



# // RESILIENT TOGETHER //

2022 Partner Exchange

THE CHANGING REFRIGERANT  
LANDSCAPE

# Agenda



- Refrigerant choices
- Regulatory landscape – firming up but more to do
- Industry alignment around dates and GWP limits
- Standards changes you need to know
- Refrigerant pricing dynamics



# Why Are Refrigerants Transitioning?

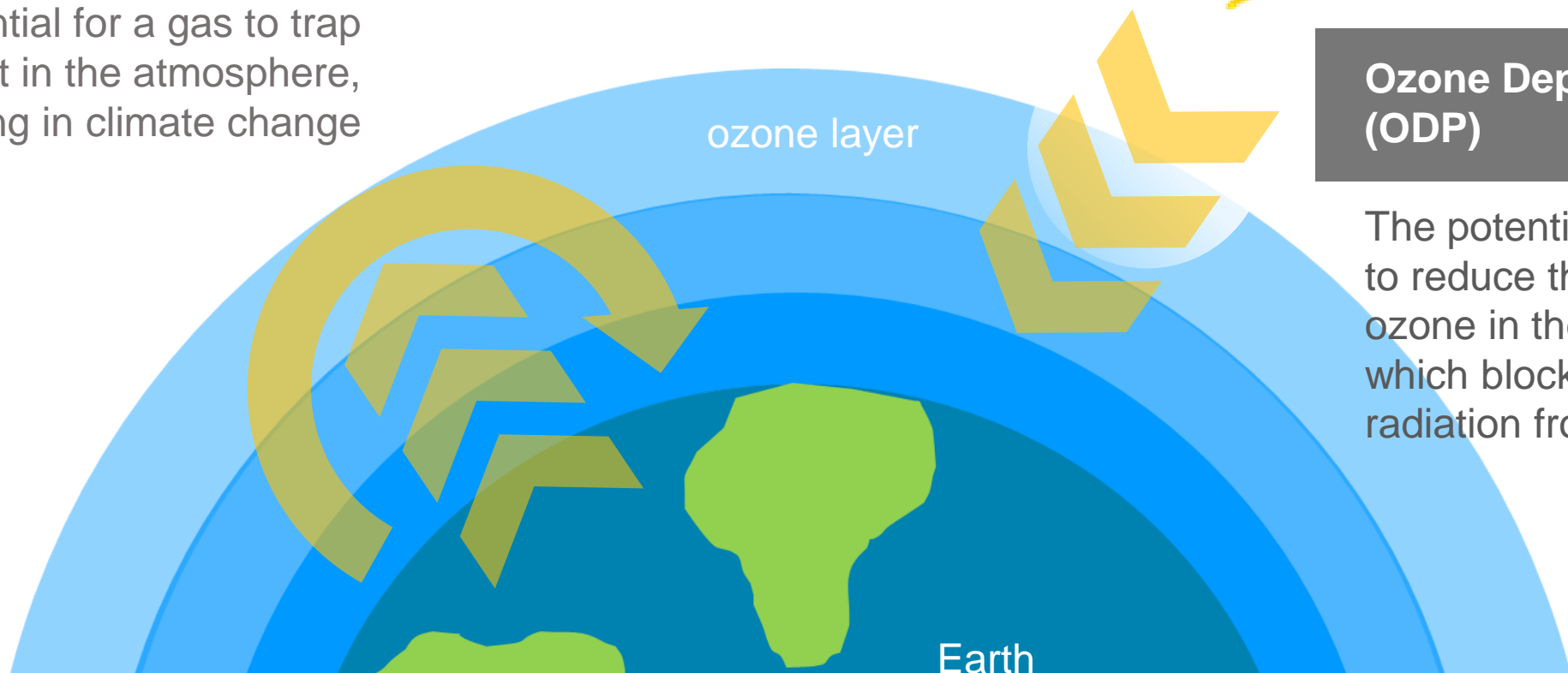


## Global Warming Potential (GWP)

The potential for a gas to trap heat in the atmosphere, resulting in climate change

## Ozone Depletion Potential (ODP)

The potential of a substance to reduce the amount of ozone in the atmosphere which blocks harmful radiation from the sun

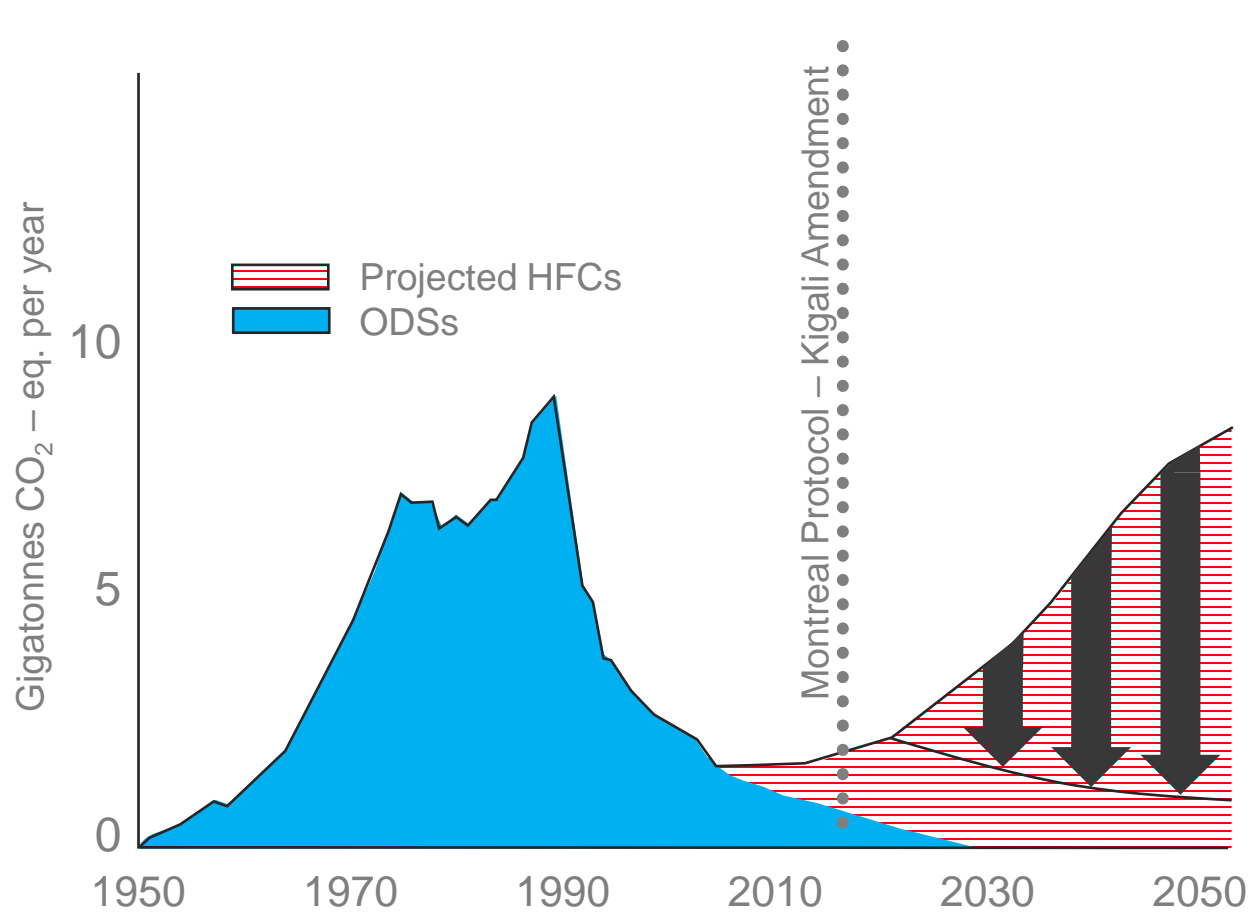
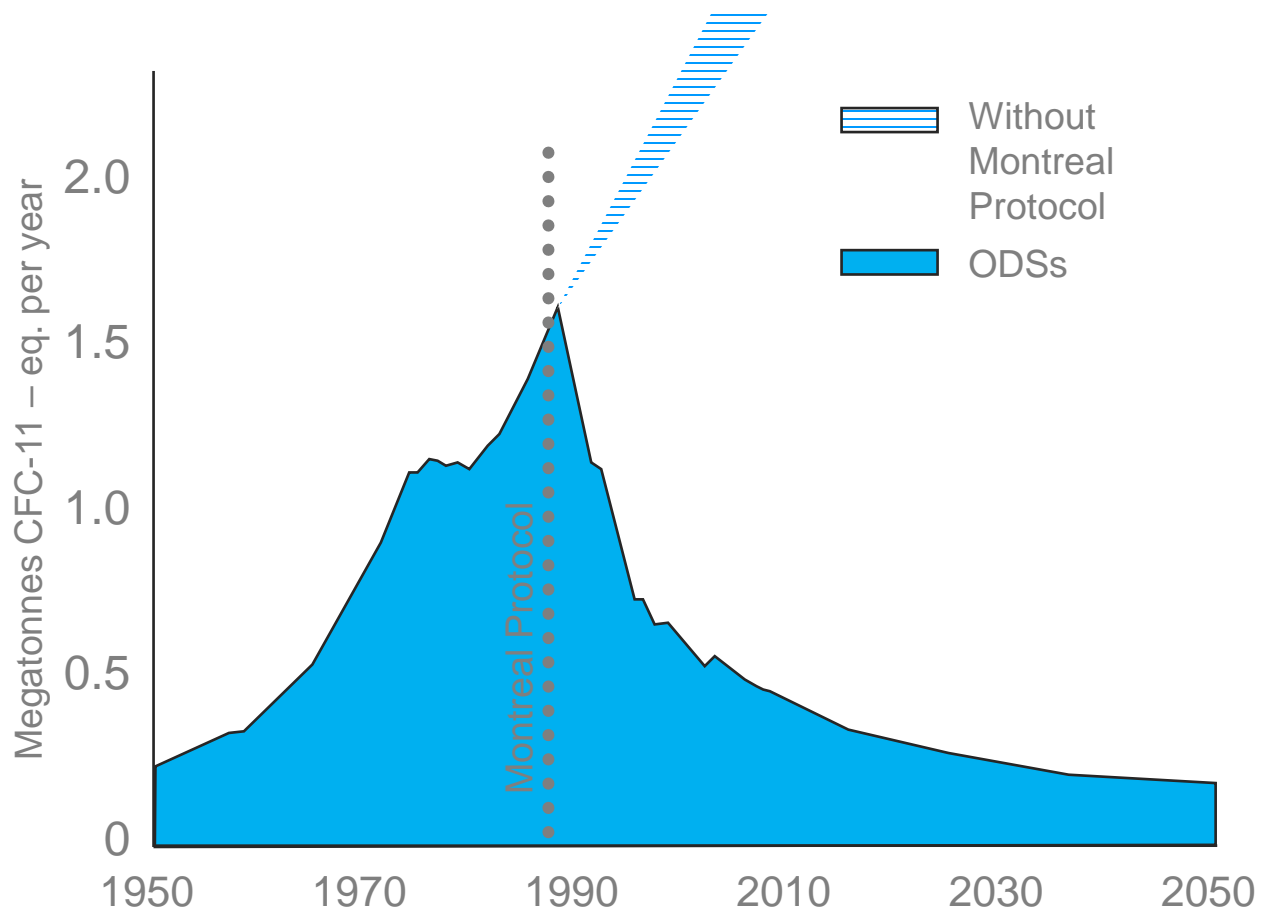


# What could have happened...

# What could have happened...

### ODP-weighted emissions

### GWP-weighted emissions





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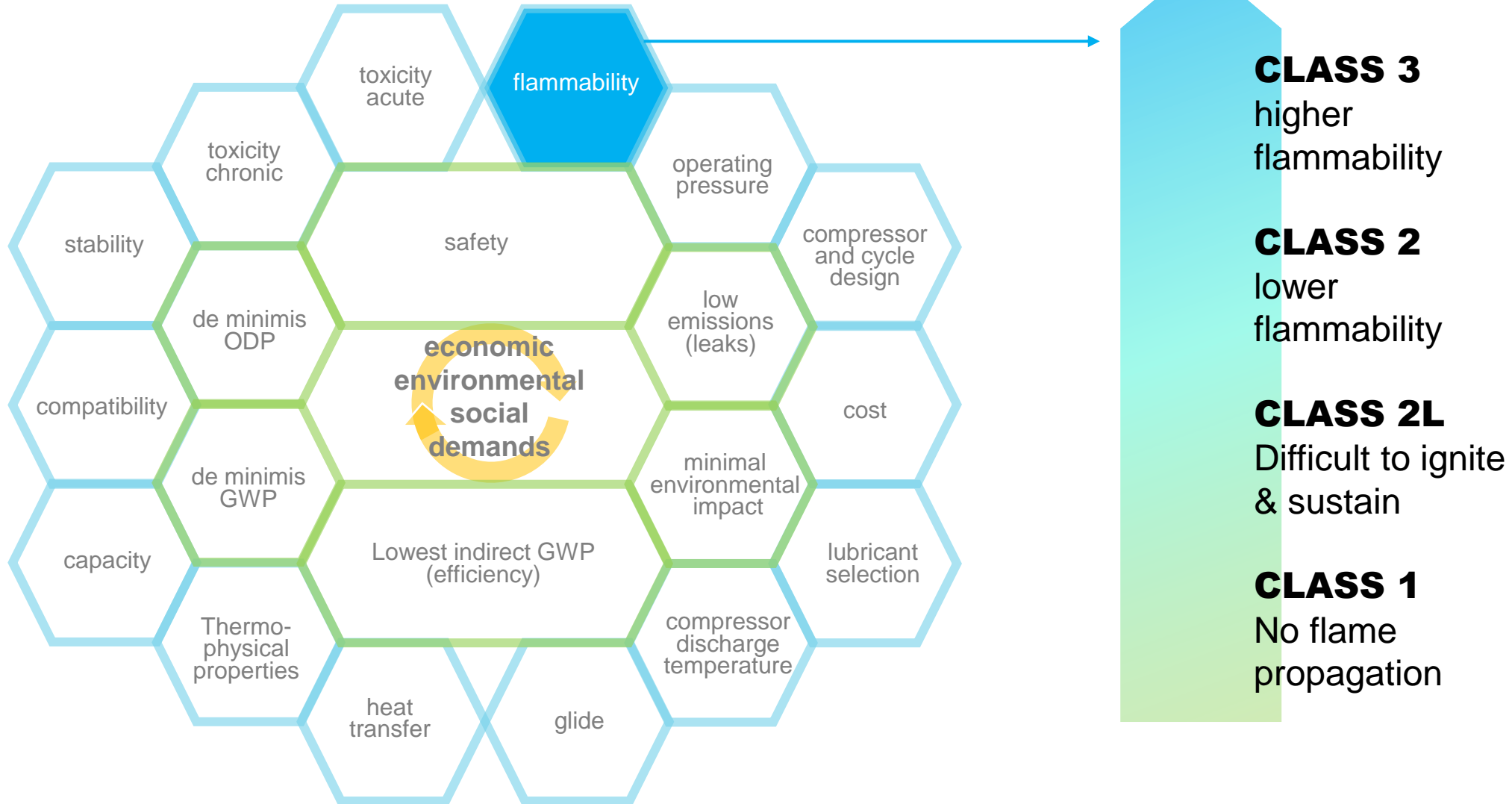
# Refrigerant Choices

# Next-Generation Refrigerants



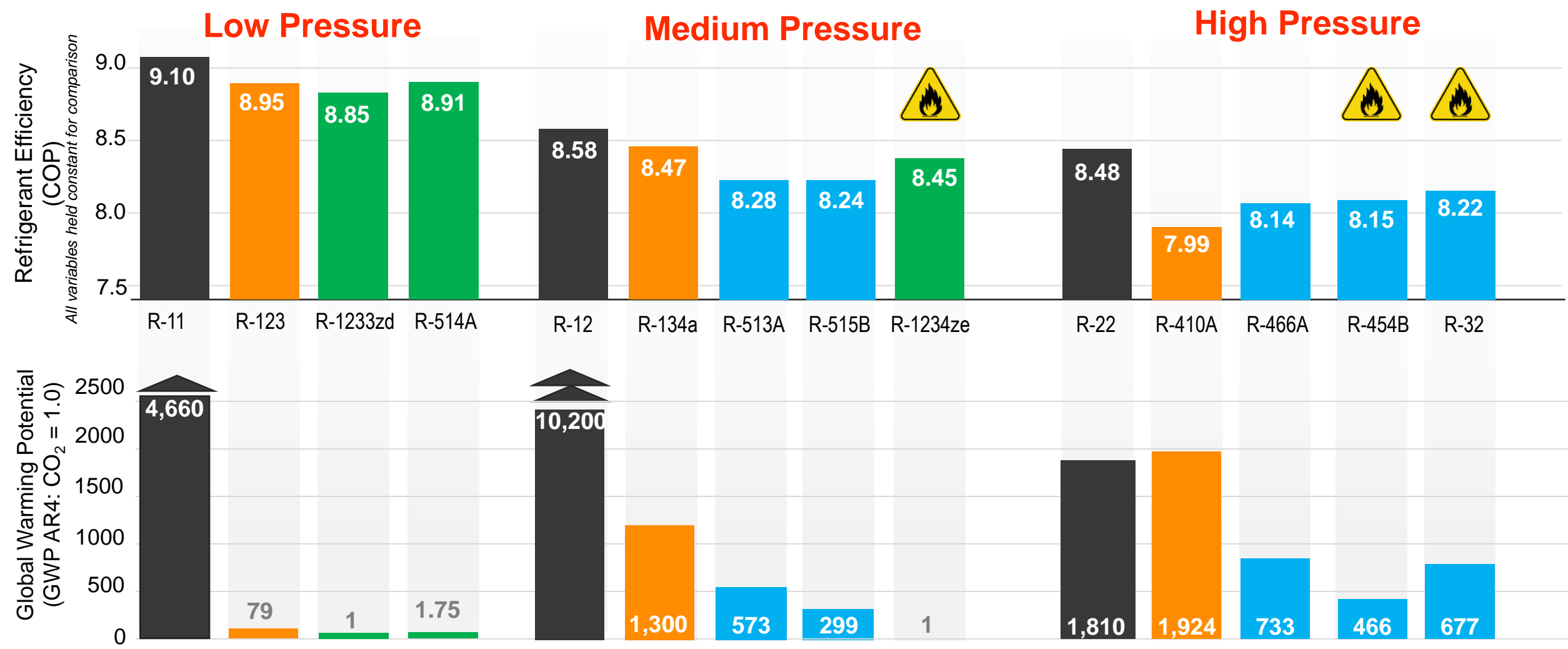
There is No Perfect Refrigerant

# Next-Generation Refrigerants



# Efficiency and GWP Comparison

Past Transitional Lower GWP Ultra-Low GWP



Industry choices offer options & trade-offs; New options evolving





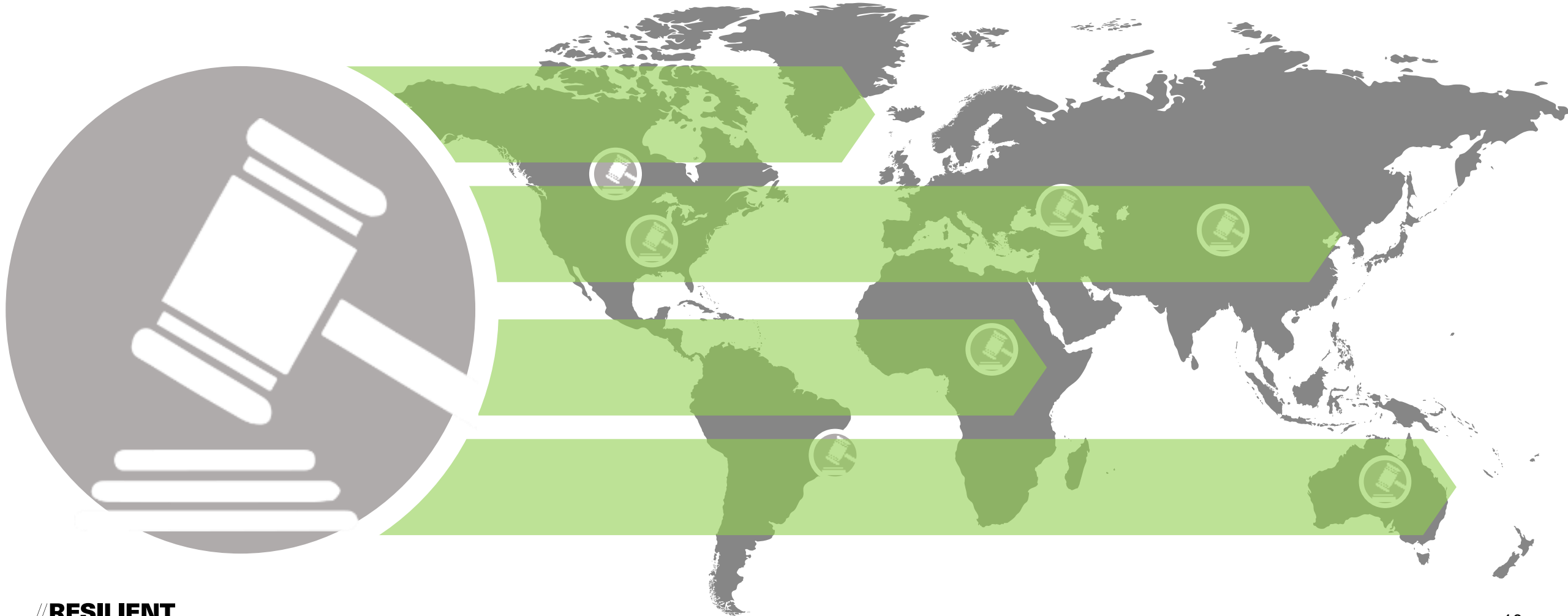
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# Refrigerant Regulatory Landscape

# The Legal Framework behind the Refrigerant Transition



The transition out of high GWP HFCs is occurring globally under both the Montreal Protocol and the Paris Agreement



# The U.S. is Regulating the HFC Transition Now

## Ratifying the Kigali Amendment is optional



### Comprehensive Federal U.S. HFC phase down

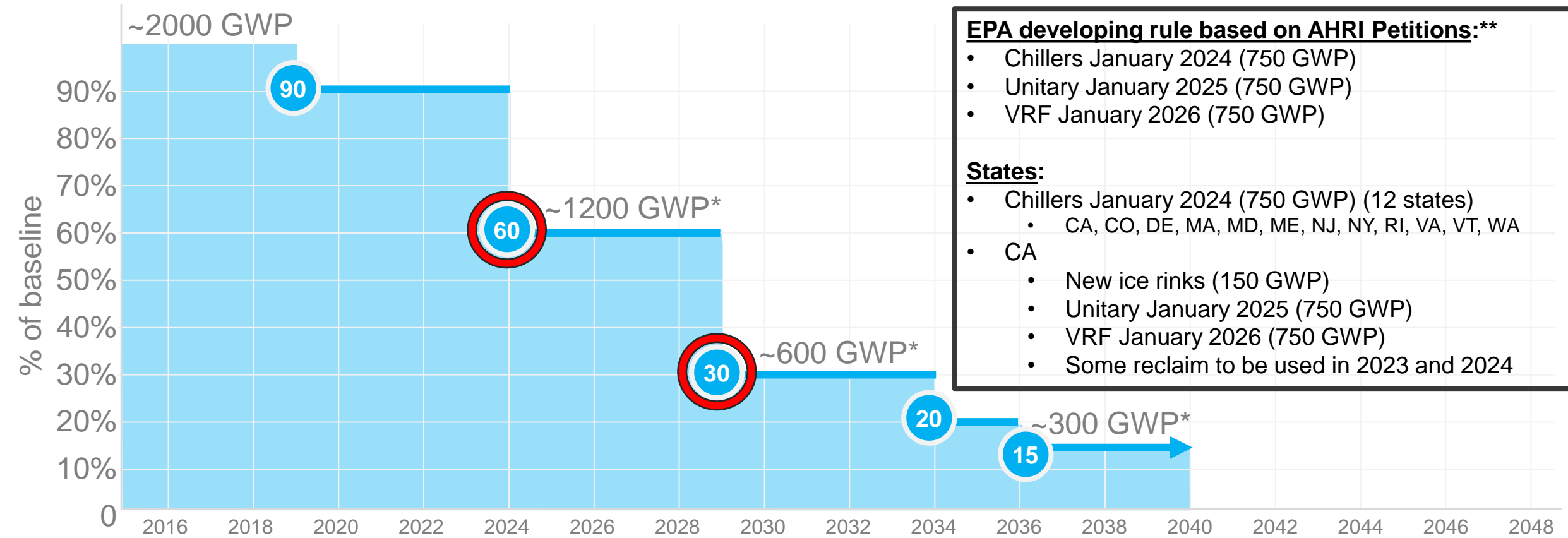
- U.S. AIM Act requires EPA to regulate HFC phase down in the same time frame as the Kigali Amendment
- EPA allocation regulation (Sept. 2021) reduces refrigerant supply by 10% (GWP) in 2022 to align with legislation
- EPA sets equipment sector bans with GWP limits by **Oct 2023** per AIM Act and industry petitions
- EPA to add HFCs to refrigerant management regulation (CAA 608)
- Federal regulation reduces refrigerant supply by 40% (GWP) in 2024

The Future is Known... the How and When is becoming Clearer



# The U.S. HFC Transition

AIM Act Requires Production/Consumption Reductions through Allocations Following the Montreal Protocol Kigali Schedule for Developed Countries



**EPA developing rule based on AHRI Petitions:\*\***

- Chillers January 2024 (750 GWP)
- Unitary January 2025 (750 GWP)
- VRF January 2026 (750 GWP)

**States:**

- Chillers January 2024 (750 GWP) (12 states)
  - CA, CO, DE, MA, MD, ME, NJ, NY, RI, VA, VT, WA
- CA
  - New ice rinks (150 GWP)
  - Unitary January 2025 (750 GWP)
  - VRF January 2026 (750 GWP)
  - Some reclaim to be used in 2023 and 2024

\* Estimated GWP caps based on an overall average production baseline

\*\* U.S. Supreme Court ruling on WVA v EPA should not impact

Significant GWP Reductions in 2024 and 2029 and Overlapping Product Bans

# States are Enacting Legislation and Updating Building Codes to Enable A2Ls for the Unitary, VRF and Residential Systems

- **Legislation**

- “Codes cannot prohibit the use of SNAP approved refrigerants in listed equipment”

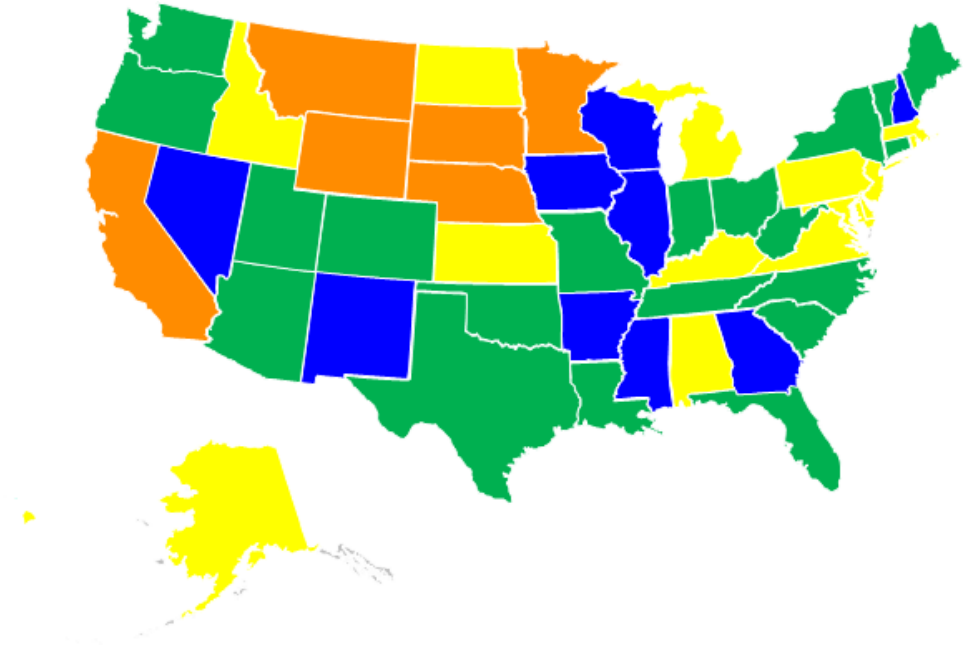
- **State Code updates**

- ASHRAE® 34, 15, UL 60335-2-40



- **A2Ls already enabled for Chillers**

- 2018 model codes updated and adopted by most states
- Jurisdictions can also approve by project (AMM)



■ A2Ls Enabled    
 ■ A2L Enablement likely in 2022

■ A2L Enablement likely in 2023    
 ■ A2L Enablement likely in 2024

# AHRI EPA Petition Signatories

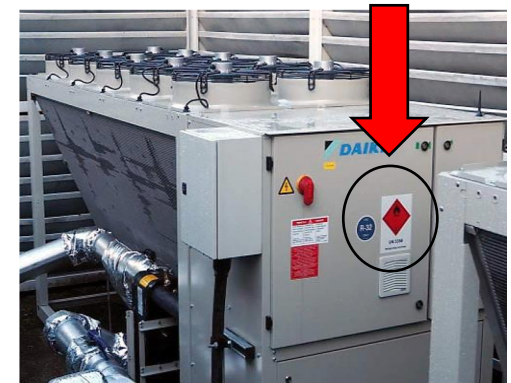
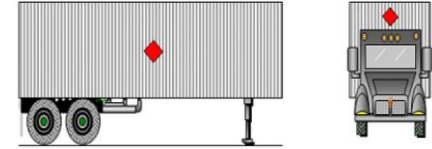
- Trane Technologies
- Daikin
- Johnson Controls
- Rheem
- Carrier
- A-Gas
- ASA
- Arkema
- ASHRAE
- Colorado Dept of Health and Environment
- Lennox
- Honeywell
- HARDI
- Danfoss
- Emerson
- Dover
- Mitsubishi Electric
- Nortek
- RSES
- SystemAir

# U.S. DOT Requirements for Flammable Refrigerants

## Cylinders and Equipment



- Typical requirements today for flammable gases in equipment/cylinders
  - Equipment/cylinder RED labels
  - Placarded trucks with DOT drivers and hazmat certification
  - **Violations can result in penalties up to \$500,000 and potential jail time**
- **Residential** (up to 12 kg/25 lb)
  - Labeling only – exempt from placarding or special drivers
- **Unitary** (12 kg to 20 kg/50 lb)
  - Special permit in process to exempt from placarding and special drivers
- **Cylinders up to 220 lb gross weight**
  - Labeling only
- **Large Unitary and Chillers** (50 lb – 5,000 lb)
  - Special permit in process to exempt from placarding and special drivers





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# Standards Changes You Need to Know



# ASHRAE® 15 – 2019 Direct Systems - Occupied Space using 2Ls



Impacted Product Types:

RTU's

VRF

WSHP

Splits

Impacted Refrigerants:

R-32

R-454B

## NEW REQUIREMENTS

### Equipment Refrigerant Detectors:

- Factory installed at the evaporator coil
- Must act quickly (<15 seconds) and at low levels (25% of Lower Flammability Limit)
- When activated increase airflow supplied to the occupied space and turns off compressors, heaters, and other electrical devices

### Ignition Sources

- Avoid locating potential ignition sources in ductwork
  - Electric resistance allowed with minimum CFM (200 ft/min)

# ASHRAE® 15 – 2019 Indirect Systems - Machinery Room using 2Ls



Impacted Product Types:

Chillers

Impacted Refrigerants:

R-1234ze

R-32

R-454B

## NEW REQUIREMENTS

**Space Refrigerant Detectors:**

- When activated increase airflow supplied to the occupied space and turns off compressors, heaters, and other electrical devices. (25% of Lower Flammability Limit)
- Must activate in under 15 seconds

**Remote Control:**

- Must be possible to initiate a chiller stop and initiate the ventilation sequence from immediately outside the machinery room.

**Multipoint Refrigerant Detector:**

- Are no longer allowed for 2L refrigerants

**Ventilation Rates:**

- 2 rates required
  - Trouble Alarm
  - Emergency Alarm
- Increased ventilation rates

# A2L Refrigerant Training

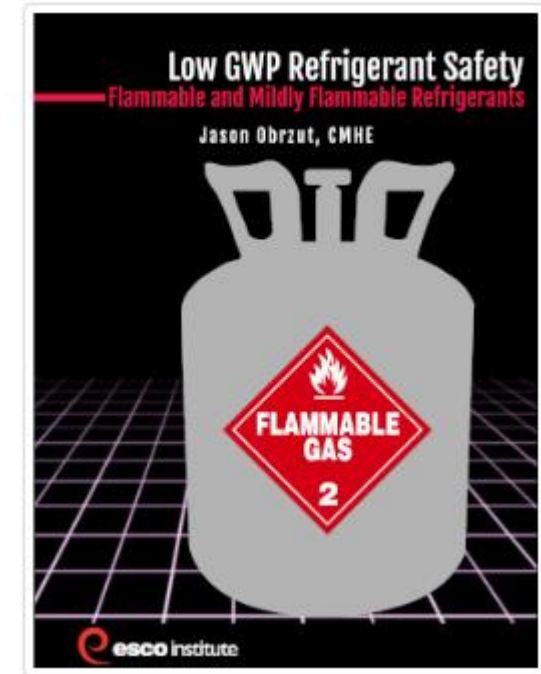


## Training Manual

- Refrigerant safety
- Introduction to Low GWP refrigerants
- Refrigerant properties and characteristics
- The refrigeration cycle
- Working with refrigerant blends
- Proper installation and service guidelines
- Flammable refrigerant considerations
- Explanation of the associated codes and standards for A2L refrigerants

## Certification

- General Flammable Refrigerant Safety Knowledge
- Core ACR Knowledge
- Flammable System Service Safety
- Flammable System Installation Safety
- Flammable Refrigerant Transportation and Handling Safety



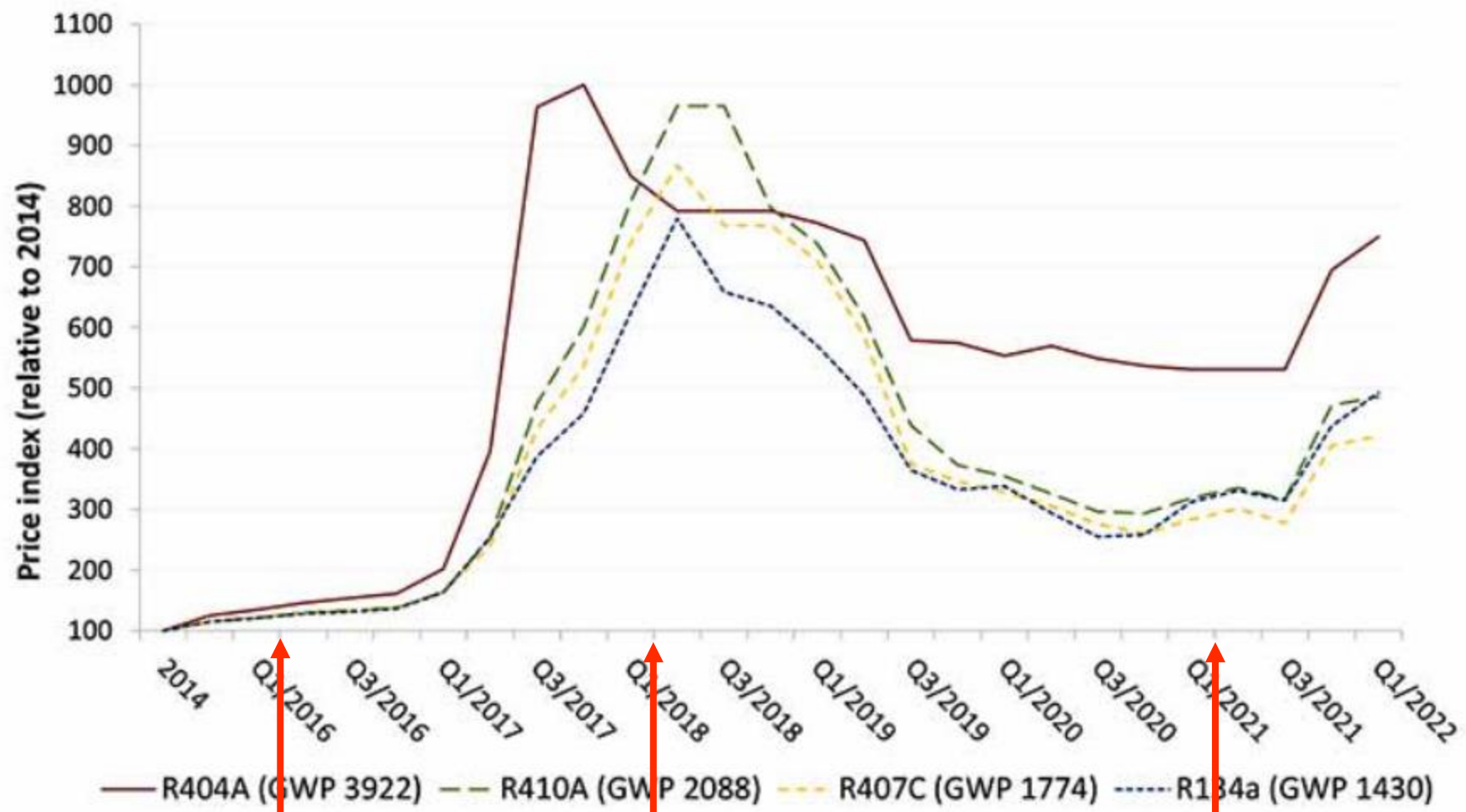


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# Refrigerant Pricing Dynamics



# EU Allocation Rule Impacts Refrigerant Pricing



The development of purchase prices of four high GWP HFC refrigerants at gas distributor level

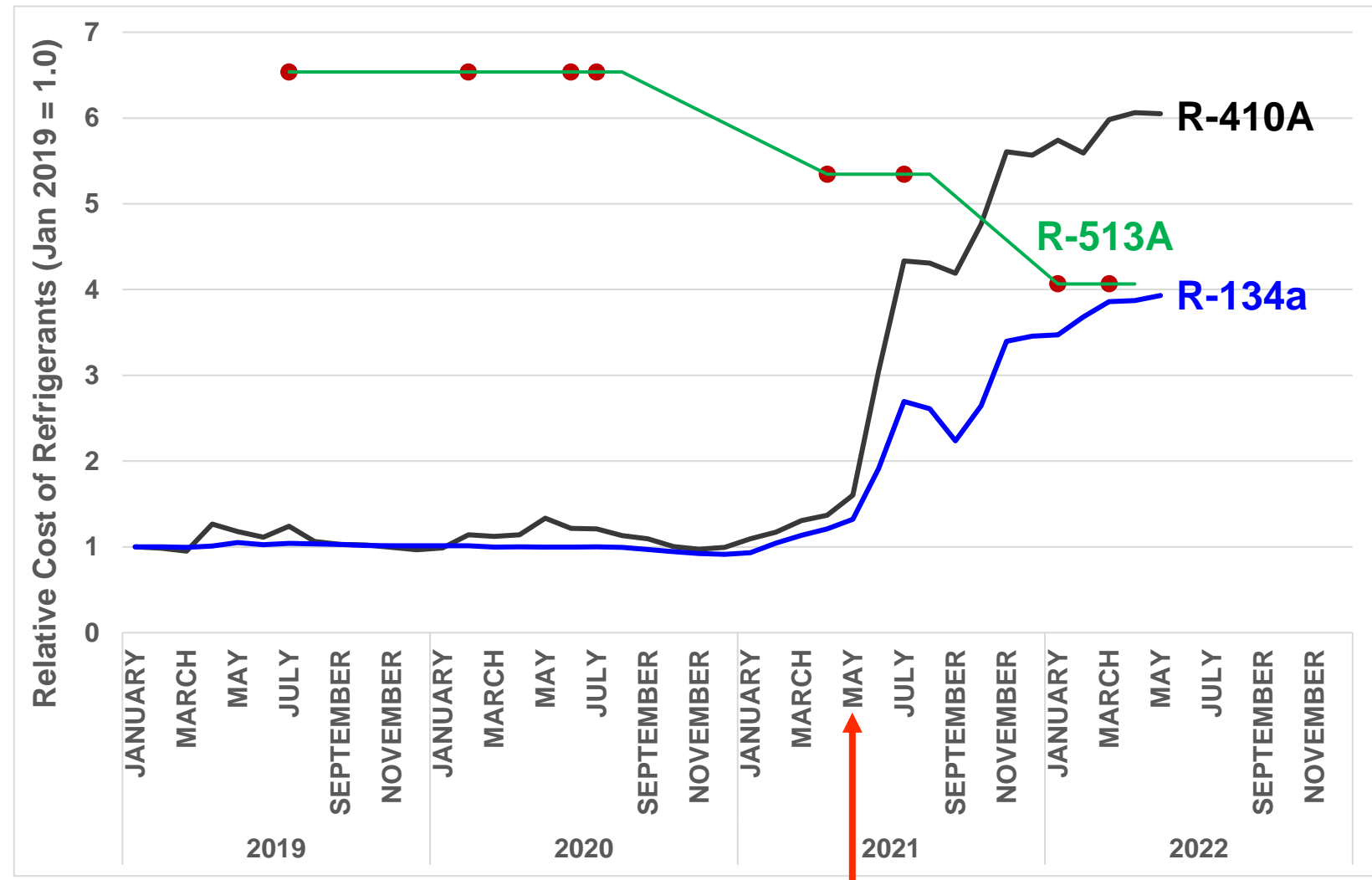
European F-Gas Reductions

-7%                      -37%                      -55%





# U.S. Refrigerant Pricing Changes Follow Similar Trend to the EU



U.S. EPA Announces HFC Allocation Rule

# What Actions Should I Take?



- There is no perfect refrigerant
- Take a balanced approach:  
*Safety, Environmental Impact, Efficiency*
- Leak tightness is key!
- Next-generation alternatives are available today for some products (larger applied products)
- Unitary and residential applications need states and jurisdictions to update the mechanical codes to the latest standards

Use the facts to plan for tomorrow

**LET'S GO BEYOND!**

**HVAC Industry Update Round Conversation Requirements**

Government's emphasis on reducing emissions and energy consumption is a key driver of the world's energy companies. Energy efficiency is a key business strategy for many companies, and HVAC systems play a significant role in that strategy.

**Industry Consensus on UIC Obligations**

The industry is pushing for a common standard for UIC obligations. The industry is pushing for a common standard for UIC obligations. The industry is pushing for a common standard for UIC obligations.

**Global HVAC Focus: Down Under the Minimal Protocol**

Global HVAC Focus: Down Under the Minimal Protocol. Global HVAC Focus: Down Under the Minimal Protocol.

**Key Takeaways**

- Government's emphasis on reducing emissions and energy consumption is a key driver of the world's energy companies.
- Energy efficiency is a key business strategy for many companies, and HVAC systems play a significant role in that strategy.
- The industry is pushing for a common standard for UIC obligations.
- Global HVAC Focus: Down Under the Minimal Protocol.

**EcoWise Energy Performance Report**

Additional Information of Your Green Performance

Key Takeaways:

- Energy Performance Report
- Additional Information of Your Green Performance
- Key Takeaways

**LET'S GO BEYOND!**

**What You Want to Know About B-27**

Key Takeaways:

- What You Want to Know About B-27
- Key Takeaways

**EcoWise Energy Performance Report (continued)**

Additional Information of Your Green Performance

Key Takeaways:

- Additional Information of Your Green Performance
- Key Takeaways





# Thank you!

Any questions?

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