businesses in the stand-alone equipment sector, however, is expected to be approximately $14,200, including $14,100 compliance cost and $80 record-keeping cost. The initial cost for a typical businesses are expected to range from $80 to approximately $254,200, including $0 to $254,100 compliance cost and $80 disclosure and providing records cost. The cost to report sales records (upon request) for all affected businesses is estimated to be $40 per business only in years 2, 5, 10, 15, 20, assuming sales records are requested in these years, which would be $130,000 in total for the 20-year life of the regulation for all businesses.

The estimated cost per metric ton of CO_2E ($MTCO_2E$) reduced is less than $1.00/$MTCO_2E$ reductions, with a state-wide cost of $210,000 per year and reductions of up to 3.4 $MMTCO_2E$ per year by 2030.

The initial and annual costs for an individual manufacturer are expected to be minimal at most, with negligible costs for end-users, such as retail food stores.

The only cost to foam manufacturers will be adding disclosure language to invoices and providing records in years CARB requests records. As per U.S. EPA SNAP Rules, foam manufacturers have been prohibited from using the HFC foam expansion agents listed in this regulation since January 1, 2017.

Further discussion of the costs can be found in Section VIII, “Economic Impacts Assessment.”

I. Was There a Public Process to Develop the Regulation?

Consistent with Government Code sections 11346, subdivision (b), and 11346.45, subdivision (a), and with the Board’s long-standing practice, CARB staff held a public workshop and had several other meetings with interested stakeholders during the development of the proposed regulation. The workshop was advertised broadly in advance using related CARB email lists, webpages, and other outreach methods, while simultaneously advertising the availability of a new dedicated email list and webpage for future HFC measure related announcements. CARB staff worked closely with stakeholders, reviewing their comments from both the workshop along with several follow-up meetings to discuss their comments and recommendations.

There was also a public process during the adoption of the U.S. EPA SNAP Rules beginning in 2014. Costs, benefits, and requirements of these SNAP Rules were developed in collaboration with national stakeholders by actively soliciting feedback and sharing information pertinent to the proposed rulemaking.

These informal pre-rulemaking discussions, the workshop, and information provided during the adoption of the SNAP Rules provided CARB with useful information that was considered during development of the regulation that is now being proposed for formal public comment. Further discussion of the public process can be found in Section XI, “Public Process for Development of the Proposed Action (Pre-Regulatory Information).”

J. California Legislative Mandates and Legal Authority to Regulate

California is committed to lead and support pioneering efforts to protect the environment and improve public health while maintaining a vibrant economy. California made a groundbreaking commitment to address climate change with the passage of AB 32 – the “California Global Warming Solutions Act of 2006.” AB 32 charges CARB with reducing statewide GHG emissions to 1990 emission levels by 2020 and maintaining a statewide GHG emission limit, while seeking continuing GHG emissions reduction. In 2016, California strengthened its commitment when Governor Brown signed SB 32, the “California Global Warming Solutions Act of 2006: Emission Limit,” codifying an additional reduction target for statewide GHG emissions of 40 percent below 1990 emission levels by 2030.

Achieving deep reductions in HFC emissions and other SLCP is necessary to meet the GHG emissions reduction called for by AB 32 and SB 32. Recognizing this, the California Legislature passed Senate Bill 605 (SB 605),[5] the “Short-Lived Climate Pollutants Act,” requiring CARB to develop a plan to reduce emissions of SLCPs, and SB 1383, the “Short-Lived Climate Pollutants: Methane Emissions: Dairy and Livestock:

[5] SB 605 (Lara, Stat. 2014, Ch. 523).

Organic Waste: Landfills Act," requiring CARB to approve and begin implementing the plan by January 1, 2018. SB 1383 also sets targets for statewide reductions in SLCP emissions by 40 percent below 2013 levels by 2030 for HFCs as well as targets for black carbon and methane. The Board adopted CARB's SLCP Strategy in March 2017, which describes CARB's strategy for reducing annual HFC emissions to meet the SB 1383 2030 goal, therefore avoiding the worst impacts of climate change and meeting air quality goals in California.

Hence, California Health and Safety Code sections 38510, 38598, 38560, 38562, 38566, 38580, 39600, 39601, and 41511 grant CARB authority to adopt regulations that reduce emissions of GHGs and HFCs and to "do that which is necessary" to carry out CARB's purpose. California Health and Safety Code sections 39730, 39730.5 grant CARB authority to regulate HFCs. CARB is therefore authorized to regulate stationary refrigeration and foam end-uses as emissions sources of HFCs.

K. State: Existing CARB Measures

California has existing regulations to reduce emissions from non-residential stationary refrigeration equipment, motor vehicle air-conditioning, self-sealing valve requirement for small cans of automotive refrigerants purchased by "do-it-yourself" (DIY) mechanics, consumer product aerosol propellants, and semiconductor manufacturing. A brief description of current California HFC regulations follows:

- Refrigerant Management Program (RMP): The RMP (Cal. Code of Regs., tit. 17, §§ 95380, et seq.) is modeled after the U.S. EPA Clean Air Act, Section 608 program to protect the stratospheric ozone layer by reducing usage and emissions of ozone-depleting substances. In addition to ozone-depleting substances, CARB also included non-ozone-depleting substance HFC refrigerants with a 100-year GWP of 150 or greater (considered "high-GWP"). RMP requires facilities with refrigeration systems with more than 50 pounds of high-GWP refrigerant (for example, supermarkets and cold storage warehouses) to inspect for and repair leaks, maintain service records, and in some cases, report refrigerant use. The regulation also affects any person who installs, services or disposes of any equipment using a high-GWP refrigerant; and refrigerant wholesalers, distributors and reclaimers. The RMP has helped change industry practices to become more proactive in preventing refrigerant leaks, which has helped businesses save money by avoiding system repairs and downtime as well as the cost of replacement refrigerant.

- Advanced Clean Cars (ACC) Program: HFC emissions from transportation are largely from mobile vehicle air-conditioning (MVAC). The components of the ACC program are the Low-Emission Vehicle (LEV) regulations (contained in various sections, commencing with Cal. Code of Regs., tit. 13, §§1900 et seq.) that reduce criteria pollutants and GHG emissions from light- and medium-duty vehicles, and the Zero-Emission Vehicle (ZEV) regulation (commencing with Cal. Code of Regs, tit. 13, §§1962.1, et seq), which requires manufacturers to

produce an increasing number of pure ZEVs (meaning battery electric and fuel cell electric vehicles), with provisions to also produce plug-in hybrid electric vehicles (PHEV) in the 2018 through 2025 model years. As California and the U.S. EPA implement the MVAC credits programs under their light-duty vehicle GHG emission standards, and the MVAC leakage standards under their heavy-duty vehicle GHG emission standards, the share of HFC emissions from the transportation sector are expected to decline.

- Small-can "DIYer" Regulation for Mobile Vehicle AC Re-charging: The DIYer regulation (Cal. Code Regs., tit. 17, §§ 95360, et seq.) reduces emissions from small containers of automotive refrigerant by requiring the use of self-sealing valves on containers, improved labeling instructions, a refundable deposit recycling program, and an education program that emphasizes best practices for vehicle recharging.

- Consumer Product Aerosol Propellant Regulations: The consumer products regulation (Cal. Code Regs., tit. 17, §§ 95409, et seq.) prohibits aerosol propellants with a GWP of 150 or greater used in spray dusters (keyboard dusters), boat horns, tire inflators, and other consumer aerosol products.

- Semiconductor Manufacturing F-gas Regulations: Regulations for semiconductor manufacturing (Cal. Code Regs., tit. 17, §§ 95320, et seq.) set emission standards for operators of semiconductor operations and requires reporting of F-gas use. In addition to HFCs, other F-gases are included: perfluorocarbons (PFCs), sulfur hexafluoride (SF_6), and nitrogen trifluoride (NF_3).

L. Federal: Existing U.S. EPA Measures

The U.S. EPA regulates HFCs under two separate sections of the Clean Air Act. The existing federal regulations on HFCs include the following provisions:

- U.S. EPA Rule 612 (40 Code of Federal Regulations, Part 82, Subpart G, Appendices U and V): The SNAP Program was established under Section 612 of the Clean Air Act (42 U.S.C. § 7671k, et seq.) to identify and evaluate substitutes for ozone-depleting substances. The program looks at overall risks to human health and the environment from existing and new substitutes; publishes lists; promotes the use of acceptable substances; and provides the public with information.

  Under the Obama Administration, the 2013 Climate Action Plan directed the U.S. EPA to use their authority through the SNAP Program to consider climate impact as part of their comparative risk framework for evaluating alternatives. SNAP Rules 20 and 21 were the first SNAP Rules to prohibit high-GWP HFCs in certain end-uses where more climate-friendly alternatives were readily available and posed a lower overall risk to human health and the environment.

The most recent lists were published in “Protection of Stratospheric Ozone: Change of Listing Status for Certain Substitutes Under the Significant New Alternatives Policy Program” [80 Federal Register 42870 (July 20, 2015)] and “Protection of Stratospheric Ozone: New Listings of Substitutes; Changes of Listing Status; and Reinterpretation of Unacceptability for Closed Cell Foam Products Under the Significant New Alternatives Policy Program; and Revision of Clean Air Act Section 608 Venting Prohibition for Propane.” [81 Fed. Reg. 86778 (Dec. 1, 2016)].

- U.S. EPA Rule 608 (40 Code of Federal Regulations, Part 82, Subpart F): Section 608 of the Clean Air Act (42 U.S.C. § 7671g, et seq.) prohibits the knowing release of refrigerant during the maintenance, service, repair, or disposal of air-conditioning and refrigeration equipment. The U.S. EPA requires proper refrigerant management practices by owners and operators of refrigeration and air-conditioning systems, technicians, and others.

M. Global: The Kigali Amendment

The Montreal Protocol, a 1987 environmental agreement, brought the world together to repair the ozone layer. The Kigali Amendment amends the Montreal Protocol to include HFCs and phase down the production and consumption of HFCs globally to protect against climate change. Phasing down HFCs under the Montreal Protocol is expected to avoid up to 0.5°C warming by the end of the century. The international agreement is an outcome of the Twenty-Eighth Meeting of the Parties to the Montreal Protocol (MOP28), which was held in Kigali, Rwanda in October 2016. Recently the Kigali Amendment was ratified by more than 20 countries, the threshold number needed for the agreement to enter into force on January 1, 2019.

Under the Kigali Amendment, developed countries must begin to phase down HFC production and consumption in 2019, with an increasing cap until only 15 percent of production and consumption remains by 2036. Developing countries will begin a phasedown in 2029, and developing countries in hot ambient climates will have until 2032 to begin a phasedown.

The phasedown schedule is shown in Table 2 below:

TABLE 2: GLOBAL HFC PRODUCTION/CONSUMPTION CAP PHASEDOWN SCHEDULE *

Year	Developed Countries	Developing Countries Group 1	Developing Countries Group 2**
2017-2018	No Freeze		
2019	90%		
2024	60%	Freeze	
2028			Freeze
2029	30%	90%	
2032			90%
2034	20%		
2035		70%	
2036	15%		
2037			80%
2040		50%	
2040			70%
2045		20%	
2047			15%

** The baseline to calculate a production/consumption cap for developed countries is the annual average of HFC consumption (CO_2-equivalents) in 2011, 2012, and 2013, plus 15 percent of the annual average consumption of HCFCs in 2011-2013.*

***Group 2 countries include the Gulf Coast Countries (Saudi Arabia, Kuwait, the United Arab Emirates, Qatar, Bahrain, and Oman), India, Iran, Iraq, and Pakistan.*

It is important to note that the Kigali Amendment has yet to be ratified by the United States. To take effect in the United States, the Amendment must be ratified by the U.S. Senate, followed by legislation or rulemaking by U.S. EPA to provide a mechanism for implementing the phasedown schedule.

N. Federal SNAP Rules at Risk

On August 8, 2017, the D.C. Circuit ruled in favor of petitioners, Mexichem Fluor and Arkema, in two consolidated cases challenging U.S. EPA's authority to require manufacturers who have already replaced ozone-depleting substances with HFC substitutes to then replace those HFC substitutes with alternative approved substitute chemicals under the SNAP Program's Rule 20. The Rule is being defended by environmental groups, low-GWP refrigerant manufacturers, and a group of administrative law professors. CARB and Attorney Generals from multiple states also filed an amicus brief defending the Rule. A similar court case against SNAP Rule 21 has been held in abeyance pending resolution of the SNAP Rule 20 legal case.

Due to the uncertainty surrounding the recent court ruling on the federal SNAP regulations, and U.S. ratification of the Kigali Agreement, CARB is reviewing the strategy for reaching the SB 1383 HFC emissions target. CARB's first priority is to counter any lost reductions from a court decision to vacate SNAP Rule 20. The second step is to take additional action to require the use of more environmentally friendly alternatives in refrigeration and air-conditioning systems in California.

O. California Adaptation of HFC Prohibitions Listed in Federal Rules

While awaiting a response from the D.C. Circuit, CARB is creating regulatory certainty by regulating HFCs used in retail food refrigeration, vending machines, and foam end-uses originally addressed in the SNAP Rules. The provisions relating to retail food refrigeration are the most impactful in terms of emissions and also because the compliance dates have already passed or are immediately upcoming.

Other sectors addressed in the SNAP Rules include stationary air-conditioning, mobile vehicle air-conditioning (MVAC), propellants, solvents, and fire-suppressants. CARB is anticipating proposing additional rules to implement more stringent SLCP measures, which will cover end-uses such as stationary air-conditioning, which have later effectiveness dates in the SNAP Rules.

This rulemaking addresses stationary refrigeration in vending machines, retail food sectors, and foam end-use sectors, which have currently existing or upcoming effectiveness dates in the SNAP Rules. In the retail food refrigeration sector, vacating the SNAP Rules would create a gap between when the SNAP Rules were to take effect and when new CARB SLCP measures could take effect. This time period, 2018 to 2020, is critical for retail food refrigeration as older equipment using HCFC-22, an ozone-depleting refrigerant with a GWP of 1810, are rapidly being replaced. A window of opportunity exists in the next five years to accelerate the transition of refrigeration and air-conditioning equipment to lower-GWP refrigerants, before another generation of equipment is locked into using higher-GWP refrigerants over their average lifetimes of 15 to 20 years.

The SNAP Rules would have functionally prohibited new equipment in retail food from using a refrigerant with a GWP greater than 2100, a slight increase in GWP from HCFC-22. However, without the SNAP Rules in place, the default refrigerants used would have GWPs in excess of 3900, more than doubling the global warming from this one sector. The large impact of a gap in prohibiting harmful HFCs in new and retrofit refrigerant equipment, is due to the 15- to 20-year average lifetime of equipment.

The foam end-use sectors listed in this regulation have not used high-GWP HFC foam expansion agents for several years, and using low-GWP agents in their production is the current business practice. However, the foam end-use sectors listed are included in the regulation to prevent potential future use of high-GWP HFCs in new production of foam.

Other end-use sectors are better addressed through other existing regulatory framework in California, including the Advanced Clean Cars (ACC) Program for MVAC and the Consumer Product Regulation for propellants.

II. PROBLEM THAT THE PROPOSAL IS INTENDED TO ADDRESS

California has specific legal mandates to reduce GHG and more specifically, HFC emissions. Beginning with AB 32, California created a comprehensive, multi-year program to reduce GHG emissions in California. In 2016, the Legislature directed California to further reduce GHG emissions with the enactment of SB 32, requiring a 40 percent reduction in GHG emissions below 1990 levels by 2030. As indicated above, HFCs are powerful climate forcers with a relative climate forcing impact that is tens or even thousands of times greater than CO_2. In 2016, the Legislature enacted SB 1383, requiring a 40 percent reduction of HFC emissions below 2013 levels by 2030.

Fluorinated gases are projected to grow rapidly through 2030. CARB has identified retail food refrigeration end-uses as being large sources of HFC emissions in California. CARB's Scoping Plan and SLCP Strategy identify HFCs as an important GHG and SLCP mitigation measure. Unless emissions reductions from these sectors are maintained, they will grow exponentially, making it more difficult to both maintain current State GHG emission limits under AB 32, and to meet California's future mandates under SB 32 and SB 1383.

Accordingly, HFC emissions from retail food refrigeration, vending machines, and certain foam end-use sectors must be reduced. California was relying in substantial part on U.S. EPA's SNAP Rules. In a recent court decision by the D.C. Circuit, U.S. EPA's ability to require replacement of HFCs under the SNAP Rules is limited. Although environmental groups, industry, several states, CARB, and administrative law professors are actively defending these rules in court, immediate action is necessary to maintain and enforce prohibitions for certain end-uses of HFCs. Emissions from other end-use sectors are being addressed through separate regulatory efforts.

III. SUMMARY AND RATIONALE FOR CARB'S DETERMINATION THAT EACH ADOPTION IS REASONABLY NECESSARY

In this chapter, CARB provides a brief summary of the provisions included in the proposed regulation, explaining the rationale for CARB's determination that each provision of the regulation is: (1) reasonably necessary to carry out the purpose of the statutes or other provisions of law that the action is implementing, interpreting, or making specific; and (2) reasonably necessary to address the problem for which the regulation is proposed.

Section 95371. Purpose.

Summary of Section 95371

This section states that the purpose of the proposed regulation is to reduce HFC emissions by adopting specific U.S. EPA SNAP prohibitions for certain substitutes in refrigeration and foam end-uses. It also states that the proposed regulation has been designed to meet GHG reduction targets established in the California Global Warming Solutions Act, as codified in Health and Safety Code section 38500 et seq., HFC emissions reduction targets identified in Health and Safety Code section 39730.5, and in the Short Lived Climate Pollutant Strategy developed pursuant to Health and Safety Code sections 39730 and 39730.5.

Rationale of Section 95371

This section establishes that the proposed regulation will maintain HFC emissions reductions from refrigeration, vending machine, and certain foam end-uses and provide reference under applicable CARB authority. This provision of the proposed regulation is reasonably necessary to inform the regulated community why the proposed regulation is being adopted – to maintain HFC emissions reductions and comply with legal mandates under existing laws—AB 32, SB 32, SB 605, and SB 1383. The emissions reduction targets for 2030 are especially relevant for this proposed rulemaking because CARB's strategy for meeting these targets includes past and near-term action to comply with SNAP Rules 20 and 21 effective dates.

GHG emissions are contributing to global warming, which has a multitude of negative effects upon human health and the environment, as listed in numerous studies, and notably summed up in the 2014 Fifth Assessment Report (AR5) from the Intergovernmental Panel on Climate Change (IPCC), Working Group II report "Climate Change 2014: Impacts, Adaptation, and Vulnerability" (IPCC 2014b). The HFC emissions reduction will account for approximately 10 percent of all GHG reductions required by SB 32 and 24 percent of all HFC emissions reduction required by SB 1383.

Section 95372. Applicability.

Summary of Section 95372

This section specifies who is responsible for complying with the regulatory requirements and provides reference under applicable CARB authority. The regulation applies to any person who (1) sells, (2) installs, (3) uses, or (4) enters into commerce, in the State of California, any substitute in end-uses listed in Table 1, section 95374.

Rationale of Section 95372

This section ensures that the proposed regulation will apply to designated new and retrofit end-use categories. Compliance would not be limited to only the end-user of the

equipment, but to the entire supply chain of the equipment, from manufacturer, to distributor, seller, installer, operator and the end-user—which is necessary to ensure compliance with the proposed regulation.

Section 95373. Definitions.

Summary of Section 95373

This section establishes definitions for the terms used in the proposed regulation and provides reference under applicable CARB authority.

Rationale of Section 95373

Establishing definitions for key terms provides clarity and specificity in the proposed regulation, which is necessary for the regulated community to understand the requirements and which refrigerants, equipment, and actions are covered by the proposed regulation. The definitions are consistent with generally accepted descriptions and understandings of refrigeration equipment and foam end-uses.

Section 95374. List of Prohibited Substitutes.

Summary of Section 95374

This section lists the specific types of refrigeration and foam end-use sectors and HFCs that are prohibited in new and retrofitted equipment for retail refrigeration and vending machine end-uses, and in foam end-uses and provides reference under applicable CARB authority. Retrofitted equipment are those which have the original refrigerant designed to be used in the equipment replaced with a new type of refrigerant.

Table 1 in Section I. “Introduction and Background” Subsection D. “Which End-use Sectors Will be Covered by This Regulation?” provides the general end-use, specific end-use, prohibited substitutes, effective date, and corresponding GWP.

The first stationary refrigeration equipment category is retail food refrigeration, which includes new and retrofit stand-alone equipment, refrigerated food processing and dispensing equipment, remote condensing units, and supermarket systems. New and retrofit vending machines are the second stationary refrigeration category. The third category is foam end-uses, which include rigid polyurethane and polyisocyanurate laminated boardstock, flexible polyurethane, integral skin polyurethane, polystyrene extruded sheet, and phenolic insulation board and bunstock.

Rationale of Section 95374

This section is necessary to maintain required HFC emissions reductions in California as originally required by the U.S. EPA SNAP Program. The sectors were chosen because they have the largest HFC emission impacts, as shown in Table 1 and have upcoming

effective dates in the SNAP Rules. The substances listed have high-GWP values, which will contribute to climate change. Thus, prohibiting these substances will reduce the impacts of climate change and lower the overall risk to human health and the environment by the status change date. The foam end-use sectors included also have existing effectiveness dates. It was necessary to include them to prevent future use of high-GWP HFCs in new production of foam.

Other end-use sectors are being addressed through other measures. Please see Section I, Introduction and Background, Subsection O for a description of the rationale for excluding certain sectors. Additionally, please see Section IX, Evaluation of Alternatives, Alternative 2, for additional descriptions supporting CARB's decision to address other sectors through other measures.

Section 95375. Requirements.

Summary of Section 95375

This section contains the prohibition on using HFCs in refrigeration and foam end-use sectors, as listed in section 95374, as well as disclosure and record-keeping requirements to support enforcement in California and provides reference under applicable CARB authority.

Rationale of Section 95375

This section is necessary for CARB to be able to enforce the regulation. The record-keeping requirement is necessary for CARB to confirm that all products are compliant with the regulatory requirements. The disclosure requirement is necessary to inform the consumer that the product is legal in California, thereby reducing the chance of non-compliant products entering into the stream of commerce in California.

Section 95376. Enforcement.

Summary of Section 95376

This section specifies the types of violations that may occur under this proposed regulation. Subsection (a) specifies that failure to comply with any requirement constitutes a separate violation, which includes failure to retain or produce any records. Subsection (b) specifies that submitting or producing inaccurate information or records is a separate violation. Subsection (c) specifies that falsifying any information or record is a separate violation. Subsection (d) provides the provision of the Health and Safety Code (section 38580) under which CARB would be seeking penalties and subsection (e) provides notice that any violation may be enjoined pursuant to the Health and Safety Code section 41513.

Rationale of Section 95376

This section is required to specify that failure to comply with any of the proposed requirements is subject to enforcement action. Each enforcement provision is clearly identified so as to provide notice to the regulated entities and ensure the proposed regulation is not interpreted in such a way to mean that a regulated party is not subject to enforcement action. It ensures that the regulated parties will comply with the requirements of the regulation.

Section 95377. Severability.

Summary of Section 95377

This section specifies that each part of the proposed regulation is severable.

Rationale of Section 95377

This section is necessary so that the proposed regulation is not interpreted in such a way to mean that a future determination, which invalidates any part of the proposed regulation, does not invalidate any other requirement in the proposed regulation, therefore keeping the proposed regulation in full force and effect.

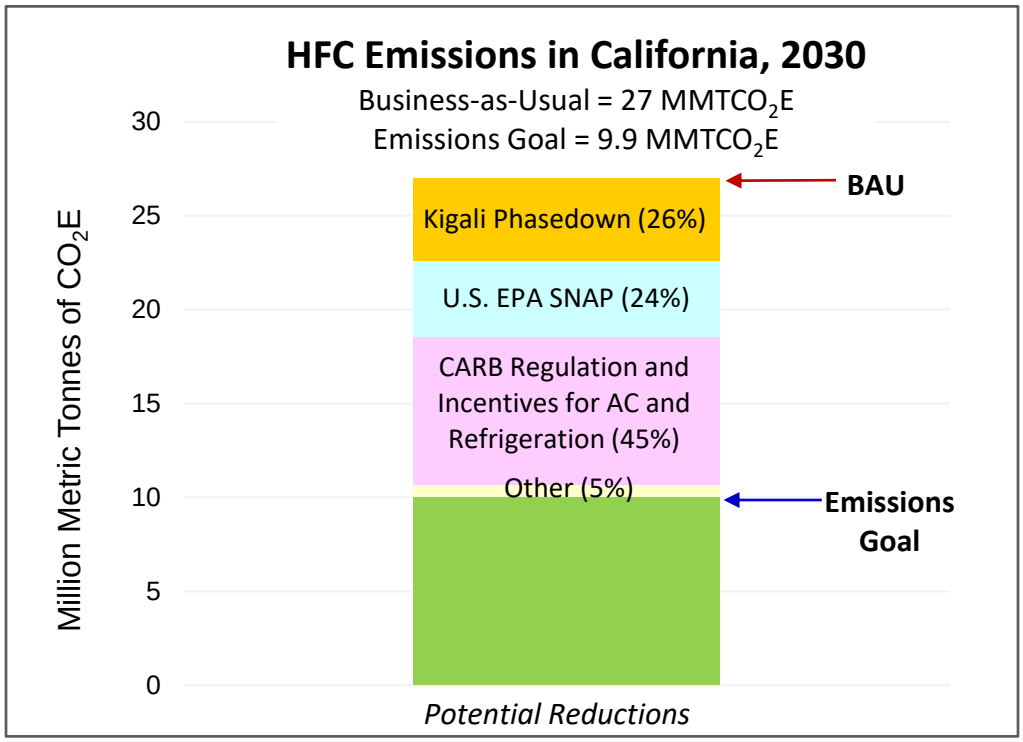
IV. BENEFITS ANTICIPATED FROM THE REGULATORY ACTION INCLUDING THE BENEFITS OR GOALS PROVIDED IN THE AUTHORIZING STATUTE

As a part of developing the HFC measures in the SLCP Strategy, CARB estimated business-as-usual (BAU) HFC emissions for California through 2050. CARB also conducted an analysis to determine if the global HFC phasedown schedule with reductions in production and consumption of HFCs beginning 2019 would be sufficient to allow California to meet its SB 1383 emissions reduction goal, without additional reduction measures nationally or in California (CARB 2017c). In developing both the BAU forecast and emission reduction scenarios, CARB used California's High Global Warming Potential Gases Emission Inventory (CARB 2016a, 2017b) as well as a peer-reviewed, California-specific HFC emissions model developed by CARB (Gallagher, G. et al. 2014).

CARB has estimated annual emissions in 2013, the baseline year for the SB 1383 target, to be 16.5 $MMTCO_2E$. By 2030, annual HFC emissions are expected to grow to 27.0 $MMCO_2E$ even with existing CARB Rules in place (as of January 1, 2017). To meet a 40 percent reduction in HFC emissions below 2013 levels, annual emissions in California must decrease by 17.1 $MMTCO_2E$ to reach 9.9 $MMCO_2E$ per year in annual emissions in 2030. CARB was anticipating achieving 26 percent of the reductions needed from the implementation of the Kigali Amendment in the United States, 24 percent from SNAP Rules 20 and 21, 45 percent from additional CARB regulations and incentives for air-conditioning and refrigeration systems, and another 5 percent from other CARB reduction measures, which may include provisions for transportation

refrigeration units, heavy-duty motor vehicle air conditioning, and chronically leaking refrigeration equipment (see Figure 2 below).

FIGURE 2. POTENTIAL HFC EMISSION REDUCTIONS FROM EXISTING AND PROPOSED MEASURES



International, national, and state measures will be needed to achieve the required HFC Emission Reductions by 2030 in California. The U.S. EPA SNAP program is an integral part of the measures needed.

In Table 3, CARB estimates the following HFC emissions reductions, shown in $MMTCO_2E$, in California expected from implementing the proposed regulation.

TABLE 3. EXPECTED HFC EMISSIONS REDUCTIONS IN CALIFORNIA

Year	Annual Reductions ($MMTCO_2E$)	Cumulative Reductions ($MMTCO_2E$)
2018	0.3	0.3
2019	0.4	0.7
2020	0.7	1.4
2021	0.9	2.4
2022	1.2	3.6
2023	1.5	5.1
2024	1.7	6.8
2025	2.0	8.8
2026	2.3	11.1
2027	2.5	13.6

Year	Annual Reductions ($MMTCO_2E$)	Cumulative Reductions ($MMTCO_2E$)
2028	2.8	16.5
2029	3.1	19.6
2030	3.4	22.9

Appendix B contains additional details on the assumptions and emissions factors used to estimate emissions reductions as a result of adopting the proposed regulation.

No reductions in criteria pollutants are anticipated.

V. AIR QUALITY

All air quality benefits are from the reductions of GHGs. CARB does not anticipate any reduction in criteria or toxic air contaminants. As shown in the preceding emissions reductions table, annual GHG reductions are estimated to be up to 3.4 $MMTCO_2E$ by the year 2030, with cumulative reductions of 22.9 $MMTCO_2E$ from 2018 through 2030.

Prohibiting the very-high GWP refrigerants may result in added energy efficiency in refrigeration equipment using alternative refrigerants, reducing electricity usage, which would reduce emissions caused by generating electricity. However, U.S. EPA did not quantify energy benefits from SNAP Rules 20 and 21. Similarly, California will not attempt to show air quality benefits resulting from less electricity generated as a result of this proposed regulation.

VI. ENVIRONMENTAL ANALYSIS

A. Introduction

This chapter provides the basis for CARB's determination that the proposed regulation is exempt from the requirements of the California Environmental Quality Act (CEQA). A brief explanation of this determination is provided in section B below.

CARB's regulatory program, which involves the adoption, approval, amendment, or repeal of standards, rules, regulations, or plans for the protection and enhancement of the State's ambient air quality, has been certified by the California Secretary for Natural Resources under Public Resources Code section 21080.5 of CEQA (14 Cal. Code Regs. § 15251(d)). Public agencies with certified regulatory programs are exempt from certain CEQA requirements, including but not limited to, preparing environmental impact reports, negative declarations, and initial studies. CARB, as a lead agency, prepares a substitute environmental document (referred to as an "Environmental Analysis" or "EA") as part of the Staff Report prepared for a proposed action to comply with CEQA (17 Cal. Code Regs. §§ 60000-60008). If the regulation is finalized, a Notice of Exemption will be filed with the Office of the Secretary for the Natural Resources Agency and the State Clearinghouse for public inspection.

B. Analysis

CARB has determined that the proposed regulation is categorically exempt from CEQA under the “Class 8” exemption (14 Cal. Code Regs. § 15308) because it is an action taken by a regulatory agency for the protection of the environment.

The proposed regulation will add to State regulations the end-use sectors and prohibited HFCs as listed in section 95374 of title 17, California Code of Regulations. The HFC prohibitions in end-use sectors that the U.S. EPA SNAP program currently regulates are at risk of being vacated through federal court action. The applicable end-use sectors and HFC prohibitions as regulated by the U.S. EPA SNAP program will be adopted into the proposed CARB regulation as listed in section 95374 of title 17, California Code of Regulations.

The U.S. EPA SNAP program is an integral part of meeting the state’s target of 40 percent reduction in HFC emissions below 2013 levels by 2030 as required by SB 1383 and as described in the SLCP Strategy developed pursuant to that section. CARB counts on SNAP for approximately 24 percent of the reductions needed. This new regulation will assure emissions reduction within California associated with the applicable parts of the SNAP Rules through preserving prohibitions on use of certain substances.

The proposed action is designed to protect the environment and CARB has determined there is no substantial evidence indicating the proposal could adversely affect air quality or any other environmental resource area, or that any of the exceptions to the exemption applies (14 Cal. Code Regs. § 15300.2); therefore, this activity is exempt from CEQA.

VII. ENVIRONMENTAL JUSTICE

State law defines environmental justice as “the fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies. Government Code, section 65040.12, subdivision (c). CARB is committed to making environmental justice an integral part of its activities. The Board approved its Environmental Justice Policies and Actions (Policies) on December 13, 2001, to establish a framework for incorporating environmental justice into CARB's programs consistent with the directives of State law. These policies apply to all communities in California, but recognize that environmental justice issues have been raised more in the context of low-income and minority communities.

The proposed regulation aims to reduce the impacts of climate change, which would otherwise be expected to exacerbate or create environmental injustice. There are no known negative environmental justice impacts that have been identified with regard to the proposed regulation.

VIII. ECONOMIC IMPACTS ASSESSMENT

A. Summary

The economic impacts assessment was conducted to meet current legal requirements under the Administrative Procedure Act (APA). This chapter contains the estimated costs to businesses and public agencies to comply with the proposed amendments to the regulation.

The costs of the proposed regulation was estimated by scaling the U.S. EPA nationwide cost to California's 12.1 percent of the U.S. population, along with manufacturers' markup and the amount of time and materials required to comply with each of the adopted provisions of the proposed regulation for each end-use sector. The approximations of costs provide a general estimate of the economic impacts that typical end-use sectors might encounter. Individual companies may experience different impacts than those projected here, depending on various factors.

The cost of the proposed regulation was estimated to be $4.12 million in compliance costs and $130,000 in reporting costs and the one-time cost to update the invoice language, for a total of $4.25 million.

CARB has determined that the additional costs of the proposed adoption would not adversely affect businesses. As a result, CARB does not expect a noticeable change in employment, business creation, expansion, or elimination, or business competitiveness in California.

CARB does anticipate benefits to the health and welfare of California residents and the state's environment as outlined in section IV above but does not anticipate any cost or benefits to worker safety.

B. Legal Requirements

Section 11346.2 of the Government Code requires an economic impact assessment for non-major regulations or a standard regulatory impact analysis (SRIA) for major regulations to be included in the ISOR when proposing to adopt, amend, or repeal a regulation. A major regulation is defined by section 11342.548 of the Government Code as a regulation that will have a potential economic impact to California business enterprises and individuals in an amount exceeding $50 million in any 12-month period. CARB has determined that the proposed regulatory requirements do not meet the major regulation threshold because the economic impact is below $50 million.

For non-major regulations, sections 11346.2 and 11346.3 of the Government Code require state agencies to assess the potential for adverse economic impacts on California business enterprises and individuals when proposing to adopt or amend any administrative regulation. The assessment shall include a consideration of the impact of the proposed regulation or amendments on California jobs; business expansion,

elimination, or creation; the ability of California businesses to compete; and benefits of the regulation to the health and welfare of California residents, worker safety, and the state's environment.

The costs to comply with the proposed regulation are below $50 million and less than $10 million in any one year. Therefore the proposed regulation does not meet the major regulation threshold as specified in Government Code section 11342.548 or Health and Safety Code section 57005.

C. Cost Impacts Analysis

The proposed regulation would only apply to entities in the stationary commercial refrigeration sector in five end-use categories, and end-use categories in the foam sector, which includes rigid polyurethane and polyisocyanurate laminated boardstock, flexible polyurethane, integral skin polyurethane, and phenolic insulation board and bunstock (Table 4). The regulatory costs and benefits include the following: The number of affected businesses is 49,500, of that, 28,400 (62 percent) are small companies. In total, the cost of the proposed regulation will result in an impact of $4.25 million over its lifetime of 20 years. The impact on state government will be $658,000 in the next three years. The proposed regulation will not result in the creation of jobs because of the minimal cost impact of the proposed regulation. The impact to health and welfare of California residents, workers safety, or California's environment due to the proposed regulation will be approximately 3.4 $MMTCO_2E$ reduction in HFC emissions annually by 2030. A more expansive description of the costs by sector is described in Table 5.

TABLE 4: SECTORS AFFECTED BY PROPOSED REGULATION

End Use Sector	Number of Affected Companies	Number of Small Companies	Percentage of Small Companies
Supermarket Systems - Retail Food	2,700	1,100	41
Remote Condensing Units	43,100	27,300	63
Stand-alone Equipment - Retail Food	30	20	67
Vending Machines	10	0	0
Retail Food Refrigeration – New Refrigerated Food Processing and Dispensing Equipment	20	0	0
Polystyrene Foam Product Manufacturing	10	0	0
Polyurethane and Other Foam Product Manufacturing	60	0	0
Total	45,900	28,400	62

Breakdown of Affected Businesses by Sector

Retail Food Refrigeration – Supermarket Systems:

The proposed regulation would affect a total of 2,700 companies: approximately 340 refrigeration equipment manufacturers based on equipment registered in the CARB RMP Refrigerant Registration and Reporting System (R3) tool's online database; approximately 2,000 contractors with the appropriate and active State C-38 or C-20 license to install or retrofit the refrigerant contained in the refrigeration equipment; and approximately 360 retail food companies that could retrofit their existing equipment by removing the existing refrigerant and replacing it with a compliant refrigerant in the same equipment based on registered companies in R3.

The CARB R3 has a list of 170 of the principal refrigeration equipment manufacturers used in the registration of refrigeration equipment. The list was derived from outreach to facilities with stationary refrigeration equipment regulated under the RMP regulation. Additional entries by R3 users indicate the existence of a total of approximately 340 manufacturers. In the registration of refrigeration equipment in R3, the top 10 manufacturers constitute 55 percent of the registered refrigeration equipment. None of the equipment manufacturers are believed to be located in California and they are not expected to be small businesses. Based on the manufacturing scale needed to produce the equipment, none of these manufacturers are expected to have fewer than 100 employees.

The installation of the equipment is mostly done by construction contractors with the required California Contractor State License Board (CSLB) license (C-38 – Refrigeration Contractor), or larger equipment service companies who also have the appropriate required contractor's license. The service companies would also be the entities that retrofit existing equipment. CARB estimates that approximately 43 percent (860) of the 2,000 installers and service companies are considered to be small businesses because they are independently owned and operated with fewer than 100 employees.

The SNAP Rules that are to be adopted in the proposed regulation also apply to retrofits of the existing equipment to remove the existing refrigerant and replace it with a new refrigerant in the same equipment. The R3 data was again used to determine the number of entities with refrigeration equipment in the retail food sector expected to retrofit the refrigerant in their refrigeration systems that would be affected by the proposed regulation, which include the following North American Industry Classification System (NAICS) codes: 445110, 452910, 452112, 447110, 453998, 445299, 445230, 445120, 445210, 445291, 445220, 452990 and 446191. These data indicate approximately 360 retail food companies registered in R3.

All companies in the state with facilities that use at least one refrigeration system with more than 50 pounds of refrigerant are required to register using the R3 online reporting system. Of these approximately 360 companies, approximately 300 have Dun and Bradstreet employee number information and approximately 200 (72 percent) were determined likely to be small businesses with fewer than 100 employees. Extrapolating from this percent of small businesses to the total 360 companies indicates approximately 260 small businesses. Although the aforementioned entities would potentially choose to retrofit, there is no requirement to retrofit. Each year approximately 3 percent of the facilities are likely to retrofit their refrigerant type. Likewise, approximately 7 percent of the facilities are likely to install new refrigeration systems each year.

Remote Condensing Units:

Remote condensing units are manufactured by an estimated 10 manufacturers, 8 of which account for more than 90 percent of new equipment. None of equipment manufacturers are believed to be located in California and they are not expected to be small businesses due to the manufacturing scale needed to produce the equipment; none are expected to have fewer than 100 employees.

An estimated 43,100 facilities that contain remote condensing units are potentially subject to retrofit requirements. These would include convenience stores, specialty food stores, pharmacies and drug stores, hotels, and restaurants. Of these stores there are approximately 14,000 convenience and specialty food stores and 3,300 pharmacies and drug stores in California (NAICS codes 44512, 44521, 44522, 44523, 445291, 445292, 445299, 4453, 446110, 452990. In addition there are approximately 26,000 hotels and restaurants (NAICS codes 72111, 72112, 72211, 722211, 722212, 722213, 72241) that are likely to have remote condensing units potentially subject to retrofit of the refrigerant type (ICF 2015a, 2015b). Approximately 63 percent, or 27,300, are likely to be small businesses.

Although the aforementioned entities may potentially choose to retrofit, there is no requirement to retrofit. Approximately 5 percent of the affected entities are expected to replace their existing refrigeration system with a new refrigeration system, assuming a 20-year equipment lifetime.

The same set of service companies as noted above in the supermarket systems discussion would be affected to retrofit remote condensing units.

Stand-Alone Retail Food Refrigeration Units:

Stand-alone (self-contained) refrigeration units used in retail food refrigeration are found at many convenience stores, supermarkets, and restaurants. According to information derived from the North American Association of Food Equipment Manufacturers (NAFEM), there are approximately 30 manufacturers of the

stand-alone refrigeration units affected by the proposed regulation of which 90 percent of the market share are manufactured by large companies and 10 percent by small businesses. Twenty manufacturers were determined to be small businesses with fewer than 100 employees who account for the remaining 10 percent of the market share.

Approximately 5 percent of the affected entities are expected to replace their existing equipment with a new equipment, assuming a 20-year equipment lifetime. Stand-alone units are typically not economical to retrofit because they are small units; they are more likely to be replaced with new units. However, for those that retrofit, the same set of service companies (as noted above in the supermarket systems discussion) would be the affected entities and be affected similarly.

Vending Machines:

Based on information provided by the vending machine industry, there are approximately 10 companies who manufacture the equipment and would be affected by the proposed regulation, of which none are considered to be small businesses. Of these 10 companies, 2 account for more than 50 percent of the vending machines manufactured. Approximately 7 percent of the existing vending machines are expected to be replaced with new vending machines each year. The lifetime of a vending machine is on average, 15 years. Vending machines are typically not economical to retrofit because they are small units; they are more likely to be replaced with new units.

Retail Food Refrigeration – New Refrigerated Food Processing and Dispensing Equipment:

There are approximately 20 companies who manufacture the refrigerated food processing and dispensing equipment (ICF 2016) and they are not considered to be small businesses.

Polystyrene Foam Product Manufacturing:

There are approximately 10 potentially affected businesses who manufacture the foam systems (companies who manufacture the basic chemical composition) of polystyrene foam (ICF 2015b). None of the manufacturers are considered small businesses. These businesses use HFCs in their product, however, the specific HFC that they are known to use (HFC-152a) is not affected by the prohibitions. The companies who manufacture the foam systems typically market the foam system to other manufactures and consumers who combine the elements of the foam system to make a foam product. The SNAP prohibitions for this end-use went into effect January 1, 2017, thus all foam system manufactures are currently

not using the prohibited HFCs and are not affected by the proposed regulation with the exception of the record-keeping and disclosure provisions.

Urethane and Other Foam Product Manufacturing:

There are approximately 60 businesses potentially affected by the proposed regulation who manufacture foam systems for polyurethane products in the four affected end-use categories (Rigid Polyurethane and Polyisocyanurate Laminated Boardstock, Flexible Polyurethane, Integral Skin Polyurethane, and Phenolic Insulation Board and Bunstock; ICF 2016). However, none of these businesses use HFCs prohibited by SNAP Rule 20 in the foam systems (ICF 2015a). The SNAP prohibitions for these end-uses went into effect January 1, 2017, thus all manufactures are currently not using the prohibited HFCs and are not affected by the proposed regulation. The end-uses are included in the regulation to prevent new businesses entering the field from using HFCs if the SNAP Appendix U (Rule 20) is vacated by the courts. None of the manufacturers are considered small businesses.

Overall, of a total of 45,900 potentially affected businesses (Table 4), 62 percent or 28,400 businesses are considered to be small businesses because they are independently owned and operated and have fewer than 100 employees.

Methodology

The costs of the proposed regulation was estimated by scaling the U.S. EPA nationwide cost to California's 12.1 percent of the U.S. population, along with manufacturers' markup and the amount of time and materials required to comply with each of the adopted provisions of the proposed regulation for each end-use sector.

To determine the costs of SNAP Rules 20 and 21, the U.S. EPA commissioned studies by ICF International that estimated the nationwide annualized costs of the Rules (ICF 2015b, 2016). The studies determined that SNAP Rule 20 was unlikely to impose cost on the retail food industry. The industry would continue to operate under BAU because the SNAP Rules do not require any business transition to a lower-GWP refrigerant or alternative technology.

The studies, however, estimated the nationwide annualized cost of SNAP Rule 20 to be $1.8 million at a 7 percent discount rate over a 20-year equipment life, or approximately $19.1 million in total, for manufacturers of stand-alone equipment and vending machines as shown in Table 5. The studies for SNAP Rule 21 show an annualized nationwide cost to be $0.42 million over a 20-year equipment life, or approximately $4.4 million in total for manufacturers of refrigerated food processing and dispensing equipment. The total nation-wide cost of the portions of SNAP Rules 20 and 21 in the proposed regulation is $23.5 million (ICF 2015b, 2016). The California share of the costs were then estimated based on the California apportioned share of the national population: 12.1 percent of the U.S. population between 2010 and 2016; therefore, indicating that the California share of

the Federal total compliance cost would be $2.8 million. Considering the refrigeration industry average gross profit margin of 31 percent as percent of sales for the past five years (Bizminer 2017), the California share of the federal total compliance cost including the mark-up cost from manufacturers to California buyers would amount to $4.12 [i.e., $2.8/(1 – 0.31)] million. The California estimated costs are likely to be on the high side because some affected manufacturers have already complied with the federal SNAP rules.

TABLE 5: COSTS TO SECTORS AFFECTED BY PROPOSED REGULATION

End Use Sector	U.S. Initial Cost (Million $)	California Initial Cost Plus Mark-up (Million $)	California Initial Cost Per Manufacturer	
			Typical Business	Small Business
Supermarket Systems - Retail Food	0	0	0	0
Remote Condensing Units	0	0	0	0
Stand-alone Equipment - Retail Food	16.1	2.8	254,100	14,100
Vending Machines	3.0	0.5	52,000	0
Retail Food Refrigeration – New Refrigerated Food Processing and Dispensing Equipment	4.4	0.8	38,900	0
Polystyrene Foam Product Manufacturing	0	0	0	0
Polyurethane and Other Foam Product Manufacturing	0	0	0	0
Total	23.5	4.1	-	-

Supermarket systems, remote condensing units, polystyrene foam manufacturing, and polyurethane foam manufacturing end uses all have compliance dates in the SNAP Rules of January 1, 2017 or before, therefore, no additional costs are attributable to this proposed regulation to meet the reductions in use of the specified HFCs.

If enacted as a State regulation, the proposed regulation would require affected manufacturers to maintain records although it does not mandate routine reporting; the regulation allows CARB to request the records when desired. CARB has found that manufacturers currently record the information required for other purposes, such as warrantees, etc.; thus, no additional cost is indicated for record-keeping.

Since the manufacturers are nation-wide, a nation-wide estimate of employee wages and benefits was used. According to the U.S. Bureau of Labor Statistics (BLS 2017), employee compensation for the manufacturing sector the median wage was $25.98 per hour in June 2017 and the benefit amounted to $13.86 (53.4 percent of the hourly wage). Therefore, total hourly labor cost was estimated to be $39.84.

The disclosure statement mandated by the regulation on each invoice would require a one-time change to the invoice language. This change is estimated to take one hour; approximately $40 per refrigeration equipment manufacturer and $16,135 (i.e., $39.84 x 405) for all manufacturers. The disclosure statement is also mandated by the proposed regulation for the foam end-use sectors. Incorporating the disclosure statement on the invoice would require a one-time change to the invoice language. This change is estimated to take one hour, approximately $40 per affected foam manufacturer and $2,789 (i.e. $39.84 x 70) for all manufacturers.

Although there are no legal requirements on how often CARB can and will request records, for the purpose of providing a cost estimate, CARB could request records from the manufacturers the first and second year, then the fifth year and every five years thereafter. CARB estimates that it will take one hour to query the records for this report; approximately $239 (i.e., $39.84 x 6) per manufacturer and $98,811 (i.e., $239 x 405) for all manufacturers over 20 years. Similarly, to provide a cost estimate CARB could request records from the polystyrene foam manufacturers for the first and second year, then the fifth year and every five years thereafter for a total of 6 times over 20 years. CARB estimates that it will take one hour to query the records for this report; approximately $239 (i.e., $39.84 x 6) per polystyrene foam manufacturer and $16,733 (i.e., $239 x 70) for all manufacturers over 20 years.

Therefore, total statewide costs of the regulation over its 20-year lifetime are estimated to be $4.25 million (i.e. $4.12 million in compliance costs plus $130,000 in disclosure and record production costs) over its 20-year lifetime.

Cost to Small Businesses

The initial cost for small businesses for all affected sectors except stand-alone equipment for the retail food sector are expected to be zero. The stand-alone sector is the only affected sector in which CARB has identified small businesses. The initial cost for small businesses in the stand-alone equipment sector, however, is expected to be approximately $14,200, including approximately $14,100 compliance cost, $40 one-time cost to update the invoice to include the disclosure statement, and $40 to query and submit the sales records in response to an expected CARB request. Annual ongoing cost will be $40 only in years 2, 5, 10, 15, and 20 when sales records are expected to be requested.

Cost to Typical Businesses

The initial cost for a typical business is expected to range from approximately $80 to $254,200, including $0 to $254,100 compliance cost, $40 one-time cost to update the invoice to include the disclosure statement, and $40 to query and submit the sales records in response to an expected CARB request. Annual ongoing cost will be $40 only in years 2, 5, 19, 15, and 20 when records are expected to be requested.

TABLE 6. INITIAL AND ONGOING COSTS FOR A TYPICAL BUSINESS

End Use Sector	Initial Cost	Ongoing Cost*
Supermarket Systems - Retail Food	$80	$40
Remote Condensing Units	$80	$40
Stand-alone Equipment - Retail Food	$254,200	$40
Vending Machines	$52,100	$40
Retail Food Refrigeration – New Refrigerated Food Processing and Dispensing Equipment	$39,000	$40
Polystyrene Foam Product Manufacturing	$80	$40
Polyurethane and Other Foam Product Manufacturing	$80	$40

**Ongoing cost occurs only in years 2, 5, 10, 15 and 20 when sales records are requested.*

Since affected businesses already maintain the required records, the cost of record-keeping is zero. However, affected manufacturers are expected to make a one-time change to their invoice language and report their sales records in years 1, 2, 5, and every five years thereafter when CARB is expected to request records. CARB estimates it will take one hour to update the invoice language and one hour to query the records per manufacturer at the total reporting cost of $80 in the first year and $40 per report in years 2, 5, 10, 25, and 20 when CARB is expected to request sales records form manufacturers.

Cost to State Government and Local Agencies

The proposed regulation is expected to have no impacts on local agencies, school districts, or State government agencies except CARB. The agency will require two additional Air Pollution Specialist (APS) staff to implement and enforce the proposed regulation starting in the 2018-2019 fiscal year. The staff cost is zero in the current (2017-2018) fiscal year and $330,000 for the 2018-2019 first year and $328,000 for 2019-2020 and thereafter, for a total three-year cost of $658,000.

IX. EVALUATION OF REGULATORY ALTERNATIVES

Government Code section 11346.2, subdivision (b)(4) requires CARB to consider and evaluate reasonable alternatives to the proposed regulatory action and provide reasons for rejecting those alternatives. This section discusses alternatives evaluated and provides reasons why these alternatives were not included in the proposal. As explained below, no alternative proposed was found to be less burdensome and equally effective in achieving the purposes of the regulation in a manner than ensures full compliance with the authorizing law. The Board has not identified any reasonable alternatives that would lessen any adverse impact on small business.

Alternative 1: No Action

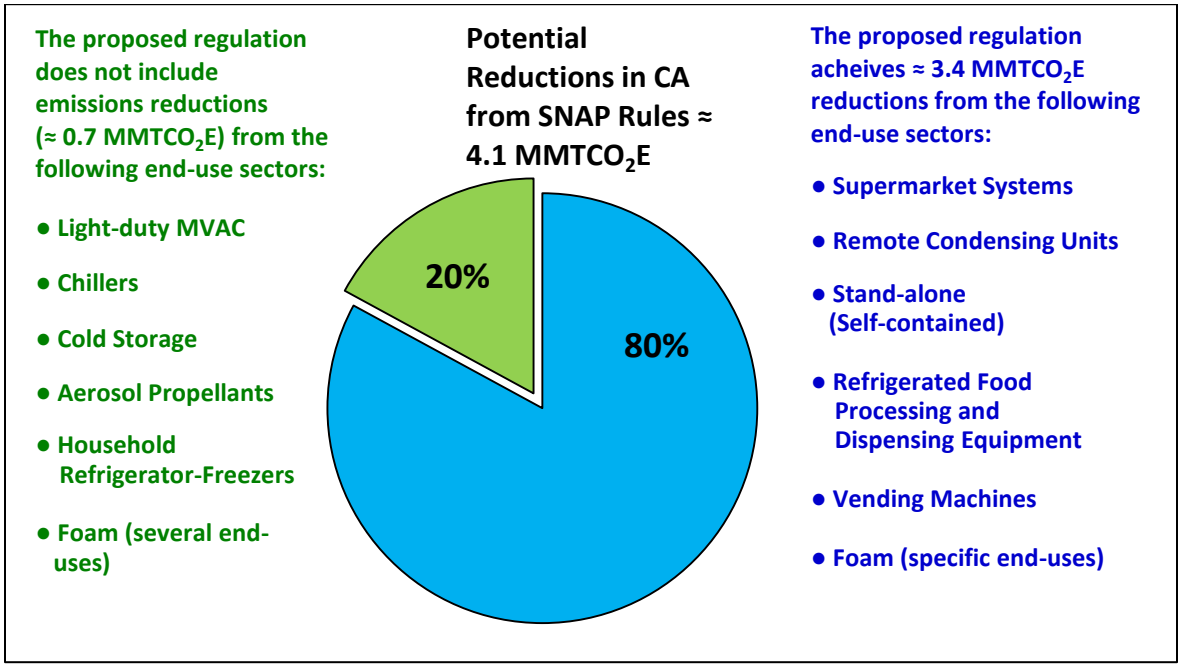
The first alternative CARB staff considered was to take no action. CARB staff rejected this alternative because without the proposed rule, AB 32, SB 32 and SB 1383 emissions reductions targets would be seriously jeopardized – California would lose the expected annual emissions reduction of 3.4 $MMTCO_2E$. Immediate action is key to counteract the uncertainty caused by the August 8, 2017 D.C. Circuit Court ruling in *Mexichem Fluor v. U.S. EPA* and to prevent harm to the environment that reverting back to high-GWP refrigerants and foam blowing agents would cause. In addition, CARB would be left without enforcement mechanisms to achieve the emissions reduction required by statute in the event that the SNAP Rules are vacated or otherwise held unenforceable by a federal court. California enforcement entities are more familiar with the affected entities and better able to provide focused and effective enforcement.

Alternative 2: Adopt U.S. EPA SNAP Rules in their Entirety

The second alternative would be to adopt SNAP Rules 20 and 21 for all end-use sectors, not just specific end-uses (foam, retail food refrigeration and vending machine end-uses). Other end-uses listed in SNAP Rules 20 and 21, which are not being addressed through this proposed rulemaking by CARB include propellants, solvents, certain foam blowing end-uses, fire suppressants, chillers, cold storage warehouses, household refrigerators and freezers, and air-conditioning end-uses including motor vehicle air conditioning (MVAC). This alternative was proposed by environmental groups after the workshop.

This alternative would increase annual emissions reduction from a maximum of 3.4 $MMTCO_2E$ to 4.1 $MMTCO_2E$ by 2030 (an increase of 0.7 $MMTCO_2E$ in reductions). However, adopting all SNAP requirements would increase the California share of total federal compliance costs, including mark-up, by 39 times from $4.1 million to $162.2 million. The pie chart below (Figure 3) shows the relative HFC emissions in California from end-use sectors included in SNAP Rules 20 and 21 prohibitions. Note that the pie chart only shows HFC emissions reductions from those end-use sectors specifically regulated by SNAP Rules 20 and 21.

FIGURE 3. POTENTIAL HFC EMISSIONS REDUCTIONS BY 2030 IN END-USE SECTORS COVERED BY SNAP RULES 20 AND 21 ADDRESSED BY THIS PROPOSED REGULATION



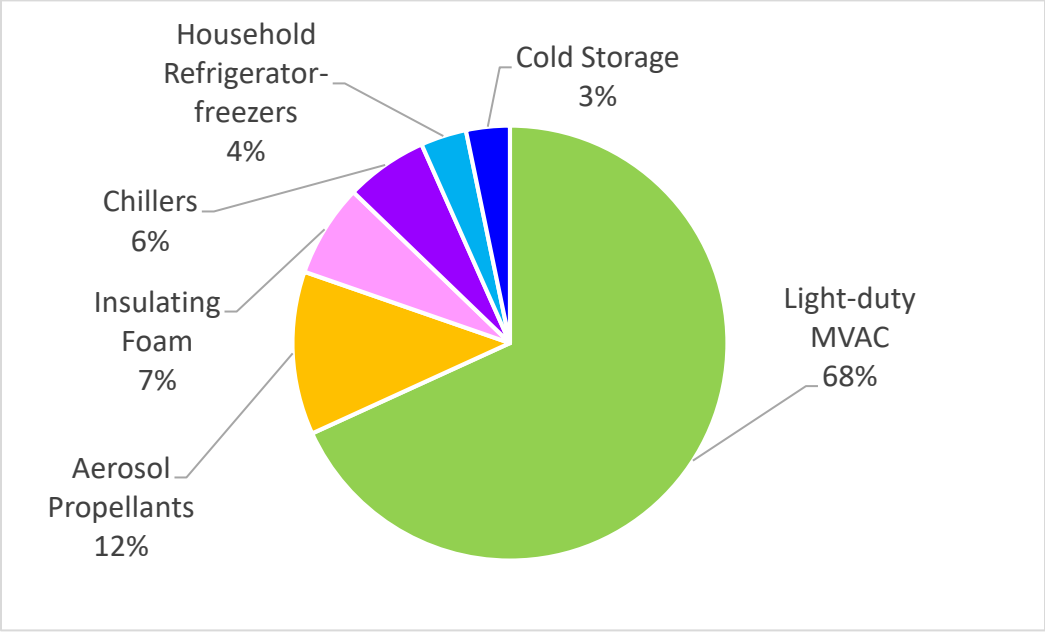
Potential emissions reduction from end-use Sectors in SNAP Rules not covered by the proposed regulation are shaded green. Other actions may be taken to reduce emissions from these sectors.

Approximately, a maximum annual emission reduction of 4.1 $MMTCO_2$ in year 2030 is expected from SNAP Rules 20 and 21. This regulation will achieve up to approximately 3.4 $MMTCO_2E$ annual emissions reduction by 2030, which is approximately 80 percent of the emissions reduction expected from SNAP Rules. The remaining HFC emissions from end-use sectors not directly included in this regulation will be addressed and mitigated through other measures, as discussed below and in Section I. Subsection O "California Adaptation of HFC Prohibitions Listed in Federal Rules."

<u>Remaining SNAP Rules 20 and 21 End-Use Sectors to be Addressed Through Other Actions</u>

For reference, we show the relative emissions of just those end-use sectors in SNAP Rules 20 and 21 not covered directly by this regulation (the following pie chart Figure 4 is a subset of the green shaded sectors in the previous Figure 3). Figure 4 shows that the light-duty MVAC sector comprises more than two-thirds of the HFC emissions in SNAP Rules 20 and 21 end-use sectors that will be addressed through other actions. The rationale for not adopting MVAC and the other end-use sectors within this regulation is described below.

FIGURE 4. RELATIVE HFC EMISSIONS FROM END-USE SECTORS IN SNAP RULES 20 AND 21 TO BE ADDRESSED THROUGH OTHER ACTIONS



Relative emissions of end-use sectors regulated by SNAP Rules 20 and 21. CARB analysis 2017.

<u>MVAC - Light Duty Vehicles</u>:

CARB adopted the Advanced Clean Cars (ACC) program in 2012. This program, developed in coordination with U.S. EPA and National Highway Traffic Safety Administration (NHTSA), combined the control of smog-causing pollutants and GHG emissions into a single coordinated set of requirements for model years 2015 through 2025. The requirements of the ACC program in California were subsequently adopted nationally as a Federal Program.

Although SNAP Rule 20 bans HFC-134a (GWP 1430) for light-duty MVAC beginning Model Year MY 2021, many auto manufacturers are already making light-duty vehicles with AC systems using HFO-1234yf as the refrigerant, with a GWP less than 10. Other auto manufacturers are developing MVAC systems using CO_2 as the refrigerant (GWP of one). The Federal Clean Cars program gives auto makers fuel efficiency credit incentives for low-leak, low-GWP, and fuel-efficient MVAC systems for new light-duty vehicles.

<u>Chillers</u>:

SNAP Rule 21 prohibits certain high-GWP HFCs in new chillers for most uses beginning January 1, 2024. CARB has proposed regulations (as part of the SLCP Strategy) to prohibit all high-GWP refrigerants from new chillers beginning

January 1, 2021. Therefore, the existing SNAP Rule 21 prohibitions will be redundant and unnecessary for California.

Cold Storage:

SNAP Rule 21 prohibits certain high-GWP HFCs in new chillers beginning January 1, 2023. Cold storage facilities using more than 50 pounds of high-GWP refrigerant in any system are already covered by the leak inspection and repair requirements of the RMP. As part of the SLCP Strategy, CARB proposed regulations will include cold storage in the stationary refrigeration requirements, which prohibit high-GWP refrigerants in new equipment beginning January 1, 2021.

Foam:

CARB is including the foam sectors covered by SNAP Rule 20 prohibitions in certain HFCs beginning January 1, 2017. The other foam sectors where the SNAP Rule 20 and 21 HFC prohibitions have not yet begun will be addressed through additional rulemaking in California when CARB begins to adopt SLCP Strategy measures.

Aerosol Propellants:

CARB has had consumer product aerosol propellant regulations in place since 2008 that prohibit propellants with a GWP of 150 or greater in spray dusters (keyboard dusters), boat horns, tire inflators, and other consumer aerosol products. The SNAP Rule 20 prohibitions on HFC-125, HFC-134a, HFC-227ea, and blends of HFC-134a and HFC-227ea in new aerosol propellant products beginning January 1, 2016, are either covered by existing CARB regulations or will be considered in the future. Therefore, adopting SNAP requirement for aerosol propellants is not necessary.

Household Refrigerator-Freezers:

SNAP Rule 21 prohibits certain high-GWP HFCs in new refrigerator-freezers beginning January 1, 2021. According to the Association of Home Appliance Manufacturers (AHAM) the appliance industry determined that in order to meet Department of Energy (DOE) energy efficiency requirements for new equipment, the best alternative refrigerant to replace HFC-134a was isobutane (R-600a), a highly flammable hydrocarbon. However, SNAP regulations limited the amount of highly flammable refrigerant in equipment to 57 grams or less, which was insufficient to operate a standard household refrigerator-freezer. Appliance industry plans to transition to isobutane refrigerant were delayed while appealing to the U.S. EPA to increase the allowable refrigerant charge sizes of highly flammable refrigerants.

On November 20, 2017, U.S. EPA issued a new rule that allowed up to 150 grams of highly flammable refrigerants in new household refrigerator-freezers, paving the way for manufacturers to begin producing low-GWP equipment. AHAM has proposed a voluntary transition, nationally to low-GWP refrigerant, low-GWP insulation equipment from all major appliance manufacturers.

CARB will work in collaboration with U.S. EPA and the appliance industry to ensure that the voluntary program is backed up by alternate requirements if necessary and may consider including this sector in future rulemakings.

The CARB analysis of HFC end-use sectors covered in SNAP Rules 20 and 21 concludes that HFC emissions from the end-use sectors not included in this regulation will be reduced more effectively using the alternate reductions approaches described above.

Alternative 3: Small Business Alternative

CARB considered an exemption for small business to lessen any potential adverse impact. This alternative was rejected for the following four reasons. First, the proposed regulation is the adaptation of a portion of federal SNAP Rules which have been or are at risk of being vacated. CARB's exemption of small businesses will be in contradiction of the SNAP Rules if they are not vacated. Second, any exemption of small businesses would be temporary because CARB needs the emissions reduction from small businesses to achieve emissions reduction targets for 2030. A delay in the implementation of the proposed regulation requirements on small business would be less cost effective. Third, an exemption for small businesses will create confusion among end-users because it would be difficult to distinguish between compliant and non-compliant equipment. Finally, enforcement would be significantly complicated because inspectors would have to distinguish between compliant and non-compliant equipment on the basis of the business size of the equipment manufacturer.

Alternative 4: Performance Standards in Place of Prescriptive Standards

The proposed regulation does not mandate the use of specific technologies or equipment. It prohibits use of certain HFCs and requires the regulated parties to keep certain records and insert a disclosure statement on their invoice explaining the equipment or product is legal for sale in California. It is not clear whether the list of prohibited substances are prescriptive standards because there are many ways to comply with the requirements and there is no requirement to use a specific substance. However to the extent that these standards are prescriptive, they are necessary to ensure proper reductions in HFCs to mitigate climate change, and to comply with legal mandates. To the extent the disclaimer and record-keeping requirements are prescriptive, they are necessary for proper enforcement of the regulation without significant cost to the regulated party and to place the consumer on notice.

Health and Safety Code section 57005 Major Regulation Alternatives

The proposed regulation will not result in a total economic impact on state businesses of more than $10 million in one or more years of implementation. Therefore, this proposal is not a major regulation as defined by Health and Safety Code section 57005.

X. JUSTIFICATION FOR ADOPTION OF REGULATIONS DIFFERENT FROM FEDERAL REGULATIONS CONTAINED IN THE CODE OF FEDERAL REGULATIONS

Under section 612 of the Clean Air Act (42 U.S.C. § 7671k) U.S. EPA is authorized to require direct replacement of ozone-depleting substances. Sections 604-606 of the Clean Air Act (42 U.S.C. § 7671c-e) imposes a specific phase-out schedule for listed substances. Under the SNAP program, U.S. EPA adopted a list of ozone-depleting substances that must be replaced and also lists substances for replacement and substances that are "safe" or unsafe substitutes. Under the SNAP program, U.S. EPA may require manufacturers to stop using listed chemicals and replace them with listed safe substitute substances. The lists of safe and prohibited substances are fluid and may change over time. In 2015, U.S. EPA promulgated a final rule ("2015 Rule") that removed HFCs from the "safe" substitute category list to the "prohibited" list (40 C.F.R. Part 82, Subpart G).

Mexichem Fluor, Inc. and Arkema, Inc. sought review of U.S. EPA's 2015 Rule, arguing that U.S. EPA did not have authority to require manufacturers to replace HFCs with alternative substances. The D.C. Circuit granted the petitions and vacated the 2015 Rule to the extent it requires manufacturers to replace HFCs with a substitute substance if the manufacturers replaced the use of ozone-depleting substances with the HFCs at a time when the HFCs were considered a safe substitute substance. En banc review of the D.C. Circuit decision is being considered. However, even if en banc review is granted and the decision is reversed, it is expected for this case to ultimately result in U.S. Supreme Court review, which will take at a minimum, two years for California to know the ultimate resolution.

Even if the SNAP Rules are not vacated, CARB's proposed regulations are authorized by law. Under the federal Clean Air Act, 42 U.S.C. 7401(c), Congress stated the purpose of the law is to provide states with the primary responsibility to reduce air pollution and this section of the federal Clean Air Act related to ozone-depleting substances does not specifically preempt state regulations. Moreover, California's proposed regulation does not duplicate the federal standard but rather, is narrower and more stringent. California's proposed regulation is concerned with reducing HFC emissions within California while the SNAP Rules are concerned with limiting HFC emissions nationwide.

The proposed regulations are necessary and the cost of differing State regulations is justified by the benefit to human health, public safety, public welfare, or the environment. Under AB 32, SB 32, and SB 1383, California has specific legal mandates that it must meet to reduce both GHGs and HFCs. If the D.C. Circuit's ruling stands, it will profoundly disrupt California's efforts to reduce HFC emissions in California as mandated by State law. The use of HFCs is increasing in California. Also, the products using HFCs often have an average lifetime upwards of 15 to 20 years. Once a product using HFCs is installed or otherwise placed into use in California, it is difficult to require removal, and thus "locks in" those HFC emissions for 15 or more years. Therefore, California must ensure use of HFCs is curtailed as soon as possible, otherwise it will become far more difficult to fend off increases of HFCs.

XI. PUBLIC PROCESS FOR DEVELOPMENT OF THE PROPOSED ACTION (PRE-REGULATORY INFORMATION)

The original SNAP Rules were the subject of a lengthy public process to develop the regulations, with U.S. EPA working closely with stakeholders beginning with an August 6, 2014 Federal Register Notice of Proposed Rulemaking, with adoption dates of July 20, 2015 for Rule 20, and December 1, 2016 for Rule 21. Costs, benefits, and requirements of these SNAP Rules were developed in collaboration with national stakeholders by actively soliciting feedback and sharing information pertinent to the proposed rulemaking.

Consistent with Government Code sections 11346, subdivision (b), and 11346.45, subdivision (a), and with the Board's long-standing practice, CARB staff held a public workshop and had several other meetings with interested stakeholders during the development of the proposed regulation.

CARB staff have worked closely for the past eight years with the regulated entities, many of which are subject to California's RMP that was approved by the Board on December 9, 2009. CARB have also worked with these same stakeholders in the development of the AB 32 Scoping Plan (2008 and the updated 2014 version), and in the development of the SLCP Strategy (CARB 2017a).

For this rulemaking, CARB staff held a pre-rulemaking public workshop on October 24, 2017, to discuss the proposed action and related proposals. The workshop presentation and draft rule language as well as other workshop details and background materials including CARB's *Kigali Amendment California Reductions Methodology Final Draft* (CARB 2017c) were posted online and public feedback was solicited, received and analyzed via questions during the workshop as well as written comments at a new HFC Measures webpage (https://ww2.arb.ca.gov/hfc-reduction-measures-rulemaking). Written comments were invited to be submitted at an online portal through November 10, 2017. Thirteen public comments were received at the comment submission webpage.[6]

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[6] CARB, *Workshop Comment Log*, https://www.arb.ca.gov/lispub/comm2/bccommlog.php?listname=hfc-measure-ws (last visited Dec. 28, 2017).

The workshop was webcast and the video recording of the workshop was posted online,[7] which had been requested by a number of stakeholders.

The workshop was advertised broadly in advance using related CARB email lists, webpages and other outreach methods, while simultaneously advertising the availability of a new dedicated email list and webpage for future HFC measure related announcements.[8]

The development of this regulatory proposal has further been aided and informed by related public processes. These related sources of input have included:

- The U.S. EPA regulatory process, particularly for SNAP Rules 20 and 21, including public comments received, as documented in the Federal Register and elsewhere;
- The development of CARB's Short-Lived Climate Pollutant Strategy, required by legislation (SB 605 and SB 1383), which included numerous workshops throughout the state as well as a CEQA review process;
- Directly meeting with diverse stakeholders upon request;
- Review of published contemporary industry news and opinion articles and other communications found in trade journals, newspapers and other written sources; and
- Informational meetings with other regulatory entities, including U.S. EPA and other agencies.

These informal pre-rulemaking discussions provided CARB with useful information that was considered during development of the regulation that is now being proposed for formal public comment.

X. REFERENCES

1. (Bizminer 2017) Bizminer; Industry Financial Report, [3334] Ventilation, Heating, Air-Conditioning, and Commercial Refrigeration Equipment Manufacturing, ALL US, Sales Class: industry-wide, Sector: Manufacturing, NAICS-6 industries Applied: 333413, 333414, 333415. Release date: June 2017, produced for ISOR on December 14, 2017 (http://www.bizminer.com/reports/if_report.php?id=1549779&format=html).

2. (BLS 2017) Bureau of Labor Statistics (BLS), Table 11, Private industry workers, by major industry group: employer costs per hours worked for employee compensation and costs as a percentage of total compensation, 2004-2017. In:

[7] CARB, *Workshop* (Oct. 24, 2017), available at https://www.youtube.com/watch?time_continue=2&v=0SOTKiIucMI

[8] CARB, *HFC Reduction Measures*, https://ww2.arb.ca.gov/our-work/programs/hfc-reduction-measures (last visited Dec. 28, 2017).

Employer Costs for Employee Compensation, National Compensation Survey, p. 220. September 2017.

3. (CARB 2016a) California's High Global Warming Potential Gases Emission Inventory: Emission Inventory Methodology and Technical Support Document, 2015 Edition. April 2016.

4. (CARB 2016b) California's 2000-2014 Greenhouse Gas Emission Inventory: Technical Support Document, 2016 Edition. September 2016.

5. (CARB 2017a) Short-Lived Climate Pollutant Strategy. March 2017.

6. (CARB 2017b) California Greenhouse Gas Emissions for 2000 to 2015 - Trends of Emissions and Other Indicators, 2017 Edition. June 6, 2017.

7. (CARB 2017c) Potential Impact of the Kigali Amendment on California HFC Emissions: Estimates and Methodology used to Model Potential Greenhouse Gas Reduction in California from the Global Hydrofluorocarbon (HFC) Phasedown Agreement of October 15, 2016, in Kigali, Rwanda ("Kigali Amendment"). Final. December 15, 2017.

8. (California Department of Finance 2017) P-1: State Population Projections (2010-2060): Total Population by County. In Excel worksheet: Total Estimated and Projected Population for California and Counties: July 1, 2010 to July 1, 2060 in 5-year Increments. February 2017.

9. (Gallagher, G. et al., 2014) High-global Warming Potential F-gas Emissions in California: Comparison of Ambient-based versus Inventory-based Emission Estimates, and Implications of Estimate Refinements. Environmental Science & Technology 2014, 48(2), pp. 1084−1093. 2014.

10. (ICF 2015a) Economic Impact Screening Analysis for Regulatory Changes to the Listing Status of High-GWP Alternatives – Revised. July 2015.

11. (ICF 2015b) Revised Cost Analysis for Regulatory Changes to the Listing Status of High-GWP Alternatives. July 2015.

12. (ICF 2016) Cost Analysis for Regulatory Changes for the Listing Status of High-GWP alternatives Used in Refrigeration and Air Conditioning, Foams, and Fire Suppression. September 2016.

13. (IPCC 2007) 2.10.2 Direct Global Warming Potentials. In: IPCC Fourth Assessment Report (AR4): Climate Change 2007: Working Group I: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, pp. 211-214. 2007.

14. (IPCC 2014a) Summary for Policymakers. In: Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. 2014.

15. (IPCC 2014b) Climate Change 2014: Impacts, Adaptation, and vulnerability. In: Fifth Assessment Report (AR5) from the Intergovernmental Panel on Climate Change (IPCC), Working Group II. 2014.

16. (UNEP 2016) United Nations Environment Programme (UNEP), Decision XXVIII/--- Further Amendment of the Montreal Protocol. In: Dubai pathway on hydrofluorocarbons, Decision XXVIII/--- Further Amendment of the Montreal Protocol, Submitted by the Contact group on HFCs, Twenty-Eighth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer, p. 2. October 14, 2016.

17. (Census 2016) U.S. Census Bureau, Population Division; Table 1. Annual Estimates of the Resident Population for the United States, Regions, States, and Puerto Rico: April 1, 2010 to July 1, 2016 (NST-EST2016-01). Release Date: December 2016 (downloaded from https://www2.census.gov/programs-surveys/popest/tables/2010-2016/state/totals/nst-est2016-01.xlsx on December 14, 2017).

18. (U.S. EPA 2016) U.S. Action to Meet the Montreal Protocol Phaseout Schedule. Table on website, "Phaseout of Class II Ozone-Depleting Substances" printed to PDF Dec. 5, 2017 from URL: https://www.epa.gov/ods-phaseout/phaseout-class-ii-ozone-depleting-substances.

19. (Velders, et al., 2009) The large contribution of projected HFC emissions to future climate forcing. Proceedings of the National Academy of Sciences of the United States of America (PNAS), 106(27), pp. 10949–10954. July 7, 2009.

20. (Velders, et al., 2014) Growth of climate change commitments from HFC banks and emissions. Atmospheric Chemistry and Physics, 14, pp. 4563–4572. May 12, 2014.

XIV. APPENDICES

Appendix A: Proposed Regulation Order

Appendix B: Emission Estimates