

Sustainable Refrigeration Summit

Connecting the Pieces for
Supermarket Refrigeration Solutions

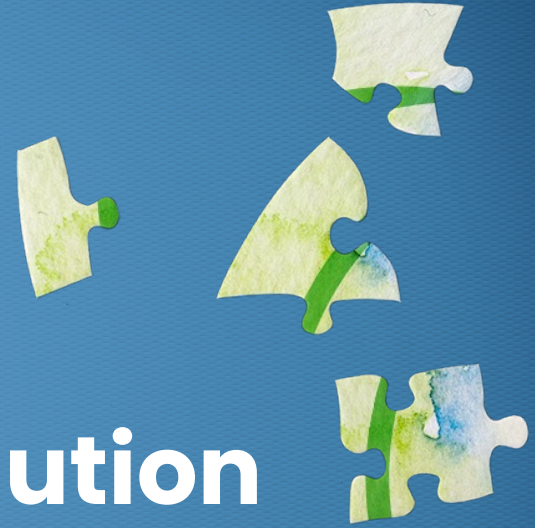


NORTH AMERICAN
**Sustainable
Refrigeration
Council**

nasrc.org

ESyCool green Sustainable Energy Solution for food retail stores

Viessmann Refrigeration Solutions



ESyCool green

Sustainable Energy Solution for Food Retail Stores

Viessmann Refrigeration Solutions

October 26th, 2022

NASRC Clean Air Summit 2022

Agenda

15 minutes with a lot of information

- Viessman Refrigeration Solutions, a short intro on us and our ambitions
- EsyCool green, R290 heat-pump concept for commercial refrigeration
- Questions

We are a 105-year-old family business

Independently owned,
responsibly led, executing fast





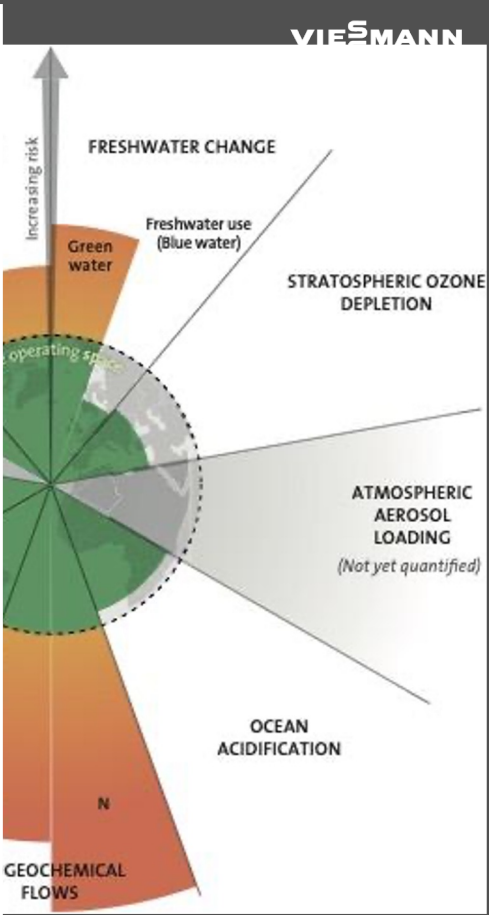
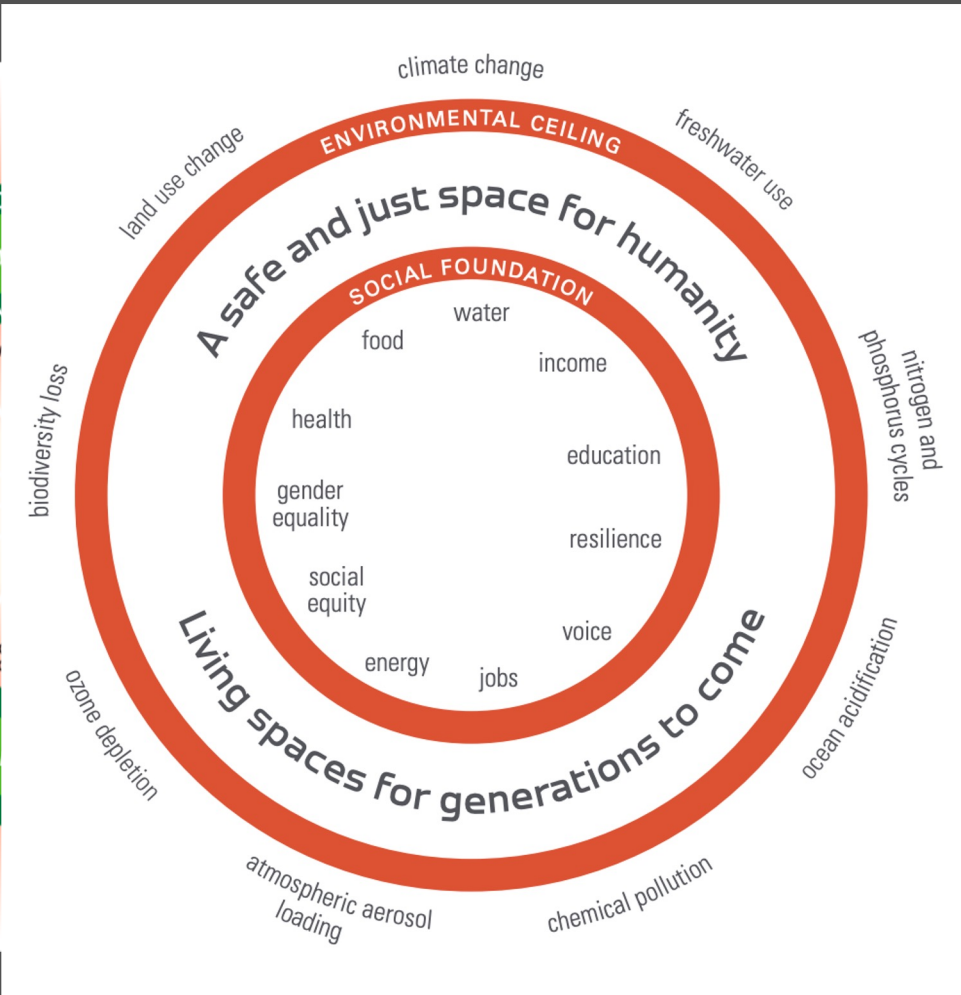
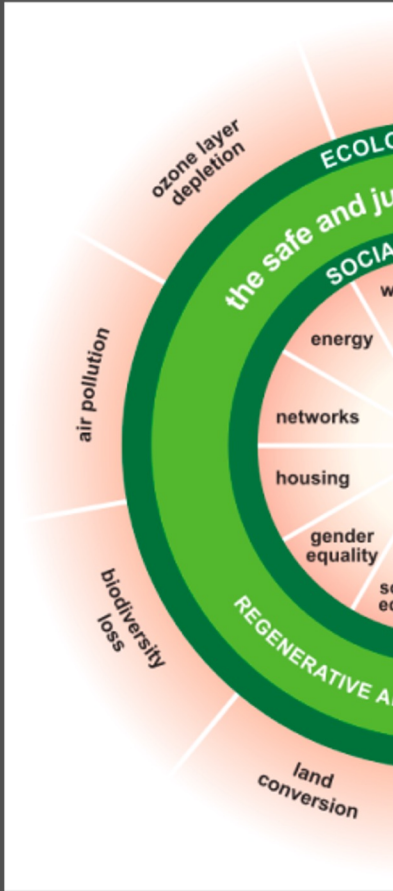
Climate
Solutions



Refrigeration
Solutions



Investment





Principles

1. We are **aligned with science** (1.5C)
2. We defined and execute a **global strategy** for the whole group
3. We address the **whole value chain**
4. We foster a **systems transformation** beyond our own operations



SCIENCE BASED TARGETS

DRIVING AMBITIOUS CORPORATE CLIMATE ACTION

2050

Paris Agreement Net-Zero
Viessmann Net-Zero (I, II, III)

2045

German Net-Zero Target
Net-Zero Operations Germany (I,II)

2035

Mission Zero Target for region Waldeck-Frankenberg
HQ Net-Zero Operations (I,II)

2030

-50% absolute CO2 reduction in our own operations vs 2019 (I,II)
-55% CO2 intensity vs 2019(III)

2019

-50% absolute CO2 reduction in our own
operations vs 2005 levels (scopes I & II)

Net zero: amount of GHG going *into* the atmosphere = amount of GHG going *out of* the atmosphere

Scope I: own operations and vehicles

Scope II: purchased electricity, steam, heating, cooling

Scope III: emitted indirectly upstream or downstream

CO2 intensity: emissions related to a specific economic output



SCIENCE
BASED
TARGETS

DRIVING AMBITIOUS CORPORATE CLIMATE ACTION

On track for our science-based target

Scope I & II

-17.8 % since 2019
(-8 900 tons CO₂)

Scope III

-15.6 % since 2019
(CO₂ / EUR added value)

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- EsyCool green, R290 heat-pump concept for commercial refrigeration
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An aerial architectural rendering of a sustainable urban development. The central focus is a large, modern building with three prominent, curved, white facades that are densely covered with green plants, creating a vertical forest effect. The building's facade is punctuated by numerous rectangular windows. In the foreground, a large, rectangular pond with a small, circular island in the center is surrounded by lush green landscaping and pedestrian walkways. To the left, a large building with a blue, solar-paneled roof is visible. The background shows a dense urban landscape with various residential and commercial buildings under a clear blue sky with some light clouds.

ESyCool green

... for generations to come

The image shows two large, dark-colored industrial heat pump units mounted on a metal frame on a rooftop. The units have condenser coils and various access panels. A semi-transparent grey box is overlaid in the center, containing white text. The background is a cloudy sky.

ESyCool = Energy Saving System for Cooling applications
green = natural refrigerant

What is ESyCool green?

A sustainable and energy-efficient system:

- Cooling of refrigerated cabinets and cold rooms
- Cooling of LT refrigerated cabinets and LT cold rooms
- Heating of buildings
- Air conditioning of buildings
- Mainly for food retail and convenience stores

How is this realised?

- Generation of cold and warm brine with Tecto EC Pro Units
- Tecto (MT<) refrigerated cabinets and (MT<) cold rooms
- Generation of cold brine for air-conditioning with cold brine sets (possibly also with HP function) Generation of cooling capacity with a CO2 hybrid system

What is ESyCool green?

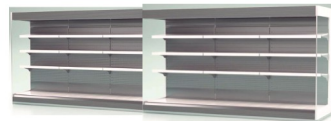
ESyCool green ist always a turn-key solution for our customer!



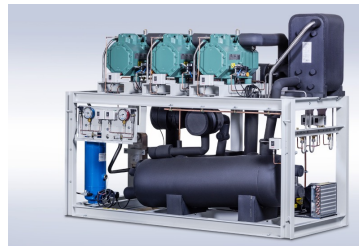
Heat exchanger for heating



Tecto EC Pro



Tecto MD5/MD7/LEH0/SV5



R744 hybrid system



R290 Chiller/heat pumps



Tecto IS1



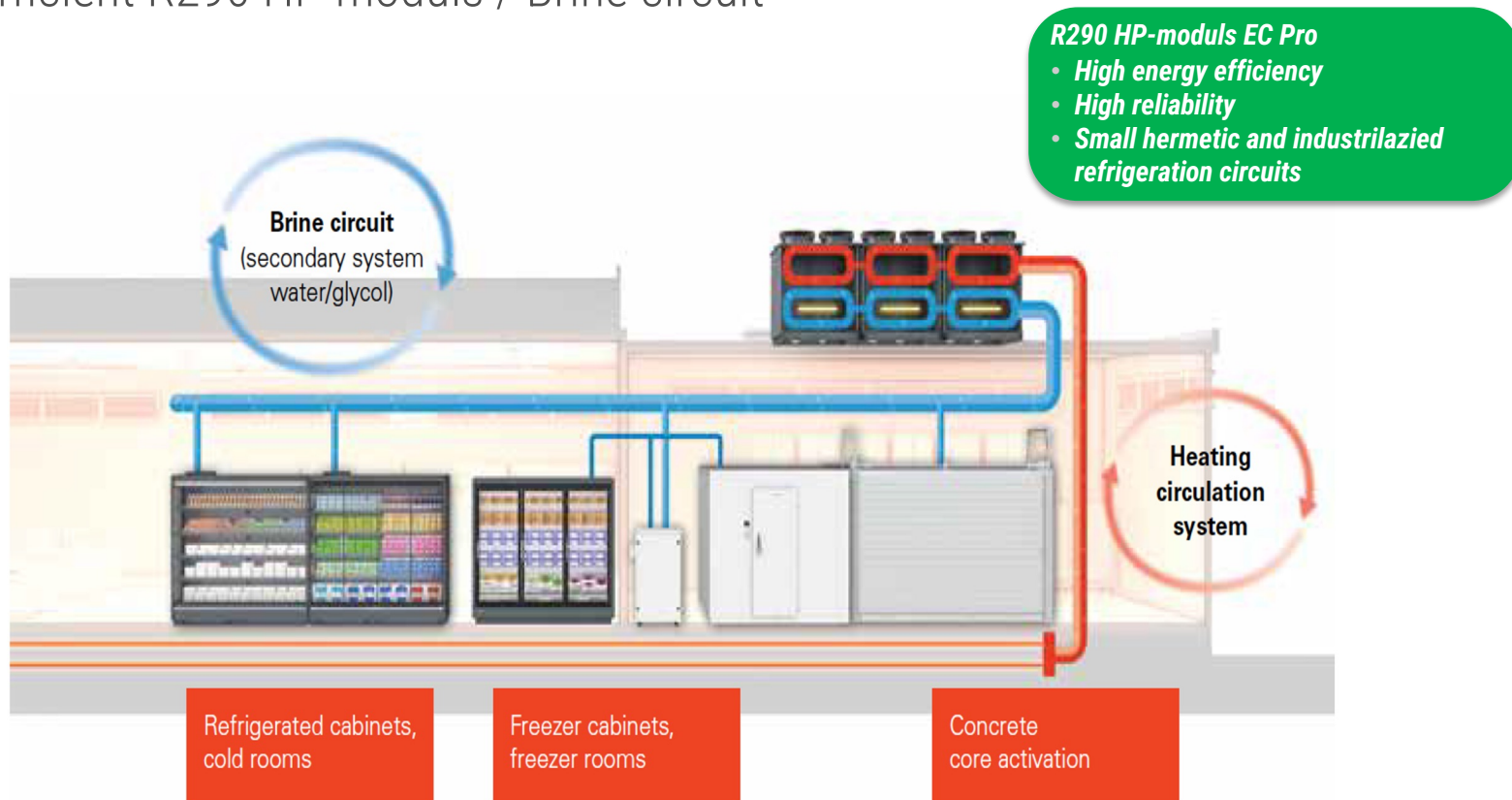
TectoCell



Tecto VF1

ESyCool green ... sustainable cooling & heating

Energy efficient R290 HP-moduls / Brine circuit



Tecto EC Pro Units

R290 heat pumps

Outdoor heat pump unit R290 (Sole/Sole)	EC Pro 2x12 kW stand-alone (single use)	EC Pro 24 kW multiple connection (2x/3x/4X)
Cooling capacity	12 + 12 = 24 kW (32hp)	24 kW (32hp)
Heating capacity	max. 34 kW (45.6hp)	max. 34 kW (45.6hp)
Refrigerant charge	2,35kg (5.2lb)	2.3 kg (5lb)
No. of fans	2	2
Dimensions L / D / H	1.7 / 2.4 / 2.0 m (5.5ft / 7.9ft / 6.6ft)	1.7 / 2.4 / 2.0 m (5.5ft / 7.9ft / 6.6ft)



Store formats in food retail

Power stages of EC Pro units

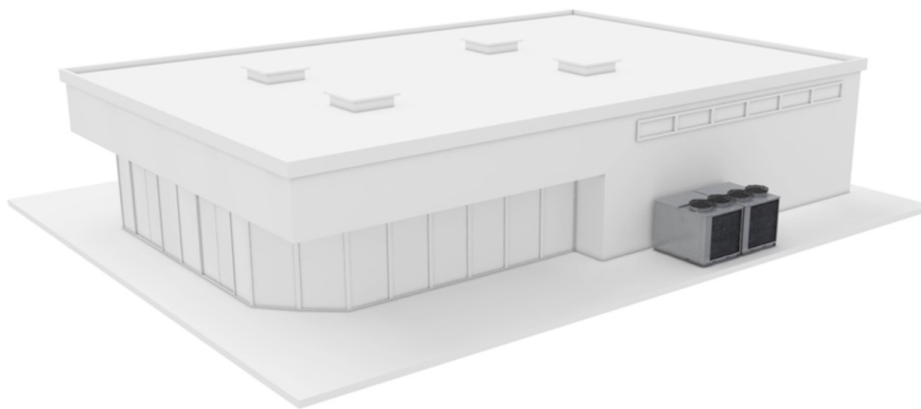


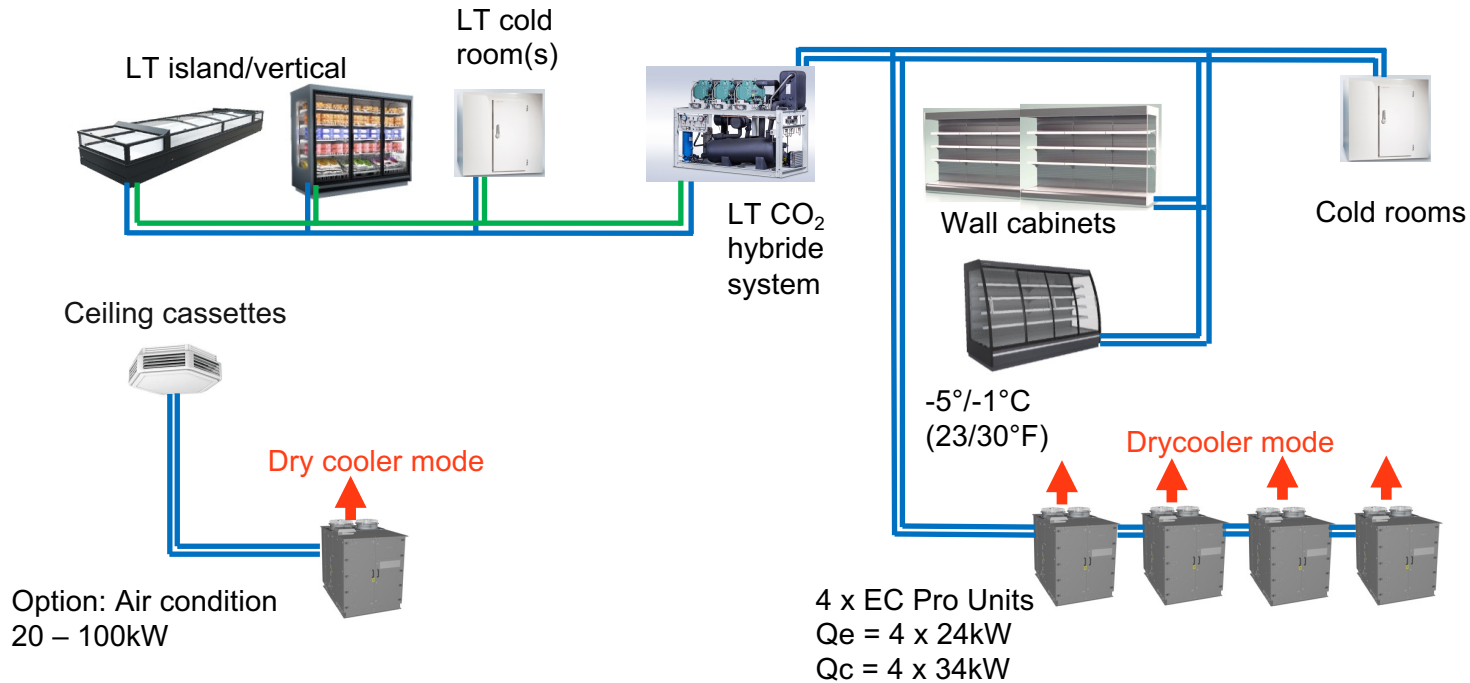
Image shows 2x EC Pro 24 kW

Store formats	EC Pro units	Ref. Capacity	Heating capacity
Small stores (Forecourt, C-Stores, small Discounter)	EC Pro 2x12 kW	10 – 24 kW	up to 34 kW
Small/medium stores (Discounter, small Supermarkets)	2x EC Pro 24 kW	25 – 48 kW	up to 68 kW
Medium stores (big Discounter, Supermarkets)	3x EC Pro 24 kW	49 – 72 kW	up to 102 kW
Medium/large stores (medium/large Supermarkets)	4x EC Pro 24 kW	73 – 96 kW	up to 136 kW

ESyCool green

Integral summer mode

1100 hours per year
 $t_a > 20^\circ\text{C}$ (68degF)



LT island/vertical

LT cold room(s)

LT CO₂ hybride system

Wall cabinets

Cold rooms

Ceiling cassettes

32/27°C (90/81°F)

-5°/-1°C (23/30°F)

No dry cooler mode

Dry cooler mode

4 x EC Pro Units

$Q_e = 4 \times 24\text{kW}$

$Q_c = 4 \times 34\text{kW}$

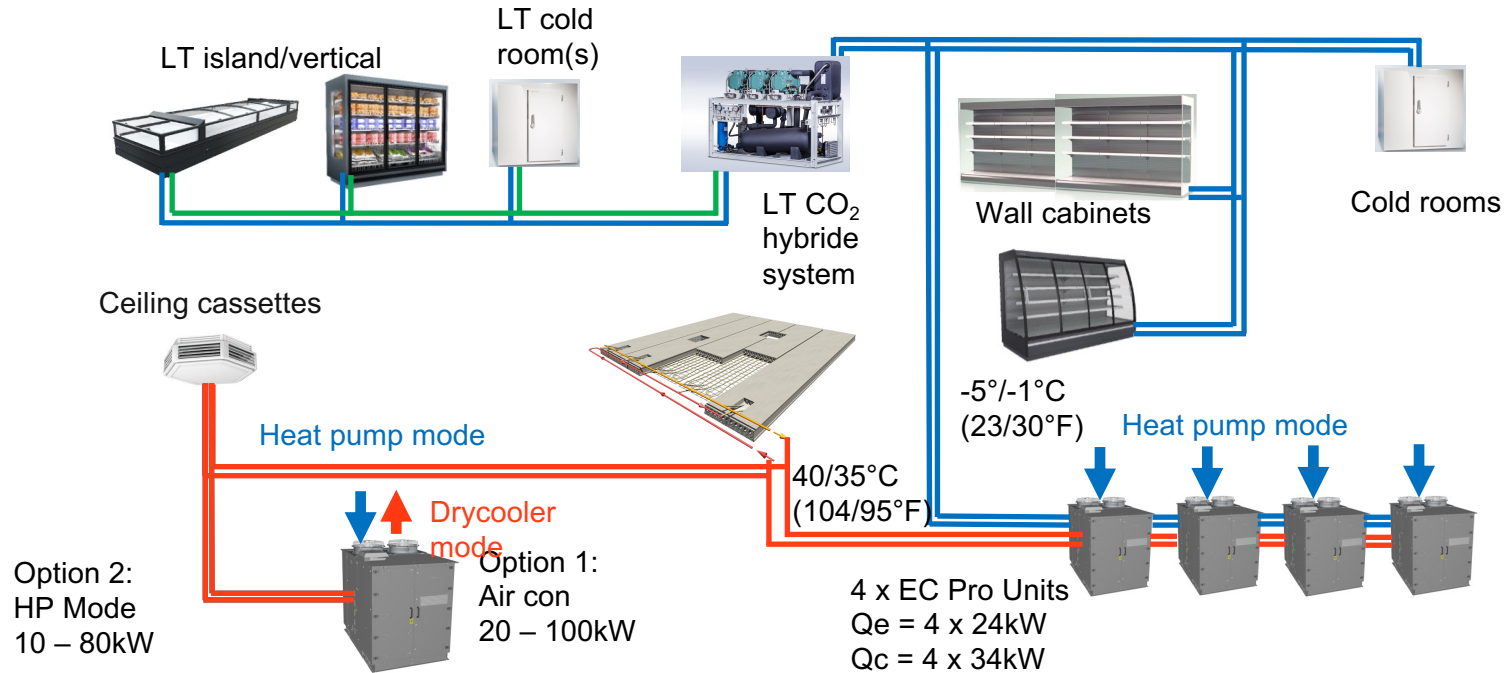
tion: Air condition
- 100kW

ESyCool green

Integral Winter mode

3160 hours per year
 $t_a < 7^\circ\text{C}$

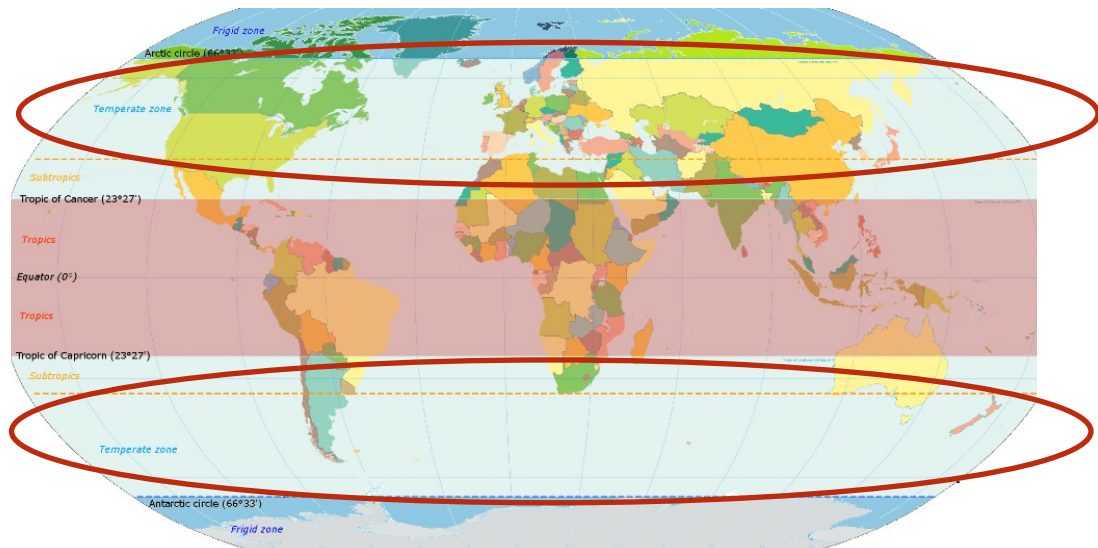
VIESSMANN



EsyCool Green

Experiences so far

- 10-27% reduced energy YoY consumption compared to CO2 DX systems in comparable stores and environment
- Most savings in zones with temperate climate, 26.6degF – 64.4 degF (-3degC – 18deg C)
- Concept keep being developed as we go from refrigeration towards climatization



Installations ESyCool green 3.0

Experiences so far

- 10 installations that are currently operational
- 50 new installations expected the next 12 months
- Interest is fast growing from the customers with the pilot installations
- Pilots for convenience stores under evaluation



Key benefits

- Natural refrigerant R290
- 90-95% less refrigerant charge due to compact hermetic HP design
- Up to 25% lower energy consumption
- Industrial manufactured series EC Pro units
- Improved performance adjustment due to modular system
- Maximum temperature stability and robust operation reliability of the system
- Simplified service and maintenance requirements
- Future-oriented energy management capabilities - Total Energy Solutions

VIESMANN