

Refrigerant Phase-Outs

Explained and Untangled

March 13th 2024



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Hosted by:



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Chillers, Fans, Lab exhaust, Lab energy recovery, pre-fab plants, terminal
equipment, humidification, air purification, etc.*

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Cooling Options

- Chilled Water
- Air and Water-Cooled DX
- Evaporative Condensing DX

Energy Recovery

- Enthalpy and Desiccant Wheels
- Regenerative Dual Core
- High-Eff. Glycol Run-Around
- Energy Recovery Heat Pipes
- Enthalpy and Sensible Cores

Heating Options

- Hot Water/Steam/Electric
- Indirect/Direct Gas Furnace
- Water/Air-Source Heat Pump

Dehumidification

- Ventilation Air
- Pool Units
- Ice Rink Units
- Desiccant Dehumidification
- Wrap-Around Heat Pipes



CENTRAL CHILLED WATER AND HOT WATER SYSTEMS

Chillers

- Air-Cooled | Water-Cooled
- Process and Low-Temperature
- Integral Free-Cooling
- Absorption

Fluid Coolers

- Air-Cooled | Adiabatic
- Flat | Vertical | V-Bank

Heat Pumps

- Air-to-Water
- Water-to-Water | Geothermal
- Simultaneous Heating/Cooling
- Heat Recovery
- Booster (High Temp)
- Modular and Unitary
- Domestic Hot Water
- Wastewater Heat Recovery



FANS AND LABORATORY EXHAUST SYSTEMS

Laboratory Exhaust Fans

- High-Plume Dilution
- FRP/Perchloric Systems
- Integral Acoustical Packages
- Plenums with Energy Recovery

AHU Plenum Fans

- Highly-Optimized Acoustics
- Ultra-High Efficiency
- ECM Fan Arrays
- Retrofit Fan Solutions



TERMINAL EQUIPMENT

Heat Pumps

- Horizontal | Vertical | Stacked
- Geothermal
- DOAS | 100% OA

Fan Coils | Unit Heaters

- Chilled Water and DX
- Hot Water/Steam/Electric
- Horizontal | Vertical | Stacked
- Concealed | Exposed

Chilled Beams | Induction Units

- Active & Passive Chilled Beams
- VAV Chilled Beams
- Displacement Induction Units

Duct and Unit-Mounted Coils

- Hot Water/Steam/Electric
- Chilled Water
- Direct Expansion
- Freeze-Block Technology



HTS NEW ENGLAND

FACTORY-FABRICATED CHILLER AND BOILER PLANTS

Outdoor Enclosed Plants

- Chillers
- Boilers
- Cooling Towers
- Pump Packages

Fully Custom Plant Design

- 3D Design Software
- Unlimited Equipment Choices
- Optional Controls Package



HUMIDIFICATION

Steam Humidification

- Direct Steam
- Gas-Fired
- Electric
- Steam-to-Steam

Atomizing Humidification

- Ultra-High Efficiency
- AHU-Mounted or Directly in Space
- CRAC Air Treatment



HIGH-EFFICIENCY KITCHEN VENTILATION SYSTEMS

Kitchen Exhaust Equipment

- Hoods
- Scrubbers/Precipitators
- Pollution Control Units

Kitchen Exhaust Control Systems

- Demand Control Ventilation
- Make-Up Air Integration
- Exhaust Hood Balancing Dampers



AIR PURIFICATION

- Electronically-Enhanced, High-Efficiency Filtration
- Ultraviolet Germicidal Irradiation (UVGI)
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Experts in VRV air conditioning system design, installation, and service. DXS offers a single-source solution for VRV equipment and the associated ventilation and controls. This includes complete VRV integration with multiple manufacturers of AHU's and ERU's.

High Efficiency Air & Water Source Heat Pumps

- Air, Water, and Ground Source VRV /VRF
- Standard and Cold Climate
- Dual Fuel and Gas Driven
- Split & Thru-wall All-in-One Units

Ventilation, Controls, & Other

- Standard & Passive House ERV's
- VRV Driven ERV's
- Building Automation (VRV & Cloud Based)
- ASHP Accessories (Mounts, Rails, etc.)



HTS/CTI CONTROLS

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HTS SERVICE AND PARTS

We provide service, repair, and replacement for all commercial HVAC systems. As the official Daikin OEM Parts Distributor, we offer competitive pricing and provide timely solutions for all your Parts & Aftermarket needs.



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Control Technologies, Inc. is owned and operated under HTS New England to offer customers a single-source for comprehensive HVAC systems with high-quality building automation solutions.

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Your Source for All-Electric Buildings



All-Electric Multi-Residential (New)

Individual ASHPs for each suite
VRV driven Passive House ERV

280 lbs R-410a



All-Electric K-12 (New)

VRV driven custom central VAV AHUs

VRV Heat Pump condensing units

600 lbs R-410a



Net Zero School Cambridge (New)

Geothermal

Water-source heat pump chillers

Custom AHU

640 lbs R-410a



Electrification of Commercial Office (Retro)

VRV driven semi-custom modular AHUs

VRV Heat Pump condensing units



720 lbs R-410a



Typical All-Electric Commercial Office (NEW)
Ducted semi-centralized VRV systems
ASHP VRV driven packaged Rooftop ERVs

850 lbs R-410a

Agenda

- **Part 1 – How refrigerants fit into decarbonization**
- **Part 2 – The science of refrigerants, and why it matters**
- **Part 3 – Codes, standards, and flammability**
- **Part 4 – Phase-outs of refrigerants in HVAC equipment**
- **Part 5 – Where we are today with equipment**

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What is more important in reducing Emissions?



Electrification
&
Energy Efficiency

VS.



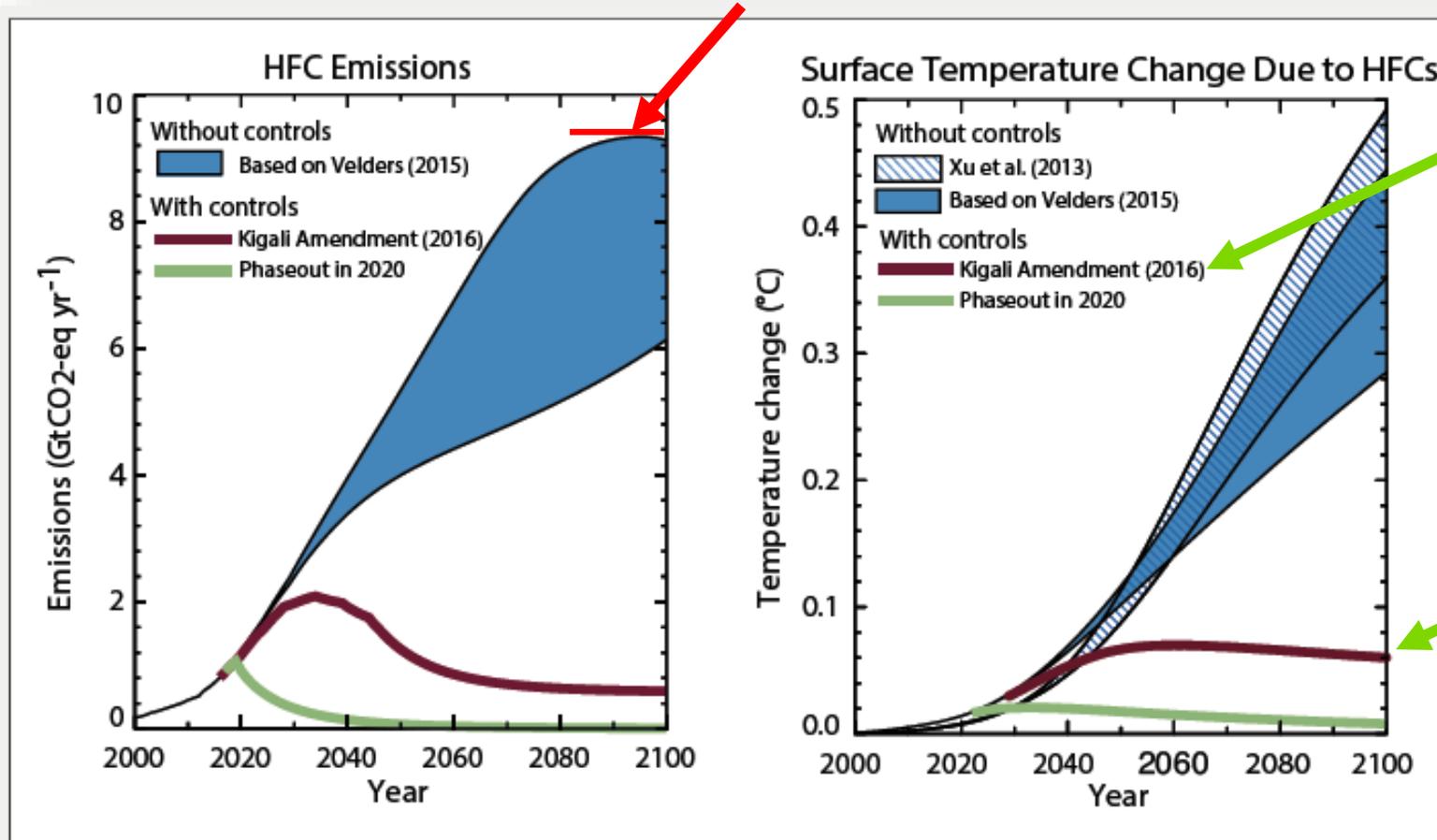
Reducing
emissions from
refrigerant leaks

The answer is: Both are important, but make sure decisions consider overall lifetime emissions impact, and not just impacts from one potential source (such as refrigerants)

Refrigerant choice can have major impacts on overall HVAC system efficiency, their ability to heat, complexity, and resulting emissions



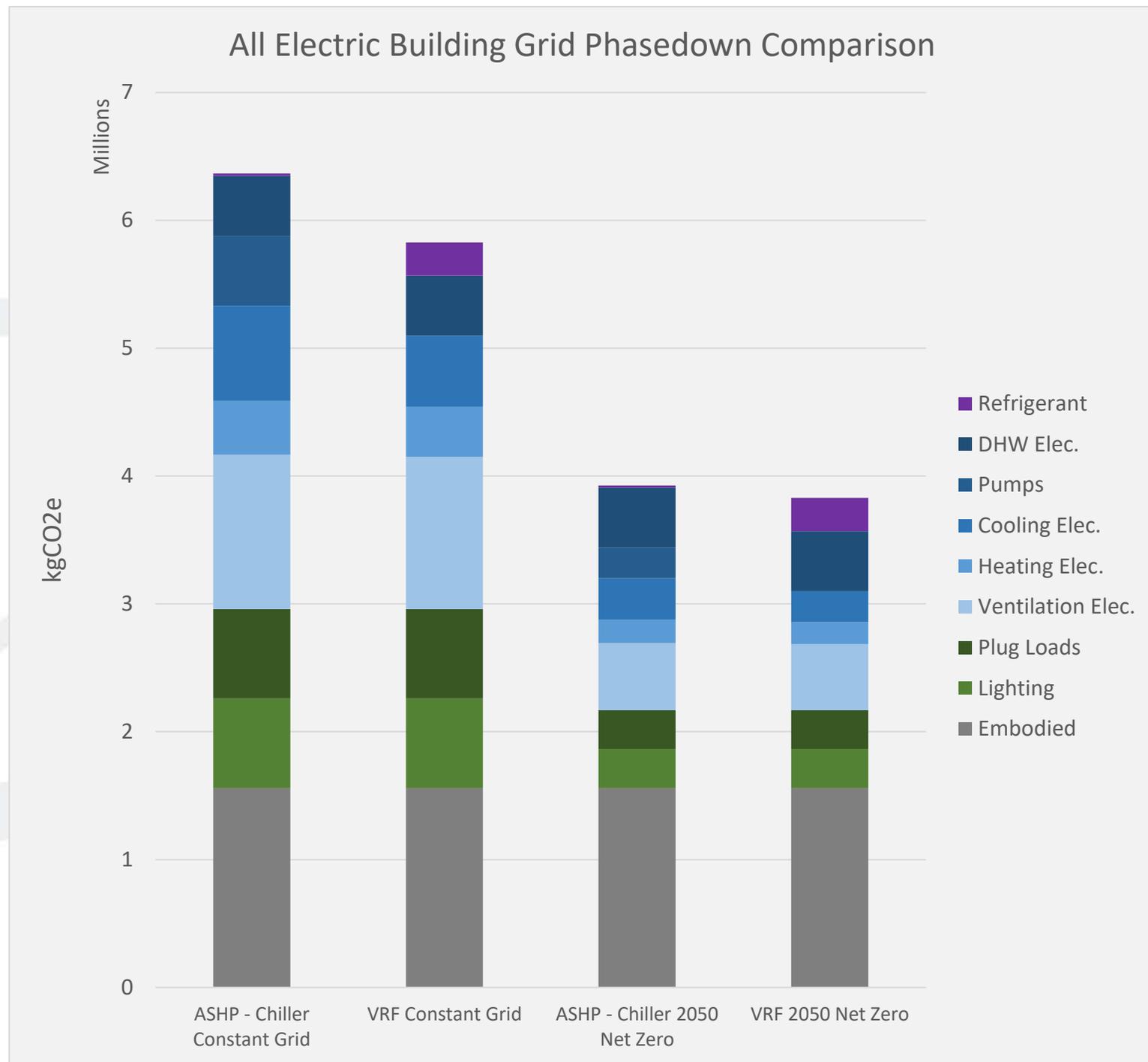
Looking at refrigerant emissions in isolation



Important to address!

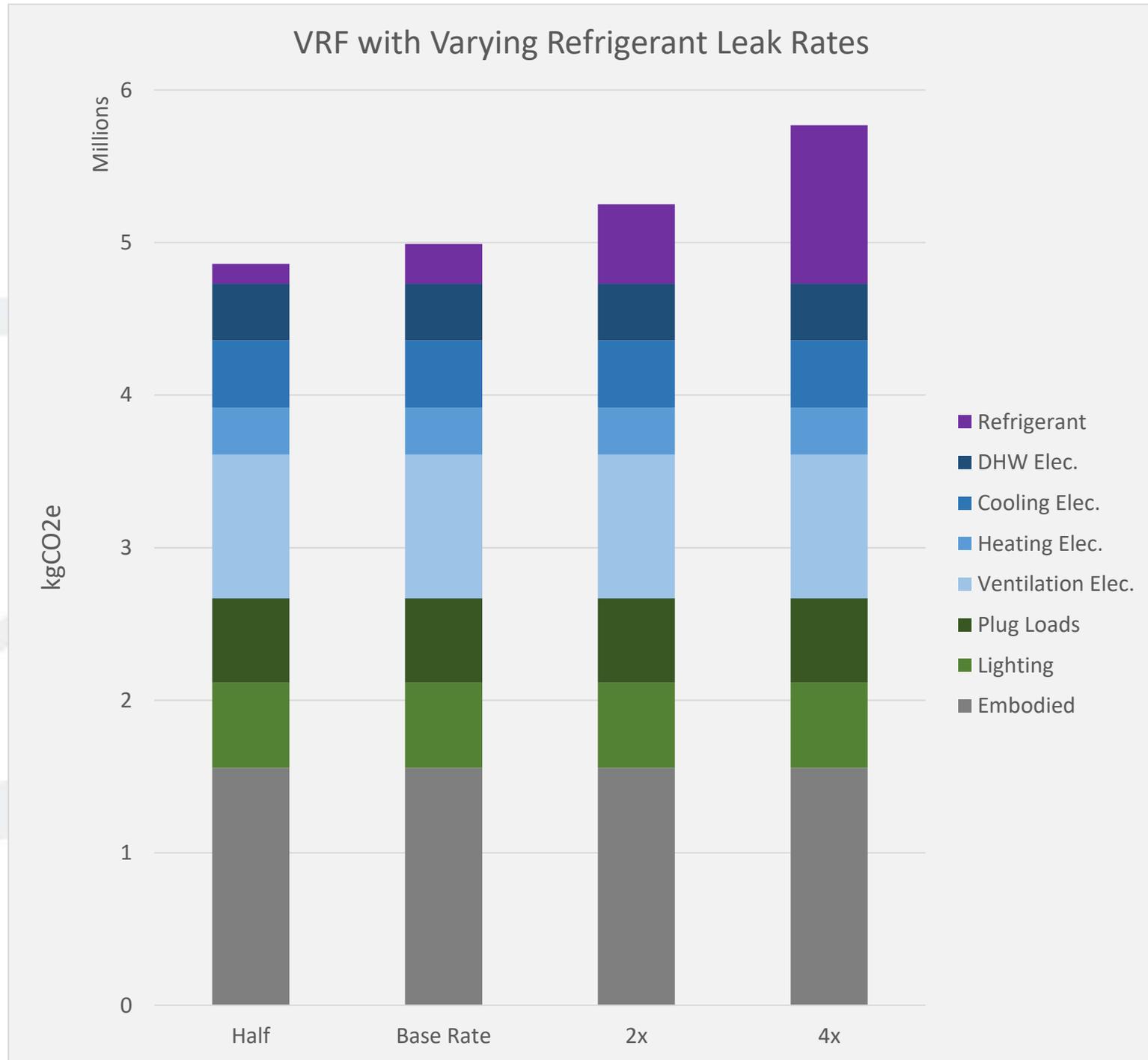
Life Cycle Climate Performance

- Building LCCP Study using 3rd party energy model
- 8 Story multi-rez building (Boston)
- All-Electric HVAC systems
 - VRF vs ASHP Chiller
 - ASHP DHW
 - VRF driven ERVs
- Deep analysis of grid emissions
 - Correlations to time-of-day & year
 - Correlations to weather
 - Overlaid onto TMY3
 - Multiple Grid phasedown scenarios
- Multiple refrigerant leak rates and emission scenarios



Life Cycle Climate Performance

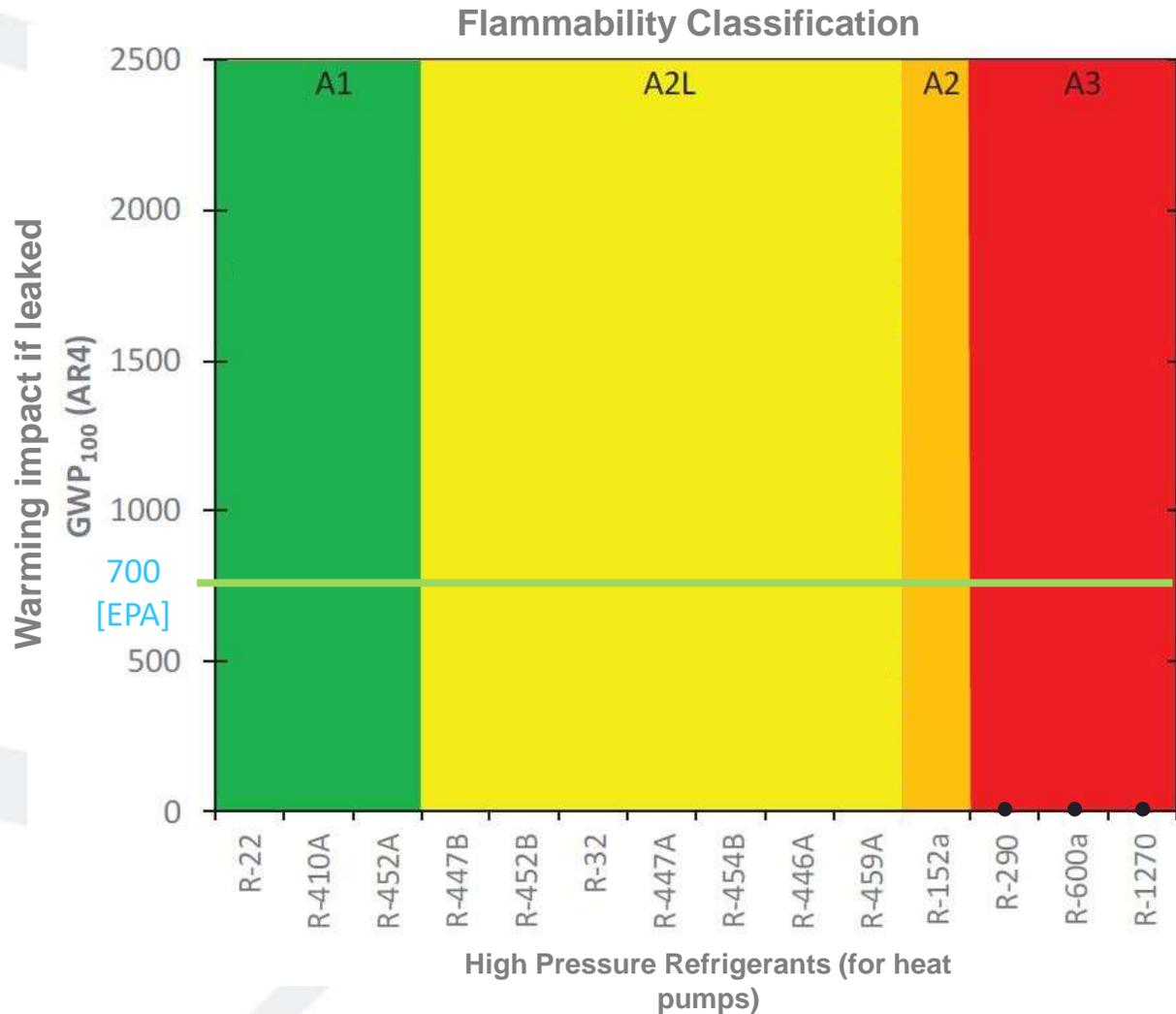
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Why can't we just find or create lower GWP refrigerants for heat pumps?



- Flammability and GWP are essentially inversely proportional

GWP vs Flammability

- More Fluorine results in more stable chemicals. Great to reduce flammability, bad for GWP as it doesn't breakdown

ASHRAE Standard 34 – Designation and Safety Classification of Refrigerants (2022)

Higher Flammability	A3	B3
Flammable	A2	B2
Lower Flammability	R-32 R-454B A2L	B2L*
No Flame Propagation	R-410A A1	B1
	Lower Toxicity	Higher Toxicity

↑

- Most refrigerants can and will combust when put into a high-energy situation such as a fire (ie. R-410a)
- There are (4) flammability classes, and no class called “non-flammable”
- **1:** Flame propagation Test (at testing standard of 140F)
 - No flame propagation = Class 1
- **2:** How much (needed to ignite), how hot, how fast
 - Concentration needed to ignite (LFL) < 0.10 kg/m³ = Class 3
 - Heat of Combustion HOC > 19 kJ/g = Class 3
 - Otherwise, high LFL and low HOC = Class 2
 - *If burn velocity < 10 cm/sec ~ 20ft/minute = Class 2L*

A1 vs A2L Flammability comparison

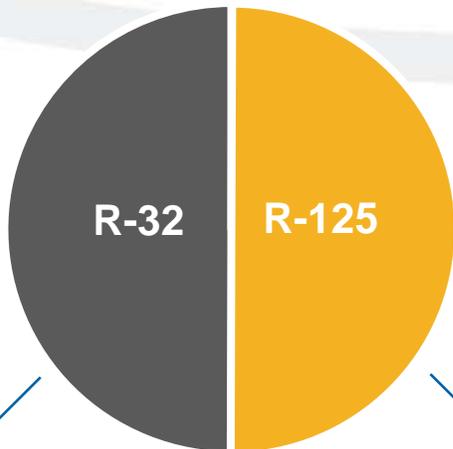
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R-410a Alternatives

(high pressure, low GWP refrigerants for heat pumps)

R-410a

(non-proprietary)



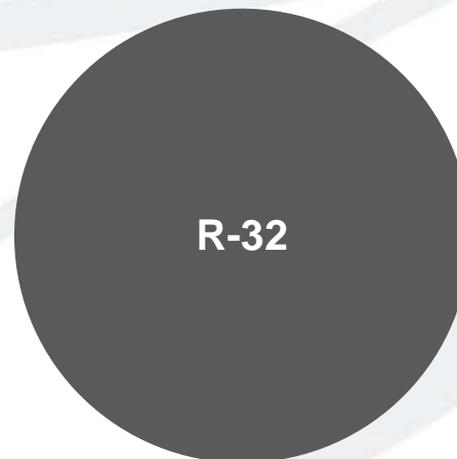
Class: A1

Most efficient & highest capacity high-pressure refrigerant¹

High fluorine content refrigerant with low performance but high stability resulting in the A1 classification

R-32

(non-proprietary)



Class: A2L

R-32 is simply the removal of R-125 from R-410a, resulting in a pure refrigerant with the best performance across high pressure refrigerants¹

R-454B

(proprietary)



Class: A2L

R-32 mixed with HFO R-1234yf reduces the GWP but results in a blend with a slight glide, and a slight reduction in capacity and efficiency

1. <https://www.nature.com/articles/ncomms14476/figures/3>



Water-Cooled Chillers:
Low / Medium pressure refrigerants



85F
Condenser
Water

41F

44F Supply
Water

Air-Cooled Chillers:
Medium / High pressure refrigerants



95F Ambient

53F

42F Supply
Water/Glycol

R-123 (GWP 79)
↓
R- 1233zd (GWP 1)*

R-134A (GWP 1430)
↓
R- 513A (GWP 573)
↓
R-515B (GWP 292)
R-1234ze (GWP 1)

R-410A (GWP 2088)
↙ ↘
R-454B (GWP 466) **R-32 (GWP 675)**

Air-Source **Heat Pump** Chillers:
High pressure refrigerants

120F Supply
Water



-4F Ambient

124F



Air-Source **Heat Pump** VRV / Splits:
High pressure refrigerants

113F
Refrigerant
(condensing temp)



-22F
Ambient

135F



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Application / Design / Installation rules

Who? Who makes the rules on which refrigerants can be used, how much can be used, where they can be run, and any other safety requirements?

- **EPA?** Yes, via phase out rules & SNAP rules
- **UL?** Yes, as the equipment safety certification body
- **ASHRAE?** Yes, with standards that classify and apply refrigerants
- **ICC / IMC?** Yes, as the model building code, deciding standards language
- **State Building Code?** Yes, deciding which model code and amendments
- **AHJ?** Yes, often referred to in codes, enforcement
- **Manufacturers?** Yes, new UL often refers to manufacturer instruction and data
- **Project Team?** Yes, code & standard interpretation, overall advice





700 GWP (for most HVAC systems, 2025 & 2026)


ASHRAE
AHRI
ASTM
Etc.


ICC
IMC/IBC/IFC/IRC


State Building Code
(with amendments)


AHJ
Inspectors

UL
UL 60335-2-40 2022

Manufacturers
(IOMs, data)


PROJECT TEAM

Over Simplification!



Application / Design / Installation rules

What? What are the rules on what refrigerant can be used, how much of it, any extra safety requirements or rules etc.

1. Which language / rules is the project bound by?

Which version of IMC? Which version of ASHRAE? UL 60335-2-40.

* Building Code Dependent *

2. What is the exposure of the refrigerant?

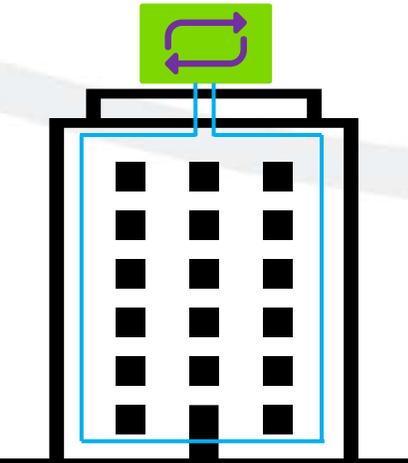
Where is the refrigerant in the building, and where can it leak.

Outside? Machinery room? Occupied space?

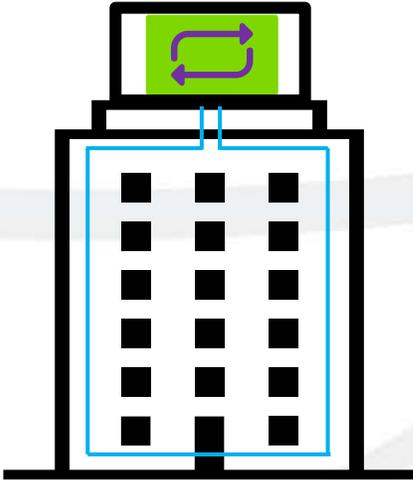
Dictates allowable refrigerant quantities and other requirements.



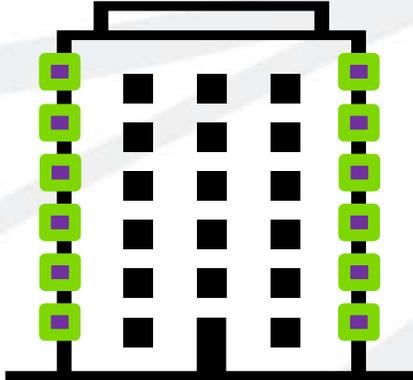
Refrigerant location & exposure



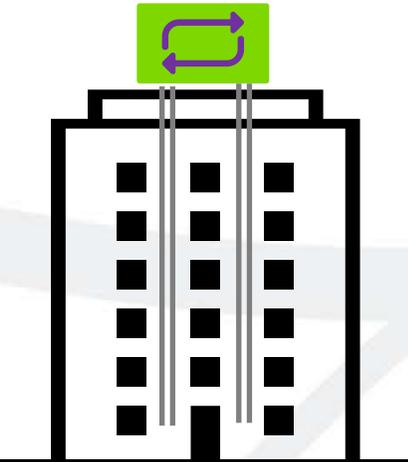
Refrigerant contained outdoors
Hydronic distribution



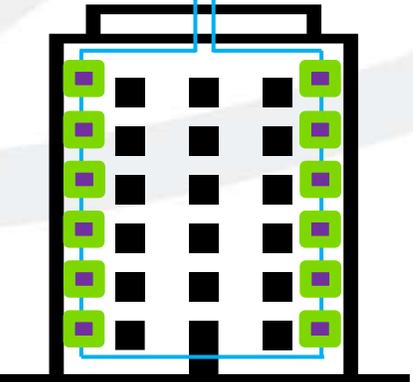
Refrigerant in machine room
Hydronic distribution



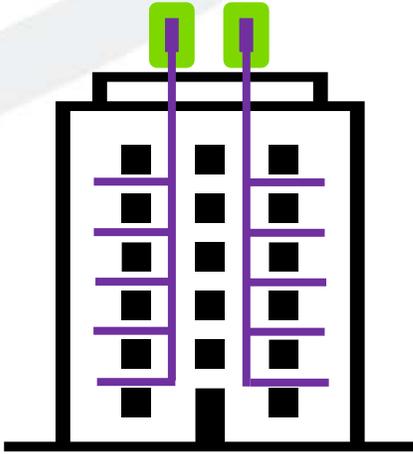
Refrigerant contained in
packaged terminal units



Refrigerant contained outdoors
Ductwork distribution



Refrigerant contained in small
distributed units



Direct distribution of heat
through building with refrigerant

- Efficiency
- Emissions
- Cost
- Tenant Metering

Flammability & ASHRAE

- **ASHRAE 34:** Classification standard for refrigerant
- **ASHRAE 15 :** Application standard for refrigerant systems with a focus on health & safety
 - 3-year cycles, latest edition: 2022 (*ASHRAE edition ≠ building code!*)
 - Increased adoption of low flammability refrigerants over the last decade
 - Increased alignment with IEC standards (i.e., Europe) that are much further along
- **2016:** No allowance for A2Ls in direct systems
- **2019:** Some allowances for A2Ls in direct systems, up to ~4lbs due to unclear detection requirements. Fire-rated shaft requirements, pipe shield requirements.
- **2022:** Clear allowances for A2Ls in direct systems, with some mandatory and optional safety mitigation measures that limits leakage (major environment side affect). Removal of fire-rated shaft requirements (if RCL is met), removal of pipe shields, RCL increase etc.



ICC Adoption

IMC 2018: Yes

IMC 2021: Yes

IMC 2024: Some,
missing key sections.

ASHRAE Standard 15 - 2022 & A2L's

- The ASHRAE Standard 15 committee did a fantastic job!
Released Fall 2022
- The standard has multiple long-awaited clarifications and definitions, especially for the distributed DX systems (VRF)
- Results in increased safety for VRF systems
- Results in a reduction in refrigerant leakage and associated emissions due to the added safety mitigation measures
- UL 60335-2-40 2022 has adopted most provisions
- IMC 2024 missing most key A2L related sections

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ASHRAE Standard 15 - 2022 & A2L's

- Refrigerant Concentration Limit (RCL) still applies
 - Ensures safety in case of a refrigerant leak
 - Toxicity, oxygen deprivation and flammability are analyzed to determine RCL
- RCL comparison: R-410a (A1) vs R-32 / R-454b (A2Ls)

1. Toxicity: All refrigerants are Class A, Low toxicity.

2. Flammability:

R-410a:	RCL not limited by flammability as it is Class 1
R-32 / R-454b:	RCL of 25% of LFL as they are class 2L refrigerants

R-32 =	4.8 lbs / mcf
R-454b =	3.1 lbs / mcf*

3. Oxygen deprivation (26 lbs / mcf for refrigerants denser than air)

R-410a =	26 lbs / mcf
R-32 =	26 lbs / mcf
R-454b =	26 lbs / mcf



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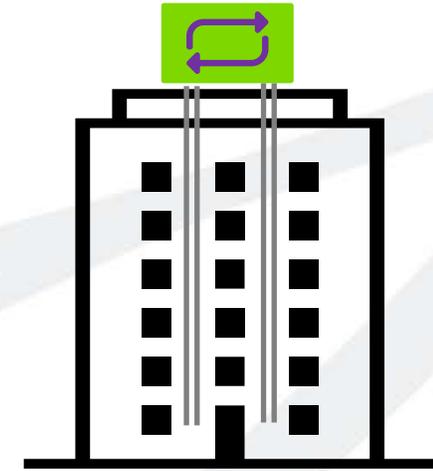
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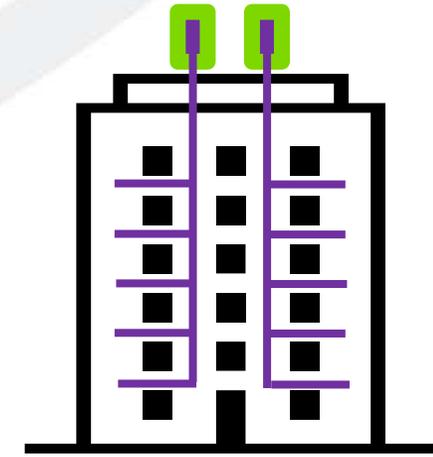
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Refrigerant contained outdoors
Ductwork distribution



Direct distribution of heat
through building with refrigerant



ASHRAE Standard 15 - 2022 & A2L's – VRV/VRF

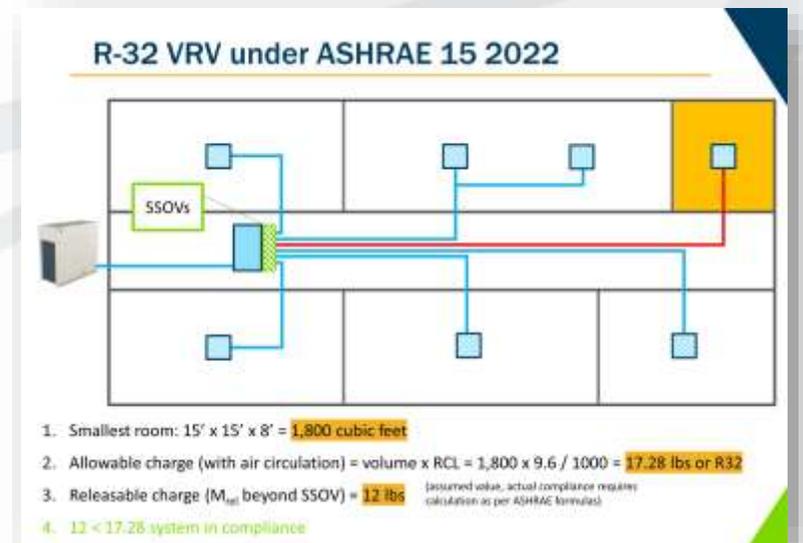
- All A2L VRV/VRF will need refrigerant detection in all spaces
 - **Daikin:** factory mounted detectors in fan coils
 - **Result:**
 - Increased safety (R410a had no detection)
 - Increased RCL from 4.8 (R-32) to **9.6 lbs / mcf**
 - *R-32 also has ~30% less charge than R-410a*
- Safety Shut Off Valves (SSOVs) can be used to reduce the “releasable charge” of the system
 - **Daikin:** factory mounted safety shut off valves
 - **Result:**
 - Reduced safety risks (upon a leakage event)
 - Reduced emissions (upon a leakage event)
 - Simplification of R410a to R32 VRV retrofits

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ASHRAE Standard 15 - 2022 & A2L's – VRV/VRF

- Definitions and calculations for connected spaces
- *Potential* need for fired rated and naturally ventilated refrigerant pipe chases for buildings over 2 stories
- Review pipe and branch selector box locations
- Proper use of VRV/VRF software for RCL compliance
- No ignition sources in the airstream (listed electric heat okay)
- **Overall result for VRV/VRF systems under ASHRAE 15 2022 with R-32:**
 - Applicability to smaller spaces
 - Major reduction in refrigerant leakage & emissions during a leak event
 - 30% less refrigerant, 68% lower GWP, SSOVs to limit leakage
 - Ability to identify and locate leaks early (via detectors) *Combined with VRV IOT monitoring!*
 - Increased safety



Code Adoption for A2L refrigerants

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- Some States making this change legislatively, others through codes (amendments to IMC 2021)
- What does “acceptance” and “allowance” of A2Ls actually mean?
 - Depends on which language is adopted by each State / AHJ
 - Based on language, allowance and concentration depends on the location, exposure and quantity of refrigerant

Code Adoption for A2L refrigerants – MA & 10th Edition Code

- Not expected to make this change legislatively, but through code changes & BBRS
- 10th Edition code carries 2021 I-Codes (IMC 2021) which does not have the latest language surrounding A2Ls, nor the latest referenced standards (ASHRAE 15, UL)
- BBRS recently had 10th edition code open hearings and accepted public comments through March 6th
 - HTS/DXS testified and submitted multiple proposed changes (as did Daikin and AHRI)
 - Attempting to bring the latest language into MA, putting us ahead of other States



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EPA History

- EPA phased out ozone-depleting substances, phasing out CFCs & HCFCs
 - i.e., going from R-22 to R-410a in high pressure systems
 - Pretty tricky... different pressures, different volumes and pipe sizes, oils.
- Solved our ozone problem. But now we have a Global Warming Potential problem (the “GWP” of a refrigerant, if it leaks).
 - EPA tried to address this...



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The Kigali Amendment

- Amendment to the Montreal Protocol to globally phase down HFC's (85% reduction in CO₂ tons equivalent) due to their Global Warming Potential (GWP)
- U.S. has been in and out (Obama – Trump – Biden)
- No direct legislative impact in the U.S. (until the AIM Act...)

2016

- Signed October 15th 2016 (28th meeting of the Montreal Protocol)

2019

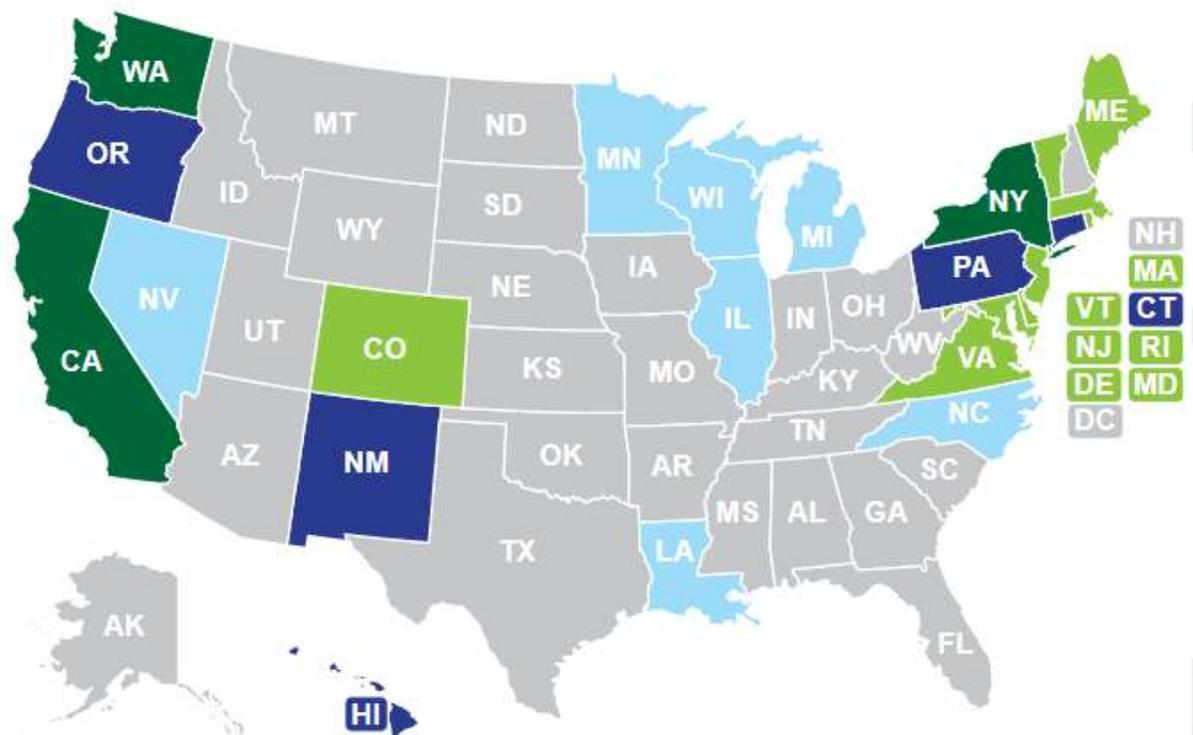
- Start of the phase down for developed countries (including USA)

2036

- Phase down of developed countries (including USA) by 85%

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State level activity



- U.S. Climate Alliance states started taking matters into their own hands
- Many followed the SNAP 20/21 guidelines
- Some States are still continuing with their phase down / phase out plans in parallel to the EPA
- Both EPA rules and State rules can apply in certain States!

■ SNAP + Additional GWP Limits ■ SNAP 20/21 Signed Into Law ■ SNAP 20/21 Pending
■ US Climate Alliance Member

Massachusetts (310 CMR 7.76)

- Phase-outs started Jan 1, 2024 for chillers
- Heat pump chillers are included, since they generate chilled water for comfort cooling
- Permitting date is key (old refrigerants still allowed on projects permitted before Jan 1, 2024)
 - **Watch for EPA 2025 limit!**

End-Use Category: Air Conditioning		
Centrifugal chillers (new)	FOR12A, FOR12B, HFC-134a, HFC-227ea, HFC-236fa, HFC245fa, R-125/ 134a/ 600a (28.1/70/1.9), 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-423A, R-424A, R-434A, R438A, R-507A, RS-44 (2003 composition), THR-03	January 1, 2024
Positive displacement chillers (new)	FOR12A, FOR12B, HFC-134a, HFC-227ea, KDD6, R125/ 134a/ 600a (28.1/70/1.9), 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-424A, R-434A, R-437A, R438A, R-507A, RS-44 (2003 composition), SP34E, THR-03	January 1, 2024

- VRV/VRF and mini/multi splits are not included
- Heating only heat pumps are not included



Main EPA Ruling



FACT SHEET

Final Rule - Phasedown of Hydrofluorocarbons: Restrictions on the Use of Certain Hydrofluorocarbons under Subsection (i) of the American Innovation and Manufacturing Act of 2020

Overview of this Final Rule

This final rule, signed on Oct 5, 2023, restricts the use of higher-GWP HFCs in new aerosol, foam, and refrigeration, air conditioning, and heat pump (RACHP) products and equipment.



Main EPA Ruling



Refrigeration, Air Conditioning, and Heat Pump Systems*			
Subsector	Systems	Global Warming Potential Limit or Prohibited Substances	Installation Compliance Date ⁵
Stationary air conditioning and heat pumps	Residential and light commercial air conditioning and heat pump systems	700	January 1, 2025 ⁶
	Variable refrigerant flow systems	700	January 1, 2026
Chillers	Industrial process refrigeration with exiting fluid below -50 °C (-58 °F)	Not covered	Not covered
	Industrial process refrigeration with exiting fluid from -50 °C (-58 °F) to -30 °C (-22 °F)	700	January 1, 2028
	Industrial process refrigeration with exiting fluid above -30 °C (-22 °F)	700	January 1, 2026
	Comfort cooling	700	January 1, 2025



Main EPA Ruling



FACT SHEET

Final Rule - Phasedown of Hydrofluorocarbons: Restrictions on the Use of Certain Hydrofluorocarbons under Subsection (i) of the American Innovation and Manufacturing Act of 2020

⁶New systems with a GWP above 700 can be installed until January 1, 2026, so long as all components are manufactured or imported prior to January 1, 2025 (refer to the [Interim Final Rule](#) for additional details).

		2024	2025	2026	2027	2028
Mini / Multi Split ASHPs	Manufacture with R-410a	Yes	Only for replacement as “components”			
	Sell / install R-410a inventory	Yes	Yes (1-year sell-through)	No		
	R-32 Availability	On-going releases	Yes			
PTACs PTHPs RTUs	Manufacture with R-410a	Yes	No			
	Sell / install R-410a inventory	Yes	Yes (3-year sell-through)			No
	R-32 / R-454B Availability	On-going releases	Yes			
VRV / VRF	Manufacture with R-410a	Yes	Only for replacement as “components”			
	Sell / install R-410a inventory	Yes	Yes (1-year sell-through)*	No		
	R-32 Availability	No	On-going releases	Yes		



		2024	2025	2026	2027	2028
Chillers	Manufacture with GWP > 700	Yes (if permitted < 2024)	No			
	Sell / install inventory	Yes (if permitted < 2024)	No			
	New Refrigerants	On-going releases	Yes			

Agenda

- Part 1 – How refrigerants fit into decarbonization
- Part 2 – The science of refrigerants, and why it matters
- Part 3 – Codes, standards, and flammability
- Part 4 – Phase-outs of refrigerants in HVAC equipment
- **Part 5 – Where we are today with equipment**

Are we ready for these new refrigerants?!

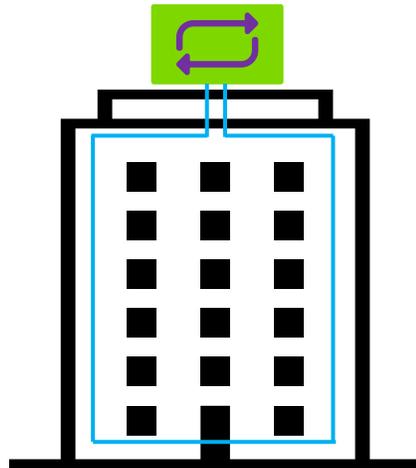
Depends where equipment/piping is located...

- **Refrigerant Contained Outdoor**
 - Need 10th edition code + minor amendments proposed*
- **Refrigerant Contained in Machine Room / Mechanical Space**
 - Need 10th edition code + minor amendments proposed*
- **Direct Air Systems – Low Concentration Risk**
 - Need 10th edition code + minor amendments proposed
- **Direct Air Systems – Higher Concentration Risk**
 - Need 10th edition code + major amendments proposed

* Primarily needs UL 60335-2-40



Refrigerant contained outdoors



Refrigerant contained outdoors
Hydronic distribution

Chillers / Air-Source Heat Pumps: R32 / 454B / 513A
Already here! More coming in 2024

R410A /134A Deadline

1/1/24 [MA] – exception for permits before 1/2/24

1/1/25 [EPA] – no exception for permit date

Heating-Only Air-Source Heat Pumps R32 / 454B
Already here! More coming in 2024

R410A /134A Deadline

1/1/25 [EPA]



*Need MA 10th Edition Building Code



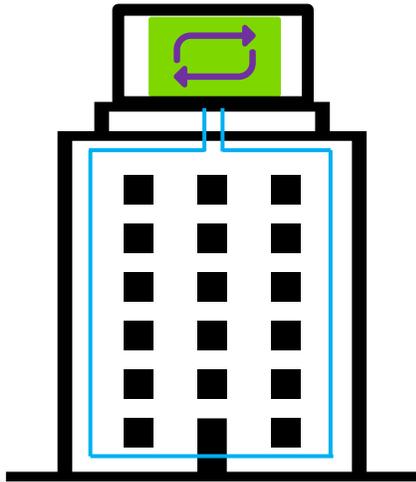
Machine Room Equipment

Chillers / Heat Pumps: R32 / 454B / 513A / 1233zd / R-515B
Already here! More coming in 2024

R410A /134A Deadline

1/1/24 [MA] – exception for permits before 1/2/24

1/1/25 [EPA] – no exception for permit date



Refrigerant in machine room
Hydronic distribution



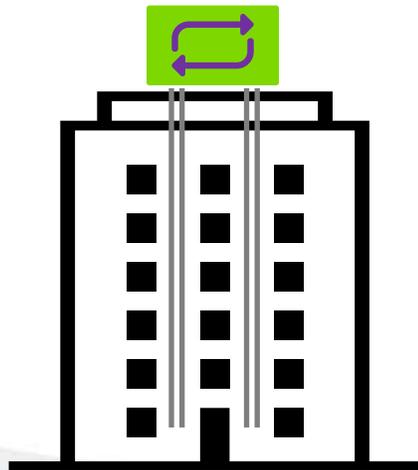
*Need MA 10th Edition Building Code



Rooftop Air Handling Systems

Rooftop Units / Condensing Units: R32 & R454B
Already here! More coming in 2024

R410A Deadline
1/1/25 [EPA]



Direct air system



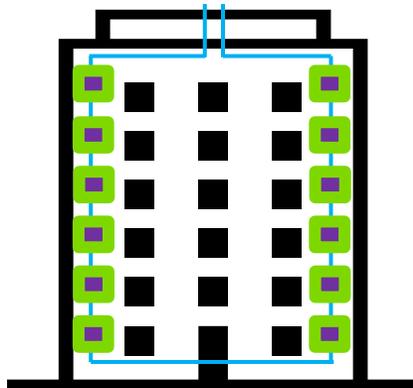
*Need amendments to MA 10th Edition Building Code



Decentralized Air Conditioning / Heat Pumps

Water-to-Air Heat Pumps: R32 & R454B
Already here! More coming in 2024

R410A Deadline
1/1/25 [EPA]



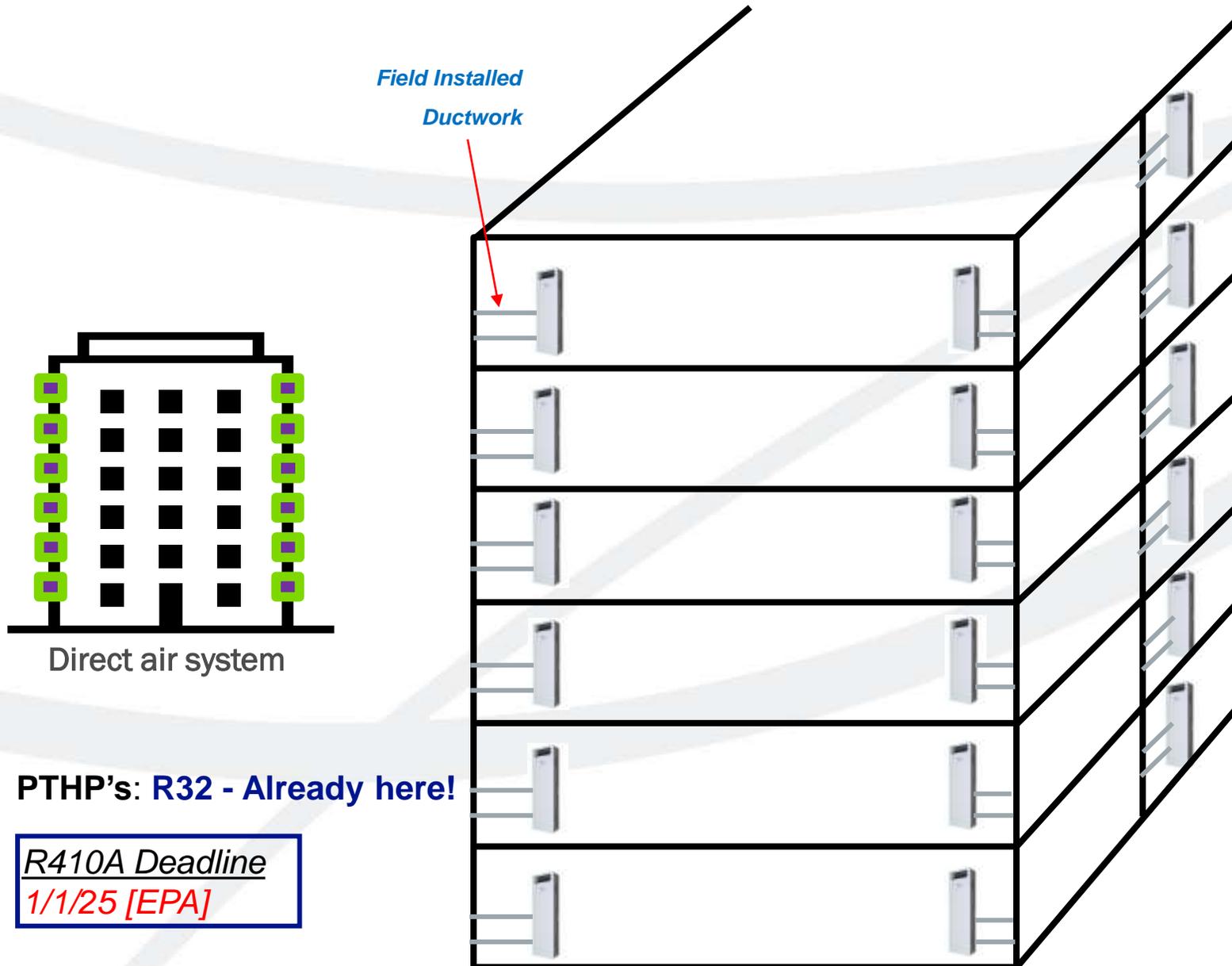
Direct air system



**Need amendments to MA 10th Edition Building Code*



Packaged Terminal Units (AC + Heat Pump)



PTHP's: R32 - Already here!

R410A Deadline
1/1/25 [EPA]



Distributed Refrigerant Systems

Mini / Multi Splits / VRV-S: R32 – Already here! More coming in 2024

R410A Deadline
1/1/25 [EPA]

DAIKIN ATMOSPHERA

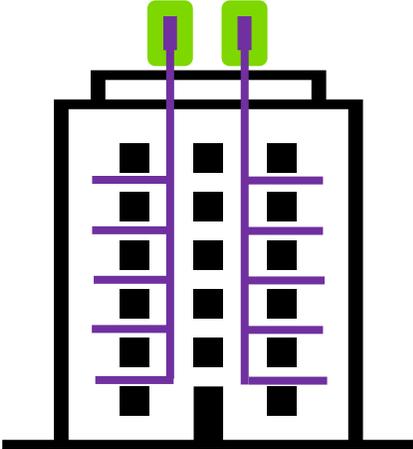
Single Zone Heating and Cooling System

Up to 27.4 SEER2 | Up to 11.2 HSPF2 | Up to 16.3 EER2



North America's 1st R-32 ASHP
Up to: 27.4 SEER2 / 11.2 HSPF2

**Need amendments to MA 10th Edition Building Code*



Direct air system

VRV / VRF 3ph: R32 – Coming in 2025

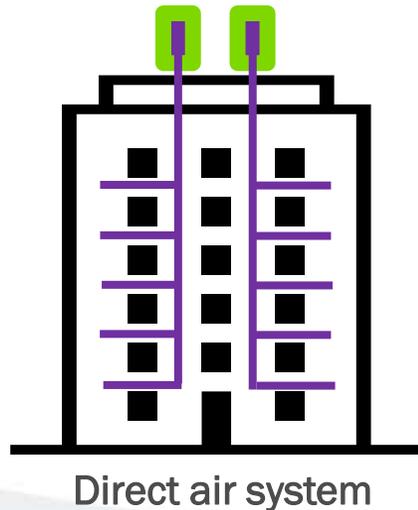
R410A Deadline
1/1/26 [EPA]



**Need major amendments to MA 10th Edition Building Code*



Distributed Refrigerant Systems



- **R-32 across the board for all major products, globally**
 - Efficiency, capacity, single component, non-proprietary, globally accepted
 - Use global knowledge of Daikin Industries R-32 products & released patents
- **Be first with direction and education on A2L splits & VRV/VRF in North America**
- **Adopt and integrate A2L safety mitigation measures for easiest install, lowest leakage risks, highest safety and highest efficiency**

Existing R-410a Distributed Refrigerant Systems

- AIM act specifically protects existing systems, ensuring they can be operated, maintained, repaired and even replaced (with some restrictions) without forcing a refrigerant change
- EPA rules do not restrict manufacturing or import of R-410a equipment used for the replacement industry
 - R-410a condensing units can be replaced with R-410a condensing units (no end date)
 - R-410a indoor units can be replaced with R-410a indoor units (no end date)
- EPA's position on what constitutes a "new system"

Is there a point at which replacing components triggers the GWP limits for new systems?

Yes. Replacing 75% or more of the evaporators (by number) and 100 percent of the compressor racks, condensers, and connected evaporator loads of an existing system would trigger the requirements of new systems.

- We expect a big R-410A VRV market to continue feeding this replacement industry

Other ways of reducing refrigerant emissions

- Chose the right refrigerant (available for the equipment)
- Pay attention to refrigerant charge (reduce where possible)
- **Keep. Refrigerant. In. Systems. (reduce the risk of leaks)**
 - Who is installing the systems? (*Certifications, not just of the contractor, but of who on site is physically doing the work*)
 - Who is (truly) witnessing the pressure test? Who is inspecting the install?
 - Where is the equipment being procured from? (*Engineering rep firms with training, experience, service instead of wholesalers*)
 - Remote monitoring & fault detection systems

Also reduces failures and down time, and overall project success

THANK YOU!

Contact Form &
Drone Draw at

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Conference + Trade Show of the Northeast Sustainable Energy Association (NESEA)



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