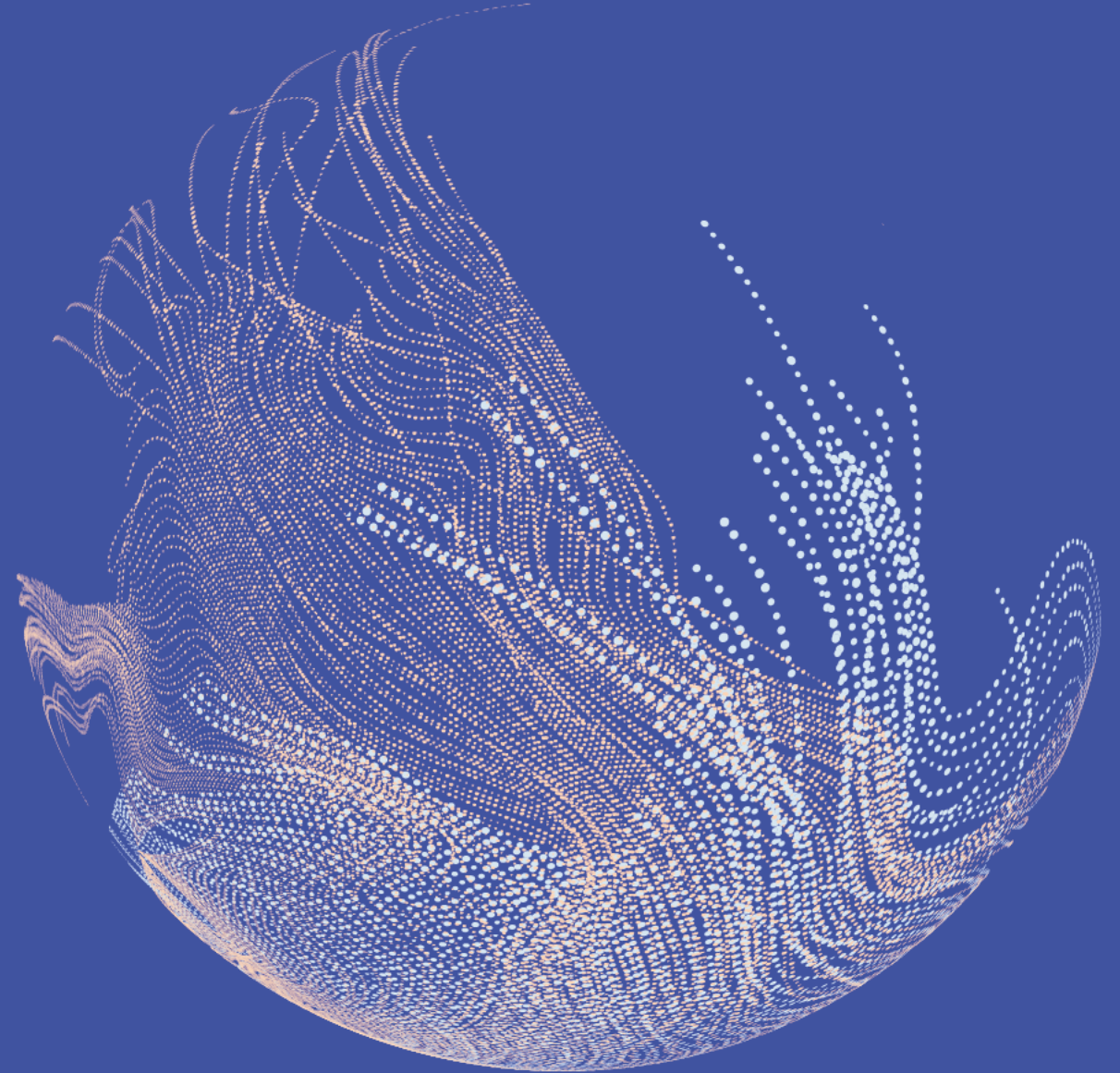




Business Case for
Natural Refrigerants



Brussels
19-20/09/2023



Migros Cassarate: R744 Integral solution with lake water

MIGROS TICINO



#GoNatRefs

97,727 employees

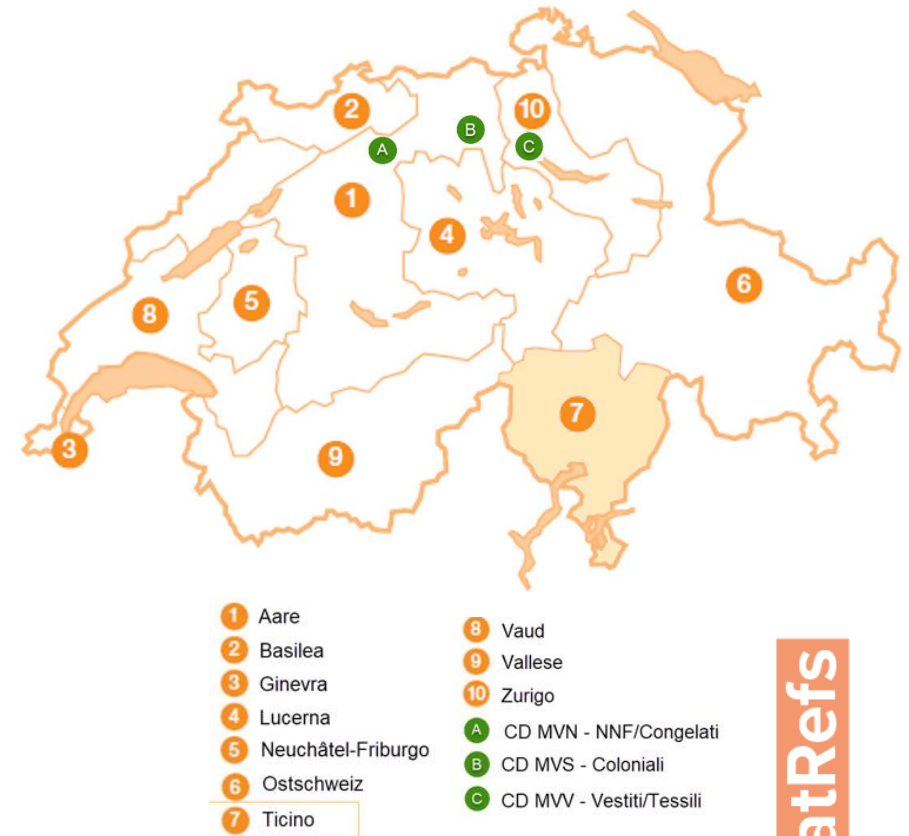
Sales of CHF 30.1 billion

Migros at a glance

With sales of **CHF 30.1 billion (2022)**, the Migros Group is the largest retail company in Switzerland and employs more than 97,700 people, making it the largest private employer in Switzerland.

Migros founded in 1925, is owned by more than **2.3 million cooperative members** who are organised into ten regional cooperatives. These cooperatives run the core business of the Migros Group – **the retail business** – with 630 branch stores.

Ambitious climate targets, products with transparent sustainability ratings and an increased commitment to combating food waste: Migros has achieved a great deal in all strategic areas in 2022.



2.31 million cooperative members

Founded in 1933

53 stores

Migros Ticino at a glance

In 1933 was founded **the first Cooperative, Migros Ticino**, a local company that has always been interested in the economic, social and cultural development of the region in which operates.

Migros Ticino is a dynamic and versatile Cooperative that operates in several areas of activity. Areas that include food and non-food commerce with the 33 supermarkets, 3 outlets and 9 specialized stores, foodservice with 8 facilities including restaurants and take-aways, 6 wineshops “Vinarte”, the promotion of fitness and wellness with 6 centers “Activ Fitness Ticino” and the publication of the weekly magazine “Azione”.

Another key factor in Migros Ticino's corporate philosophy is sustainability: the Cooperative relies heavily on new technologies to increase the efficiency of its branches. The company works daily to **reduce its environmental impact** by plant optimization, by installing photovoltaic panels on their buildings, by transporting merchandise on rail and by purchasing electric vehicles to reduce CO₂ emissions.

More than 100'000 cooperative members

Migros Energy and Environmental Goals 2030



In this framework Migros and consequently also Migros Ticino Cooperative set concrete goals, which were split between stores and the Logistics Headquarters located in S. Antonino



The goals were originally quantified in 2004 and subsequently updated in 2019. They are verified annually in collaboration with the **Energy Agency for the Economy (AEnEc)**

1

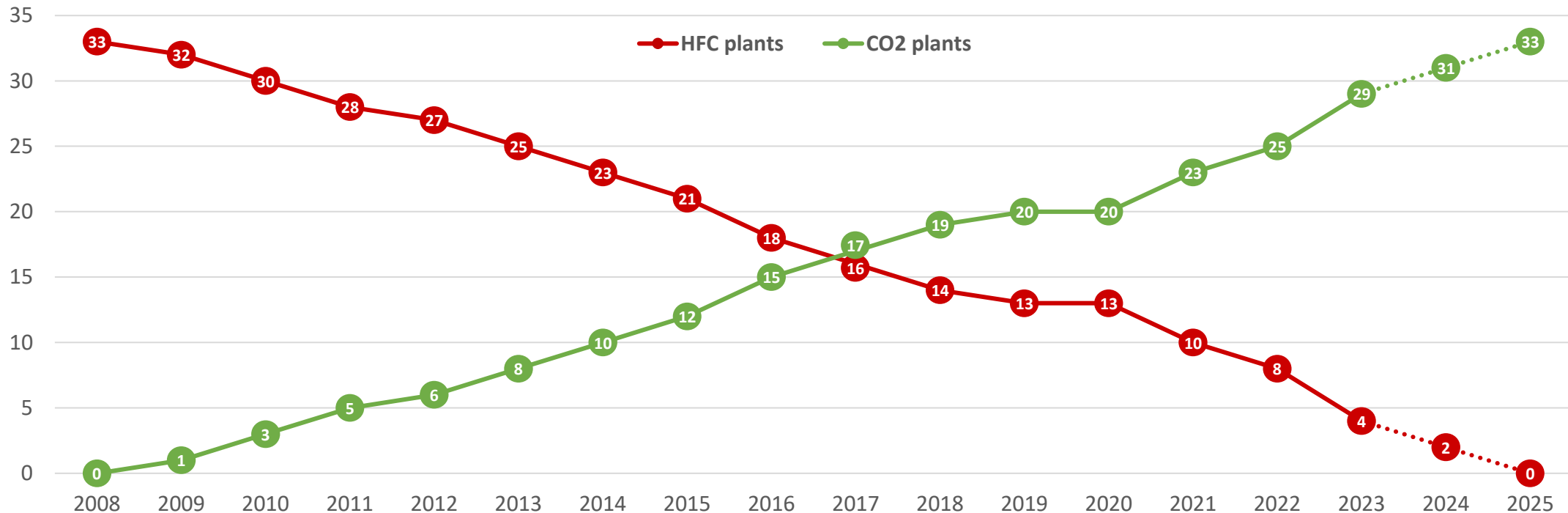
Reduction of greenhouse gas emissions by at least 42% compared to 2020.
The percentage is expected to be around 76.7% for Migros Ticino with its planned projects

2

Reduction of energy purchase by 10% compared to 2020.
For Migros Ticino, the reduction will be around 15.6 %, as a result of planned projects

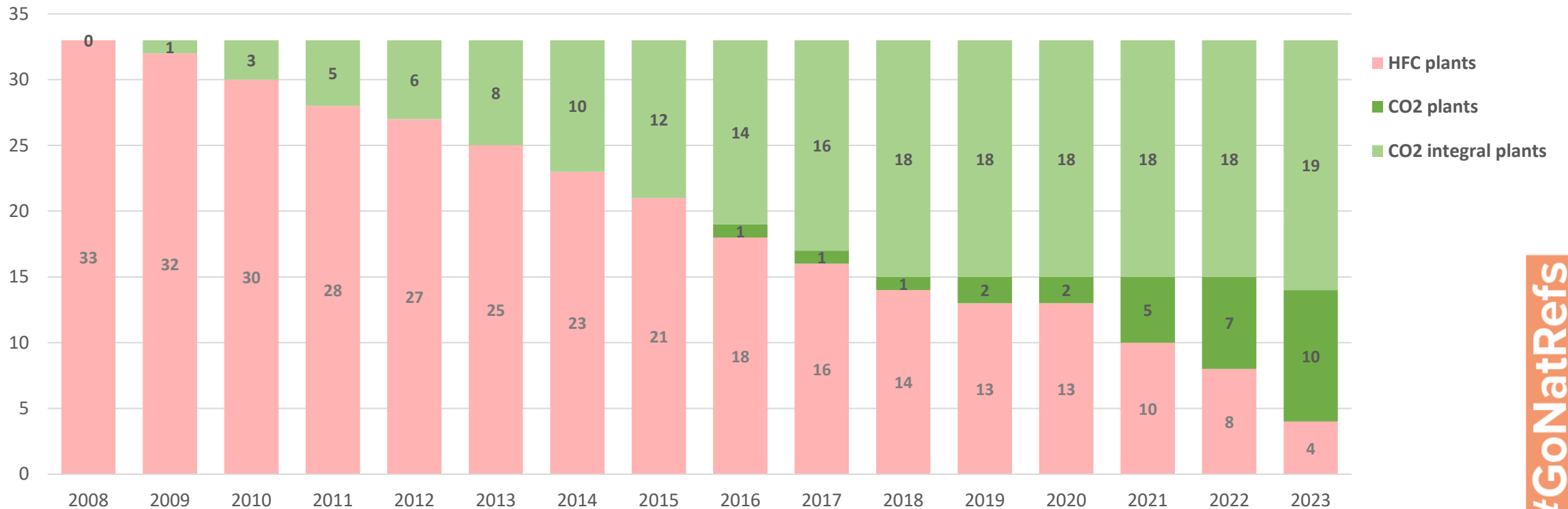
CO₂ installations

Since 2009, in stores that are being renovated or newly established, there have been exclusively commercial refrigeration systems with transcritical CO₂ technology: designed, manufactured and installed by the company **E. Biaggini SA**, in collaboration with **Eliwell by Schneider Electric**.



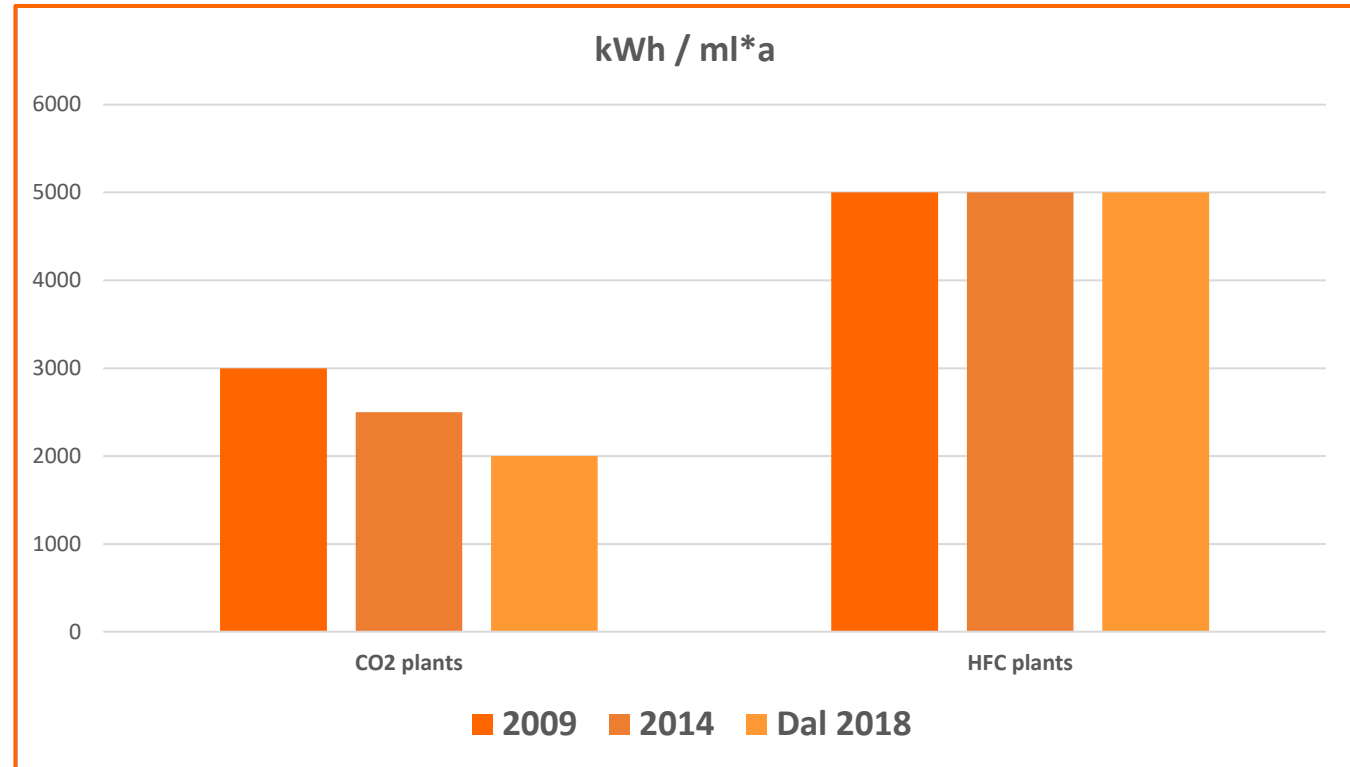
CO₂ integral TotalGreEnergy plants

Continuous desire to test new technologies while seeking the most effective tools to achieve its sustainability goals, as of 2016, Migros Ticino has been producing both industrial cold and heat for heating with the same plants: **TotalGreEnergy** was born! Over the past few years, Migros Ticino has mostly invested in CO₂ combined plants. By the end of 2023, there will be 11 combined plants, 19 commercial refrigeration-only and 4 conventional plants.



Comparison of cold plant consumption

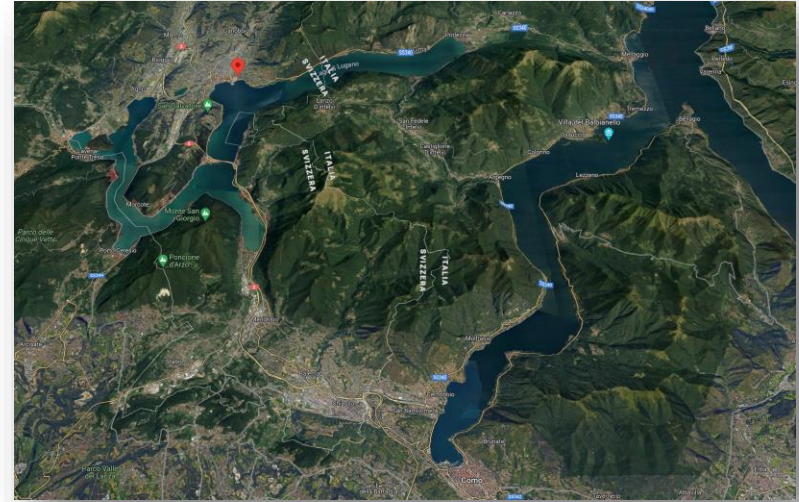
- Using closed refrigerated furniture, thermodynamic characteristics of *R744*, and continuous development of this technology have ensured the drastic decrease in energy consumption, quantified by the **KWZ** parameter (kWh/ml*year)
- From 2009 to 2018, the electrical consumption of CO₂ plants has been reduced by **1'000 kWh/ml*a**
- From 2018 to 2023, the electrical consumption of CO₂ plants has been reduced by **500 kWh/ml*a** thanks to **TotalGreEnergy** installations

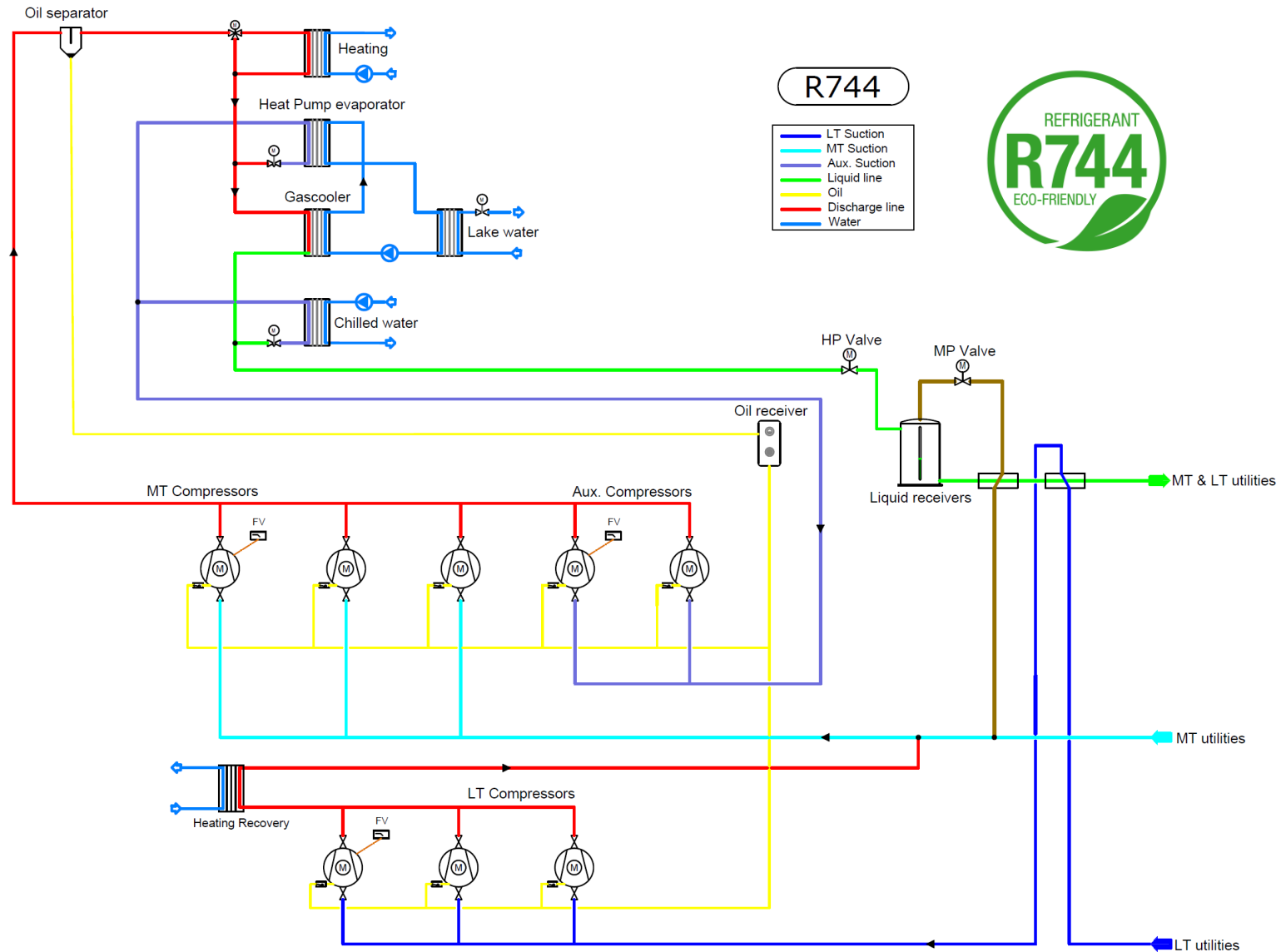


Migros Cassarate: Goals of the project

- Replacement of old **R404A** refrigeration compressor rack, **R410A** chiller and oil burner
- Installation of unique **R744** integrated system able to satisfy all the shop energy requirements (**HVAC-R**)
- Massive decreasing of installed **GWP**
- Ensuring best thermohygrometric conditions in warm and cold seasons and food preservation
- Improving **efficiency** and decreasing energy consumption
- Reaching high **reliability** and **redundancy**
- Decreasing lake water consumption

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Designed and manufactured by **biagginifrigoriferi**



Compressor rack specs.

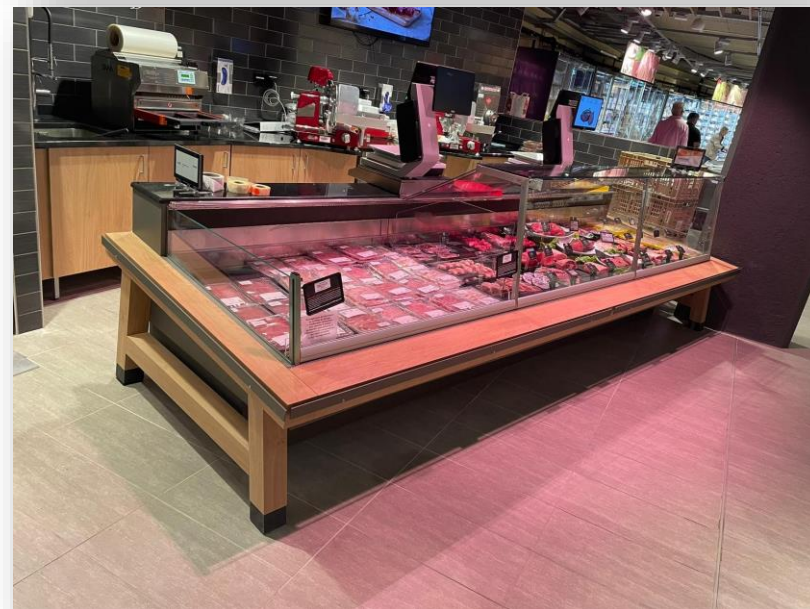
MT Compressors	[pcs.]	3 x Dorin CD4 75-6.4M
LT Compressors	[pcs.]	3 x Dorin CDS 151B
Aux Compressors	[pcs.]	2 x Dorin CD4 120-9.2H
MT capacity (To = -5°C)	[kW]	65
LT Capacity (To = -28°C)	[kW]	15
Heating water ΔT	[°C]	+35 -> +45
Cooling water ΔT	[°C]	+15 -> +10
Lake Water ΔT	[K]	6
Chiller Capacity	[kW]	120
Heat Pump Capacity*	[kW]	100
Chiller EER	[-]	6.90
Heat Pump COP*	[-]	4.50
MT Stage EER	[-]	4.40
LT Stage EER	[-]	5.20
Global EER	[-]	5.50

*Not considering free MT heating recovery

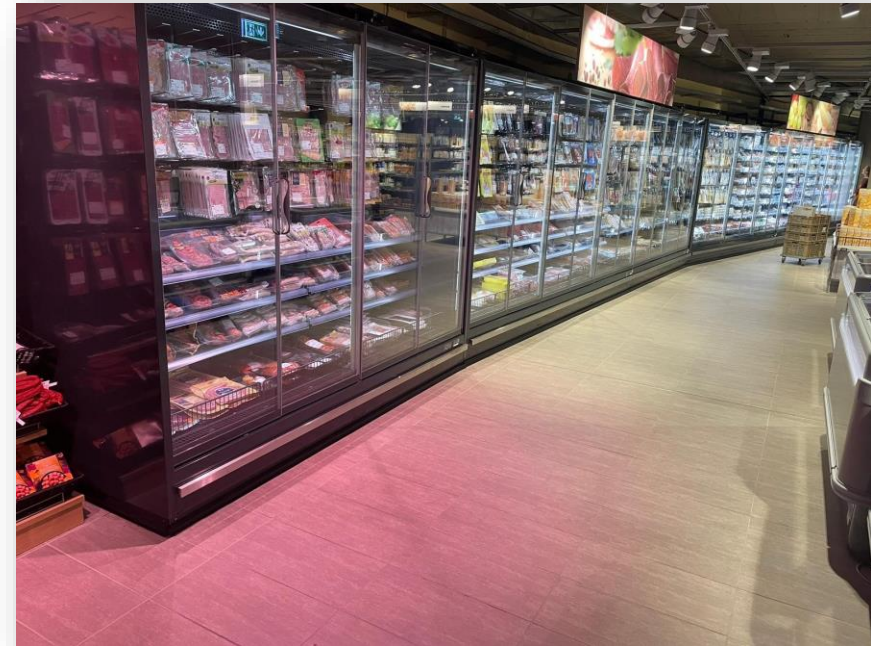
Migros Cassarate store

- 50 ml of new high performance cabinets
- 800 m² for customers, split into 2 floors
- 6 renewed cold rooms
- Just 1 pc. **R744 TotalGreEnergy** plant for all store needs
- Ventilation and fan coils devices
- Lake water directly working with compressor rack
- Store totally renewed in less than 3 months

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Migros Cassarate store

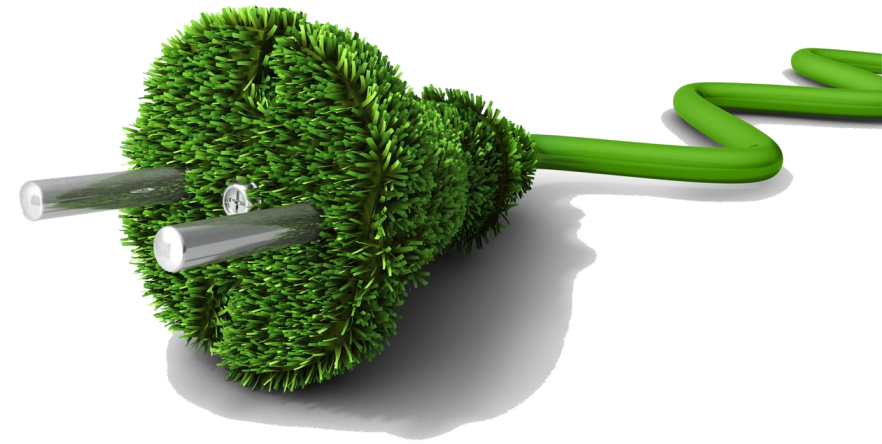


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Feedbacks and savings

- New **744** plant has been running in Migros Cassarate since 3 months
- **Energy saving: 35%** compared to old systems (refrigeration + AC)
- Improvement of ambient conditions (T° and RH%)
- Improved preservation of food and beverage products
- More efficient heating recovery thanks to **TotalGreEnergy** layout
- Total **GWP = 1**
- **Investment cost ≈ 25% lower** than traditional plants with burner/heat pump + separated air conditioning system
- Migros Cassarate store is now **HFC free** and 100% **CO₂ friendly**

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Future plans Migros - Biaggini

- **Reducing greenhouse** in Migros stores by 2030
- **Reducing energy purchasing** by 2030
- **100% CO₂** installations by 2025
- **0% HFC** running installations by 2025
- Migros Cassarate is 1st water integral plant: two similar installations are now underway
- Extending **CO₂** use in HVAC and industrial areas as well



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**Thank you
for listening!**

