



ATMO
sphere

Business Case for
Natural Refrigerants
25-27/09/17 - Berlin

Frigo-Consulting



Why CO₂ is gaining market share in industrial applications

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Industrial application with CO₂



- Fish Industry, Valencia Spain
- System successfully in operation since August 2017
- Replacing independent units for standard freezer tunnel, walk-in coolers & freezers with R507A
 - Charge: 1100 kg
 - GWP: 3990
- 2 independent CO₂-Ejector-Systems
- System capacities
 - High temperature 140 kW @ 0°C
 - Medium temperature 120 kW @ -8°C
 - Low temperature 280 kW @ -28°C
 - Ultra low Temperature 410 kW @ -50°C
- Factory area: 4000 m²
- Walk-in-cooler & -freezer: 2000 m²

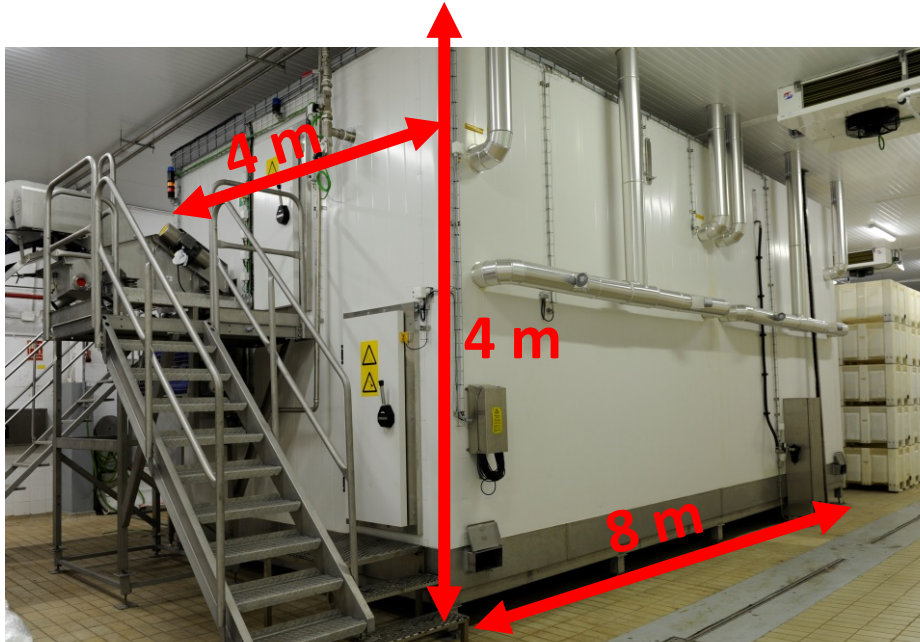
} **4'400 t/CO₂eq-a**



Gas coolers

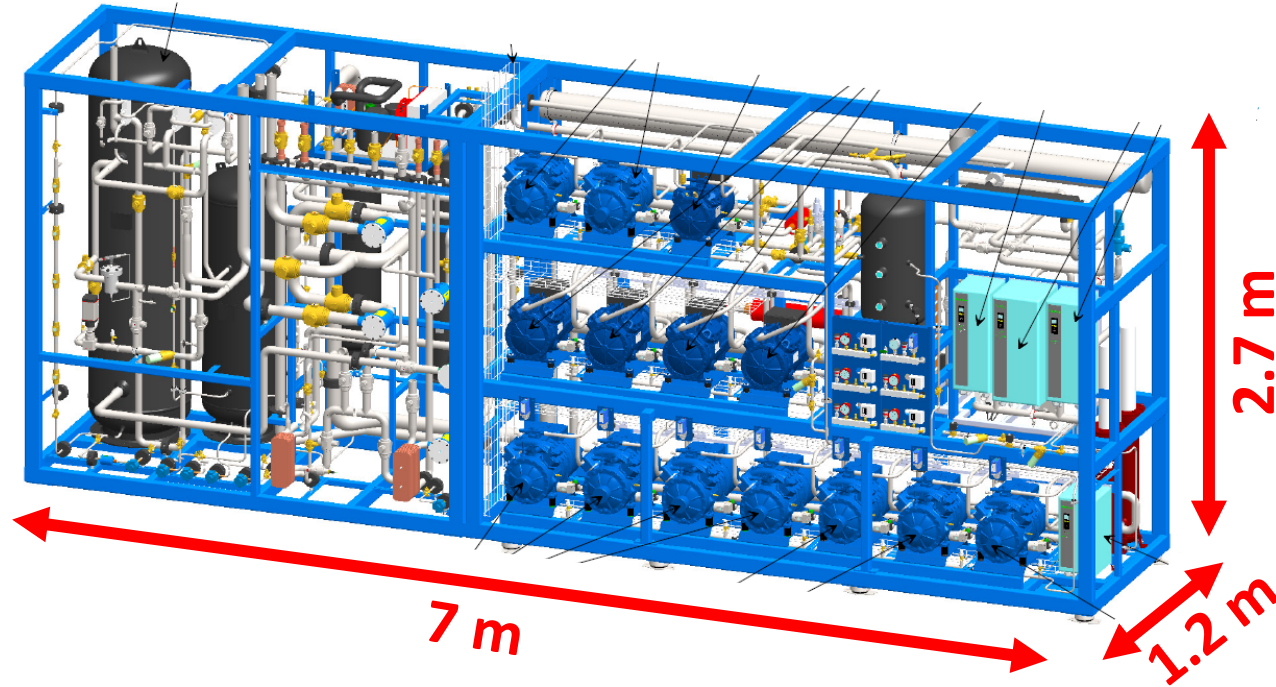


Impressions of flooded freezer tunnel

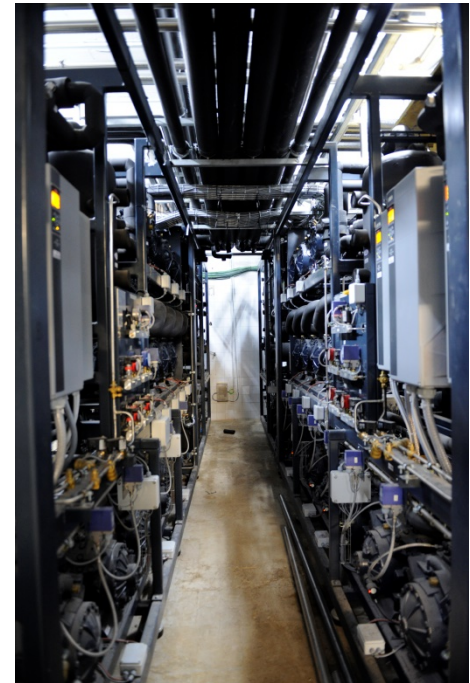
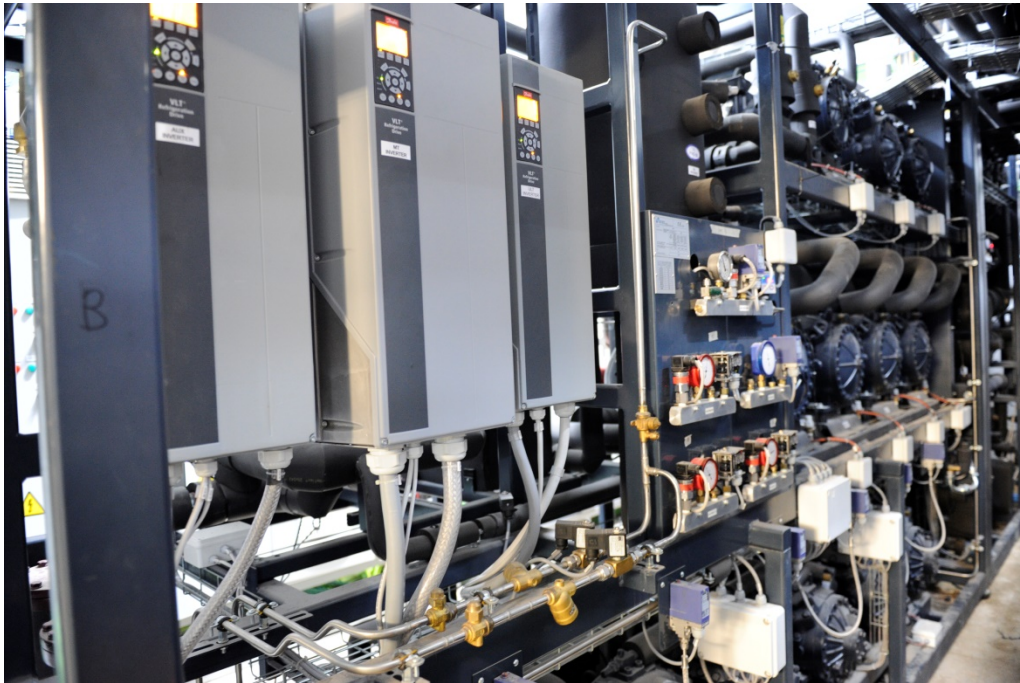


**Production volume
24 tons/day**

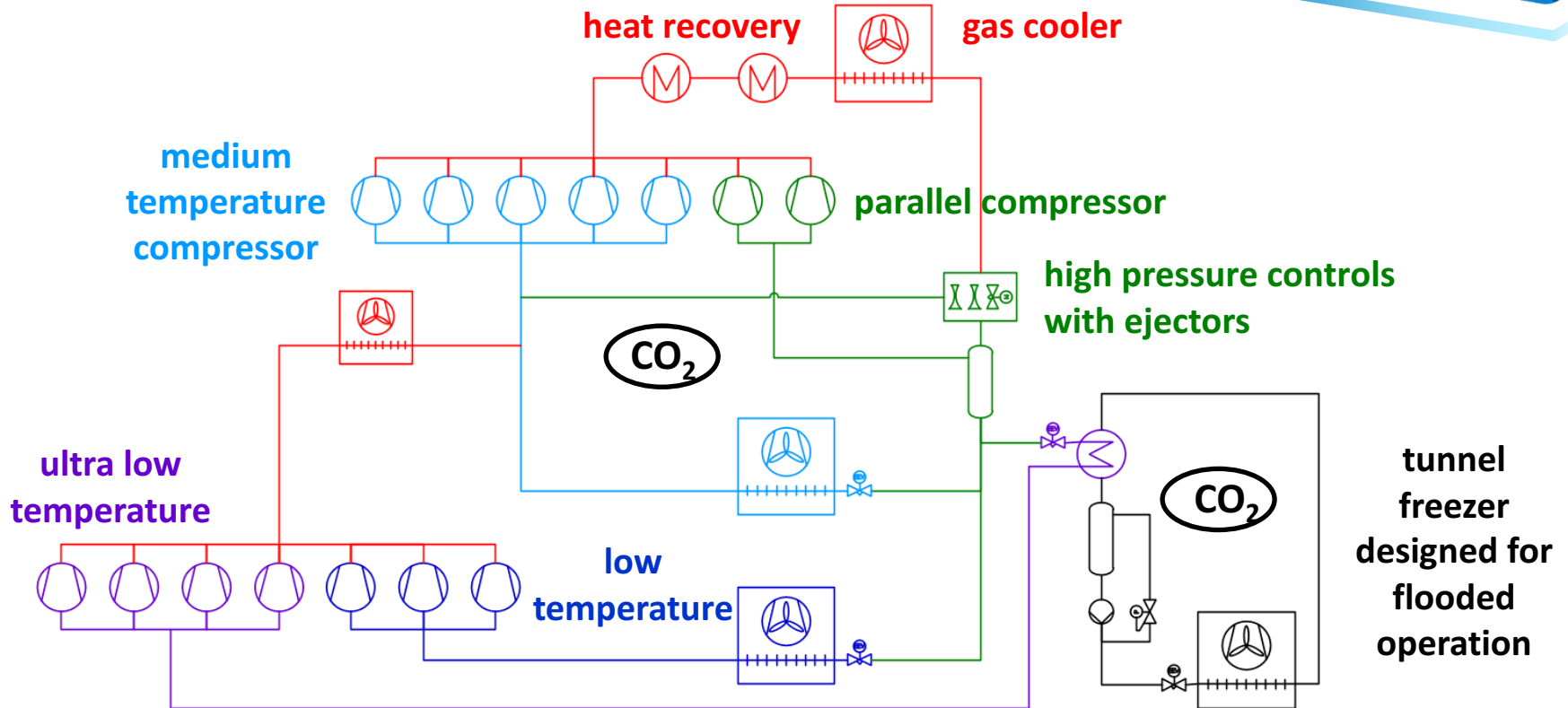
CO₂-Rack with ejectors



Implementation machinery room



P&I-Diagram



Challenges



- Remodelling factory with limited space
- Concept for ultra low temperature → -40°C
- System with one refrigerant
- Short time frame
- Flooded freezer tunnel designed for NH_3

Summary



- System successfully in operation since August 2017
- High efficiency due to heat recovery and ejectors
- Standard components
- High redundancy due to 2 independent racks
- Part load operation by multiple compressors with frequency converter
- Increasing availability of components and rising efficiency
 - ➔ pushes the boundary between CO₂ / NH₃ to higher capacities



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Thank you!

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