

# Chillventa Specialist Forums 2024

## Chillventa Fachforen 2024

**CONNECTING  
EXPERTS.**



# WHAT IS TOMORROW'S REFRIGERATION TO HELP INDUSTRIES ACHIEVE CARBON NEUTRALITY? WHAT ARE THE SOLUTIONS TO F-GAS III?

10 oktober 2024 – Delphine Martin / Pierre-Emmanuel Danet

The Climalife logo is centered on the slide. It features the word "climalife" in a white, lowercase, sans-serif font, with a registered trademark symbol (®) to the upper right of the "e". Behind the logo is a large, light blue graphic consisting of a thick, curved line forming a partial circle on the left, and a vertical column of five squares on the right. The entire slide has a solid blue background.

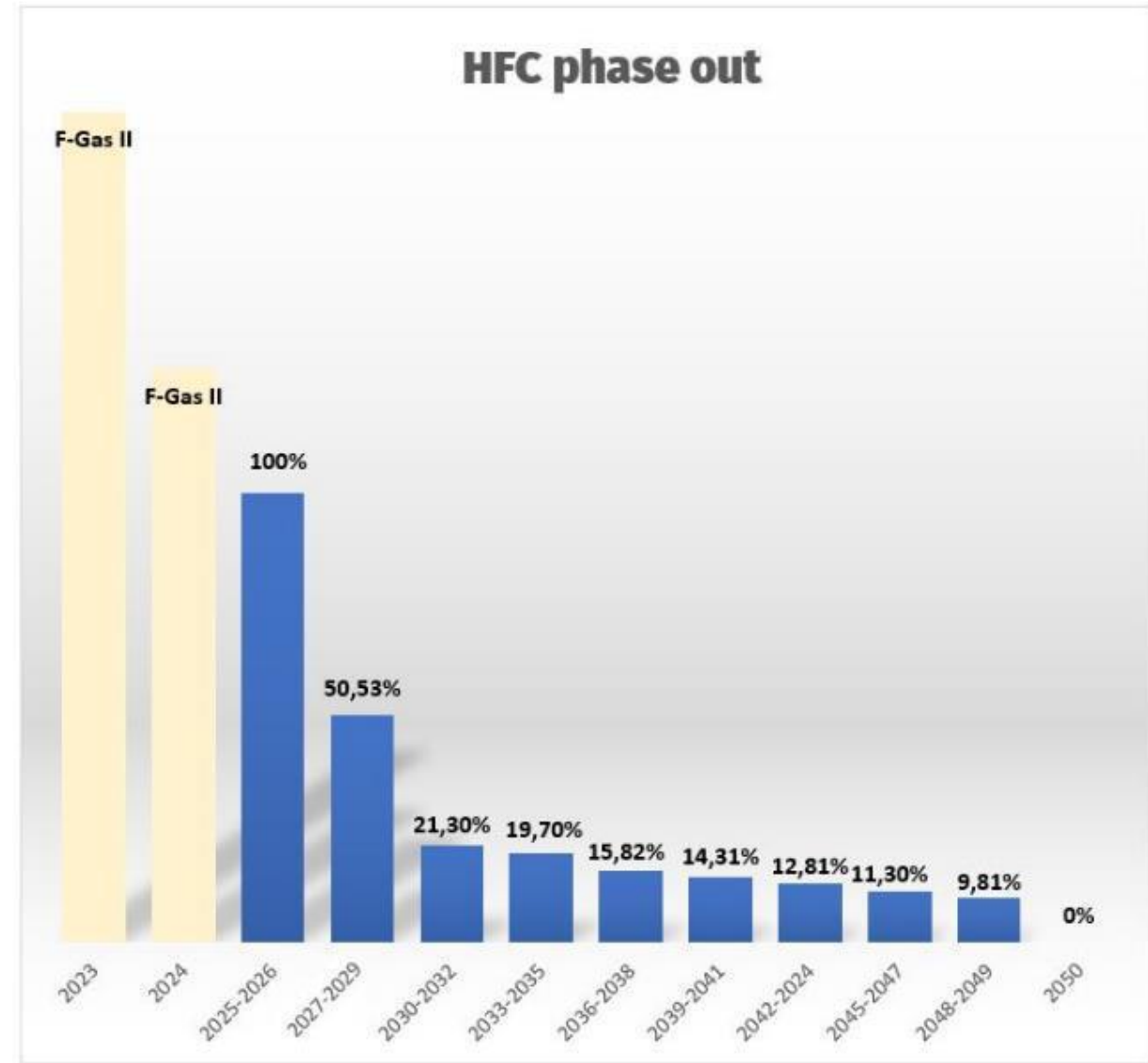
climalife®

[climalife.com](https://climalife.com)

# QUOTAS : PHASE OUT OF HFC

**F-Gas III:** The text accelerates the HFC quota restriction until a phase-out in 2050

- The quotas allocated by the Commission for HFCs have been drastically reduced:
  - In 2024, quotas have been cut by more than 40% vs 2023
  - From 2025, a new cut of more than 20% vs 2024
- Shortage risk of HFCs
- HFOs are not included in quotas
- Reclaimed products not included in quotas






# HOW TO DECARBONIZE COMMERCIAL AND INDUSTRIAL REFRIGERATION?

- Reducing t. eq. CO<sub>2</sub> of greenhouse gas emissions should strongly encourage the use of **new ultra-low GWP refrigerants**
- **Reclaimed and regenerated refrigerants** have a significant impact on the carbon footprint and contribute to face quotas reduction
- **Taking into account the eco-efficiency** approach allows :
  - Total cost of ownership (TCO)
  - Environmental impact (TEWI)



# FOOD RETAIL STORES - NEW SYSTEMS

		Medium Temperature	Low Temperature
	Large Stores (> 2000 m <sup>2</sup> )	R-455A (DX Racks, Semi-Centralized ) R-455A (Chiller) Cascade R-455A / CO <sub>2</sub> Booster CO <sub>2</sub>	
		R-1234ze (Chiller)	R-455A (Semi-Centralized)
	Small & Medium Size Stores (600 m <sup>2</sup> à 2000 m <sup>2</sup> )	R-1234ze (Chiller) R-455A (Semi-Centralized) R-455A (Chiller) CO <sub>2</sub> R-290 (Hermetically-sealed)	R-455A (Semi-Centralized) R-455A (Chiller) CO <sub>2</sub> R-290 (Hermetically-sealed)
	Convenience stores (<600 m <sup>2</sup> )	R-1234yf R-455A R-290 (Hermetically-sealed)	R-455A R-290 (Hermetically-sealed) CO <sub>2</sub>



# SOLSTICE® L40X: THE PROVEN SOLUTION FOR MT & LT IN NEW SYSTEMS

## R-455A v R-454C v R290

### More Efficient than R-454C

**MhBP**  
COP +5%  
 $Q_0$  +15%

**LBP**  
COP +7%  
 $Q_0$  +18%

### Higher Cooling Capacity than R-454C

Lower CAPEX  
(by ca. 4 to 8%) to cover the same system capacity requirements

SAVINGS

### Higher Charge Size in standard system

R-455A = 16.8kg  
vs  
R-454C = 11.4kg

### Higher charge size in Location II (Class2 )

R-455A = 84kg  
vs  
R-454C = 57kg

### Higher LFL (lower flammability limit vs R290)











- Requires 1300 times more energy to ignite
- 4.5 times less heat transferred
- 30 times slower flame

1. Higher max. charge per circuit = less circuits
2. Up to 33% lower CAPEX and OPEX to cover the same installation capacity requirements

**R-455A: the safe, efficient, high capacity, lower flammability, and more cost effective A2L solution**



## EFFICIENCY SUMMARY

	CAPEX (kEUR)	OPEX   Electricity + Service (kEUR)	TCO   CAPEX + OPEX (kEUR)	Energy Consumption (millions of kWh)	Total Carbon Footprint (t CO <sub>2</sub> e)
Small Store (500m <sup>2</sup> )	 -35%	 -15%	 -20%	 -15%	 -13%
Medium Store (1500m <sup>2</sup> )	 -25%	 -14%	 -16%	 -14%	 -13%

**R-455A delivers significant savings across all metrics reducing Scope emissions by 13% in both small (500m<sup>2</sup>) and medium stores (1500m<sup>2</sup>)**

\*The above results are based on Low and Medium temperature condensing units with R-455A vs an R-744 (CO<sub>2</sub>) Transcritical Booster System

**R-455A is an exceptionally efficient alternative for Small to Medium supermarkets**

*\* Simulation conducted with the Eco-Efficiency Model, based on specific assumptions (see back-up) and 10-year system operating period. Honeywell can conduct a simulation reflecting accurately your own situation and investment options.*

## Systeme U (France)

- Hypermarket 4200 m<sup>2</sup>
- Remodeling of the store – Replacement of R-404A central units
- 3 central units:
  - 2 MT. (300 kW) with an R-455A chiller producing cooled water (-8/-4°C).
  - A glycol water-loop with Friogel Neo to distribute medium temp. refrigerated displays
  - Another water-loop for cold rooms and preparation rooms
  - 1 x 60kW LT DX unit working with R-455A from -30°C to + 42°C



## Sorli (Spain)

- 1200 m<sup>2</sup>
- 30 kW total capacity covered by 3 condensing units (scroll)
- 13% lower life cycle emissions compared to transcritical CO<sub>2</sub>, with a 16% lower total cost of ownership



## Leclerc Express (France)

- 800 m<sup>2</sup>
- 3 cold rooms (2 chilled and 1 frozen) renovated to store fruit and vegetables, fresh produce and frozen food.
- 3 condensing units (scroll)
- Over €32K savings on total cost of ownership in 10 years



**R-455A convinces on cost, durability and reliability**





# FOOD RETAIL STORES – RETROFIT / REMODELING





Current Refrigerant	Medium Temp.	Low Temp.
R-404A, R407F, R-452A, R-448A, R-449A	Reclaimed Refrigerant R-515B <sup>(1)</sup>	Reclaimed Refrigerant
	R-455A <sup>(2)</sup>	
R-134a	Reclaimed Refrigerant R-513A R-515B <sup>(1)</sup>	N/A

(1) Remodeling with R-515B, an A1-rated (non-flammable) fluid, is technically possible for positive refrigeration. Refrigeration capacity loss comparison table  
(2) Convert A1 to A2L – needs an approval by Authorized Organisation



R-515B //	R-407F	R-404A	R-134a	R-448A	R-449A	R-452A
Delta $\Phi_0$	54,9%	54,6%	27,3%	51,0%	49,7%	50,6%

# COLD STORAGE - NEW SYSTEMS

		Storage Volume	1,000m <sup>3</sup> – 10,000m <sup>3</sup>	10,000m <sup>3</sup> – 100,000m <sup>3</sup>	>100,000m <sup>3</sup>
		System Size	MT: 21-155 kW LT: 17-108 kW	MT: 155-1320 kW LT: 108-850 kW	MT: 1.32-12.2 MW LT: 0.85-7.6 MW
Long Term Solstice® Refrigerant Solutions					
Solstice® R-1234ze		GWP = 1,37	Medium Temperature Direct Expansion	<b>Medium Temperature</b> <ul style="list-style-type: none"> <li>• Direct Expansion</li> <li>• Indirect with Glycol Water</li> </ul> <b>Low Temperature</b> Micro-Cascade 1234ze / CO <sub>2</sub>	<b>Medium Temperature</b> Indirect with Glycol Water <b>Low Temperature</b> Micro-Cascade 1234ze / CO <sub>2</sub>
Solstice® L40X (R-455A)		GWP = 146	Low Temperature Direct Expansion	Low Temperature Direct Expansion	

## Warehouse : ARNAUD S.A.S. (France)

- 8000 m<sup>2</sup>
- Construction of a new warehouse for the storage of products for the food industry
- 3 x R-455A units (130kW each) for glycol water production
- *"This solution was chosen for its technical simplicity and modularity. Economically, it is less expensive than a brine solution with screw compressors."* Gilles CARRON, President of AF-Energy.



## Refrigerated warehouse: Olano (Spain)

- 4000 m<sup>2</sup>
- Seafood storage and logistics centre / 280 kW total capacity supplied by 4 piston compressors
- 17% lower life cycle emissions compared to transcritical CO<sub>2</sub>, with a 19% lower total cost of ownership



Capital Cost, Energy Efficiency and Safety

# TOOLS DEVELOPED BY CLIMALIFE TO HELP YOU ON A DAILY BASIS

## A2L Charge Calculator



a2l.climalife.com

## F-Gas Solutions



## Refrigerant Pathway



F-Gas III approved refrigerant replacement solutions

			New equipment	
Application	Climalife	Climalife	Climalife	Climalife
AIR CONDITIONING	Residential	R32	R32	R32
	Commercial	R32	R32	R32
	Mobile	R32	R32	R32
HEAT PUMPS	Residential	R32	R32	R32
	Commercial	R32	R32	R32
	Mobile	R32	R32	R32
COMMERCIAL REFRIGERATION	Residential	R32	R32	R32
	Commercial	R32	R32	R32
	Mobile	R32	R32	R32
COMMERCIAL REFRIGERATION & LIGHT INDUSTRIAL	Residential	R32	R32	R32
	Commercial	R32	R32	R32
	Mobile	R32	R32	R32



**THANK YOU FOR YOUR ATTENTION**

**climalife<sup>®</sup>**



The expert in eco-efficient solutions to service the industry



# Chillventa Specialist Forums 2024

## Chillventa Fachforen 2024

**CONNECTING  
EXPERTS.**

