

# CO<sub>2</sub> transcritical FTE System Full Transcritical Efficiency

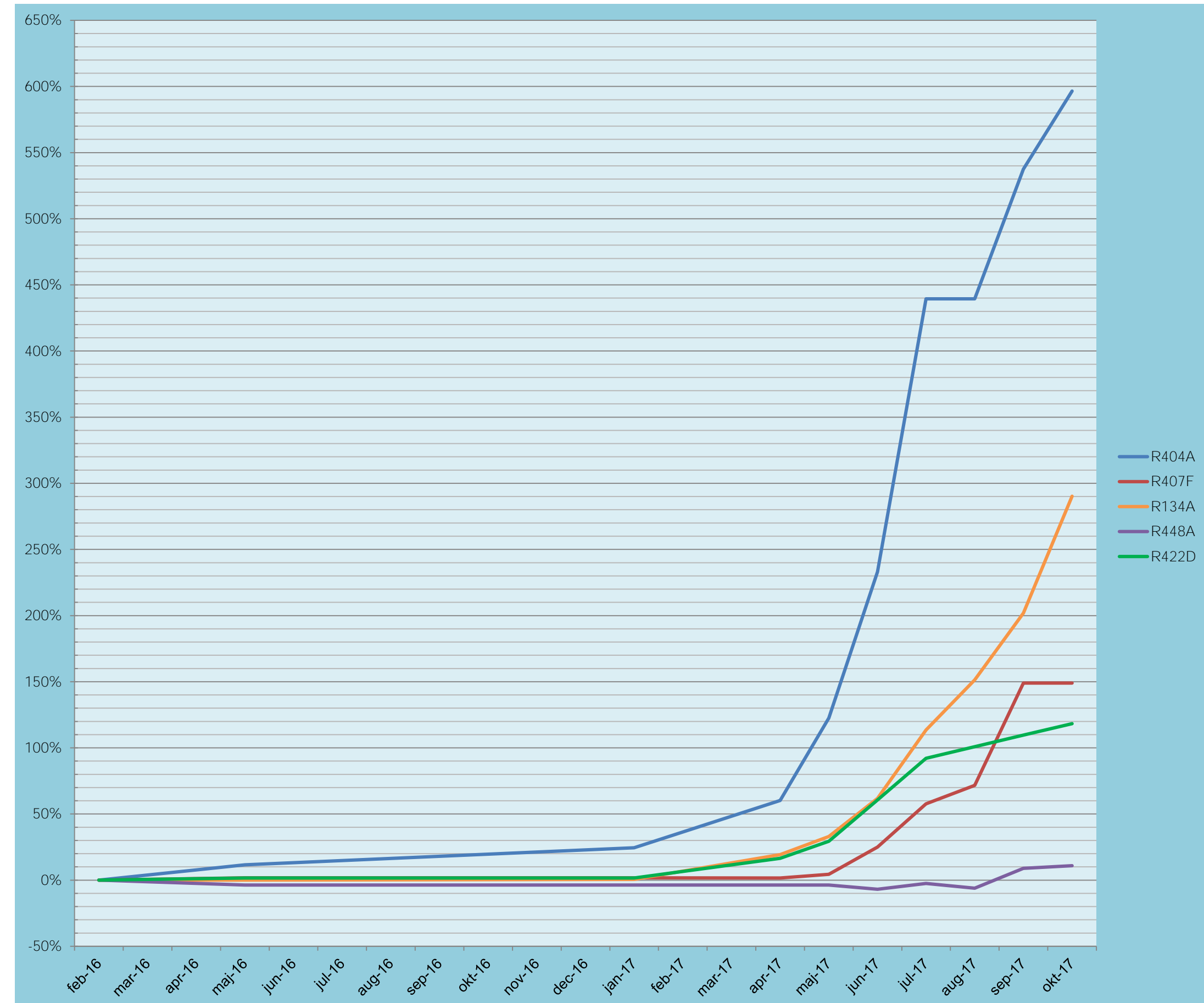
ECO<sub>2</sub>  FTE 

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# HFC refrigerants and R404A in Europe

- F-Gas restrictions and bans directly impact on market **prices and availability**
- Gas producers are discontinuing the production of R404A
- Not only the R404A but also R407A/C/F, R134a, R410A are increasing in price
- The price for installers and service providers is even higher
- The HFO refrigerants are stable

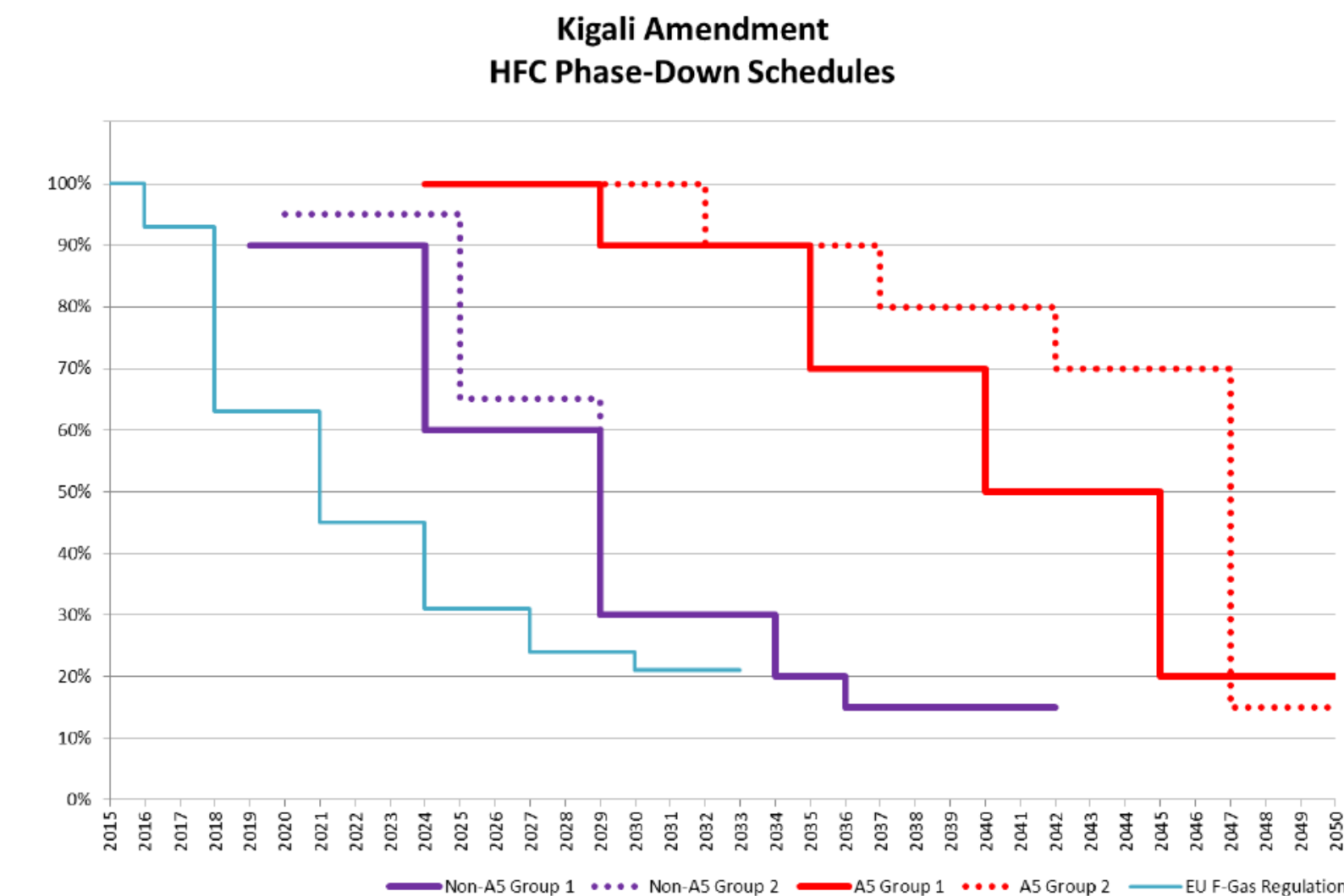


# The Kigali Amendment



- Decision XXVIII/1, October 2016
- Comes into force 1 Jan 2019
- Global phase-down of HFCs on CO2e basis from agreed baseline
- 70- 80 GtCO2e avoided by 2050
- > 0.4°C warming avoided by 2100
- Can be strengthened over time
- Energy efficiency gains could significantly increase climate impact
- Guidelines for finance to developing (A5) countries to be negotiated by end of 2018

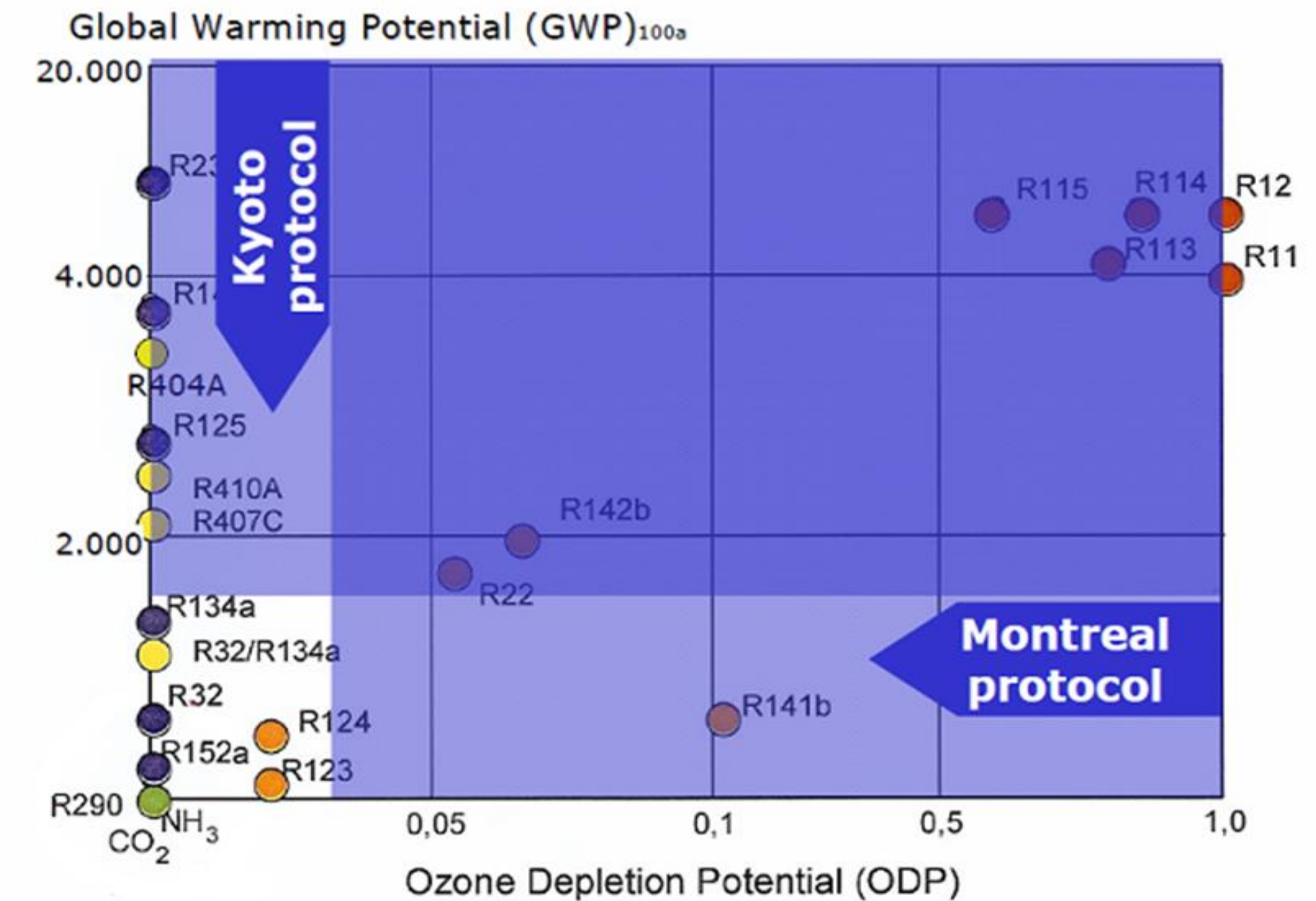
	Non-A5 (developed countries)	A5 (developing countries) – Group 1	A5 (developing countries) – Group 2
<b>Baseline</b>	Av HFC consumption (2011-2013) + 15% HCFC baseline	Av HFC consumption (2020-2022) + 65% HCFC baseline	Av HFC consumption (2024-2026) + 65% HCFC baseline
<b>Freeze</b>	-	2024	2028
<b>1<sup>st</sup> step</b>	2019 – 10%	2029 – 10%	2032 – 10%
<b>2<sup>nd</sup> step</b>	2024 – 40%	2035 – 30%	2037 – 20%
<b>3<sup>rd</sup> step</b>	2029 – 70%	2040 – 50%	2042 – 30%
<b>4<sup>th</sup> step</b>	2034 – 80%		
<b>Plateau</b>	2036 – 85%	2045 – 80%	2047 – 85%
<b>Notes</b>	Belarus, Russian Federation, Kazakhstan, Tajikistan, Uzbekistan, 25% HCFC component and one year delay for 1 <sup>st</sup> two steps	Article 5 countries not part of Group 2	Saudi Arabia, Kuwait, UAE, Qatar, Bahrain, Oman, Iran, Iraq, India, Pakistan



# Why CO<sub>2</sub> for DX remote systems

- Environment friendly refrigerant
- ODP = 0
- GWP = 1
- Excellent heat transfer capability
- Colorless and odorless up to 3%
- Not flammable
- Stable substance that does not decompose
- High cooling capacity compared to traditional refrigerants.
- Smaller pipe diameters
- Low and stable price

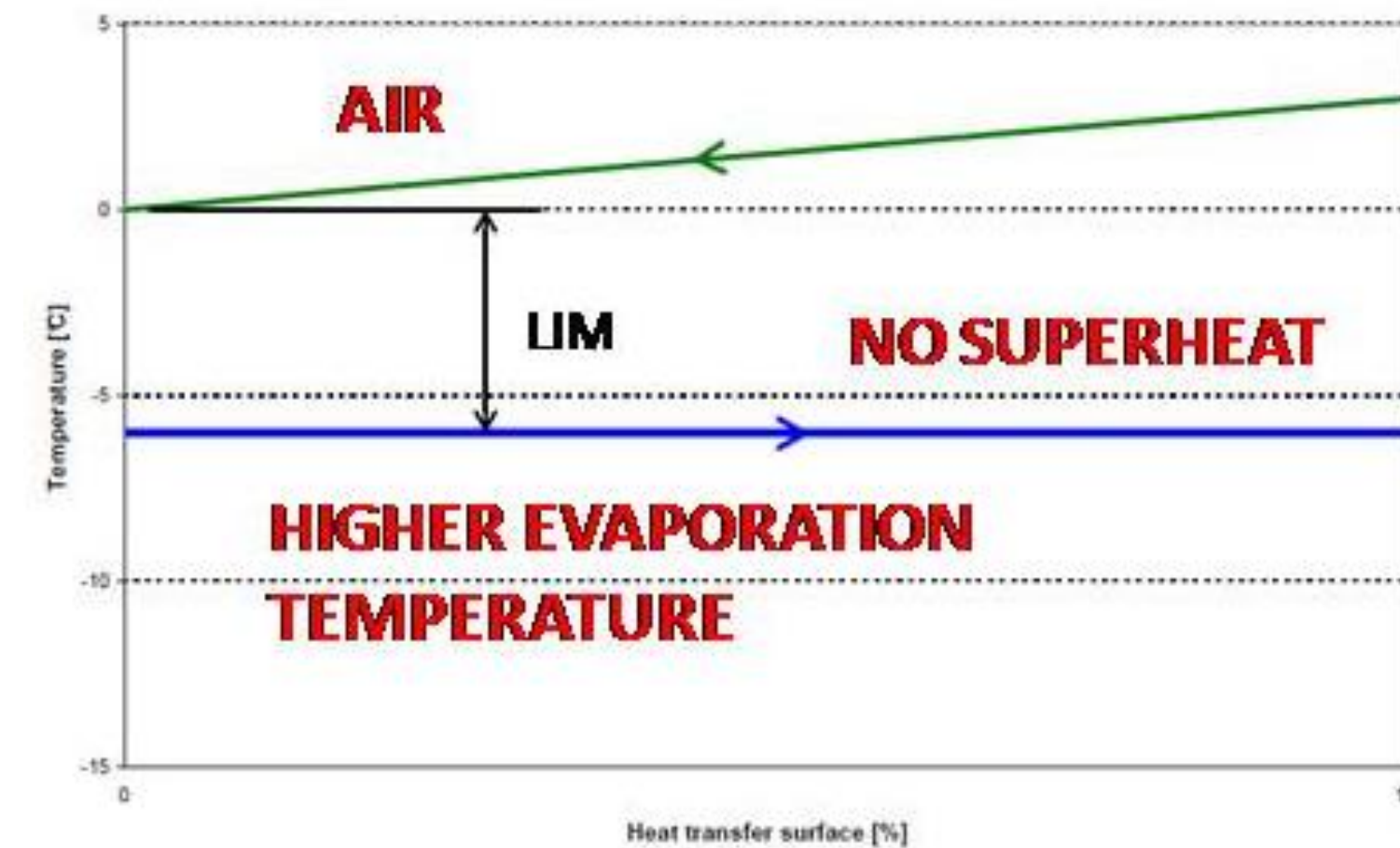
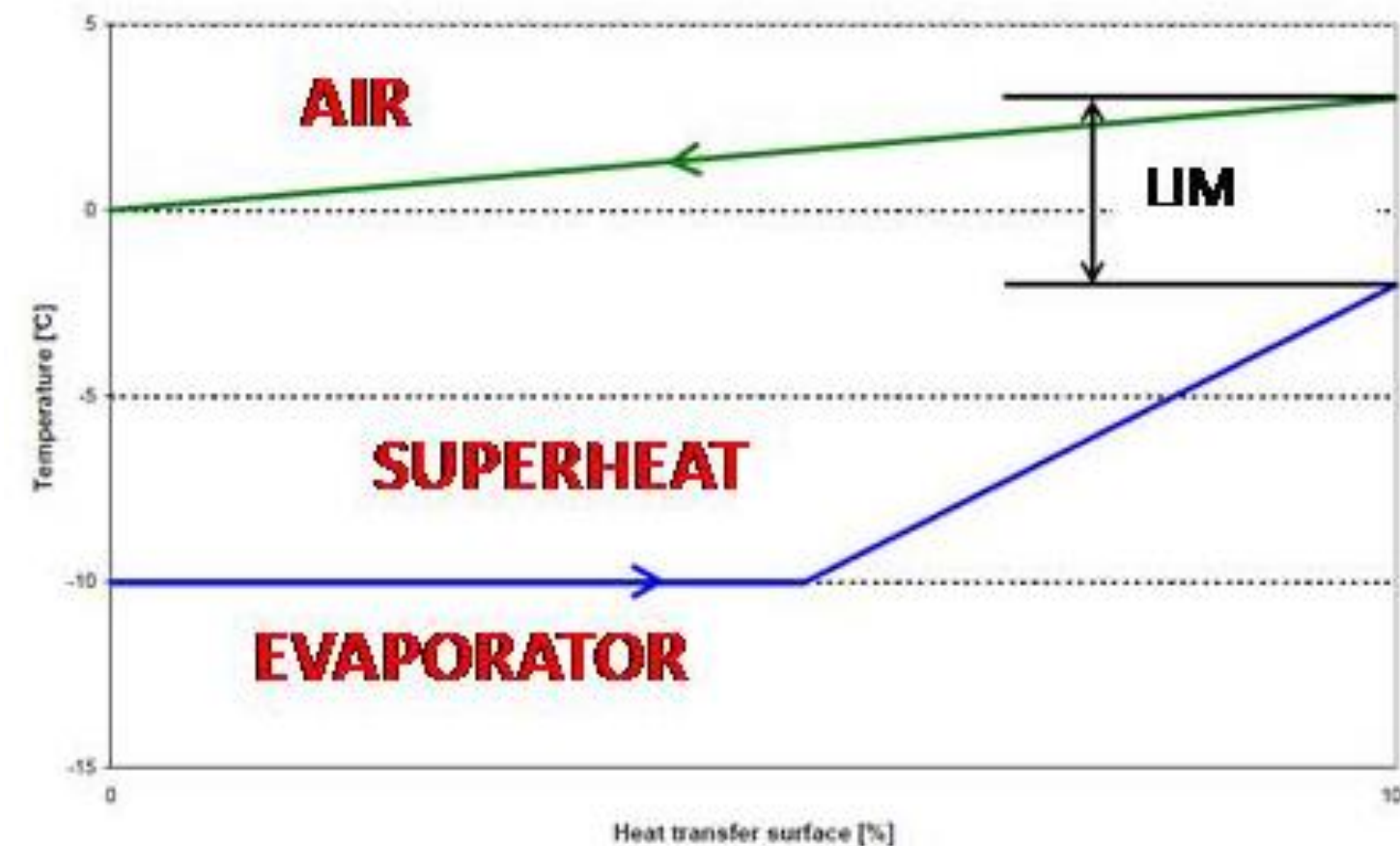
## Global Warming & Ozone depletion



# **CO<sub>2</sub> transcritical FTE System**

New highly innovative CO<sub>2</sub> transcritical solution that combines low costs, energy saving and reliability in any country, with any external temperature

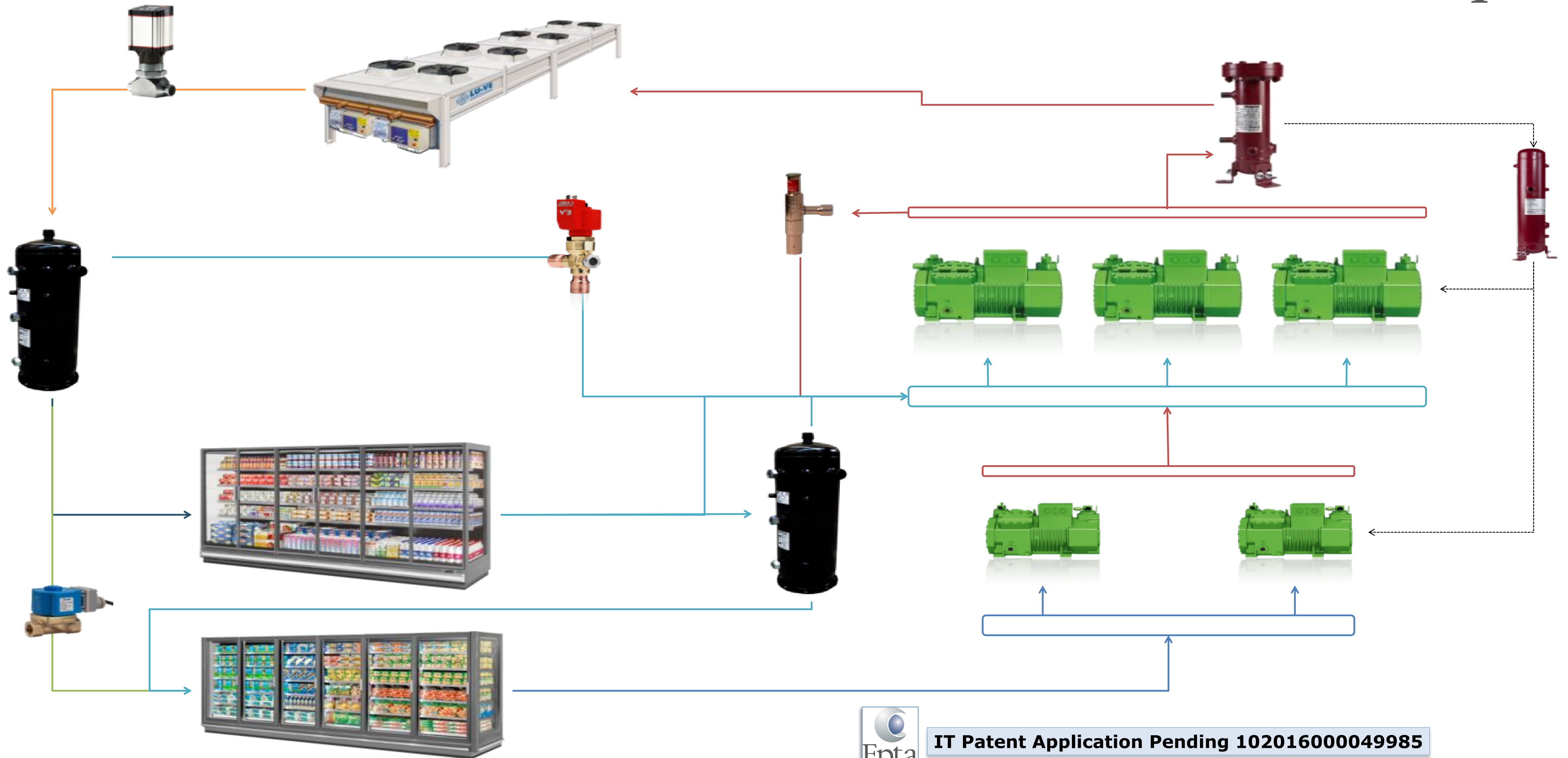
# Overfeeding of the evaporators



- » **What is the superheat?** The amount of heat added to the refrigerant after its complete evaporation. *The superheat is necessary to have only vapor at the evaporator outlet, but it also introduces a significant energy waste and higher compression work.*
- » **Superheat and Evaporating Temperature** The maximum evaporating temperature is limited by the approach between the air inlet temperature and the refrigerant temperature at evaporator outlet. *Superheat causes lower evaporation temperature and hence higher energy consumption.*
- » **ZERO superheat : overfeeding of evaporators** Superheat is completely eliminated, liquid refrigerant is mostly used at the evaporator, liquid and vapor are present at the MT evaporator outlet
- » **Advantages of evaporators overfeeding** Higher evaporation temperature (up to 6K), liquid refrigerant ensures excellent heat transfer



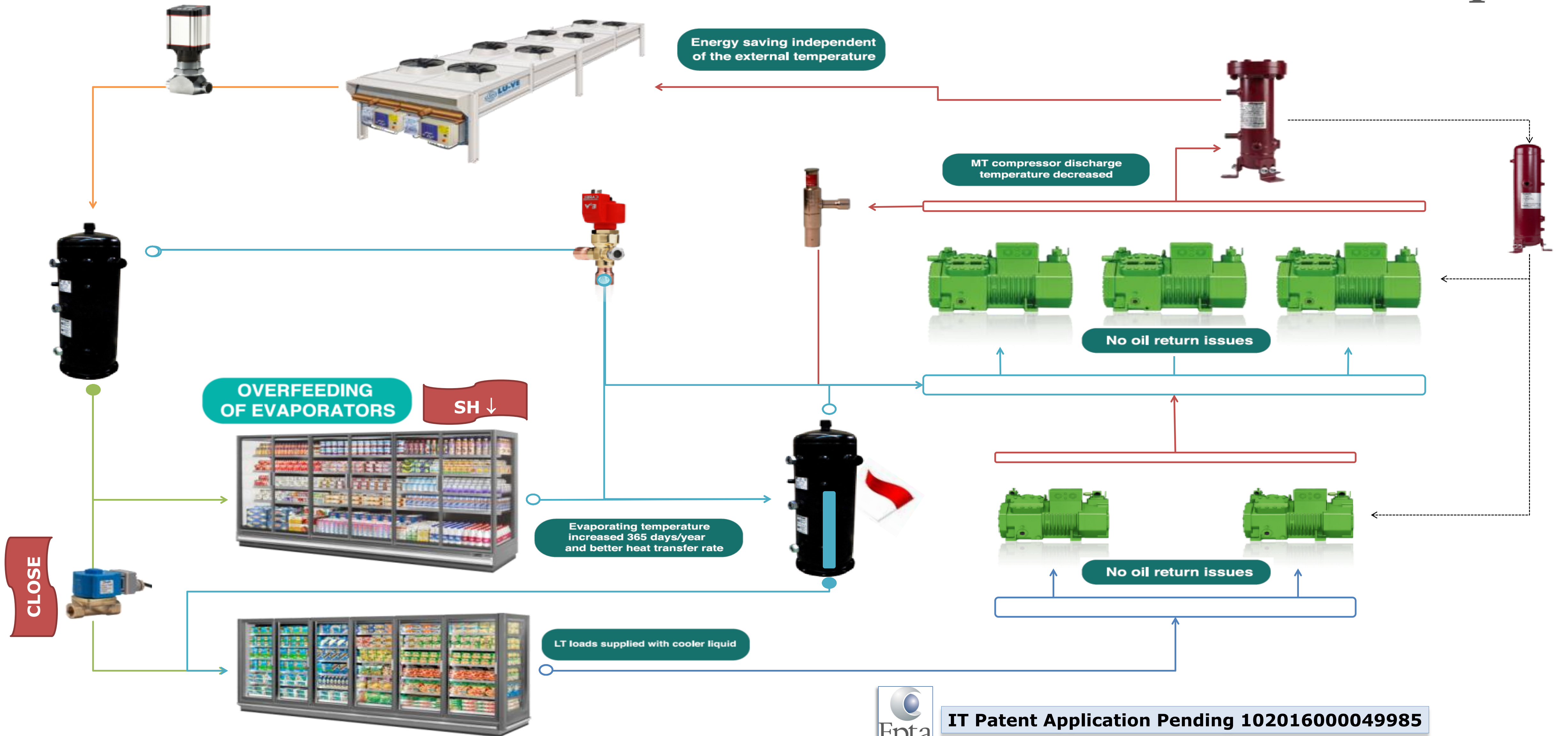
# CO<sub>2</sub> TRANSCRITICAL FTE SYSTEM



IT Patent Application Pending 102016000049985



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### **1. Evaporating temperature increased 365day/year**

The efficiency of the CO<sub>2</sub> FTE SYSTEM is given by the MT cabinets operating with flooded (overfeeding) evaporators without superheat

Evaporation temperature is increased up to 6K (2.5-3% energy saving per K)

### **2. Energy saving is independent of the external temperature**

Unlike ejector technology, the FTE system works in energy saving mode with flooded evaporators all year long

### **3. Optimal performance at EVERY temperature**

The absence of superheat decreases the discharge temperature of the compressors considerably, making it the ideal system for every climate.

### **4. LT loads supplied with cooler liquid**

Liquid to the LT freezers is subcooled after MT cabinets

### **5. No oil return issues**

Perfect lubrication is ensured as the oil circuit is uninterrupted

# **FTE Key features**



**FTE combines simplicity with outstanding performance:**

» **Energy Saving : 10%**

on an annual basis, independent of the latitude and the climate

» **Installation and maintenance cost savings: UP TO 20%**

as it requires no ejector or parallel compression and is intrinsically very reliable

**Simply available everywhere...NOW!**



# FTE Key features

## SIMPLE

because it does not need ejectors or sophisticated components, it is as simple as a standard basic CO<sub>2</sub> booster system

Mechanically the FTE system operates with the same components as the basic CO<sub>2</sub> transcritical system, plus the FTE multilevel liquid receiver.



# FTE Key features

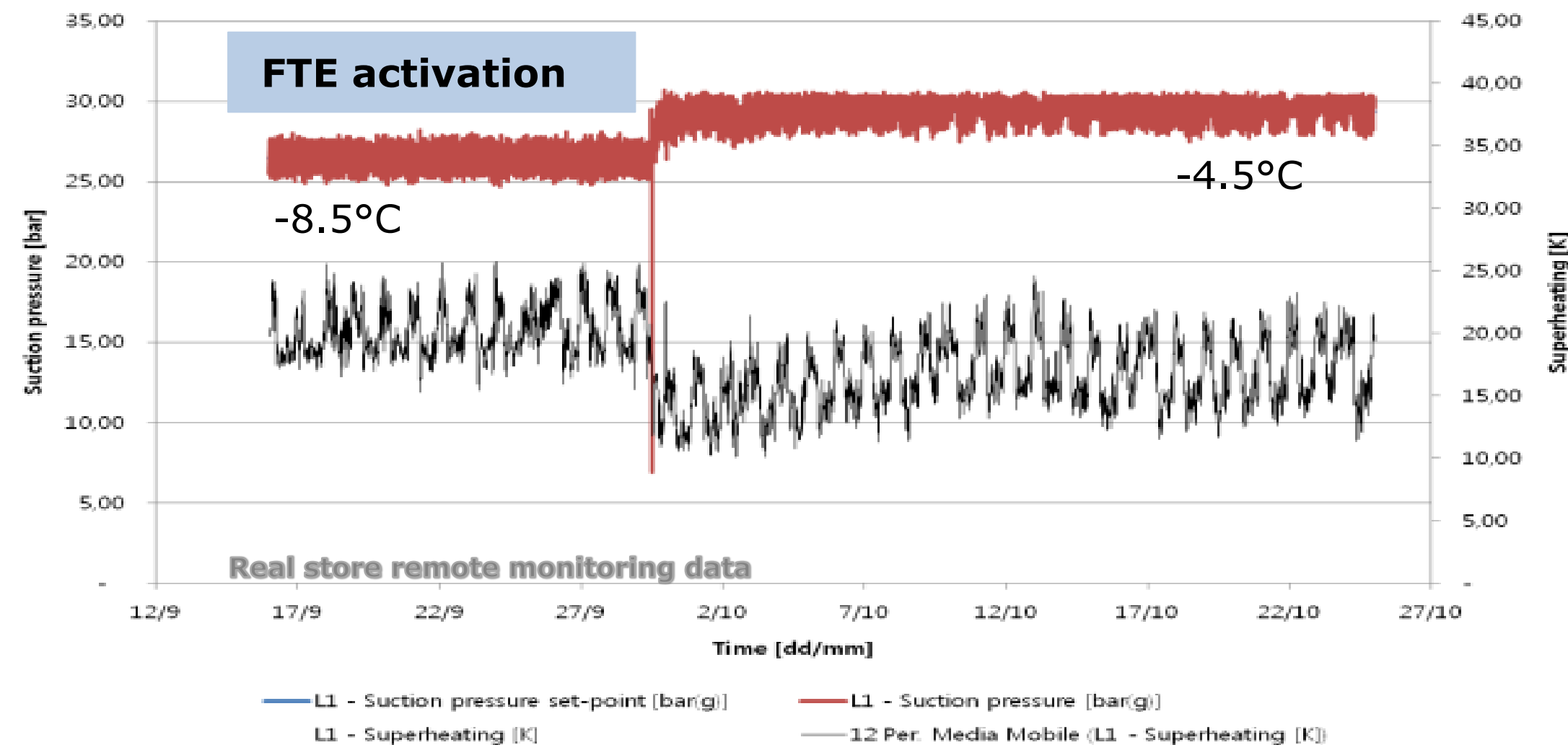


## GLOBAL

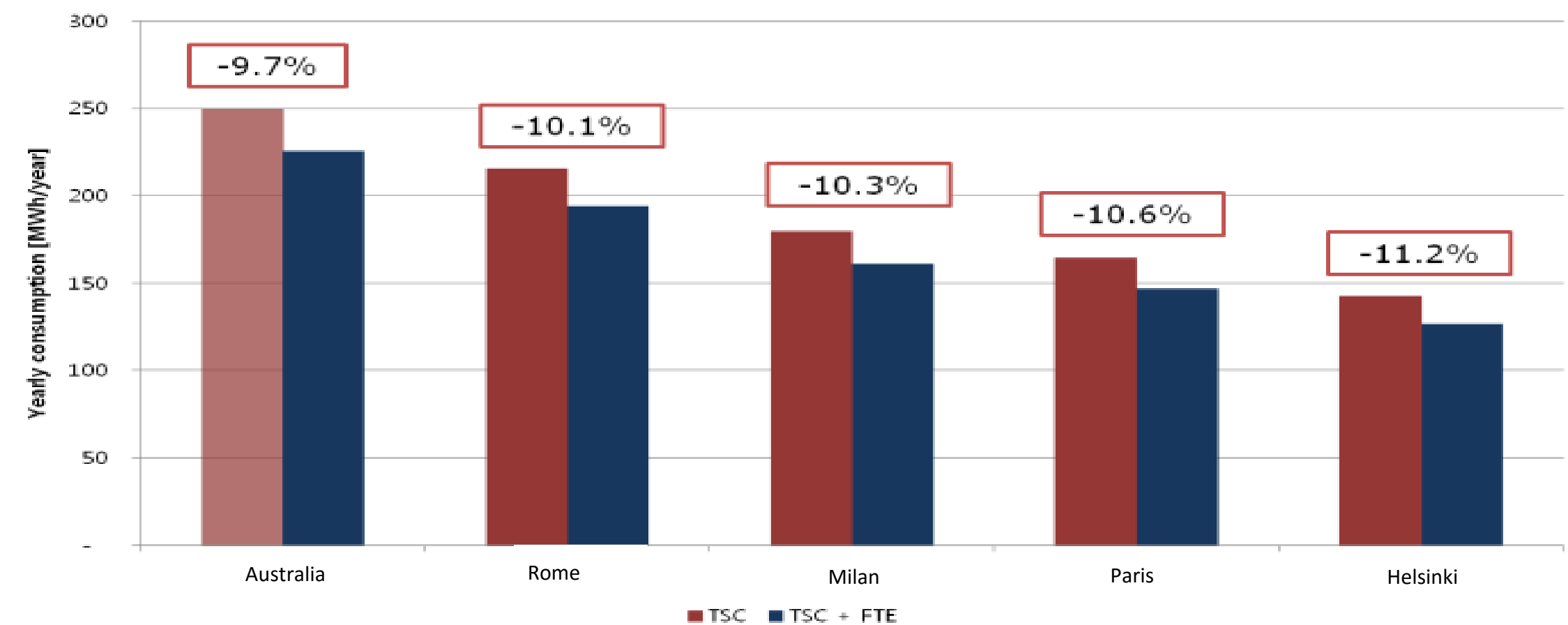
as it works perfectly in hot climates but offers the advantage of a dramatic reduction in consumption all year in any location

One solution for all markets, sustainable and efficient everywhere, and does not require any special expertise.

### Evaporating temperature increased



### Energy saving independent of the external temperature



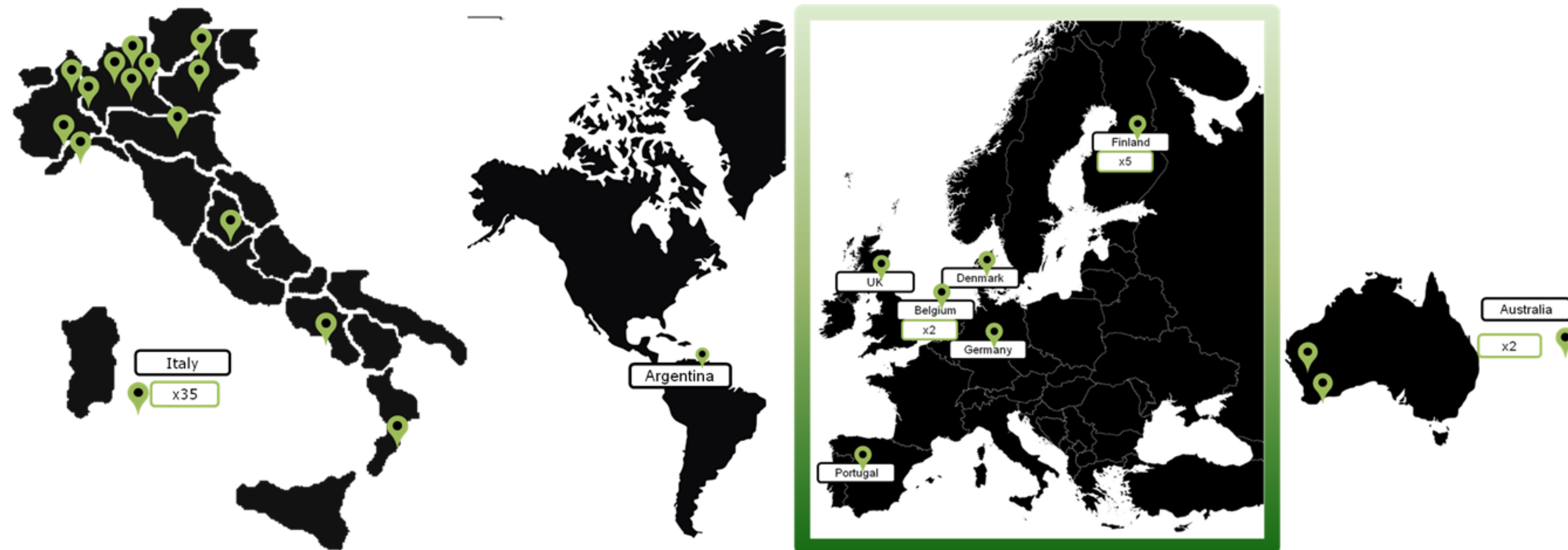
Conditions:  
 - MT cooling capacity installed: 80 kW  
 - LT cooling capacity installed: 20 kW

# FTE Key features



## RELIABLE

as it is a modular solution based on standard components produced on a large scale: the MT and LT systems use standard CO<sub>2</sub> cabinets and freezers, the power pack is a standard basic CO<sub>2</sub> booster system, whereas the heart of the system is the FTE module, an intelligent standard multi-level liquid receiver.



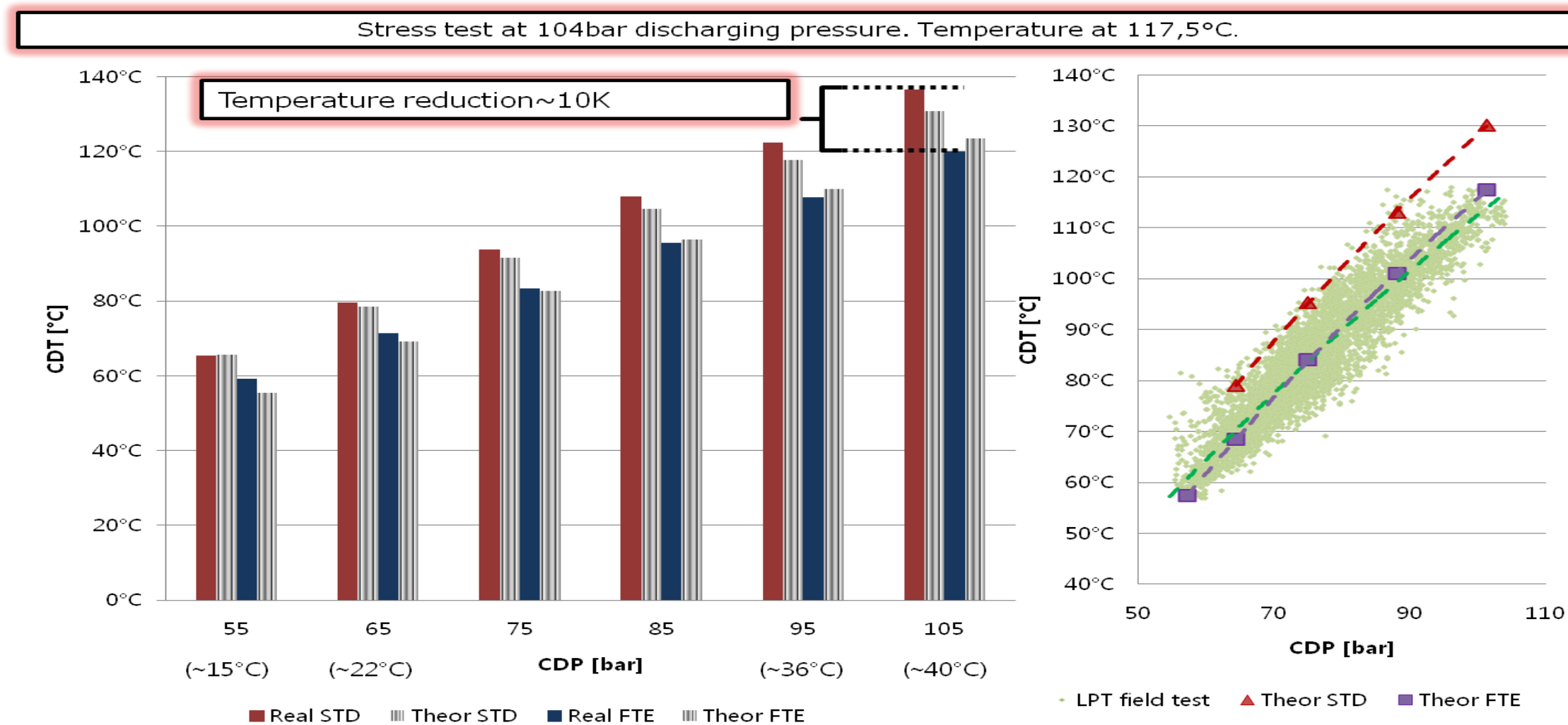
# FTE Key features



## RELIABLE

finally a CO<sub>2</sub> booster system solution more safe and robust than ever, because the FTE system reduces the compressor discharge temperature and allows perfect oil circulation providing better lubrication.

### MT compressor discharge temperature decreased



## Certificate

This is to certify that

**Epta**

has developed a

**highly innovative, energy-efficient CO<sub>2</sub> solution with reliable BITZER compressors, which maintains an uninterrupted cold chain in all climate conditions**

The transcritical Epta FTE (Full Transcritical Efficiency) system introduces a simple method to introduce flooded evaporators in commercial applications. This leads to a significant reduction of the difference between evaporation and display cabinet temperatures in the optimised mode and thus lower energy consumption.

Especially in combination with ECOLINE+ reciprocating compressors, BITZER sees the new FTE technology as a major step in the right direction towards the environmentally friendly use of refrigerants in commercial refrigeration, combined with energy efficiency in high ambient temperature regions. The FTE solution is reliable and resistant under all operating conditions, no matter whether it is used in warm or cold areas.

We would like to thank Epta, the expert in commercial refrigeration, for its innovation as well as for being a great collaborative partner and hope to carry on working together to create a successful future.

**Erik Bucher**  
Director Sales Refrigeration

Sindelfingen, 15 February 2017

**FTE is a new business model :**

- **INDUSTRIALIZE**
- **RELIABLE**
- **EFFICIENCY**

The future of natural refrigeration depends on systems that combine **cost, energy saving and reliability** in a simple design.

With CO<sub>2</sub> FTE SYSTEM the **cost, performance and reliability** gaps can finally be seen to be bridged.

FTE gives a significant contribution to **break down the barriers** to a natural future in refrigeration.

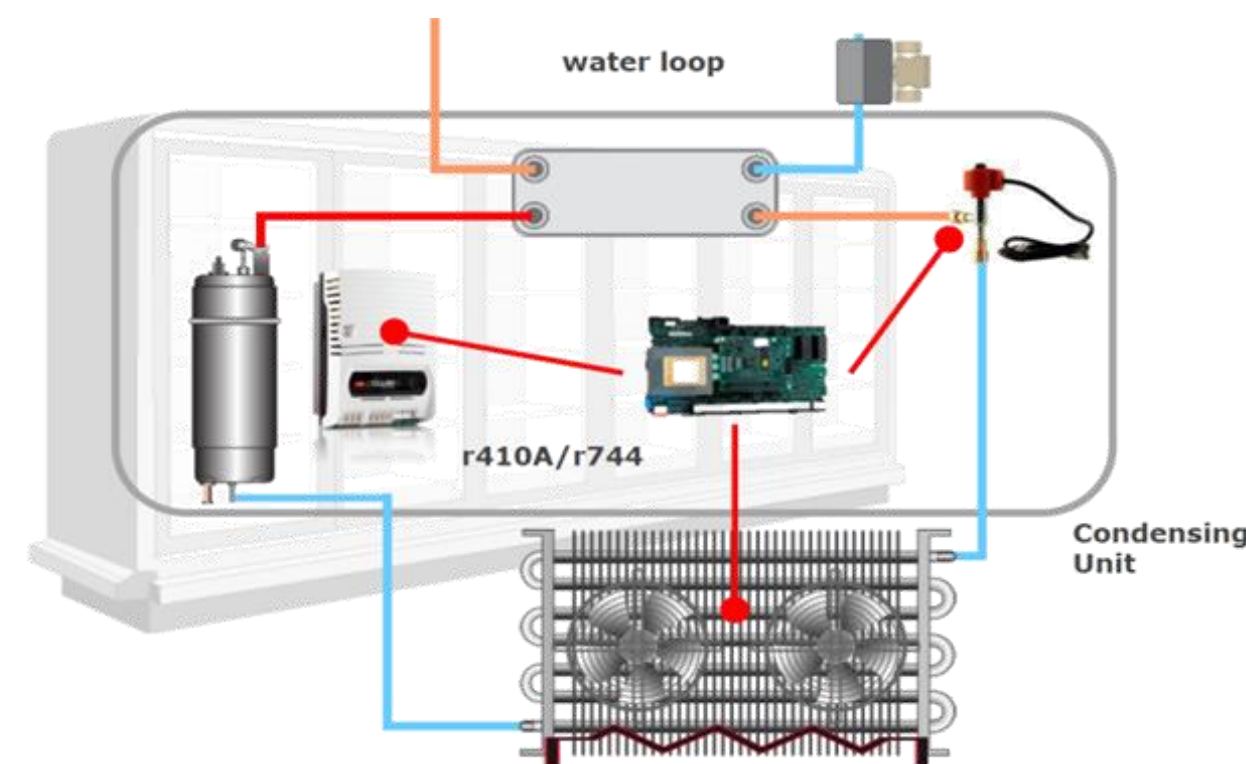
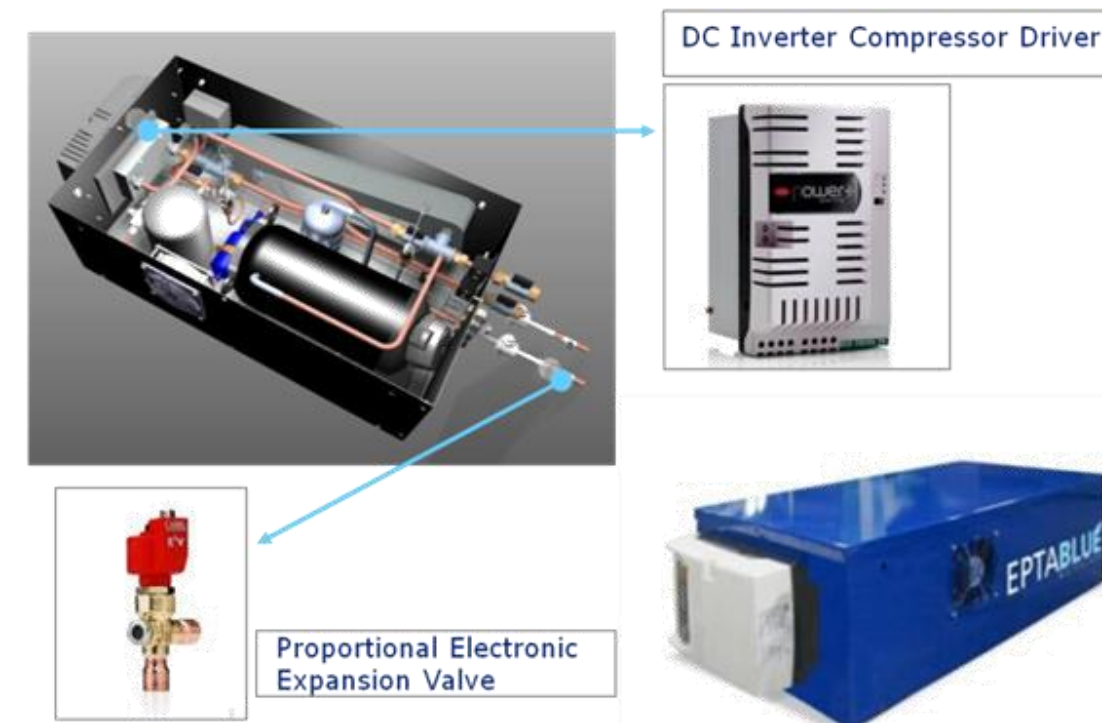
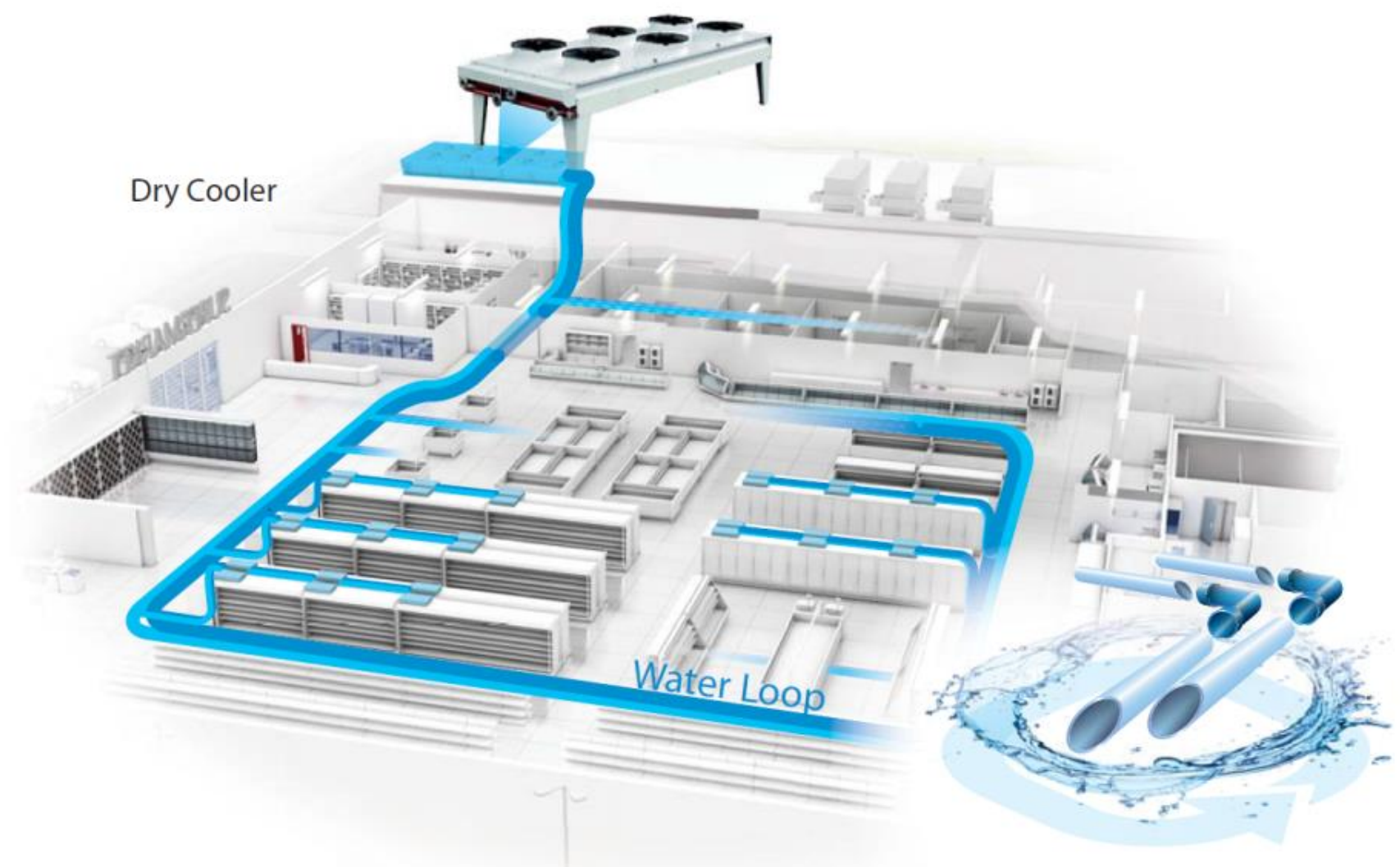








Compact intelligence  
High Efficiency System Technology



## STORE LAYOUT

*Simple, economical and practical*

- ✓ Single loop for MT/LT
- ✓ No subcooling chiller
- ✓ No technical room nor installation work
- ✓ No perceptible noise
- ✓ No equipment outdoor
- ✓ Warm climate version and new extended limits
- ✓ Freezing protected up to -25°C (glycol)

- Refrigeration systems are usually subject to huge variations of thermal loading conditions, mostly dependent on climate, HVAC store management, as well as the use of the cabinets, openings, food loading, light dimming, etc.
- Frequency controlled variable speed motors applied to waterloop systems offer practical way to achieve maximum performance all the year /all the day adapting themselves to the different field condition



# Waterloop system



## ENERGY EFFICIENCY

- All units always at their best working condition
- Wide modulation range and energy efficiency at part load
- Optimum food temperature control
- Full control of units: preventive diagnostic and maintenance

## FLEXIBILITY

- Easy layout change and showcases repositioning,
- Wider sales area, less space needed for machine room
- High investment recovery in store relocation
- Low installation and maintenance cost

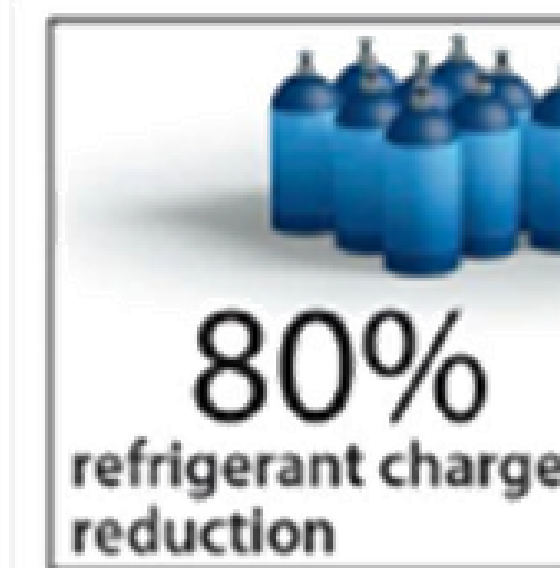
## ENVIRONMENT RESPECT

- Charge reduction **80%**
- Leaks reduction **96%**
- TEWI reduction of more than 50% due to 96% direct effect reduction (in case of HFC)

**A FULLY COMPREHENSIVE  
PRODUCT RANGE FOR  
THE NEEDS OF ANY STORE FORMAT**



- High efficiency BLDC compressors
- Individual evap. temperature
- Fully controlled performances



- No long copper pipes
- No comp rack and receivers
- 1-2kg refrigerant charge for cabinets
- Leakage free as factory connected charged, sealed and tested

# Natural refrigeration systems for Retail



To ensure the best **shopping experience** for the consumer and profitability for the client, while promoting sustainable development. A vision built on the solid foundation of the **4 E's**:  
**E**xperience, **E**fficiency, **E**xcellence and **E**volution.

## Experience



More than 100 years of history in the sector, with big investment in R&D. Creating **CO<sub>2</sub> plant** and heat recovery systems around the world

## Efficiency

Epta subscribes to **Eurovent**, a voluntary European certification programme



## Excellence: Certifications



**ISO 26001** (Corporate Social Responsibility)

**HACCP** (Food Safety Programme)

**PED** (Pressure Equipment Directive)

**PAS 99:2012** (Integrated System)

**ISO 9001:2008** (Quality System)

**ISO 14001:2004** (Environment System)

**OHSAS 18001:2007** (Safety System)

**ISO 9705** (Fire Protection – Coldrooms)

**ETA MARK**

(European Technical Approval – Coldrooms)

**WEEE** (Waste Electrical and Electronic Equipment)

## Evolution The Tev UP way

Innovative solutions like **RevUP technology** applied to a complete range of products, which revolutionizes the purchasing experience and ensures:



- high energy **efficiency**
- **attractive** merchandising
- maximum product **visibility**
- total **quality**

# Retrofitting for the best performances



The advantage is not only making the installed equipment compliant with ecocompatible technology, but also improving the performance levels in terms of energy efficiency

- ✓ **Technological analysis**
- ✓ Management of the old HFC refrigerant
- ✓ TEV adjustment/replacement
- ✓ EEV software setting/updating (or new controller)
- ✓ Energy mechanical and software update
- ✓ Refill/restart of the plant
- ✓ After few hours the system is regenerated

## Benefits of HFO refrigerants

- Non-ozone depleting and low GWP
- Improved energy efficiency vs. R-404A
- Quick, easy and cost-effective R404A retrofit
- Safe and non-flammable (ASHRAE A1)
- Supported by component manufacturers
- Extensively field tested
- Miscible with POE lubricants
- Can be topped off after leak

TIPOLOGIA DI GAS	R404A	PERFORMAX LT- R407F	XP40 - R449A	N40 - R448A
				
<b>GWP</b>	<b>3922</b>	<b>1824</b>	<b>1298</b>	<b>1273</b>
R125	44%	30%	25%	26%
R134A	4%	40%	26%	21%
R1234YF			25%	20%
R32		30%	24%	26%
R1234ZE				7%
R143A	52%			
<b>ESEMPI DI VALORI DI GLIDE</b>				
<b>TEMPERATURA</b>	<b>R404A</b>	<b>PERFORMAX LT- R407F</b>	<b>XP40 - R449A</b>	<b>N40 - R448A</b>
-31	0,7	6,2	6	6,1
-8	0,6	5,8	5,7	5,8
5	0,5	5,5	5,5	5,6
40	0,3	4,5	4,5	4,6

# Natural refrigeration systems for Retail

## F-GAS POLICIES IN EUROPE ARE WORKING WELL

- The CO2 emissions are falling in EU
- Energy consumption is key target (ECODESIGN)
- The prices and availability of HFCs is critical
- Natural refrigeration products and systems are available
- **The implementation of the F-Gas and the Kigali amendment applied at national level are essential to effectively fight global warming**



A collage of images and logos related to Epta's refrigeration solutions. It includes icons for 'CONVENIENCE Store', 'SUPERMARKET', and 'HYPERMARKET'. Logos for 'EPTABLUÉ 2.0', 'ECO2 Small', 'EPTACLIMA', and 'ECO2 Large' are displayed. A central image shows a person working at a 'E+E Epta Educational Training Centre' with 'City Guilds Approved Centre' branding. The collage also features various refrigerated display cases and equipment.

CO<sub>2</sub>





Bonnet Nèvé S.A. participates in the ECC programme for:  
Refrigerated display cabinets (RDC). Check ongoing validity of  
certificate online: [www.eurovent-certification.com](http://www.eurovent-certification.com)  
or using: [www.certiflash.com](http://www.certiflash.com)

