

# U.S. Refrigerant Policy Update

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# Air Conditioning, Heating and Refrigeration Institute

300 plus cooling & heating equipment manufacturers for residential, commercial & industrial applications:

central AC & heating equipment

commercial & industrial AC, heating & ventilation equipment

components for heating, AC & refrigeration systems

hydronic heating equipment

water heating equipment



commercial & industrial refrigeration equipment

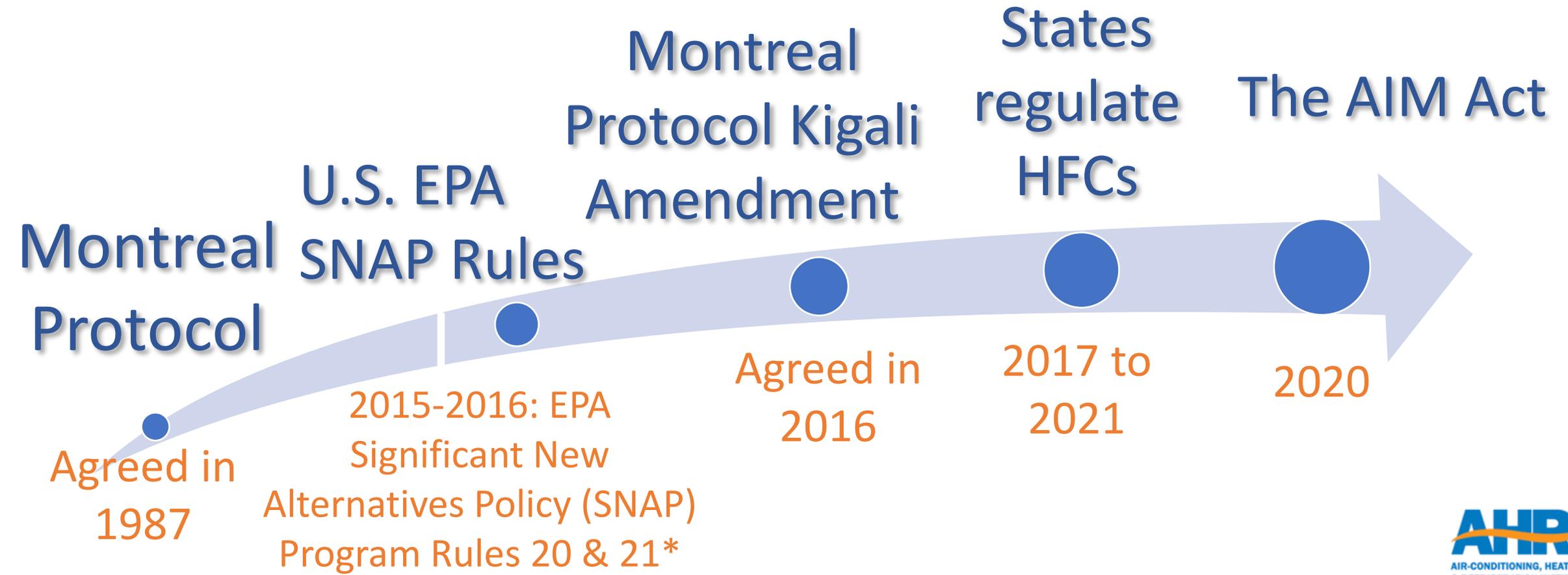
# Panelists

- Scott Stone, Founder & Partner, Glencoe Strategies LLC
- Helen Walter-Terrinoni, VP Regulatory Affairs, AHRI
- Lauren MacGowens, Regulatory Lead – Refrigeration, AHRI
- Nick Harbeck, Industry Analyst, AHRI
- Vivian Cox, Regulatory Intern, AHRI

# U.S. Refrigerant Policy Update

- American Innovation in Manufacturing (AIM) Act Implementation

# The AIM Act: How did we get here?



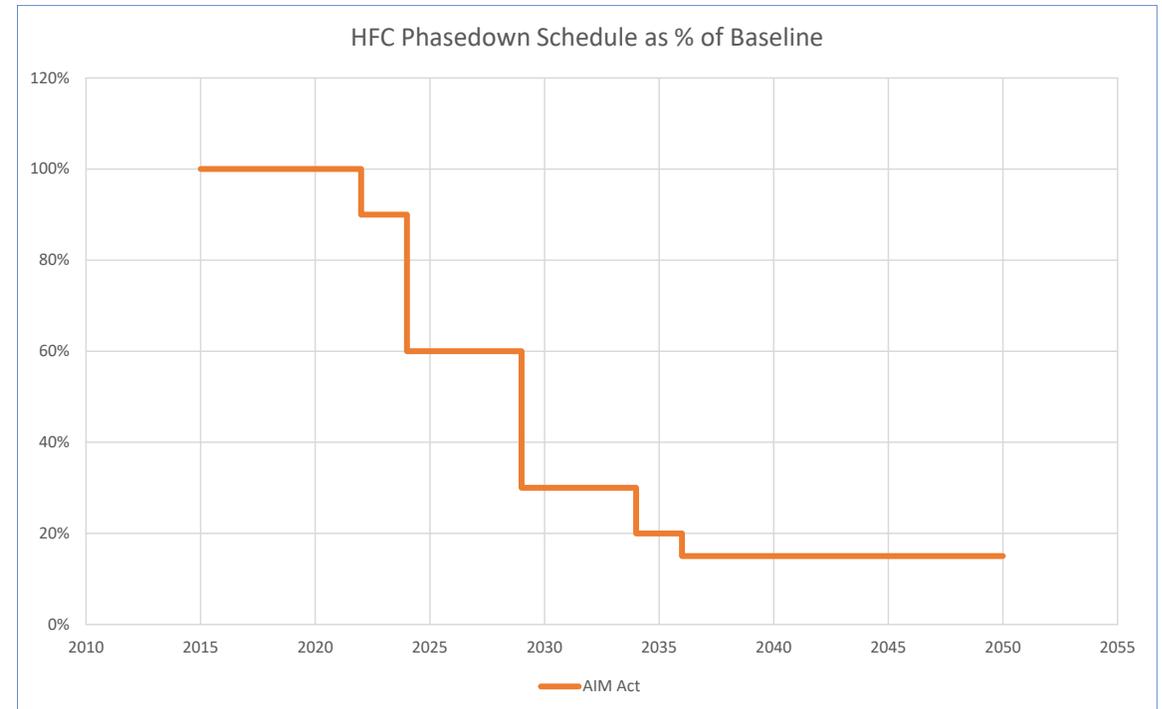
\*SNAP rules 20 & 21 were remanded back to EPA by DC Circuit Court (2017/2018)

# Implementation of the AIM Act of 2020

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# The AIM Act & The Kigali Amendment

- Phase down consumption and production of HFCs
- 2011-2013 baseline:
  - 2022: 10% reduction
  - 2024: 40% reduction
  - 2029: 70% reduction
  - 2034: 80% reduction
  - 2036: 85% reduction



# Just like the Kigali Amendment

Consumption =

Production + Imports - Exports

# Just like the Kigali Amendment

Consumption =

Supply

# AIM Act: The “To Do List”

- ✓ Establish the phasedown program and allocate allowances for production and consumption
- Address petitions for sector transitions
- Refrigerant management including recovery and reclaim

# HFC Allowance Allocation Final Rule

- The AIM Act is based on Title VI of the Clean Air Act
  - Production and consumption constrained over time
- Final rule sets baselines and allocation methodologies
  - Allocation methodologies might change in 2024
- Final rule also imposes new enforcement requirements
  - Concerns about illegal imports and environmental justice
- Allowances for 2022 allocated by separate action
  - Production and import in '22 prohibited without allowances

# HFC Allowance Allocation Final Rule, *con't*

- The AIM Act's baseline mirrors the Kigali Amendment
  - Production and consumption phase down is also the same
- For 2022-23, allowances allocated for 90% of the baseline
  - Next stepdown is significant: 60% of the baseline in 2024
- An allowance corresponds to 1 MTEVe (in 0.1 units)
  - Allowances weighted by exchange value (CO<sub>2</sub>-equivalent)
- Producers hold production and consumption allowances
  - Importers only need to hold consumption allowances

# HFC Allowance Allocation Final Rule, *con't*

- Allowances allocated only to entities operating in 2020
  - Allocation based on average of 3 highest years in 2011-2019
- Special allowances given to 6 sectors named in AIM Act
  - 'Application Specific Allowances' only usable in each sector
- Some allowances set aside for new entrants
  - Allowances not transferable and distributed pro rata if unused
- Allowances can be traded, but subject to a 5% 'offset'
  - For every 100 allowances traded, EPA takes 5 allowances

# EPA: Determine baseline and mandatory allocations for exemptions

- Rules governing....
  - Metered-dose inhalers
  - Defense sprays\*
  - Marine and trailer structural composite preformed polyurethane foam\*
  - Electronic gases
    - Etchant for semiconductor material or wafers
    - Cleaning of chemical vapor deposition chambers within the semiconductor manufacturing sector
  - Mission-critical military end uses such as fire suppression
  - Onboard aerospace fire suppression

\*Included in SNAP Rules 20 and 21

There is a temporary prohibition on states enforcing rules with respect to exempted products through 12/31/2015

# HFC Allowance Allocation Final Rule, *con't*

- Compliance and enforcement a rising priority for EPA
  - Illegal imports and 'dumping' an issue in the past
- Third party auditing and data disclosure now required
  - Most HFC production and consumption data will be public
- Refillable cylinders and QR codes phased in by 2027
  - EPA delayed effective dates of these requirements in final rule
- Administrative consequences lets EPA dock allowances
  - Loss of allowances in addition to civil or criminal penalties

# HFC Allowance Allocation Final Rule, *con't*

- HFC-23 emissions prohibited by October 1, 2022
  - Capture required for at least 99% of HFC-23 emissions
- Final rule excludes HFCs contained in imported products
  - Consistent with past practice but drawing new opposition
- Limited authorization for int'l allowance transfers
  - Production allowances tradable to 'Kigali-compliant' countries
- EPA found elevated health risks near HFC plants
  - No environmental justice action taken but will be revisited

# Near-Term HFC Regulatory Considerations

- EPA next will turn to sector-based control petitions
  - New rules to ban high GWP HFCs in certain product categories
- Sector-based controls include federal and state standards
  - Plus, definition of product categories not always clear
- Tightening supply will boost demand for reclaimed HFCs
  - New rules likely to increase recovery and minimize leaks
- Low GWP substitutes subject to additional barriers
  - SNAP approval and building code changes needed

# Current Regulatory Landscape

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# Climate Alliance States: A Regulatory Patchwork

- Hydrofluorocarbon (HFC) use regulations
  - SNAP Rules 20 & 21 (10 states)
  - California and Washington State
    - Air Conditioning 750 GWP Limit in 2025
    - Commercial Refrigeration 150 GWP Limit in 2022
- Refrigerant Management Regulations

## HFC Regulations



# State Adoption of SNAP Rules 20 & 21

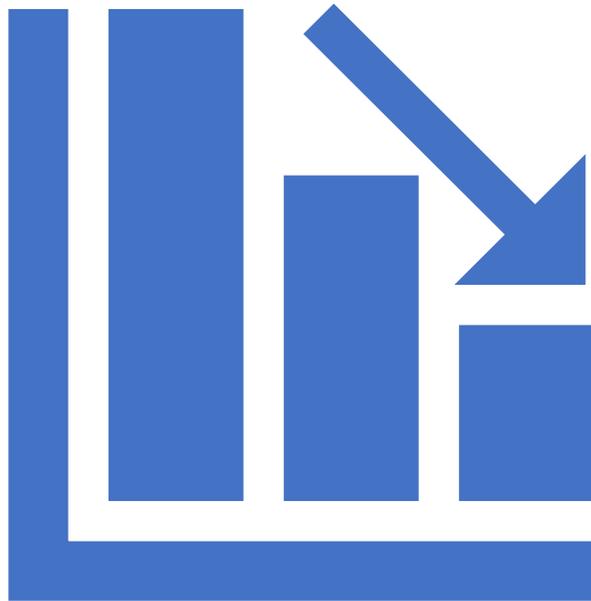
SNAP Rules 20 & 21 Effective Dates based on State Regulation and Legislation ( <b>Bold = final</b> / not bold = proposed)	California	Colorado	Delaware	New Jersey	New York	Maine	Maryland	Massachusetts	Virginia	Vermont	Washington	Rhode Isl
	1-Jan	1-Jan	1-Sep	1-Jul	1-Jan	1-Jan	1-Jan	1-Jan	1-Jan	1-Jan	1-Jan	1-Jan
Supermarket systems (new)	<b>2019</b>	2021	2021	2020	2021	2022	2021	2021	2022	2021	2020	2022
Supermarket systems (retrofit)	<b>2019</b>	2021	2021	2020	2021	2022	2021	2021	2022	2021	2020	2022
Remote condensing units (new)	<b>2019</b>	2021	2021	2020	2021	2022	2021	2021	2022	2021	2020	2022
Remote condensing units (retrofit)	<b>2019</b>	2021	2021	2020	2021	2022	2021	2021	2022	2021	2020	2022
Stand-alone MT units with a compressor capacity < 2,200 Btu/hr and not containing a flooded evaporator (new)	<b>2019</b>	2021	2021	2020	2021	2022	2021	2021	2022	2021	2020	2022
Stand-alone MT units with a compressor capacity < 2,200 Btu/hr and containing a flooded evaporator (new)	2020	2021	2021	2020	2021	2022	2021	2021	2022	2021	2020	2022
Stand-alone MT units with a compressor capacity ≥ 2,200 Btu/hr (new)	2020	2021	2021	2020	2021	2022	2021	2021	2022	2021	2020	2022
Stand-alone LT units (new)	2020	2021	2021	2020	2021	2022	2021	2021	2022	2021	2020	2022
Stand-alone units (retrofit)	<b>2019</b>	2021	2021	2020	2021	2022	2021	2021	2022	2021	2020	2022
Refrigerated food processing and dispensing equipment (new)	2021	2021	2021	2021	2021	2022	2021	2021	2022	2021	2021	2022
Cold storage warehouses	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023
Household refrigerators and freezers (new)	2022	2022	2022	2022	2022	2022	2022	2022	2022	2022	2022	2022
Household refrigerators and freezers - Compact (new)	2021	2021	2021	2021	2021	2022	2021	2021	2022	2021	2021	2022
Household refrigerators and freezers - Built-in (New)	2023	2023	2023	2023	2023	2023	2023	2023	2022	2023	2023	2023
Chillers	2024	2024	2024	2024	2024	2024	2024	2024	2024	2024	2024	2024
Does the regulation include cumulative repair/replacement language?	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	No	Yes

Last Update: September 17, 2021

SNAP Rules 20 & 21 Effective Dates based on State Regulation and Legislation ( <b>Bold = final</b> / not bold = proposed)	California	Colorado	Delaware	New Jersey	New York	Maine	Maryland	Massachusetts	Virginia	Vermont	Washington	Rhode Island
	1-Jan	1-Jan	1-Sep	1-Jul	1-Jan	1-Jan	1-Jan	1-Jan	1-Jan	1-Jan	1-Jan	1-Jun
Rigid polyurethane and polyisocyanurate laminated boardstock	2019	2021	2021	2020	2021	2022	2021	2021	2022	2021	2020	2022
Flexible polyurethane	2019	2021	2021	2020	2021	2022	2021	2021	2022	2021	2020	2022
Integral skin polyurethane	2019	2021	2021	2020	2021	2022	2021	2021	2022	2021	2020	2022
Polystyrene extruded street	2019	2021	2021	2020	2021	2022	2021	2021	2022	2021	2020	2022
Phenolic insulation board and bunstock	2019	2021	2021	2020	2021	2022	2021	2021	2022	2021	2020	2022
Rigid polyurethane slabstock and other	2019	2021	2021	2020	2021	2022	2021	2021	2022	2021	2020	2022
Rigid polyurethane slabstock appliance foam	2020	2021	2021	2020	2021	2022	2021	2021	2022	2021	2020	2022
Rigid polyurethane commercial refrigeration and sandwich panels	2020	2021	2021	2020	2021	2022	2021	2021	2022	2021	2020	2022
Polyolefin	2020	2021	2021	2020	2021	2022	2021	2021	2022	2021	2020	2022
Rigid polyurethane marine flotation foam	2020	2021	2021	2020	2021	2022	2021	2021	2022	2021	2020	2022
Rigid polyurethane (PU) high-pressure two-component spray foam	2020	2021	2021	2020	2021	2022	2021	2021	2022	2021	2020	2022
Rigid polyurethane (PU) one-component foam sealants	2020	2021	2021	2020	2021	2022	2021	2021	2022	2021	2020	2022
Polystyrene extruded boardstock and billet (XPS)	2021	2021	2021	2021	2021	2022	2021	2021	2022	2021	2021	2022
Rigid polyurethane (PU) low-pressure two-component spray foam	2021	2021	2021	2021	2021	2022	2021	2021	2022	2021	2021	2022

# Practical Implementation of the AIM Act

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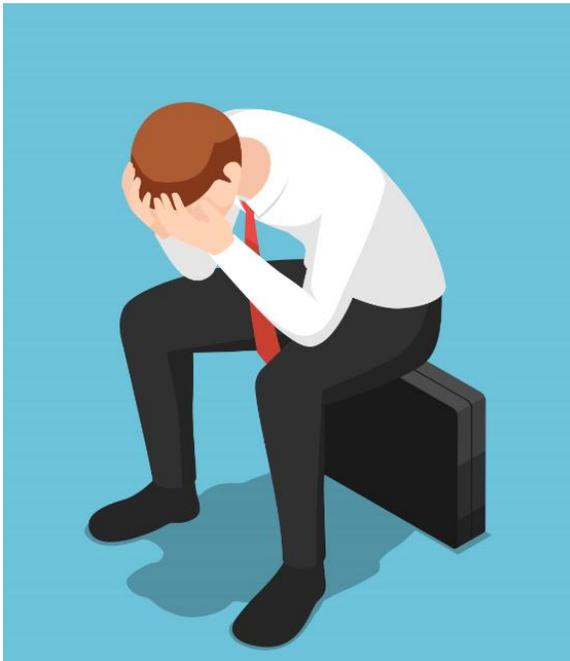


The HFC phase-down is designed to create an economic supply imbalance.

Reduced Supply Economics result in:

- Scarcity
- Increased Prices

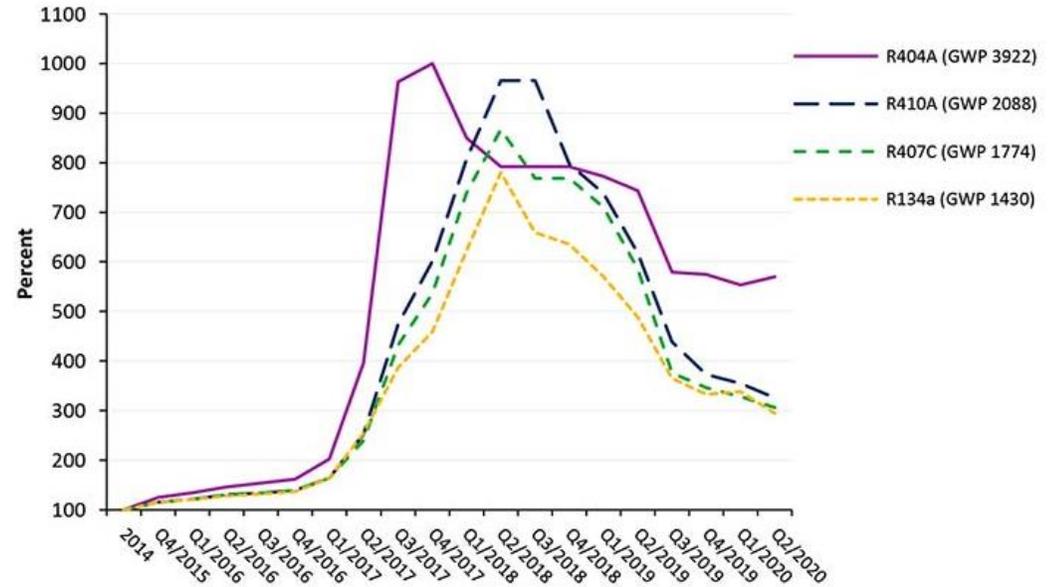
# European price increases as reported by The Cooling Post



- The Cooling Post 2020

## Refrigerant demand and prices

29 SEP 2020



Average purchase prices reported by three large refrigerant distributors. Prices are indexed to the baseline year 2014

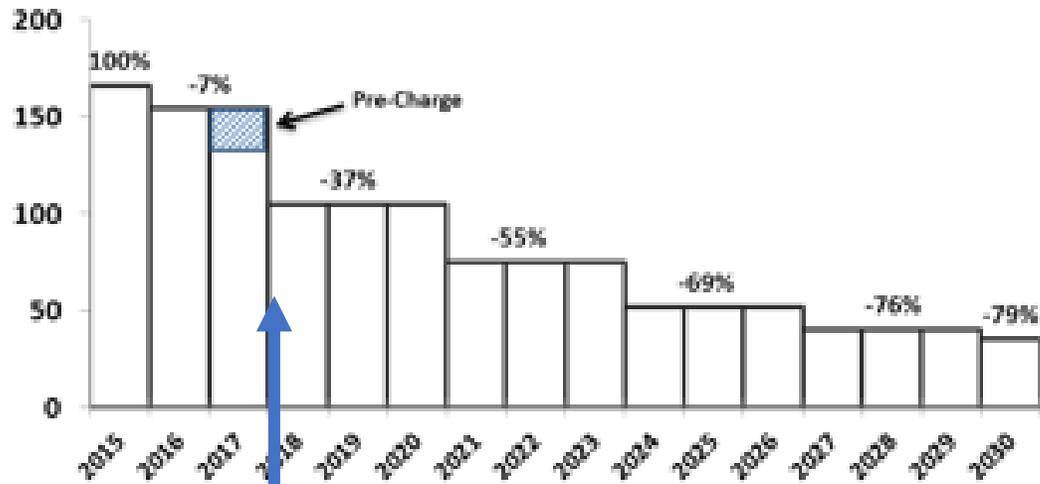
EUROPE: The effects of Covid-19 are held at least partly responsible for a fall in refrigerant demand and prices in the quarter to September.

The refrigerant price trends are recorded in the latest report from German consultancy Öko-Recherche.

# The cautionary lesson US companies hear from Europe

## Europe (EU-28) F-Gas II

Cap basis: CO<sub>2</sub> Eq MT  
CO<sub>2</sub>e sales 2009-2012



**Bottom Line:**

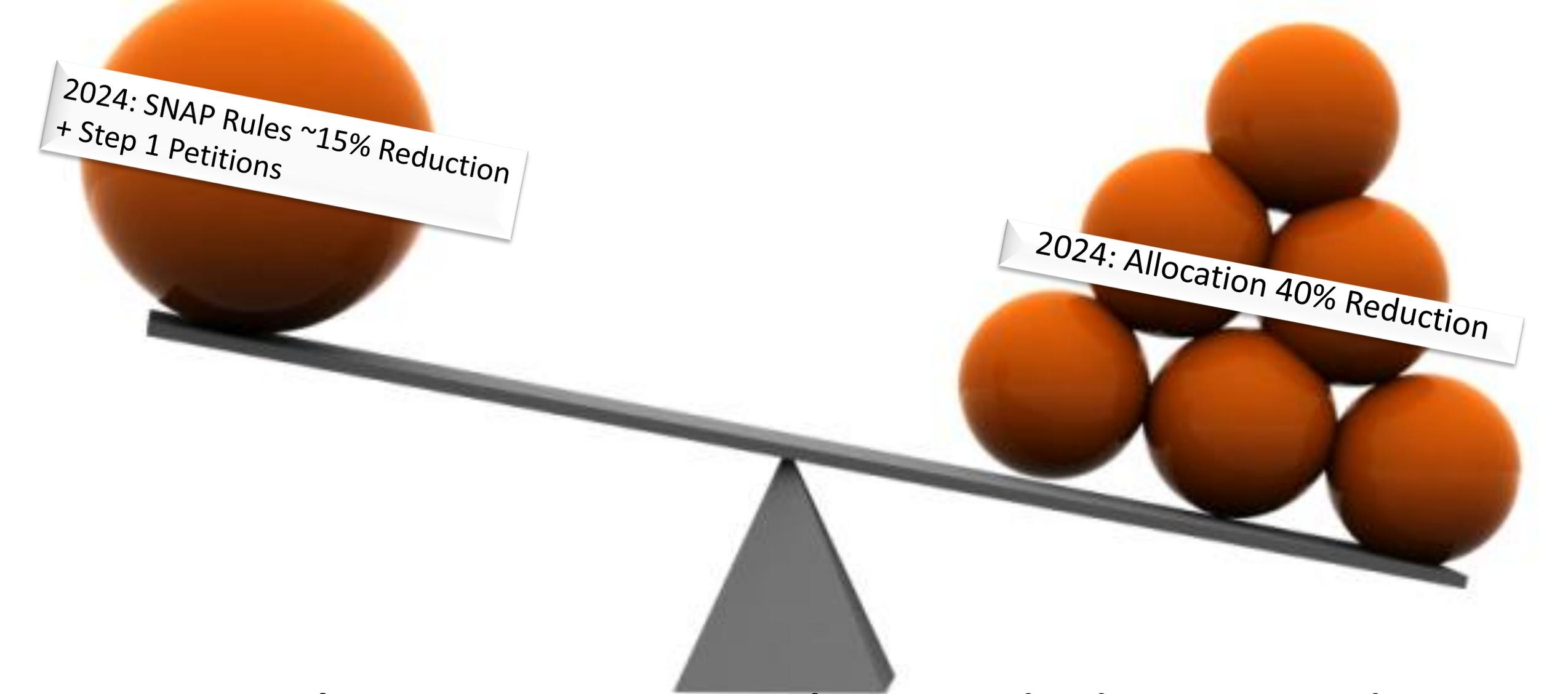
**Very little sector control prior to 2020  
created chaotic transitions in 2018**

### • Equipment Ban:

- 2015: HFC ≥ 150; refrigerators/freezers – foam & refrigerant
- 2015: HFC ≥ 2500; commercial refrig/freezers
- 2020: HFC ≥ 2500; stationary refrigeration  
HFC ≥ 150; movable room air conditioners
- 2020: HFC ≥ 150; XPS FOAM
- 2022: HFC ≥ 150; commercial refrigerators/freezers
- 2023: HFC ≥ 150; PU FOAM
- 2025: HFC ≥ 750; single split air conditioners

### • Service Ban:

- 2020: Prohibit Service and maintenance of refrigeration equipment with a min charge size of 40 tonnes CO<sub>2</sub>-equivalent with refrigerants ≥ 2500 GWP



2024: SNAP Rules ~15% Reduction  
+ Step 1 Petitions

2024: Allocation 40% Reduction

Balancing supply and demand  
is the key to a successful transition



There are options to  
balance supply and demand.

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Doing nothing isn't one of  
them.

# Reducing Demand to Balance Supply

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- Use low-GWP refrigerants in new equipment
- Consider smaller charge sizes
- Retrofit existing equipment, A1 -> A1
- Reduce leaks
- Use recovered/reclaimed refrigerant

**Bottom Line: Future compliance depends on starting now!**

US industry and retailers want demand regulations to balance supply reductions

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# Demand Regulations

- HFC or refrigerant blend bans
  - Significant New Alternatives Policy (SNAP) Program Rules 20 & 21
- Global Warming Potential (GWP) limits
  - AHRI Petitions

12 Petitions  
have been  
filed with  
EPA

NRDC/IGSD – [Reinstate SNAP Rules 20 & 21 under AIM](#)

AHRI – [Air Conditioning 750 GWP 2025](#); [Refrigeration Step 1](#), [Refrigeration Step 2](#)

EIA – [All California requirements](#)

AHAM – [AC, dehumidifiers 750 GWP](#)

IGSD – [Auto DIY](#) (do-it-yourself)

DuPont – [XPS 134a transition](#)

CPI – [PU Foam SNAP Rules](#)

IIAR – [Commercial Refrigeration](#)

HCPA – [Aerosol SNAP Rules](#)

Climate Alliance States – [SNAP Rules and California requirements](#)

# AHRI Step 1 Petition

<b>TABLE 1</b>		
<b>Product Category (New Equipment<sup>1</sup>)</b>	<b>AR4 GWP Limit</b>	<b>Transition Date</b>
Standalone/Self-contained Refrigeration Systems	SNAP Rules 20/21 Prohibitions	January 1, 2022
Remote Refrigeration Systems (> 50 lbs refrigerant charge)	1500	January 1, 2022
Remote Refrigeration Systems (<= 50 lbs refrigerant charge)	2200	January 1, 2022
Industrial and Processing Refrigeration (w/o chillers)	1500	January 1, 2022
ACIM (> 50 lbs refrigerant charge)	2200	January 1, 2022
Transport Refrigeration	2200	January 1 2023
Exceptions: ACIM < 50lbs charge, Medical, Scientific and Research Applications		

# AHRI Step 2

<b>TABLE 1</b>		
<b>Product Category (New Equipment)<sup>1</sup></b>	<b>AR4 GWP Limit</b>	<b>Transition Date*</b>
Standalone/Self-contained Refrigeration Systems	300	January 1, 2026
Remote Refrigeration Systems	300	January 1, 2026
Industrial and Processing Refrigeration (w/o chillers)	300	January 1, 2026
Exceptions: Medical, Scientific and Research Applications		
*GWP limit timeline must be at least two years after the adoption of safety standards and building codes		

# EIA Petition

**Table II: Requested Restrictions in the Refrigeration Sector**

<b>End-Use/Subsector</b>	<b>New/Retrofit</b>	<b>GWP Limit</b>	<b>Effective Date</b>
Supermarket Systems (>50lbs)	New	150 or greater	January 1, 2023, or one year following
			finalization of rulemaking
Cold Storage Warehouses	New	150 or greater	January 1, 2023, or one year following finalization of rulemaking
Industrial Process Refrigeration (excluding Chillers)	New	150 or greater	January 1, 2023, or one year following finalization of rulemaking
Other stationary refrigeration equipment (>50 lbs)	New	150 or greater	January 1, 2023, or one year following finalization of rulemaking

# IIAR

**Table 1 – IIAR: IIAR Requested Restrictions in the Refrigeration Sector**

<b>End-Use/Subsector</b>	<b>New/Retrofit</b>	<b>Prohibited Refrigerant GWP</b>	<b>Effective Date</b>
<i>Retail Food Refrigeration (&gt;50lbs refrigerant)</i>	<i>New</i>	<i>150 or greater</i>	<i>Prohibited as of January 1, 2022</i>
<i>Cold Storage Warehouses (&gt;50lbs refrigerant)</i>	<i>New</i>	<i>150 or greater</i>	<i>Prohibited as of January 1, 2022</i>
<i>Ice Rinks (&gt;50lbs refrigerant)</i>	<i>New</i>	<i>150 or greater</i>	<i>Prohibited as of January 1, 2024</i>
<i>Industrial Process Refrigeration excluding Chillers (&gt;50lbs refrigerant)</i>	<i>New</i>	<i>150 or greater</i>	<i>Prohibited as of January 1, 2022</i>
<i>Other refrigeration (&gt;50lbs refrigerant)</i>	<i>New</i>	<i>150 or greater</i>	<i>Prohibited as of January 1, 2022</i>
<b>Chillers for Industrial Process Refrigeration (&gt;50 lbs)</b>	<b>New</b>	<b>150 or greater</b>	<b>January 1, 2026</b>

# HFC Petitions

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Next week, EPA is expected to grant or deny petitions 180 days after they were filed on April 13, 2021

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If granted, EPA will determine rulemaking process and initiate the rulemaking, completing petitions within two years of granting the petition.

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Earliest effective date is one year after publication of final regulation

New Refrigerants  
must be approved by  
EPA and adopted  
into building codes.

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Adoption of Safety  
Standards

# HFCs have been used in many market sectors.



# SNAP Approval for Alternatives

- EPA SNAP program must complete a comparative analysis for all replacements.
- Stakeholders submit SNAP Applications [here](#).
- EPA evaluates the application for completeness and either
  - Requests additional information OR
  - Sends applicant a “Completeness Letter”
- EPA finishes comparative analysis and publishes a determination of listing status in the Federal Register. A list of alternatives with their status can be found [here](#).

# EPA Allows Flammable Refrigerants Provided Safety Standards are Followed

Residential and light commercial air conditioning (May 2021)

Smaller equipment (window units and PTACS) (2015)

Chillers (2012)

Self-contained refrigeration (A3 higher flammability refrigerants) (2012)

Auto air conditioning (2011)

**Room air conditioners without electric heat and a capacity of 25,000 Btu/hr or less**

January 1, 2023

**Room air conditioners with electric heat and a capacity of 25,000 Btus/hr or less**

January 1, 2024

**Portable air conditioners**

January 1, 2023

**Dehumidifiers**

2 years after EPA approval of R32 refrigerant for dehumidifiers

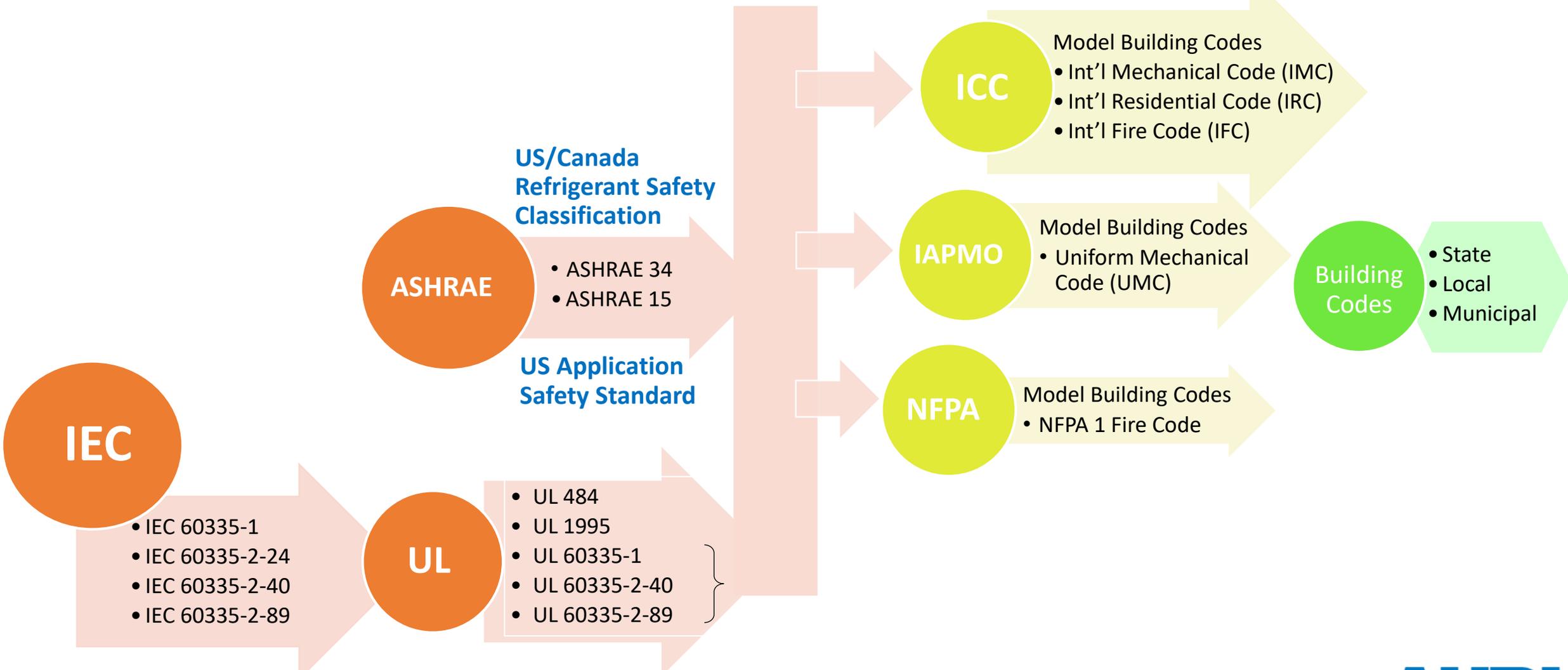
EPA is well-aware of the urgent needs for SNAP listings for compliance with the AIM Act.

- EPA received the Petition from AHAM for smaller equipment such as dehumidifiers and other products
- EPA is aware of the CARB transition dates
- CARB is aware of the need to comply with EPA SNAP listing

U.S. building codes are starting to allow new refrigerants.

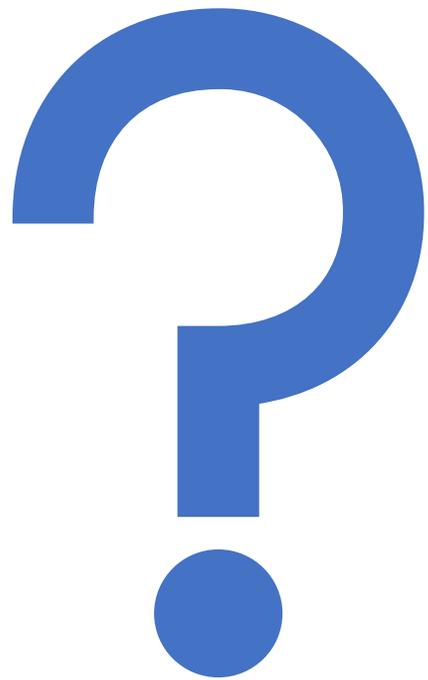
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# Standards and Building Codes Relationships



**International  
Electrotechnical  
Commission**

**US  
Product Safety  
Standards**



Questions?



▼ How was allocation determined?

# How was Allocation Determined?

- EPA collected data on production and consumption to set baselines
  - Production Baseline: 382.55 MMTEVe
  - Consumption Baseline: 303.89 MMTEVe
- EPA establishes a total allowance pool equal to 90% of the baseline
  - For future step downs, the baseline is multiplied by 60%, 30%, 20%, and 15%
- EPA allocating allowances for 90% of baseline for 2022-2023
  - Production Allowances: 344.3 MMTEVe
  - Consumption Allowances: 273.5 MMTEVe
- Allowances allocated only to entities operating in 2020
  - Allocation based on average of 3 highest years in 2011-2019
  - These allowances cannot be banked and do not carry forward



How does allocation work?

# How do I purchase an HFC?

- For 2022 and 2023, “current” manufacturers and importers of HFCs have been granted allocation to sell HFCs limited by an allocated number of exchange units or CO<sub>2</sub> eq units based on their production and importing history.
- “Current” supply chains should still be available, but there may be some limitations in the quantities of HFCs available

→ *Talk to your suppliers early about your HFC needs. Companies with allocation can be found in the [Allocation Rule](#)*



▼ What about equipment or other products that are imported with the HFC already in them?

What about imported products containing HFCs?

# Imported Products Containing HFCs

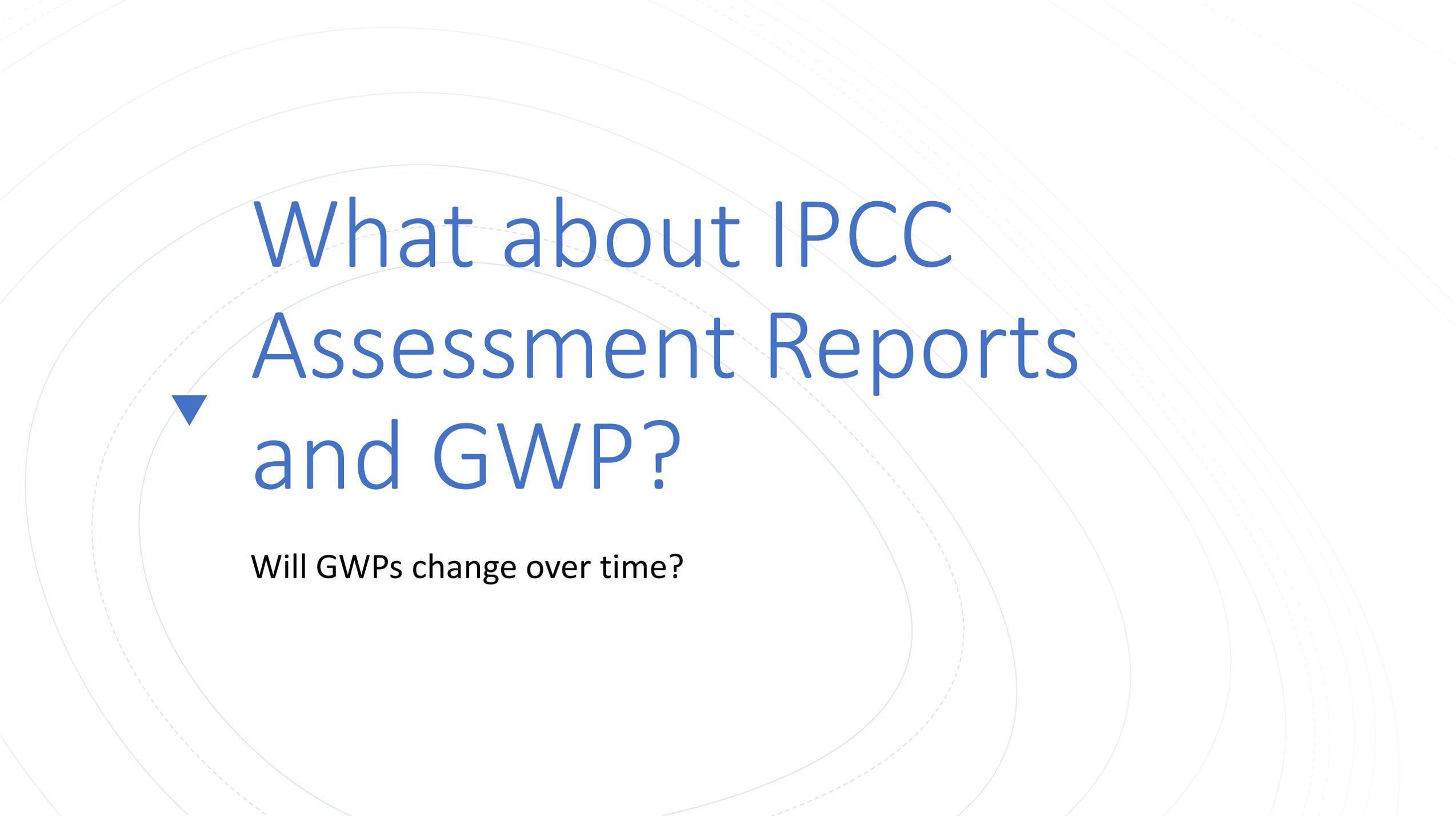
- EPA did not create a 2011 – 2013 baseline and allocation system for the import of products containing HFCs noting that data may not be readily available.
- Imported products containing HFCs will be regulated in the phase-down in the country of manufacture.
  - As of today, 126 countries have ratified the Kigali Amendment to the Montreal Protocol including China, South Korea, Japan, Mexico and other countries.
  - There is a non-participating country trade provision in the AIM Act.
- Imported products containing HFCs will also be regulated by sector-based (demand-side) regulations as requested by the petition.
  - This could be as GWP limits or bans on specific HFCs in certain products.
- Creating a baseline and phase-down in the US for products containing HFCs would create a 3<sup>rd</sup> regulation for the same HFCs!
- There may be additional anti-dumping limitations for imported products containing HFCs.



▼ What about imported  
reclaimed HFCs?

# Importing Reclaimed Refrigerant

- Reclaimed refrigerant can be imported in products or equipment without an allocation.
- Imported products containing reclaimed HFCs will also be regulated by sector-based (demand-side) regulations as requested by the petition. This could be as GWP limits or bans on specific HFCs in certain products.
- An allocation is needed to import any bulk reclaimed refrigerant.



# What about IPCC Assessment Reports and GWP?

Will GWPs change over time?

# International Panel on Climate Change (IPCC) 7<sup>th</sup> Assessment Report (AR)

- The International Panel on Climate Change (IPCC) periodically updates the values for global warming potential (GWP)
  - Each Assessment Report results in new GWP values based on new information from atmospheric scientists or, in the case of the IPCC 7<sup>th</sup> AR, a modification to the calculation using “effective” radiative forcing extending the timeline used.
  - The new values are higher for many HFCs.
- The entire world regulates based on the 2007 IPCC AR4 which has a GWP for R-32 of 677 and R-410 A of 2088.
  - The AIM Act specifically requires the use of AR4
  - The new assessments are too frequent for regulators to re-regulate based on these changes
  - If regulators were to update GWPs in regulations, they would also need to update all baseline numbers on the same basis.
  - The relative GWPs rarely shift between reports and the same good HFC alternatives would be needed for compliance
  - Even if a relative change were made, design cycles and equipment lifetimes are too long to re-work designs to pivot to the latest numbers

Please  
contact us  
with any  
U.S. policy  
questions!

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# Background Information

- The U.S. Environmental Protection Agency (EPA) released the final [publication](#) in the *Federal Register* establishing the allowance allocation and trading program under the American Innovation in Manufacturing (AIM) Act for the phasedown of hydrofluorocarbons (HFCs effective November 4, 2021).

On October 1, 2021, EPA issued [allowances](#) for the production and consumption of HFCs for calendar year 2022.

- Allowances are necessary for producing or importing HFCs starting January 1, 2022, consistent with the methodology in the final rule “Phasedown of Hydrofluorocarbons: Establishing the Allowance Allocation and Trading Program under the American Innovation and Manufacturing Act” signed September 23, 2021.
  - The EPA can allocate 90 percent of the production and consumption baselines for HFCs.
  - Beginning in 2024, EPA will only be able to allocate 60 percent of the production and consumption baselines.
  - For calendar years 2022 and 2023, EPA will allocate 344.3 MMTEVe of production allowances and 273.5 MMTEVe of consumption allowances. These allowances cannot be banked and do not carry forward.
  - HFC allowances can be found [here](#). EPA also posted a pre-publication version of the *Federal Register* notice announcing the issuance of allowances. More on the final rule can be found [here](#).



- [AHRI Safe Refrigerant Transition Task Force webinar series](#)
- HVACR technician training: [ACCA](#), [ESCO](#), and North American Technician Excellence ([NATE](#)).
- [Safe Refrigerant Transition Task Force Newsletter](#)

- Webinar 1: Air Conditioning Applications
- Webinar 2: Commercial Refrigeration Applications
- Webinar 3: Understanding Refrigerant Sensors
- Webinar 4: Predictive Tools for Refrigerant Behaviors
- Webinar 5: Refrigerant Ignition in Open Flame/Hot Surfaces: Has Anything Fundamentally Changed?
- Webinar 6: A2L Refrigerant Behavior in a Structure Fire
- Webinar 7: Refrigerant Detection Systems 101
- Webinar 8: Servicing A2L Refrigerant Systems
- Webinar 9: A2L Refrigerants and Tactical Considerations for Firefighters
- Webinar 10: Codes and Standards "Unlocked"
- Webinar 11: Joint Types and A2L Refrigerants
- Webinar 12: HVACR Equipment Needed for the Safe Refrigerant Transition



# >\$ 7 Million in Research on Flammable Refrigerants

## • Testing

- AHRTI-9007: Benchmarking Risk by Whole Room Scale Leaks and Ignitions Testing
- AHRTI-9013: A2L Consequence Study
- AHRTI-9012/Oak Ridge National Laboratory (ORNL): Real-world Leak Assessments of Alternative Flammable Refrigerants
- AHRTI-9008: Investigation of Hot surface Ignition Temperature (HSIT) for A2L Refrigerants
- AHRI-8017: Investigation of Energy Produced by Potential Ignition Sources in Residential Application

## • Modeling

- ASHRAE-1806: Flammable Refrigerants Post-Ignition Simulation and Risk Assessment Update
- ORNL: Investigate the Proper Basis for Setting Charge Limits of A2L, A2, and A3 for Various Types of Products
- NIST: Modeling tools for low-GWP Refrigerant Blends Flammability

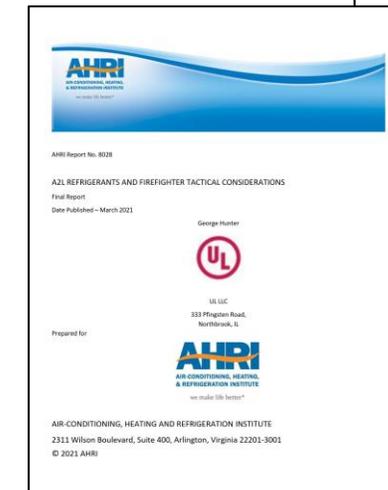
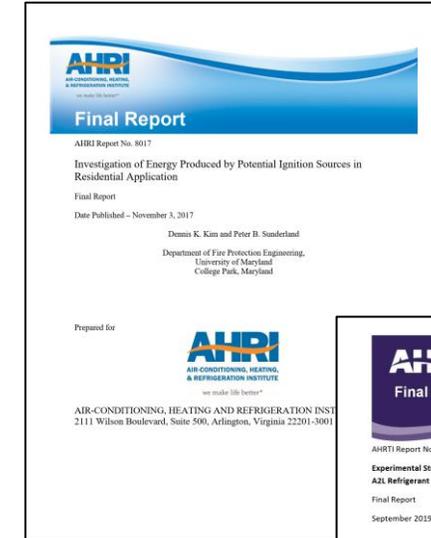
## • Servicing

- ASHRAE-1807: Guidelines for Flammable Refrigerant Handling, Transporting, Storing and Equipment Servicing, Installation and Dismantling
- ASHRAE-1808: Servicing and Installing Equipment using Flammable Refrigerants: Assessment of Field-made Mechanical Joints

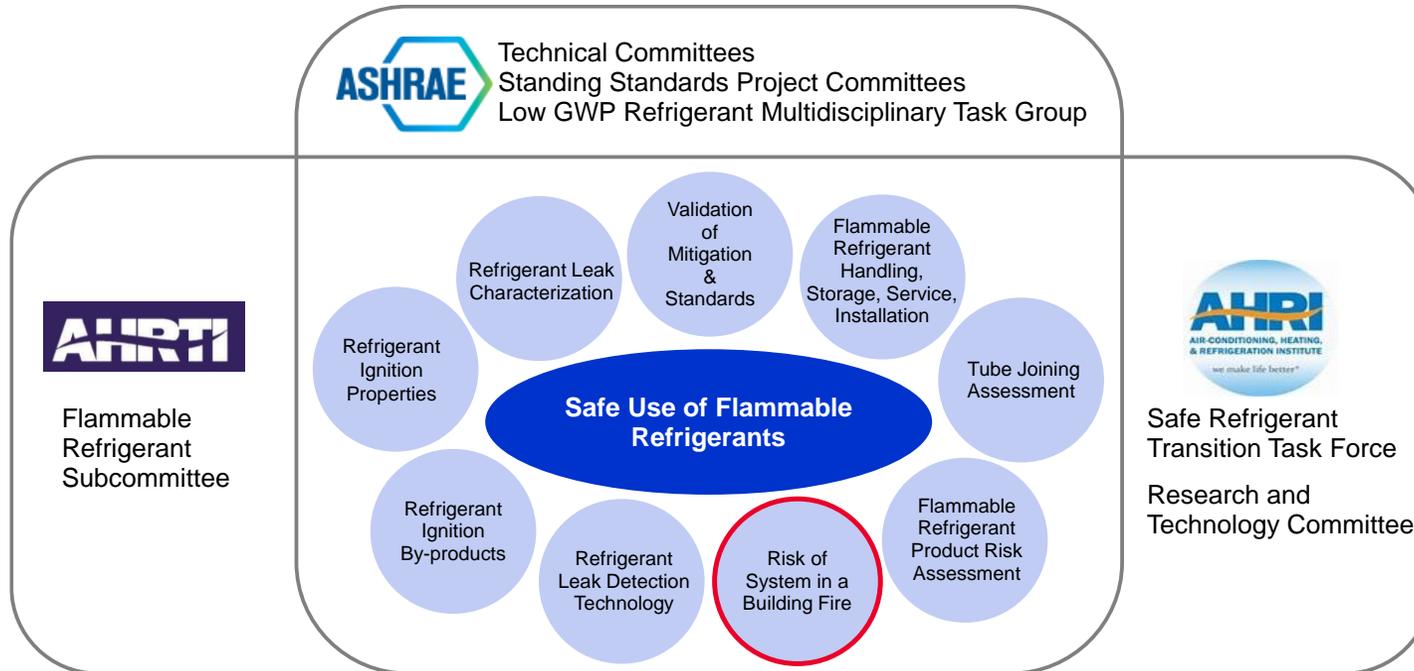
## • Detection

- AHRTI-9009: Leak Detection of A2L Refrigerants in HVACR Equipment

\*This is not a comprehensive list (excludes NFPA, Japan, Europe, Manufacturers, etc.)



# Refrigerants and Firefighter Tactical Considerations



**FLAMMABLE REFRIGERANTS**

This course will identify the hazards posed by different refrigerants and provide tactical considerations based on experimental results that can be incorporated into operating procedures to improve firefighter safety.

START COURSE

FIREFIGHTER SAFETY RESEARCH INSTITUTE

<https://training.ulfirefightersafety.org>  
Designed by firefighters for firefighters

**First project of its kind** related to fire impinging on refrigerants and equipment to provide practical information for first responders for the purpose of developing training

# Kigali Amendment

# Kigali Amendment Ratification:

## *Requirements & Procedures*

### White House Executive Order

- President Biden directed the Secretary of State to prepare to transmit the Kigali Amendment to the Senate within 60 days of the Executive Order issued on January 27, 2021.
  - State Department sent a transmittal package for the treaty to the White House on March 26, 2021.
- Importantly, President Biden has not directed that the amendment be sent to the Senate – just that it be prepared to be sent.
- Transmission to the Senate is not subject to a deadline.

# Kigali Amendment Ratification:

## *Requirements & Procedures*

### Senate Committee on Foreign Relations

- Upon receipt of an international agreement, the Senate refers the agreement and other supporting materials to the Committee on Foreign Relations.
  - The Committee is not obliged to act further unless its chair so desires.
- Treaties can languish before the Committee indefinitely; nothing resets at the end of each session of Congress.
  - There are 37 agreements currently pending before the Committee on Foreign Relations, including one from the 1940s and several from the 1960s.
- If the Foreign Relations Committee chooses to act, it typically convenes at least one Subcommittee hearing and one full Committee hearing, followed by a vote.
  - The Committee can report out a treaty favorably, unfavorably, or without recommendation.

# Kigali Amendment Ratification:

## *Requirements & Procedures*

### Senate Floor

- The treaty is then placed on the Senate's Executive Calendar, as treaty business is considered in Executive Session.
- Most often, once a treaty is placed on the Executive Calendar, the Senate agrees by unanimous consent to dispense with consideration of the treaty itself and instead proceed immediately to executive session and a vote on the resolution of ratification.
- However, unanimous consent means a single objection can prevent swift consideration of a treaty.
  - If there is such an objection, the Senate would need to resolve into executive session by a roll call vote.
  - A roll call vote on the ratification of the Kigali amendment is expected.
- Under Article II of the U.S. Constitution, a two-thirds majority of those present is required for the Senate to provide advice and consent.

# Kigali Amendment Ratification:

## *Current Status*

- White House
  - Staff seems to be coming around to supporting sending the Kigali Amendment to the Senate for ratification
- Senate Foreign Relations Committee
  - Could we get a hearing in early December (post-COP26)?
  - Support from Chairman Menendez and Ranking Member Risch to move three treaties together
    - Kigali Amendment
    - South Pacific Tuna Treaty
    - MARPOL (cruise ship waste)
- Senate Floor