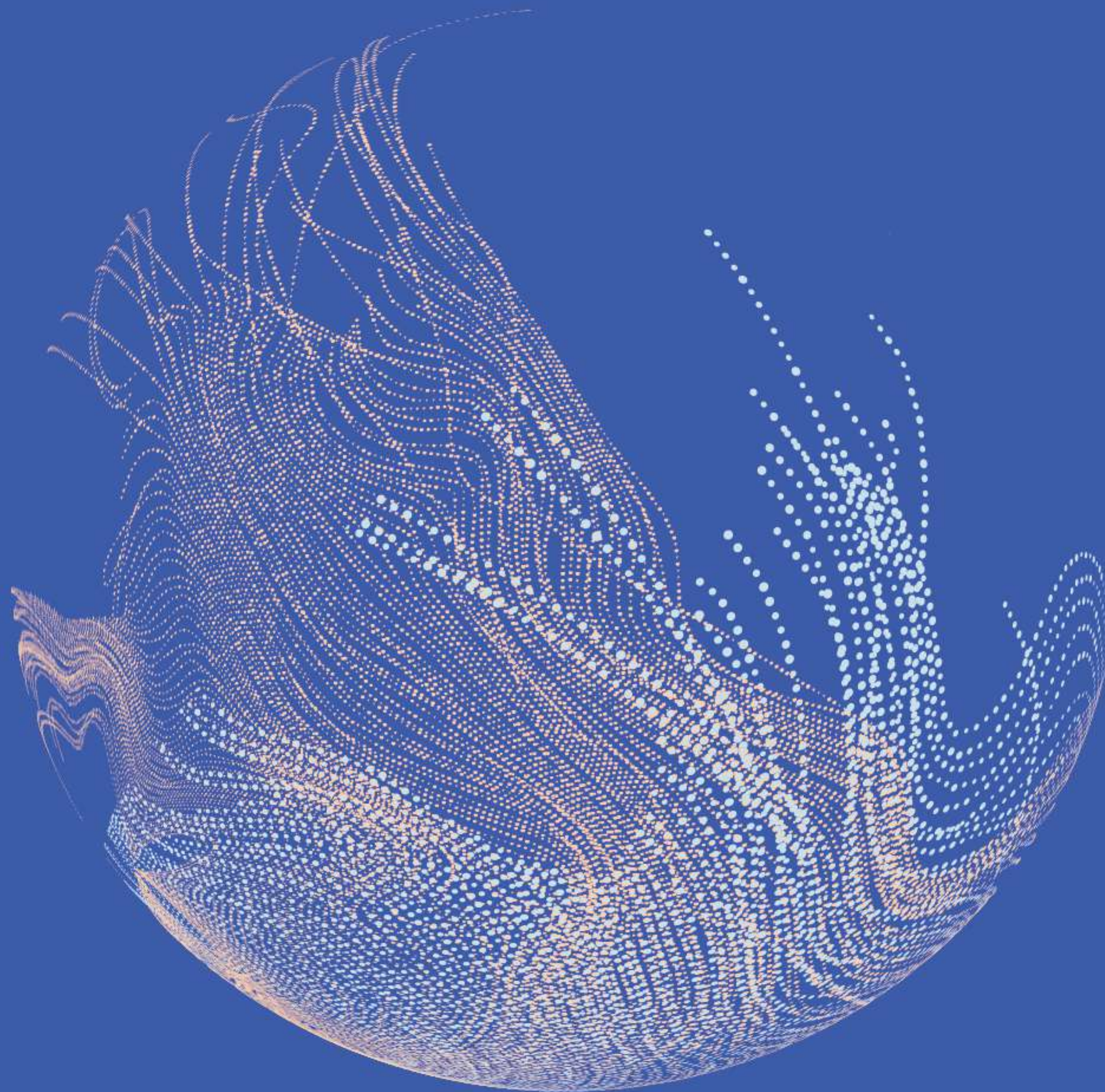




Business Case for
Natural Refrigerants



15-16/11/2022

BRUSSELS

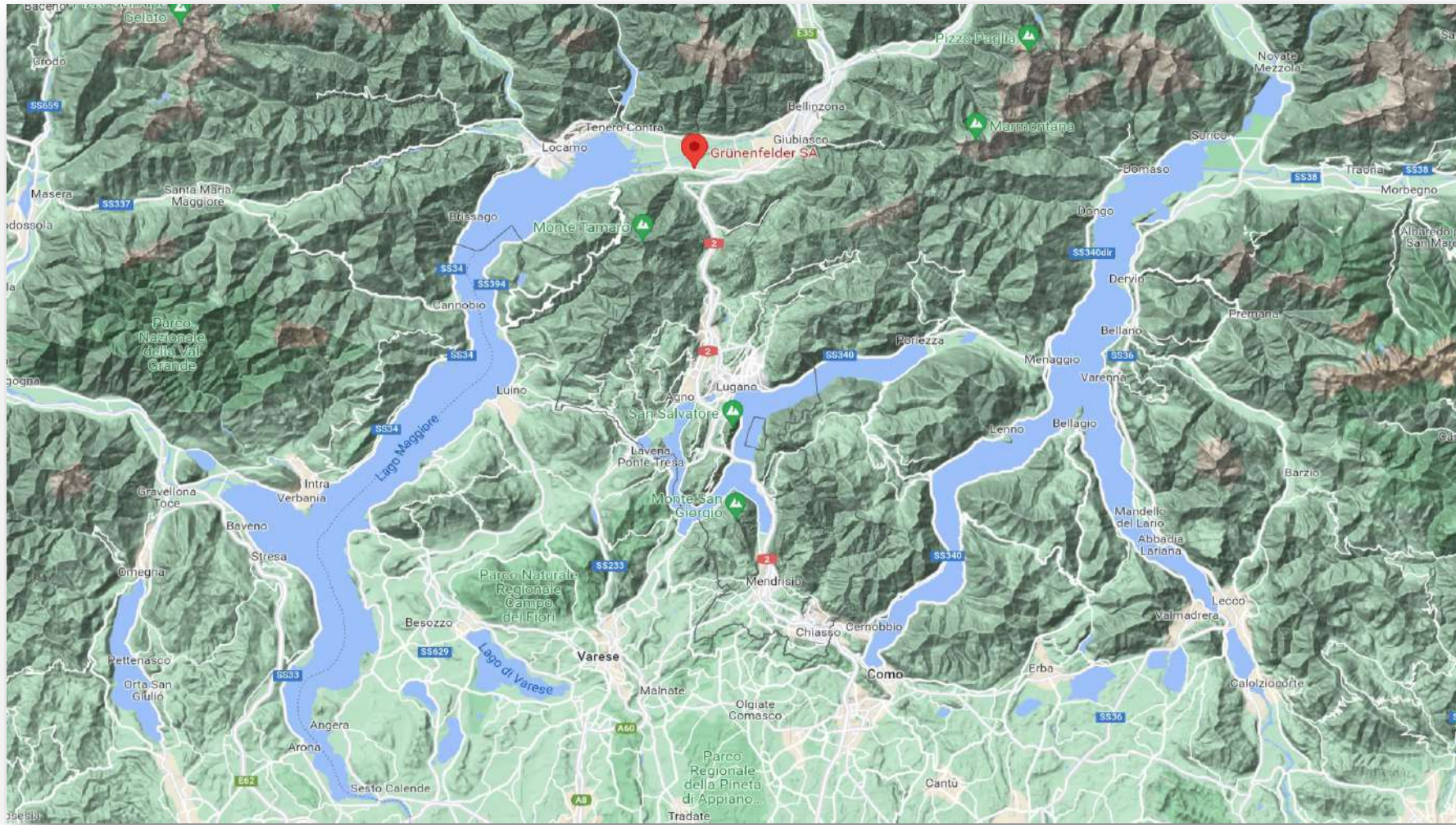


Grünenfelder SA: *R744* industrial integrated plant



#GoNatRefs

Background information



Grünfelder SA is family-run company specializing in the distribution of food and non-food products.

The company does its business mainly in the **Ticino** region, but also throughout Switzerland and beyond national borders.

The experience is based on over **65 years** of business and close partnerships with major internationally recognized brands have contributed to the affirmation of the company over the years.

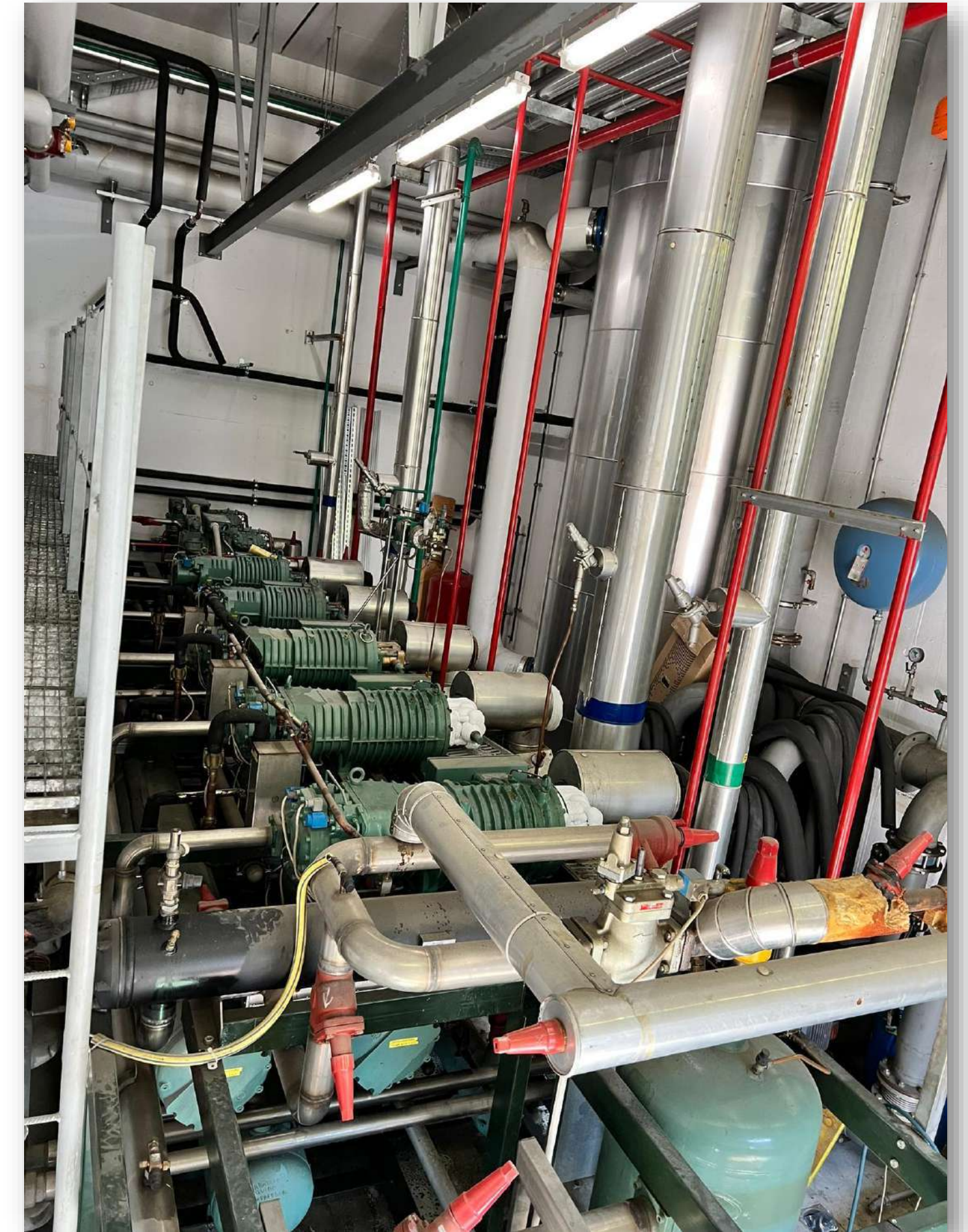
The new *R744* plant is located in **Quartino**, in Ticino region, Switzerland.

The project started in 2020, with the design of the unit and of main additional devices.

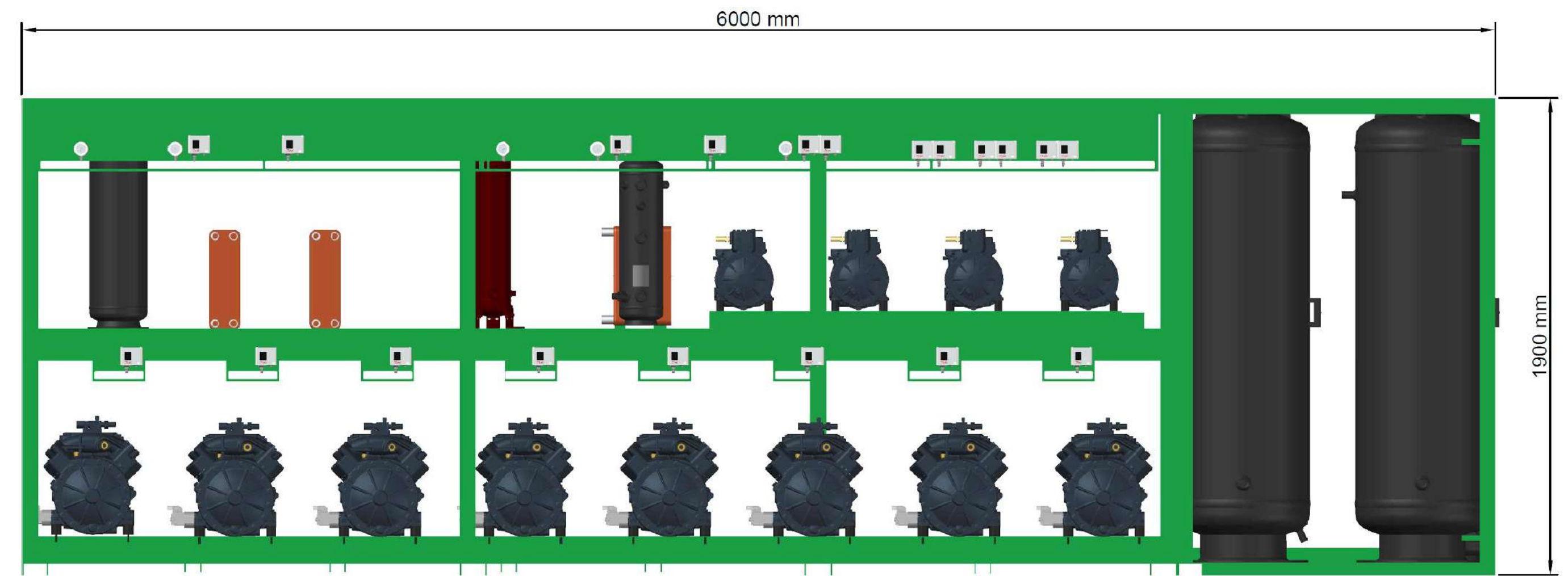
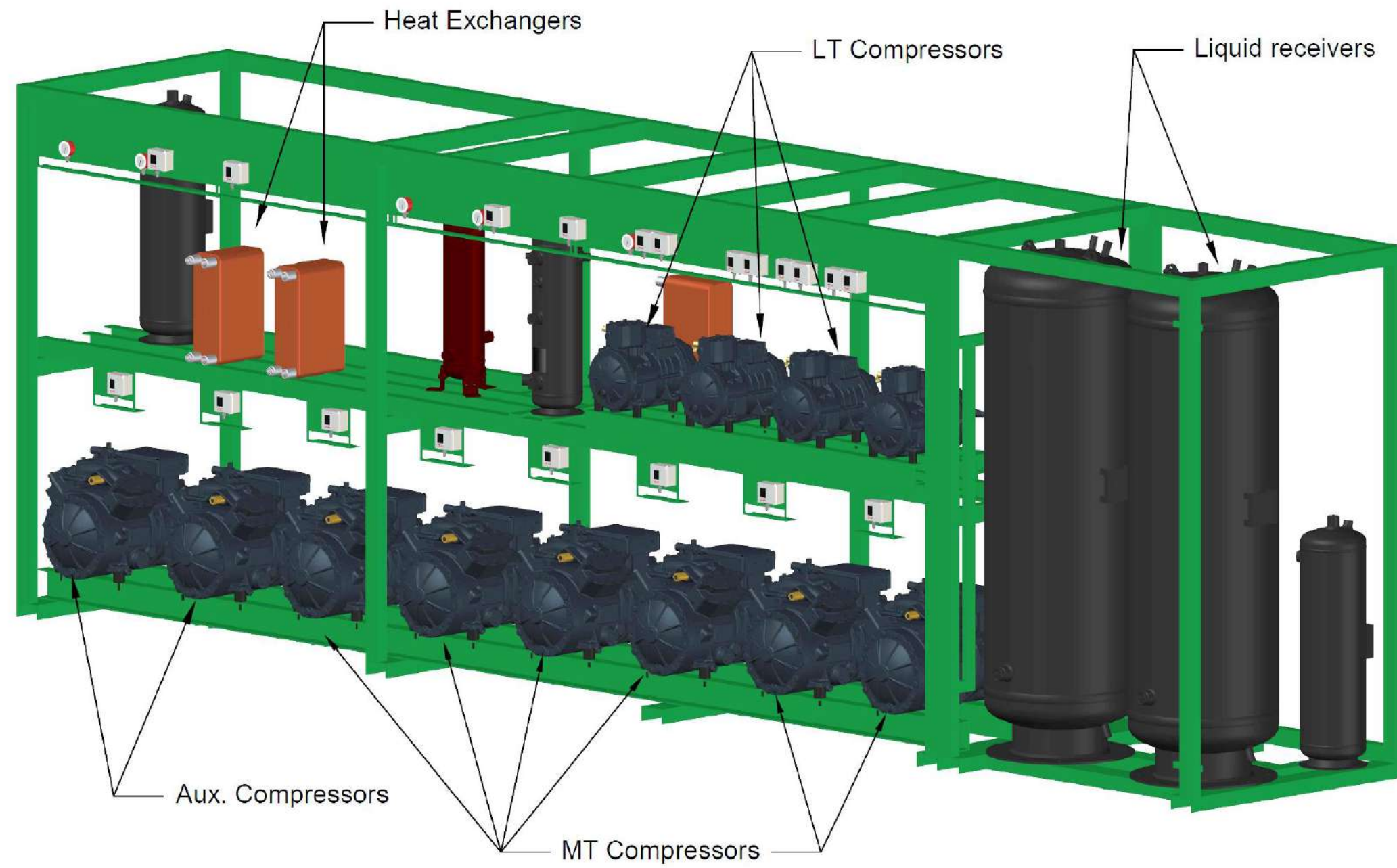


Goals of the project

- Replacement of 1pc. **R507A** refrigeration compressor rack and 1 pc. reversible **R404A** heat pump
- Installation of unique **R744** integrated system able to satisfy all the energy requirements (**HVAC-R**)
- Massive decreasing of installed **GWP**
- Guarantee best thermohygrometric conditions in warm and cold seasons
- Improve **efficiency** and decrease energy consumption
- High **reliability** and redundancy
- Decrease ground water consumption



Unit Design



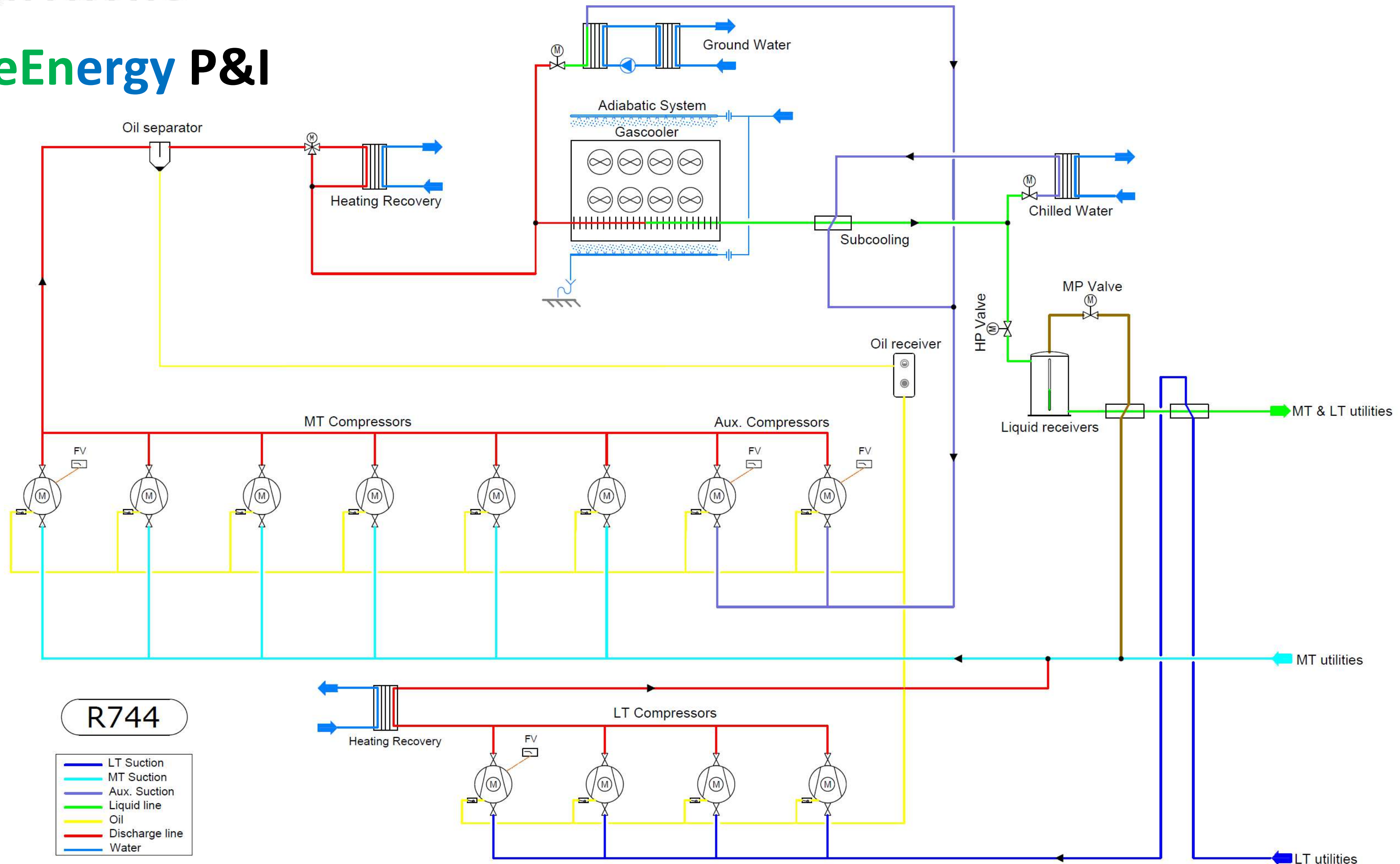
Unit Design



Totally designed and
manufactured by
biagginifrigoriferi



TotalGreEnergy P&I



Technical data

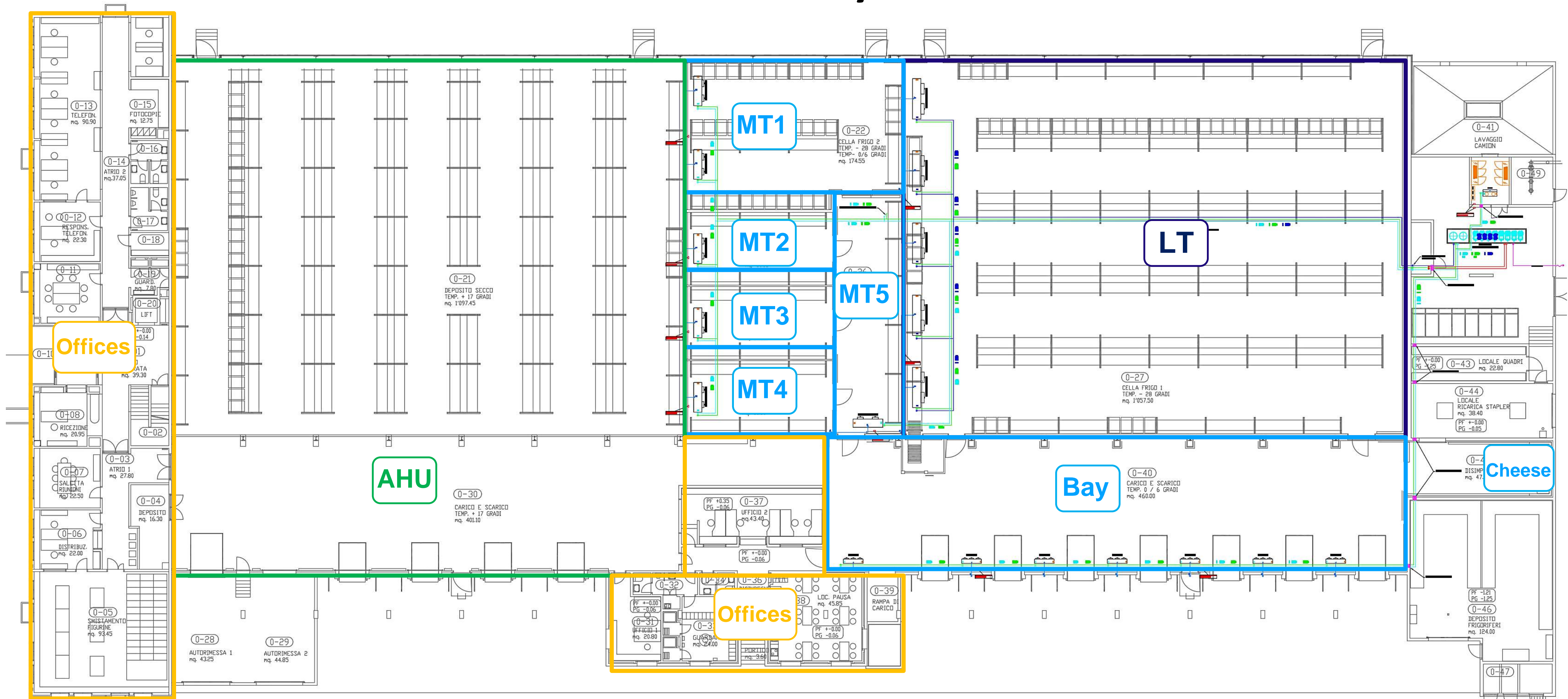
MT Compressors	[pcs.]	6 x <i>Dorin CD 3501M</i>
LT Compressors	[pcs.]	4 x <i>Dorin CDS 1501B</i>
Aux Compressors	[pcs.]	2 x <i>Dorin CD 3501H</i>
MT capacity (To = -6°C)	[kW]	300
LT Capacity (To = -29°C)	[kW]	150
Heating ΔT_{water}	[°C]	+35 -> +45
Cooling ΔT_{water}	[°C]	+15 -> +10
Ground Water ΔT	[K]	5
Chiller Capacity (Text = +35°C)	[kW]	250
Heat Pump Capacity (Text = -10°C)	[kW]	300
LP PS	[bar]	45/60
HP PS	[bar]	120
Gascooler	[-]	1 pc. <i>LU-VE</i> 8 fans + adiabatic system

Refrigerating Utilities

	LT	MT1	MT2	MT3	MT4	MT5	Bay	Offices	Ventilation	Cheese
Ta	-25 ÷ -27°C	±0 ÷ +2°C	±0 ÷ +2°C	±0 ÷ +2°C	±0 ÷ +2°C	±0 ÷ +2°C	±0 ÷ +2°C	+20 ÷ +24°C	+16 ÷ +18°C	+5 ÷ +7°C
Surface	1'060 m ²	175 m ²	95 m ²	60 m ²	60 m ²	60 m ²	460 m ²	1'620 m ²	1'100 m ²	30 m ²
Volume	12'720 m ³	2'100 m ³	1'140 m ³	720 m ³	720 m ³	720 m ³	1'840 m ³	4'300 m ³	13'200 m ³	80 m ³
Capacity	160 kW	29 kW	11 kW	11 kW	11 kW	11 kW	66 kW	80 kW	170 kW	6 kW
Evaporators	5 pcs. <i>LU-VE</i>	2 x <i>LU-VE</i>	1 x <i>LU-VE</i>	1 x <i>LU-VE</i>	1 x <i>LU-VE</i>	1 x <i>LU-VE</i>	7 x <i>Roller</i>	Fancoils	3 x AHU	2 x Static

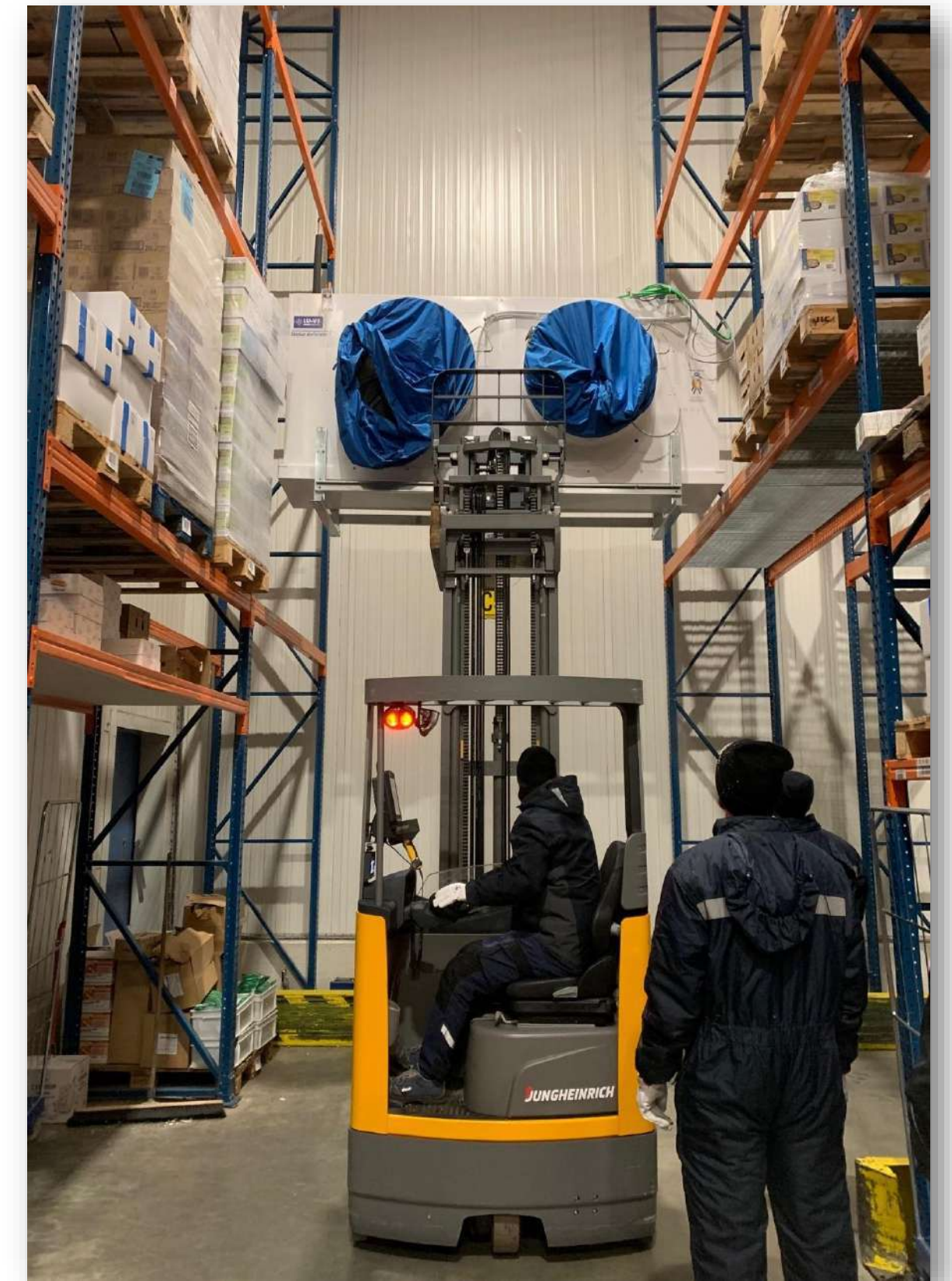
2 pcs. Electrical Rooms are cooled with R744 evaporators as well

Utilities Layout



Installation work

- New installation has been done during old system operation
 - Normal business was assured to the company
 - Old plant never stopped



Installation work



Delivery from E. Biaggini warehouse

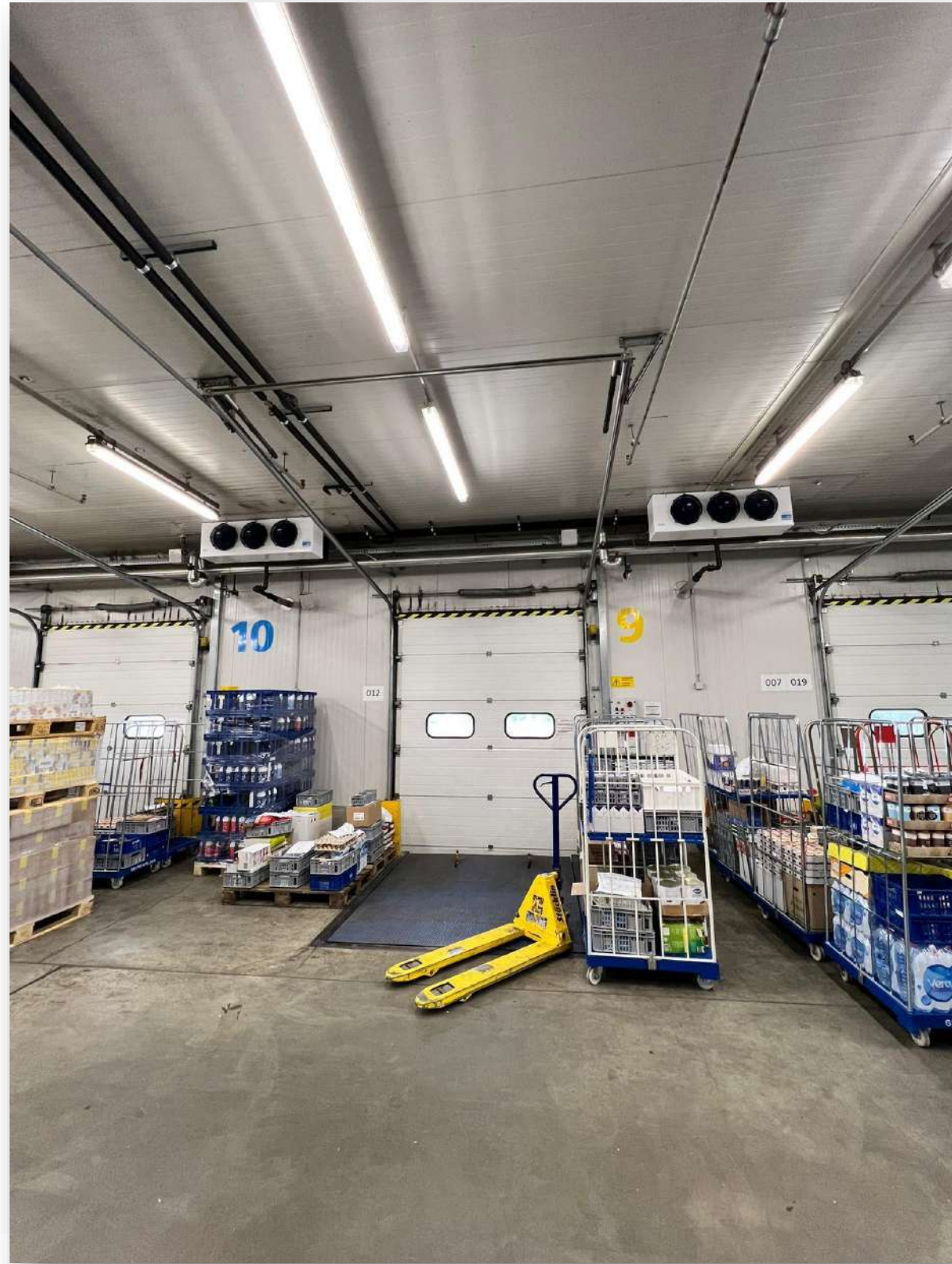


Customized dimension to fit doors and space



Compressor rack positioned instead of old reversible heat pump

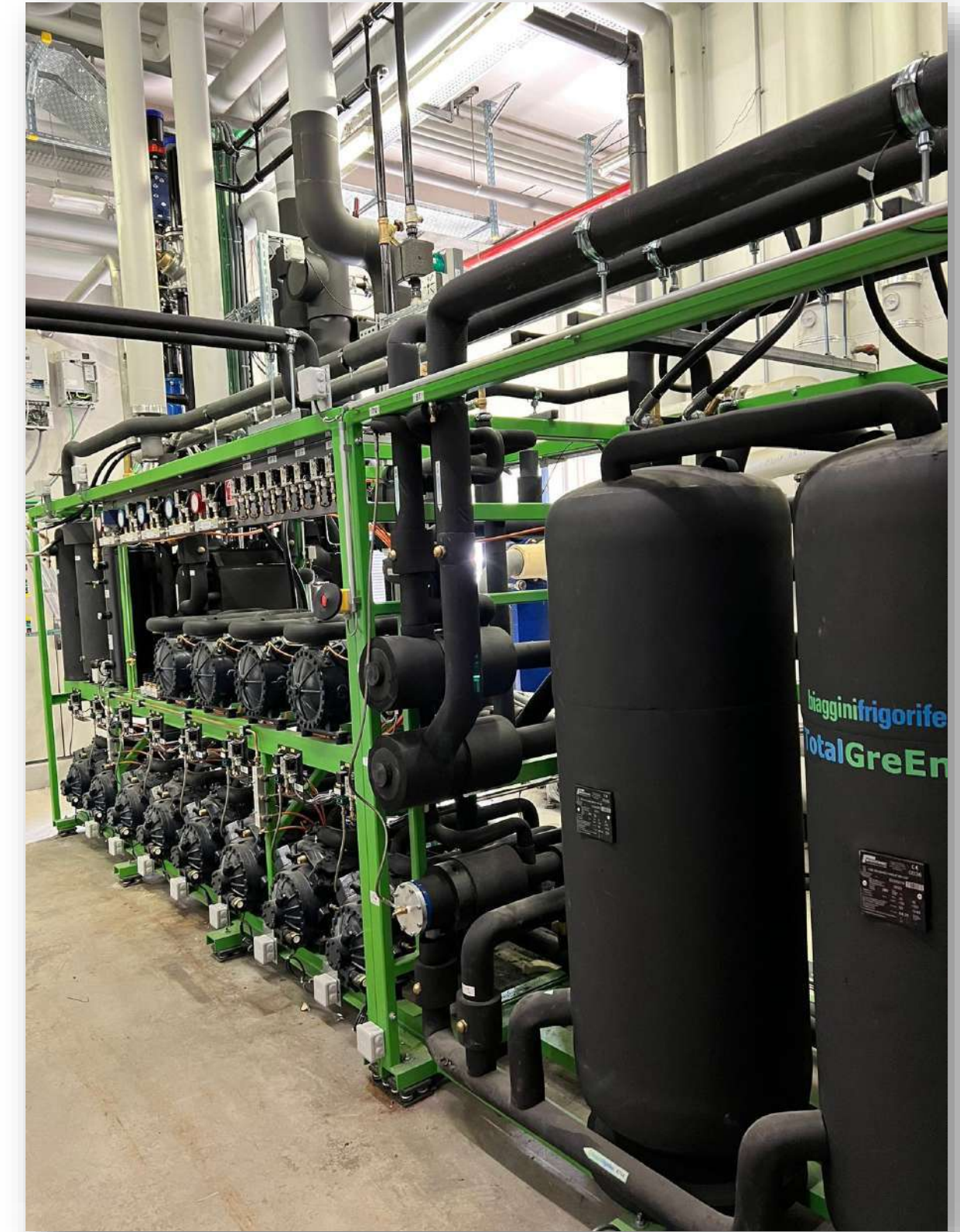
Installation work



Loading Bay evaporators



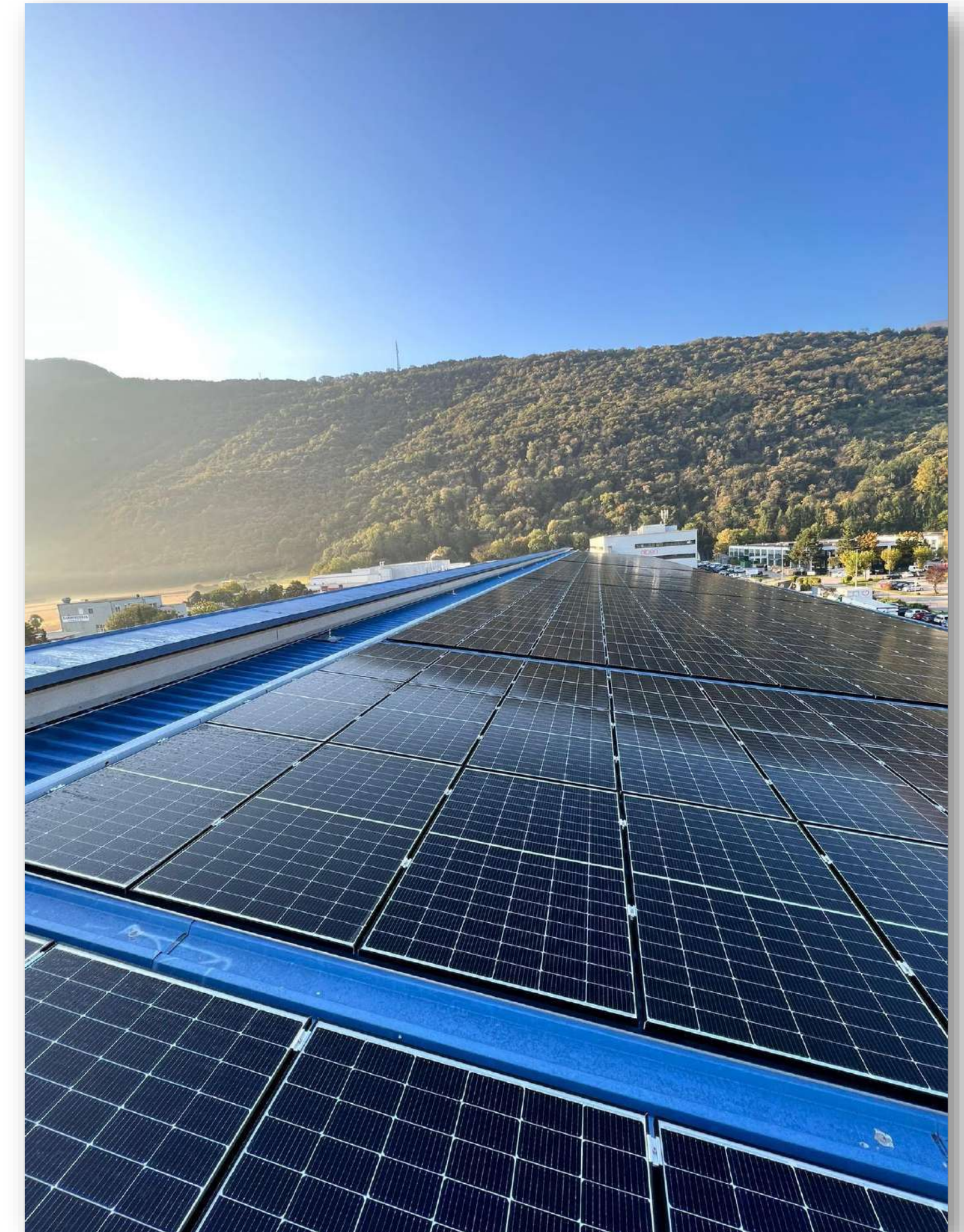
Lifting MT evaporator



R744 and water connections

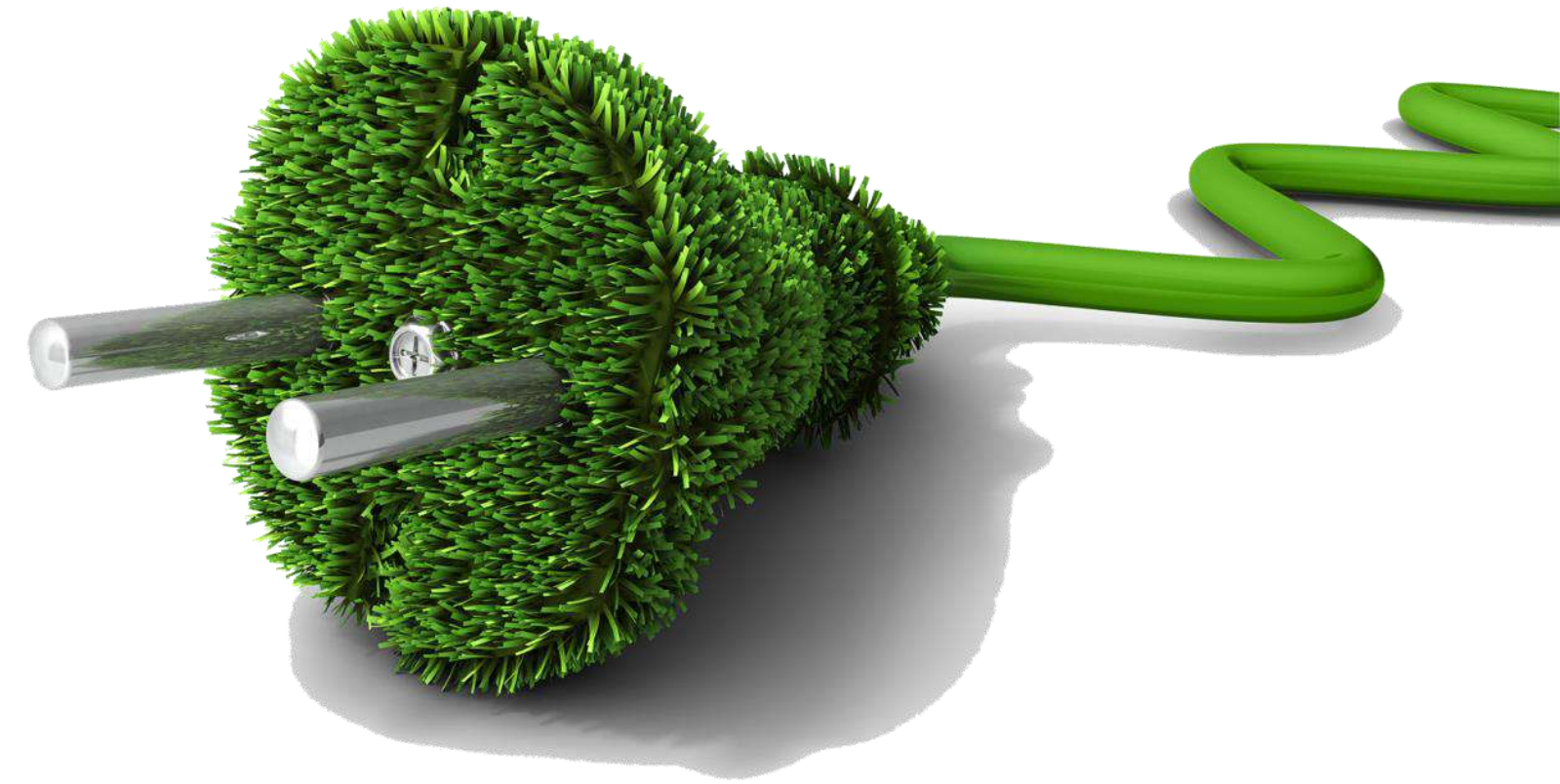
Synergy with photovoltaic system

- The company installed **3'160 m²** photovoltaic panels on the roof of the building in the same working months
- Installed capacity: **662'560 kWp**
- Thanks to the synergy between the systems, refrigeration unit will get information of solar power generation
- Knowing **kWel** available, the **TotalGreEnergy** plant will be able to force temperature in cold rooms and in water tanks with **no additional energy consumption**



Feedbacks and savings

- New **R744** integrated plant has been running now since 45 days
- **Energy consumption 30% lower** than old system (comparison made in the same period of last 5 years, net of PV panels)
- Improvements of temperature and comfort conditions (LT cold room never reached **T<-18°C** with old system, while now it reaches easily **T≤-23°C**)
- Massive decreasing of ground water consumption
- More efficient heat recovery thanks to **TotalGreEnergy** architecture
- **Eliwell** remote surveillance able to monitor all operating parameters
- Total **GWP = 1**
- Building is now **HFC free** and **100% CO₂ friendly**
- Simplification of hydraulic installation (less water pumps, exchangers ecc.)



Strong collaboration with





Business Case for
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**Thank you
for listening.**

