

Request for Feedback
Amendments to 6 NYCRR Part 494
Hydrofluorocarbon Standards and Reporting

DEC seeks initial, pre-proposal feedback on key questions related to major sources of HFC emissions in New York State and potential regulatory mechanisms for reducing these emissions. DEC requests that feedback be provided before 5 p.m. June 30, 2022. Written feedback can be mailed to climate.reqs@dec.ny.gov with the subject line, “Part 494 Update”, or to Suzanne Hagell, NYSDEC Office of Climate Change, 625 Broadway, Albany NY, 12233-1030. Where applicable, indicate if you are providing feedback on a specific question such as “Part A Question 1”.

Contents

Background: HFCs and New York State Climate Policy	2
<i>Table 1. Comparison of example refrigerants.....</i>	<i>3</i>
Questions for Consideration.....	4
Goals of this rulemaking	4
Part A. End Use Prohibitions	5
<i>Table 2. End Use Prohibitions.....</i>	<i>6</i>
<i>Table 3. Additional Sales Prohibitions under consideration.....</i>	<i>7</i>
Part B. Refrigerant Management and Disposal	8
<i>Table 4. Requirements for Existing Facilities under consideration.....</i>	<i>8</i>
<i>Table 5. Annual Leakage Rates</i>	<i>11</i>

Background: HFCs and New York State Climate Policy

The Climate Leadership and Community Protection Act (Climate Act) requires New York State to reduce annual greenhouse gas (GHG) emissions 40% by 2030 and 85% by 2050, limiting total annual emissions to no more than 60 million metric tons of carbon dioxide equivalent (CO₂e).¹ The ultimate goal is to achieve a 100% GHG emission reduction on net, or net zero GHG emissions. According to a recent assessment of hydrofluorocarbon (HFC) sources within New York State,² HFC emissions could increase up to 57% by 2050 and exceed 30 million metric tons CO₂e in 2050 and take up half of the State's total GHG emissions budget. The Part 494 regulation adopted in 2020 along with the federal AIM Act and implementing federal regulations will contribute to HFC emission reductions over time, but they are not sufficient to achieve the CLCPA's statutorily required GHG emission reductions.

In 2021, the Climate Action Council recommended a series of actions to address statewide GHG emissions.³ This Draft Scoping Plan includes recommendations in the buildings and waste sectors to address HFC emissions, while enacting a large-scale building electrification strategy. These recommendations include expanding the Part 494 prohibitions on new equipment as well as a suite of actions to address HFC emissions from existing equipment, including reporting programs, sales bans, end-of-life management, training, and research & development (R&D). This Request for Feedback reflects the recommendations of the Draft Scoping Plan.

Overall, the Draft Scoping Plan recommends transformative change across all sectors of the New York State economy. DEC is considering how an expanded Part 494 regulation can set a clear, long-term plan for such a transformation to ensure that the State can achieve the statutorily required GHG emission reductions while limiting the costs to businesses and consumers. It is also intended that this rulemaking balance the needs of multiple industries while aligning as much as possible with other jurisdictions.

The current Part 494 regulation was designed to align closely with regulations and legislation adopted by other states so to enable consistent, nationwide policy. DEC will continue to prioritize alignment with other governments but must also meet new and unique requirements of the Climate Act. One such requirement is to use the Intergovernmental Panel on Climate Change (IPCC) 20-year Global Warming Potential (GWP₂₀) metric, as adopted in 6 NYCRR Part 496.⁴ As shown in **Table 1**, GWP₂₀ values differ from the GWP₁₀₀ values used in regulations promulgated by the US Environmental Protection Agency (EPA) and the California Air Resources Board. As a result, regulatory terms that refer to specific GWP thresholds (e.g., 150 or 750 GWP) would not have the same meaning under the Climate Act. For example, R-454a is composed of 35% HFC-32, but a blend would need to be composed of less than 30% HFC-32 to fall below a 750 GWP₂₀ threshold and less than 6% to fall below 150 GWP₂₀ threshold. The GWP₁₀₀ values used today were also published more than 15 years ago; they are useful for standardization, but they do not reflect the best available science.

¹ 6 NYCRR Part 496, Statewide GHG Emission Limits

² NYSERDA. 2021. "Hydrofluorocarbon Emissions Inventory and Mitigation Potential in New York State," NYSERDA Report Number 21-28. Prepared by Guidehouse, Inc. nyserdera.ny.gov/publications

³ The Draft Scoping Plan is currently available for comment at <https://climate.ny.gov>

⁴ §496.5 Greenhouse gases. https://www.dec.ny.gov/docs/administration_pdf/revexptterms496.pdf

TABLE 1. COMPARISON OF EXAMPLE REFRIGERANTS

	Standard 100-Year GWP	CLCPA 20-Year GWP	% HFCs	Safety Group	Social Cost ⁵ (\$ per ton)
R-125	3500	6090	100	A1	400,000
R-134a	1430	3710	100	A1	180,000
R-407a	2107	4406	100	A1	247,200
R-410a	2088	4260	100	A1	238,000
R-32	675	2430	100	A2	76,000
R-448a/449a/449b	1386-1411	2995-3105	73-76	A1	~160,000
R-452b	697	2055	74	A2L	~79,000
R-513a	629	1663	44	A1	~79,000
R-454b	465	1675	69	A2L	~52,000
R-454a	236	851	35	A2L	~27,000
R-454c	145	523	22	A2L	~16,000
R-457a	137	499	18	A2L	~15,000
R-515b	290	490	9	A1	~38,000
R-1336mzz(z)	2	6	0	A1	128
R-1234ze(e)	>1	4	0	A2L	128
R-1234yf	>1	1	0	A2L	128
R-600a	3	1	0	A3	128
R-744	1	1	0	A1	128
R-717	0	0	0	B3	0

The GWP20 values for many HFCs are sufficiently high to question their consistency with the State’s GHG reduction requirements. Without regulation, the continued use of HFCs in existing equipment combined with a growing demand for new equipment will impede the State’s ability to achieve the Climate Act’s GHG emission reduction requirements. This is a particular issue for New York as the Draft Scoping Plan recommends the widespread adoption of heat pumps, which currently use high GWP HFC refrigerants.

As an additional source of information, Table 1 provides the estimated Social Cost of example HFC substances. Pursuant to DEC’s Value of Carbon Guidance, DEC will use of the federal damages-based social cost metric, but at lower discount rates, in this rulemaking. As such, the costs and benefits of this rulemaking will be estimated based on a 1%, 2% (central), and 3% discount rates rather than the 2.5% rate used by the EPA.

Finally, the actions considered in this Request are also intended to reduce emissions of ozone-depleting substances (ODS) that are climate pollutants, although they are not subject to statewide GHG emission limits under the Climate Act. In providing feedback on the questions below, please also include suggestions for controlling emissions of ODS in New York State.

⁵ Social cost for each GHG at a central 2% discount rate, in 2024. The social cost of CO2 is used for non-HFC GHGs. Note: the social cost of GHGs is separate and distinct from GWP. DEC plans to provide all values in an updated version of DEC’s Value of Carbon Guidance, available at <https://www.dec.ny.gov/regulations/56552.html>

Questions for Consideration

DEC seeks feedback on the questions listed below, which are divided into two main categories, representing the types of regulatory actions under consideration and potential compliance entities. Some entities may have feedback on multiple areas. DEC welcomes feedback from all parties. In responding to the questions below, parties are welcome to propose alternative means to achieve the goals of this rulemaking (see below). DEC is specifically seeking suggestions that are accompanied by a consideration of GWP20 emissions and the feasibility and costs of implementation.

Part A. End-Use Prohibitions: Potentially applicable to entities that manufacture, sell, offer for sale, enter into commerce, use, or install equipment, products, or substances that contain or are intended to contain HFCs or other GHGs.

Part B. Refrigerant Management and Disposal: Potentially applicable to entities that own or operate equipment that contains refrigerants and entities responsible for the servicing and disposal of HFC substances or HFC-containing equipment.

Goals of this rulemaking

NYSERDA (2021)¹ provides a review of HFC emission sources in New York State and lays out multiple emission scenarios. The most ambitious scenario⁶ was used in the Integration Analysis for the Draft Scoping Plan. DEC's emission reduction goals for this rulemaking are based on that scenario. A brief summary of the scenario is provided below:

- ➔ HFC emissions from food refrigeration equipment are 46% lower by 2030 and all but eliminated by 2050. The NYSERDA model achieves this goal by immediately prohibiting new HFC equipment and replacing all existing equipment between 2024 and 2035 with ultra-low GWP alternatives. For existing large equipment (>50lbs), leakage is also reduced to 9% per year. For small equipment, end of life recovery is increased to 90%.
- ➔ For all other stationary equipment, including all chiller applications, A/C, dehumidifiers, and heat pumps, emissions are expected to increase through 2030 due to the demand for building electrification. However, this increase is strongly mitigated through leak management. By 2050, HFC emissions from large equipment (>50lb) are 88% lower than today and emissions from smaller equipment (<50lb) are completely eliminated. NYSERDA's model achieves the necessary 2030 and 2050 reductions by prohibiting new HFC equipment by 2024 (<50lbs) and 2034 (>50lbs) while ultimately replacing all equipment stocks by 2037-2041 with ultra-low GWP alternatives. For large equipment (>50lb), leakage is reduced 50% by 2027. For small equipment, end of life recovery is increased to 90%.
- ➔ For motor vehicles, HFC emissions from air conditioning and transport refrigeration systems are eliminated by 2040. The model achieves this by assuming that federal policies will ensure that 100% of vehicles sold in NY will have non-HFC air conditioning systems by 2024 and all vehicle stocks are then replaced by 2038. For transport refrigeration, all sales are non-HFC by 2029 and all stocks are replaced by 2040. There is no change in leak rate.

⁶ Table 5 2. Modeled Mitigation Scenarios. "Scenario #8B: + Max possible recapture for small systems to increase max possible service reclaim"

Part A. End Use Prohibitions

DEC is considering updating and expanding the Part 494 prohibitions related to refrigeration and air-conditioning end-uses.

- 1) Please provide feedback on any subparts of the current Part 494, including any updates to definitions or administrative requirements that may be necessary to support an amended rule. This includes the applicability of regulatory terms used by other jurisdictions.
- 2) DEC is considering alternatives to the GWP100 thresholds used by other jurisdictions. DEC is not considering the use of GWP100 values. The alternatives proposed in this document are (a) a GWP20 threshold, (b) the % composition of HFCs, and/or (c) references to specific substances such as R-32. Please provide feedback on which option is more effective or recommend alternative options that would achieve the listed goals. Table 1 provides GWP and % composition values for a set of example refrigerants. One key difference is that the % composition option will remain static over time, but the GWP-based option may be subject to change with subsequent updates from the IPCC. If using a GWP-based option, DEC must also consider whether to incorporate the IPCC AR5 GWP values (as currently adopted in Part 496) or adopt values from the more up-to-date IPCC AR6. Finally, please provide feedback on mechanisms that would better enable enforcement of these provisions, such as whether to additional labeling of the contents of affected products is necessary.
- 3) Please provide feedback on the following prohibitions ([Table 2](#)) for inclusion into the Part 494.4 end-use categories (a) air conditioning and (b) refrigeration. Current Part 494 definitions and prohibitions were applied, including for “new” and “retrofit”. Note that the Prohibited Substances column contains multiple options as discussed in Part A Question 2. In developing this initial draft proposal, DEC considered the goals stated above, recent EPA decisions, and the Climate Act timeline. DEC recognizes that not all refrigerants that are available today can be used in every application. Where there is uncertainty regarding the availability of alternative refrigerants, please indicate alternative timelines that DEC should consider and the explanation for such uncertainty. If this timeline would postpone an effective date beyond 2035, please provide recommendations for alternative approaches for mitigating HFC emissions including how the State can support not-in-kind, zero-emission approaches to building heating and cooling or refrigeration.

End-use categories in Table 2:

Refrigeration equipment containing >50lbs of refrigerant (new construction) – Includes equipment used in supermarkets and cold storage warehouses and refers to all refrigerant used in a system, including central or distributed refrigeration systems, secondary loop, or cascade systems with multiple circuits; Industrial process chillers. This end-use category refers specifically to newly constructed facilities or fully new systems.⁷

Refrigeration equipment containing >50lbs of refrigerant (new and retrofit) – Includes the installation of new or used components in the equipment end-uses above in existing facilities, as defined in Part 494. For additional questions regarding the use and servicing of refrigerants in existing retail food facilities, see Part B.

⁷ See example definitions in California Code of Regulations, Title 17 § 95373

Refrigeration equipment containing <50lbs refrigerant (new) – Includes end uses above plus other food refrigeration end-uses such as remote condensing units, stand-alone equipment, commercial ice machines, and refrigerated food processing and dispensing equipment as used in any retail food or food service operation.

Ice rink chillers (new) – Includes indoor or outdoor ice rink chiller systems of any charge size.

Industrial process refrigeration chillers (new) – Includes chillers used for industrial process cooling and refrigeration, except in new construction (see above).

Chillers (new) – Includes chillers for use in space cooling end-uses and ice rinks, except ice rinks in new construction (see above).

Air-conditioning equipment (new) – Includes equipment used for cooling, heating, or dehumidifying air (air-conditioners, heat-pumps, and dehumidifiers) other than for vehicles.

TABLE 2. END USE PROHIBITIONS

End-use types	Prohibited Substances	Effective Date	Exceptions
Refrigeration equipment containing >50lbs refrigerant (new construction)	Any refrigerant composed of >6% HFCs or GWP20 above 10	January 1, 2024	
Refrigeration equipment containing >50lbs refrigerant (new and retrofit)	Any refrigerant composed of >6% HFCs or GWP20 above 10	January 1, 2034	
Refrigeration equipment containing <50lbs refrigerant (new)	Any refrigerant composed of >6% HFCs or GWP20 above 10	January 1, 2026	
Ice rink chillers (new)	Any refrigerant composed of >6% HFCs or GWP20 above 10	January 1, 2024	
Industrial Process Refrigeration Chillers (new)	Any refrigerant composed of >6% HFCs or GWP20 above 10	January 1, 2030	
Chillers (new)	Any refrigerant composed of >10% HFCs or GWP above 500	January 1, 2024	R-513b allowed until January 1, 2026
	Any refrigerant composed of >6% HFCs or GWP20 above 10	January 1, 2034	
Air-conditioning equipment >50lbs (new)	Any refrigerant composed of >6% HFCs or GWP20 above 10	January 1, 2027	R-32, R-466a, and R-454b allowed until January 1, 2034*
Air-conditioning equipment containing <50lbs refrigerant (new)	Any refrigerant composed of >6% HFCs or GWP20 above 10	January 1, 2024	R-32 and blends thereof allowed until January 1, 2027*

* See Part A Question 4 and Part B Question 7.

- 4) HFC-32 and certain blends thereof have a lower GWP than the most common refrigerants in these end-uses. However, the GWP20 of HFC-32 is unacceptably high. Additional regulatory controls will be needed to limit the negative impacts of HFC-32 and to meet the Climate Act requirements. Please provide feedback on whether DEC should seek to avoid the adoption of HFC-32 and blends as an intermediate substitute. Also see Part B Question 7 regarding additional regulatory actions.
- 5) DEC is considering a provision under which no equipment with greater than 50lbs of refrigerant can be replaced by equipment that contains or is intended to contain a refrigerant with a higher GWP. Please provide feedback on this provision including the applicability to specific end-uses in Table 2 and the charge size.
- 6) What other end-uses categories should be considered in this rulemaking? Should the end-use categories in Table 2 be subdivided further to enable a more efficient phase-down? Provide information on the timeline for ultra-low or zero GWP alternatives for any end-uses or end-use categories not included in Table 2.
- 7) Please provide feedback on the following considered prohibitions on the sale of high-GWP refrigerants or products ([Table 3](#)).

TABLE 3. ADDITIONAL SALES PROHIBITIONS UNDER CONSIDERATION

Prohibited Substance	Effective Date
All virgin HFC or ODS substances with a GWP20 \geq 5000. This includes but is not limited to: R-125, R-143A, R-227CA, R-227EA, R-227BC, R-23, R-236EA, R-236FA, R-245CB, R-404A, R-407B, R-417B, R-419A, R-421A, R-421B, R-422A, R-422B, R-422C, R-422D, R-422E, R-428A, R-434A, R-461A, R-507A, R-508A, R-508B, R-509A	January 1, 2027
All virgin HFC or ODS substances with a GWP20 \geq 2000. This includes but is not limited to: R-32, R-134A, R-407A, R-407C, R-410A, R-448A, R-449A, R-452B	January 1, 2034
Motor vehicle “DIY cans” of refrigerant containing virgin HFC or ODS substances	January 1, 2026

- 8) Regarding motor vehicle “DIY” cans, please provide feedback on mechanisms to address these impacts to low-income individuals and communities while ensuring that HFC emissions of high GWP refrigerants can be eliminated. Note that the sales prohibition in Table 3 refers to virgin refrigerant and would not prohibit the use of reclaimed substances. Provide feedback on the availability and cost of products made with recovered and reclaimed refrigerant or mechanisms to increase accessibility for low-income communities in New York State.
- 9) DEC is considering mechanisms to aid in the enforcement of the prohibitions above and in the current Part 494 rule. Are there other potential revisions that DEC should consider that would aid regulated entities’ ability to respond to record requests and demonstrate

compliance? Regarding Table 3, please provide feedback on the use of labeling or disclosure statements to demonstrate that products or equipment contain or are intended to be used with reclaimed refrigerant.

- 10) DEC may consider amending the record-keeping requirements in Part 494 and/or replacing such requirements with an additional registration and/or reporting program. Please provide feedback on any design elements that DEC should consider.

Part B. Refrigerant Management and Disposal

Following the recommendations of the Climate Action Council, DEC is considering regulatory actions to control the leakage and disposal of HFC refrigerants. Unlike the Part 494 prohibitions on new equipment and products, this regulation would seek to directly regulate existing HFC emission sources within New York State. This additional control is needed to mitigate HFC emissions that are already occurring and that may occur for many years after new equipment and products enter the State.

For Supermarkets, Cold Storage Warehouses, and other Retail Food Locations that own or operate equipment with >50lbs of refrigerant.

- 1) Provide feedback on the following potential additions to Part 494 (**Table 4**), including any recommended revisions or additional phasedown steps to achieve a full transition away from HFC refrigerants in existing stores. This may include an interim reporting year. Please also provide feedback on the end-user definitions, including the 20-store threshold.

Retail food facility – A facility that sells food and that operates at least one retail food equipment unit or system with >50lbs of HFC or ODS refrigerants.

Company - All businesses, affiliates, brands, or subsidiaries or franchises, owned or operated by the same parent company.

National Supermarket Chain - A retail food chain, brand name, or business operating more than 100 retail food facilities in the United States.

TABLE 4. REQUIREMENTS FOR EXISTING FACILITIES UNDER CONSIDERATION

End-user	Requirement	Effective Date
Companies owning or operating 20 or more retail food facilities in New York and national supermarket chains operating in New York	Attain a company-wide weighted average GWP20 of less than 2500 for refrigeration equipment containing > 50 pounds refrigerant	January 1, 2030
Companies owning or operating fewer than 20 retail food facilities in New York	Attain a company-wide weighted average GWP20 of less than 3000 for refrigeration equipment containing > 50 pounds refrigerant	January 1, 2030

- 2) DEC seeks input on the definition of retail food facility and whether it should encompass “retail food”, “food warehouse”, and “food service” facilities per Article 28 of the Agriculture and Markets Law.

- 3) DEC is considering requiring the companies referred to in Table 2 above to register with the agency and provide information on equipment and refrigerants in use at their facilities. Please provide feedback on any design elements that DEC should consider, including the amount of time needed to collect information. Provide feedback on whether DEC should “pre-fill” public information collected under Article 28 of the Agriculture and Markets Law.
- 4) DEC is considering a reporting program that will enable the public to assess facility emissions⁸ and for the companies referred to in Table 2 above to demonstrate compliance and attain recognition. Please provide feedback on any design elements that DEC should consider, including whether certain types of information should be confidential.
- 5) The FY23 NYS Environmental Protection Fund includes a demonstration program to aid the adoption of natural refrigerants in food stores in Disadvantaged Communities. What other types of pilot programs should DEC or other State entities consider in order to aid small and independent food stores, especially in Disadvantaged Communities?
- 6) For owners and operators of retail refrigeration equipment (greater or less than 50lbs): What specific types of support from the State would enable your business to transition away from HFCs when alternatives are made available on the market? Please comment on the relative utility of building benchmarking, energy costs, financial planning, engineering design, equipment incentives, and training.

For Refrigerant Management (Servicing and Disposal) in Stationary and Mobile Refrigeration and Air-Conditioning End-Uses

- 7) In Part A Question 3, DEC asks if certain high GWP substances should be prohibited or allowed for use with additional controls. Please provide feedback on regulatory mechanisms that can ensure that 90% of refrigerant will be recovered from chiller, air-conditioning, and heat-pump applications and how leakage can be reduced 50% in large equipment or to less than 6% per year (large means >50lbs of refrigerant). Relevant topics include:
 - Reporting programs
 - Product stewardship support, such as through Extended Producer Responsibility
 - Municipal collection programs and fee structures, including for specific refrigerants
 - Convenient locations for drop-off of appliances or recovered refrigerant
 - Commercial and/or residential collection programs
 - Methods and costs associated with recovering different refrigerants from specific blends and appliance categories and verifying blend composition, including whether the market prices of refrigerant blends cover these costs
- 8) As part of Question 7, DEC is considering a licensing and/or registration and reporting program for individuals that handle GHG-containing refrigerants. Please provide feedback on design elements that will enable NYS to reduce refrigerant loss. Relevant topics include:
 - Use of or alignment with federal or local licensing/certification/reporting programs

⁸ ECL § 75-0105(4).

- Applicable refrigerants and end-use sectors in NY (e.g., stationary, mobile)
 - Who should be licensed in NYS and relevant requirements (e.g., engineers, technicians, apprentices)
 - Design of training materials and how these can be provided
 - Involvement of industry partners, educational organizations
 - Fees and financial need
 - Evaluation of prior learning
 - Reporting frequency and content, including information on leak management practices and refrigerant sources/labels
 - Consumer access to information on licensed individuals or companies and leak management reports
- 9) DEC is considering a requirement that individuals who handle HFC-containing refrigerants ultimately complete certification in the handling of newer, alternative refrigerants. DEC welcomes feedback on all of the topics listed in Question 8 above but particularly:
- Addressing the shortage of qualified technicians that can safely handle substances
 - Design of training materials and how these can be provided, including opportunities to “train the trainer”
 - Involvement of industry partners, educational organizations
 - Timeline for phasing in this requirement
- 10) Please provide additional recommendations for reducing refrigerant loss and improving refrigerant reclaim and recovery that would be appropriate for state or local government policy or programming. Recommendations should include information on the effectiveness of such programs in other jurisdictions, such as in terms of HFC emissions or recovery rates as well as costs. DEC also seeks feedback on enforcement mechanisms of the prohibitions listed in Part A Table 3.
- 11) For mobile equipment, DEC is considering a requirement that equipment manufacturers provide the public with easily accessible information on refrigerants used in specific vehicle model years. Please provide feedback on this requirement including whether such information should be collected and hosted by DEC, by the manufacturer, or another entity.
- 12) Please provide feedback on the assumptions for annual leakage ([Table 5](#)) and recommendations for how to monitor leakage rates going forward. DEC is considering the development of reporting or registry programs as recommended in the Draft Scoping Plan. Please provide feedback on any programs or equipment types not discussed above. DEC recognizes that not all systems have a constant leak rate that is easily annualized, but these rates are used to estimate emissions under the Climate Act. Per the annual NYS Statewide GHG Emissions Report, DEC also appreciates recommendations for reconciling such “bottom-up” data with “top-down” measurements.

TABLE 5. ANNUAL LEAKAGE RATES

End-Use Category	EQUIPMENT TYPES	CURRENT AVERAGE ANNUAL LEAK RATE	TARGET AVERAGE ANNUAL LEAK RATE
Refrigeration equipment >50lbs refrigerant	Supermarket racks (High GWP)	18%	9%
	Supermarket racks (Low GWP)	9%	4.5%
	Large refrigerated warehouses (~8000lbs refrigerant)	15.9%	7.95%
	Small refrigerated warehouses (~500lbs refrigerant)	18%	9%
	Remote condensing units, walk-ins	15%	7.5%
Refrigeration equipment <50lbs refrigerant	Remote condensing units, walk-ins	15%	7.5%
	Commercial ice makers	10%	10%
	Commercial refrigerators/freezers	10%	5%
	Reach-ins, display cases; vending machines	0.2%	0.1%
Industrial Process Refrigeration Chillers	All equipment types and sizes	10%	10%
Chillers	Commercial large centrifugal chiller (~4000lbs refrigerant)	2.3%	1.15%
	Commercial medium chiller (~1000lbs refrigerant)	1.4%	0.07%
	Commercial small chiller (~500lbs refrigerant)	6.9%	3.45%
Air-conditioning equipment >50lbs	Commercial central split & package A/C; VRF	11.3%	5.65%
Air-conditioning equipment <50lbs	Commercial central split & package A/C; ductless split AC; GSHP; VRF	10%	5%
	Residential central A/C; GSHP	6.3%	3.15%
	Room A/C, Packaged A/C or HPs; HP water heaters and clothes dryers; dehumidifiers	1-2%	1-2%
Transportation Refrigeration	All equipment types and sizes	18.3%	18.3%
Motor Vehicle A/C	Light, Medium, and Heavy-Duty (High GWP)	10.1%	10.1%
	Light, Medium, and Heavy-Duty (Low GWP)	5.05%	5.05%