



# **THE NATIONAL PLAN FOR REFRIGERANT REGULATIONS**

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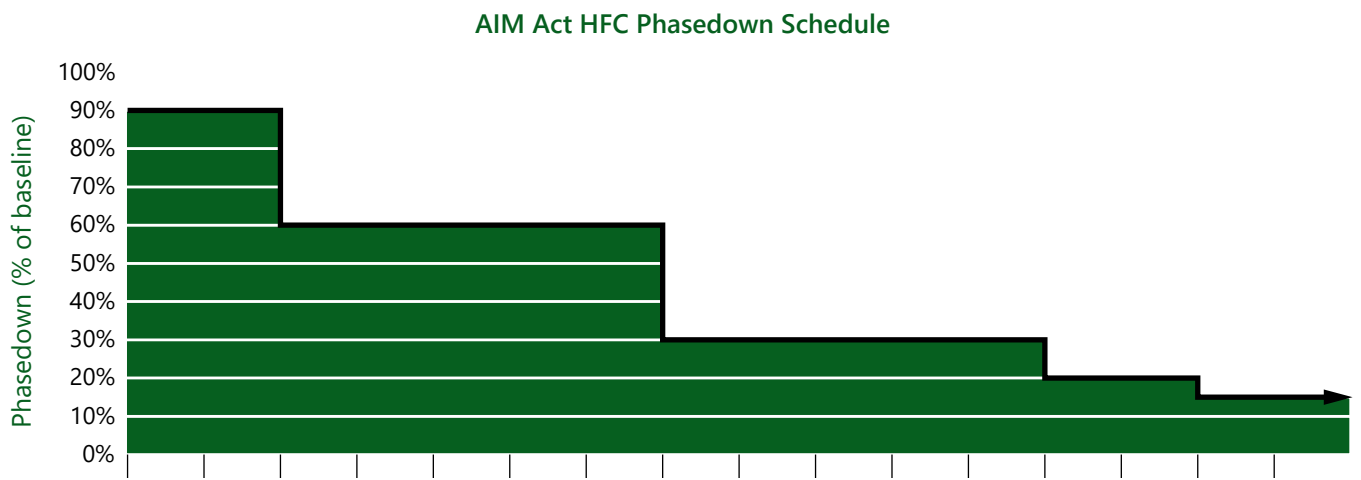


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## AIM Act & Proposed EPA Rule

The American Innovation and Manufacturing Act (AIM Act) was passed in 2020 by bipartisan support in the U.S. Congress as the United States joined the global movement to reduce human impact on climate change. The AIM Act directs the U.S. Environmental Protection Agency (EPA) to oversee the phasedown of HFC refrigerant production and consumption in an effort to transition to alternative refrigerants. The AIM Act includes a phasedown schedule that began in 2022 and continues to 2036 (See Figure 1).

FIGURE 1: AIM Act HFC Phasedown Schedule



The baseline for the phasedown schedule is refrigerant consumption from 2011 to 2013.

The EPA has published a proposed rule that will eliminate the use of refrigerants with global warming potential (GWP) greater than either 150, 300, or 700—depending on application and the size of the equipment—by 1/1/2025. These GWP limits greatly exceed those issued in the vacated SNAP Rules 20 and 21 from 2015 and 2016, respectively, which makes sense as the AIM Act urges the United States away from HFC refrigerants. The proposed rule will affect all refrigeration sectors, both commercial/retail applications and industrial applications such as cold storage, food processing, pharmaceutical/medical, ice arenas/recreational, and chillers. For more about implementation dates and which refrigerants will be eliminated, turn to [“Implementation Dates & New Projects”](#) and [“GWP Limits & Banned Refrigerants”](#) on page 4. The proposed rule will be finalized in October 2023.

This takes the responsibility of regulating refrigerants out of the hands of individual states. After SNAP Rules 20 and 21 were vacated by the Washington, D.C., Circuit Court of Appeals, it meant that states needed to write their own regulations for reducing refrigerant use. These states formed the U.S. Climate Alliance (USCA), which collectively led the country in refrigerant regulations from 2016 until this new EPA rule is finalized. This new EPA rule will exceed the regulations in many of the states in the USCA, meaning that the refrigeration industry will follow national rules. For more about where we came with state-by-state regulations, read our white paper, [“The State of Refrigerant Regulations,”](#) available on the Zero Zone website.

Some state regulations will still need to be observed. For instance, California has issued robust refrigerant regulations, and New York has been discussing GWP limits that would exceed these EPA rules. For more about specific state regulations, turn to [“State Regulations”](#) on page 6.

Since refrigerant regulations may still be puzzling, let Zero Zone help you understand these rules and how to comply with the EPA. Read on to learn more about these proposed rules.

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## Implementation Dates & New Projects

From the EPA fact sheet about the proposed rule, we learn that “*The proposed rule would prohibit manufacture and import of products containing restricted HFCs by 1/1/2025, in most cases, and would prohibit the sale, distribution, and export of products containing restricted HFCs a year later, which in most cases would be 1/1/2026.*”

The EPA is using the following definition for manufactured date: “*For equipment that is assembled and charged in the field, manufacture means to complete the circuit holding the regulated substance, charge with a full charge, and otherwise make functional for use for its intended purpose.*” Typically, manufacturers would call this definition the “operational date,” the date that equipment is ready to use. The implication of the EPA using this definition is that equipment has to arrive on site and be fully installed before 1/1/2025.

With the implementation date less than 2 years away, this will affect active projects for large systems and equipment orders with long project timelines, and even projects with shorter timelines could be affected if there are project delays. Buyers, engineers, and project managers need to start planning how to be compliant with these rules right away. Industry leaders intend to ask that the implementation date be pushed back to help manufacturers, contractors, and end users complete their existing projects.

Industry leaders also need clarification about how these implementation dates will be defined, applied, and how they will affect new projects as the proposed rule does not provide definitive guidance on what “new” means. This can be pretty obvious, such as when a new facility is built, but it becomes less obvious for remodel or renovation projects where some of the equipment could be reused. Going to these low GWP refrigerants will require reworking or replacing equipment, so it is important that “new” is well-defined before the rule is finalized.

## GWP Limits & Banned Refrigerants

This rule proposes to restrict the use of refrigerants by their global warming potential (GWP) based on the fourth assessment report (AR4) (See Figure 2). Generally speaking, equipment that uses more than 200 lbs. of refrigerant will be subject to a GWP limit of 150, and equipment that uses less than 200 lbs. of refrigerant will be subject to a GWP limit of 300. Chiller systems will be subject to a GWP limit of 700.

FIGURE 2: EPA Proposed GWP Limits

Application	Proposed GWP Limit, Less than 200 lbs	Proposed GWP Limit, More than 200 lbs	Compliance Date
Industrial Process	300	150	1/1/2025
Retail Food	300	150	1/1/2025
Cold Storage	300	150	1/1/2025
Ice Rinks	150		1/1/2025
Chillers for Industrial Process	700		1/1/2025
Chillers for Comfort Cooling	700		1/1/2025

These GWP limits will bring the end to many popular and prevalent refrigerants, such as R-404A, R-448A, and R-507, and similar refrigerants. This list shows some of the refrigerants that will go away and which will be available, but it is not a definitive list of refrigerants.

- Above 700 GWP:** R-23, R-125, R-134a, R-143a, R-227ea, R-236cb, R-236ea, R-236fa, R-245fa, R-365mfc, **R-404A**, R-407A, R-407B, R-407C, R-407D, R-407E, R-407F, R-407G, R-410A, R-410B, R-413A, R-417A, R-417B, R-417C, R-419A, R-419B, R-421A, R-421B, R-422A, R-422B, R-422C, R-422D, R-422E, R-423A, R-424A, R-425A, R-426A, R-427A, R-428A, R-4310mee, R-434A, R-437A, R-438A, R-439A, R-442A, R-447B, **R-448A**, R-449A, R-449B, R-449C, R-452A, R-452C, R-453A, R-458A, R-500, R-503, **R-507**, R-508, and R-508B.

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- **Above 300 GWP:** All refrigerants from previous list, plus R-32, R-245ca, R-446A, R-447A, R-450A, R-452B, R-454B, R-456A, R-513A, R-513B, and R-515A.
- **Above 150 GWP:** All refrigerants from previous lists, plus R-444B, R-451B, R-454A, and R-512A.
- **Below 150 GWP:** R-41, R-152a, R-429A, R-430A, R-431A, R-435A, R-440A, R-444A, R-445A, R-451A, R-454C, R-455A, R-457A, **R-717 (ammonia)**, **R-744 (CO<sub>2</sub>)**, R-1234yf, R-1234ze, and more.

## The Future of Refrigerant Options

There will be many good refrigerants available after this EPA rule is finalized and implemented. Customers can choose natural refrigerants or some HFO-based refrigerants that are below the proposed GWP limits of 150, 300, or 700. The challenge is that most of these refrigerants are not drop-in replacements for current HFC refrigerants on the market.

When the refrigeration industry had to leave R-12 behind due to its ozone depletion potential (ODP), people could turn to R-22 as a near-drop-in replacement. When R-22 left the scene, R-404A was available. Even as R-404A was being regulated out by the states in the USCA, people could still turn to refrigerants like R-448A as near-drop-in replacements. (Customers looking to lower their GWP inventory or control future refrigerant cost can still switch to refrigerants like R-448A.)

But now, the refrigerants below 150 GWP are not drop-in replacements. CO<sub>2</sub> operates at much higher pressures than other refrigerants, meaning more robust piping and components are necessary. The properties of ammonia mean it cannot be used in direct refrigeration systems, and it is mildly flammable. HFO-based refrigerants are mildly flammable, which makes these refrigerants unavailable for retrofit in existing equipment. Plus, these refrigerants have different operating conditions.

Nonetheless, even though the industry will not have a drop-in replacement, many refrigerants are still available for new facilities or full remodels.

## NATURAL REFRIGERANTS

Zero Zone Genesys™ Natural Refrigeration Solutions take us back to the beginning of refrigeration. Both CO<sub>2</sub> and ammonia were used as refrigerants in the 1800s, and now both return to the forefront of refrigeration.

**CO<sub>2</sub> (R-744)** is a leading natural refrigerant, and it is an excellent fit for commercial or industrial applications. CO<sub>2</sub> is an effective refrigerant that can serve as either the sole refrigerant in a CO<sub>2</sub> transcritical system or as a secondary refrigerant in a cascade system. The recent advent of high-pressure, iron-impregnated copper has allowed the traditionally stainless-steel piping to transition to familiar brazed copper piping, further improving value and simplifying repairs. Zero Zone Genesys™ CO<sub>2</sub> Systems can either fit inside a store's mechanical room or be built with robust housing to be placed outside to save valuable indoor space.

**Ammonia (R-717)** is a highly efficient refrigerant that is popular for industrial applications. It has better energy performance than many HFC refrigerants, and the components are readily available and robust. Ammonia has decades of proven experience in chillers and other industrial equipment. Zero Zone Genesys™ Ammonia Systems are an excellent choice for facilities and end users who prioritize efficiency and reliability. Ammonia can also be used on the high side in a cascade system with CO<sub>2</sub> on the low side.

## HFO-BASED A2L REFRIGERANTS

Many of the HFO-based refrigerants available have a safety classification of A2L from the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). A2L means these refrigerants are non-toxic (A) but mildly flammable (2L). Since A2L refrigerants carry some additional risk, systems and installations using A2L refrigerants will require additional safety components. Zero Zone is actively developing products with HFO-based A2L refrigerants, including Hybrid™ display cases, remote display cases, and rack systems.

To learn more about Genesys™ Natural Refrigeration Solutions or our HFO-based A2L plan, reach out to our sales team: <https://www.zero-zone.com/contact-sales-rep/>.

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## State Regulations

### CALIFORNIA

California led the USCA with its regulations through the California Air Resources Board (CARB). CARB developed regulations that need to be followed until this EPA rule is implemented, and CARB's regulations will even exceed this EPA rule in some areas. CARB continues to evaluate future regulations.

The California legislature passed Senate Bill (SB) 1383, which requires that HFC refrigerant levels must be reduced by 40% from 2013 levels by 2030. The California Air Resources Board (CARB) developed regulations to comply with that law. The regulations can be found on the CARB website by searching for "[Prohibitions on Use of Certain Hydrofluorocarbons.](#)" These regulations limit some systems with more than 50 lbs. of refrigerant to a GWP limit as low as 150 (See Figure 3).

FIGURE 3: California Air Resources Board (CARB) Regulations for New Equipment

Type of System	Less Than 50 lbs. of Refrigerant			More Than 50 lbs. of Refrigerant		
	GWP Limit	Effective Date	Definition of New	GWP Limit	Effective Date	Definition of New
Retail Food Equipment - All Facilities	See Footnote A	1/1/2019	See Definition 1	150	1/1/2022	See Definition 2
Cold Storage - All Facilities	See Footnote B	1/1/2023	See Definition 1	150	1/1/2022	See Definition 2
Industrial Process Refrigeration - New Facilities (excludes chillers)	No Rules			150	1/1/2022	See Definition 2
Industrial Process Refrigeration - Existing Facilities (excludes chillers)	No Rules			2,200	1/1/2022	See Definition 2
Ice Rinks - New Facilities	No Rules			150	1/1/2024	See Definition 2
Ice Rinks - Existing Facilities	No Rules			750	1/1/2024	See Definition 2
Chillers > 35°F - New Facilities <sup>c</sup>	750	1/1/2024	See Definition 3	750	1/1/2024	See Definition 3
Chillers -10°F to 35°F - New Facilities <sup>c</sup>	1,500	1/1/2024	See Definition 3	1,500	1/1/2024	See Definition 3
Chillers -58°F to -10°F - New Facilities <sup>c</sup>	2,200	1/1/2024	See Definition 3	2,200	1/1/2024	See Definition 3
Other Refrigeration <sup>d</sup>	No Rules			150	1/1/2022	See Definition 2

<sup>A</sup> Banned refrigerations from EPA SNAP Rules 20 & 21: HFC-227ea, **R-404A**, R-407B, R-421B, R-422A, R-422C, R-422D, R-428A, R-434A, **R-507A**.

<sup>B</sup> Banned refrigerations from EPA SNAP Rules 20 & 21: HFC-227ea, R-125/290/134a/600a (55.0/1.0/42.5/1.5), **R-404A**, **R-407A**, R-407B, R-410A, R-410B, R-417A, R-421A, R-421B, R-422A, R-422B, R-422C, R-422D, R-423A, R-424A, R-428A, R-434A, R-438A, **R-507A**, and RS-44 (2003 composition).

<sup>C</sup> CARB defines the chiller temperatures as the "fluid leaving temperature."

<sup>D</sup> "Other Refrigeration" refers to either a) stationary, non-residential refrigeration equipment that is not used for retail food, cold storage, industrial process refrigeration, ice rinks, or air conditioning, or b) stationary, non-residential refrigeration equipment that is used for two or more applications.

CARB includes some definitions for what would classify as new vs. existing equipment:

- Definition 1: New Refrigeration Equipment (systems below 50 lbs.)** means any refrigeration equipment that is:
  - First installed using new or used components, or a combination of new or used components, or
  - Modified such that (i) the nominal compressor capacity is increased, or (ii) the system has experienced cumulative replacements, within any 3-year time period, of components in full or exceeding 50% of the capital cost of replacing the entire refrigeration system, excluding the cost of refrigerated display cases.

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- **Definition 2: New Refrigeration Equipment (systems above 50 lbs.)** means any refrigeration equipment in a new facility that is first installed using new or used components, or a combination of new or used components, in the following:

  - (A) New construction, or
  - (B) An existing facility not previously used for cold storage, retail food refrigeration, commercial refrigeration, industrial process refrigeration, or ice rinks, or
  - (C) An existing facility used for cold storage, retail food refrigeration, commercial refrigeration, or industrial process refrigeration with a replacement of 75% or more of evaporators (by number), 100% of compressor racks, 100% of condensers, and connected evaporator loads.
- **Definition 3: “New Chiller” or “New Chiller Equipment” (systems above or below 50 lbs.)** means any chiller equipment or chiller system that is:

  - (A) First installed using new or used components, or a combination of new or used components, or
  - (B) Modified such that (i) the capacity is increased through the addition of motor-bearing components, including evaporators, compressors, or condensers, or (ii) the system has experienced cumulative replacements, within any 3-year time period, of motor-bearing components in full or exceeding 50% of the capital cost of replacing all the motor-bearing components in the entire chiller system.
- **Definition 4: “New Facility”** means any refrigeration end use that is:

  - (A) New construction, or
  - (B) An existing facility not previously used for cold storage, retail food refrigeration, commercial refrigeration, industrial process refrigeration, or ice rinks, or
  - (C) An existing facility used for cold storage, retail food refrigeration, commercial refrigeration, or industrial process refrigeration with a replacement of 75% or more of evaporators (by number), 100% of compressor racks, and 100% of condensers.

CARB has regulations that require existing retail locations to convert to lower GWP refrigerants. The formulas in **Figure 4** and **Figure 5** and effective dates in **Figure 6** will move stores toward the law’s requirement for HFC reductions.

**FIGURE 4: Greenhouse Gas Potential Reduction**

$$GHGp = \Sigma (\text{Charge} \times GWP)$$

**FIGURE 5: Weighted Average GWP Reduction**

$$WAGWP = \frac{\Sigma (\text{Charge} \times GWP)}{\Sigma \text{Charge}}$$

**FIGURE 6: California Air Resources Board (CARB) Reduction Dates**

Existing Facilities	Reduction Below 2019 Levels	Effective Date
More than 20 Stores	GHGp > 25% or WAGWP < 2,500	1/1/2026
Both More or Less than 20 Stores	GHGp > 55% or WAGWP < 1,400	1/1/2030

CARB recognizes that new technology with lower GWP may be more expensive than HFC options, so they offer some incentive programs to help stores by easing their transition. More information is available on the CARB website: <https://ww2.arb.ca.gov/resources/documents/low-gwp-incentives>.

CARB has proposed a provision for building permits, which would be useful for any in-progress projects. **“Approved Building Permits:** The prohibitions in Section 95374(c) do not apply to any facility with new refrigeration equipment that received an approved building permit before the effective date.” Please note that the application process can take time, so we recommend pursuing this soon.

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## NEW YORK

A number of states continue to evaluate their regulations on HFC gases to meet their stated sustainability goals. Federal law allows states to have more stringent requirements than the EPA, and New York has proposed the most aggressive goals with a GWP limit of 10. This would eliminate the use of most A2L refrigerants in New York. Our trade association—the Air Conditioning, Heating, and Refrigeration Institute (AHRI)—is commenting on the proposal, and we are monitoring the legislative process to see how these rules progress.

## Summary

We are heading into new territory where natural refrigerants and HFO-based refrigerants will be the only available refrigerants for new equipment. Now is the time to make CO<sub>2</sub>, ammonia, or HFO-based refrigerants the choice for your upcoming refrigeration equipment. These are complicated times, but Zero Zone is happy to partner with you and help you maintain compliance.

For more information about this White Paper, contact:

**Director of Regulatory Compliance & Refrigeration Technology**  
**Zero Zone, Inc.**

**800-247-4496**



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