

 **ATMO**  
**sphere**  
EUROPE  
solutions for europe  
**natural refrigerants**  
16-17 March 2015 in Brussels

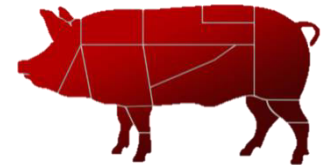
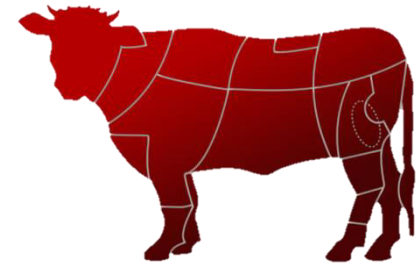
**FRIBIN:**  
Energy efficiency combined  
with increased safety thanks  
to CO<sub>2</sub> refrigeration













## Key Figures

- 20,000 metric tons of beef per year
- 65,000 metric tons of pork per year
- 50% product export
- 245 million Euros turnover per year.
- 450 employees



## Initial situation

MACHINERY ROOM	EQUIPMENT	CAPACITY	ROOM TEMP.
Nr.1	 x8  x1	1.200 kW	Driers +10°C ; 0°C
Nr.2	 x7  x3	1.700 kW	+10°C ; 0°C -25°C ; -45°C
Nr.3	 x3  x2	650 kW	+10°C ; 0°C -25°C ; -45°C
Nr.4	 x3  x1	1.850 kW	+10°C ; 0°C
21 Compressors 7 Condensers		5.300 kW	COP* = 2,47

\*COMPRESSORS

## General requirements

Maintenance Reduction & Simplification



Machinery Room Space Occupation

R717 Charge Reduction : Safety



Maximum Efficiency : Minimum operational costs



Natural Refrigerants

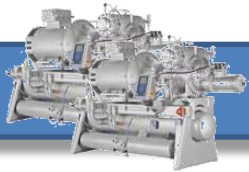


**CENTRALIZATION  
CONCEPT WITH**



## Implementation Process

Dismantle 3 of the machinery rooms



Add 2 new screw compressors

Replace tunnels and cold rooms to CO<sub>2</sub>



Installation of 3 new CO<sub>2</sub> piston compressors



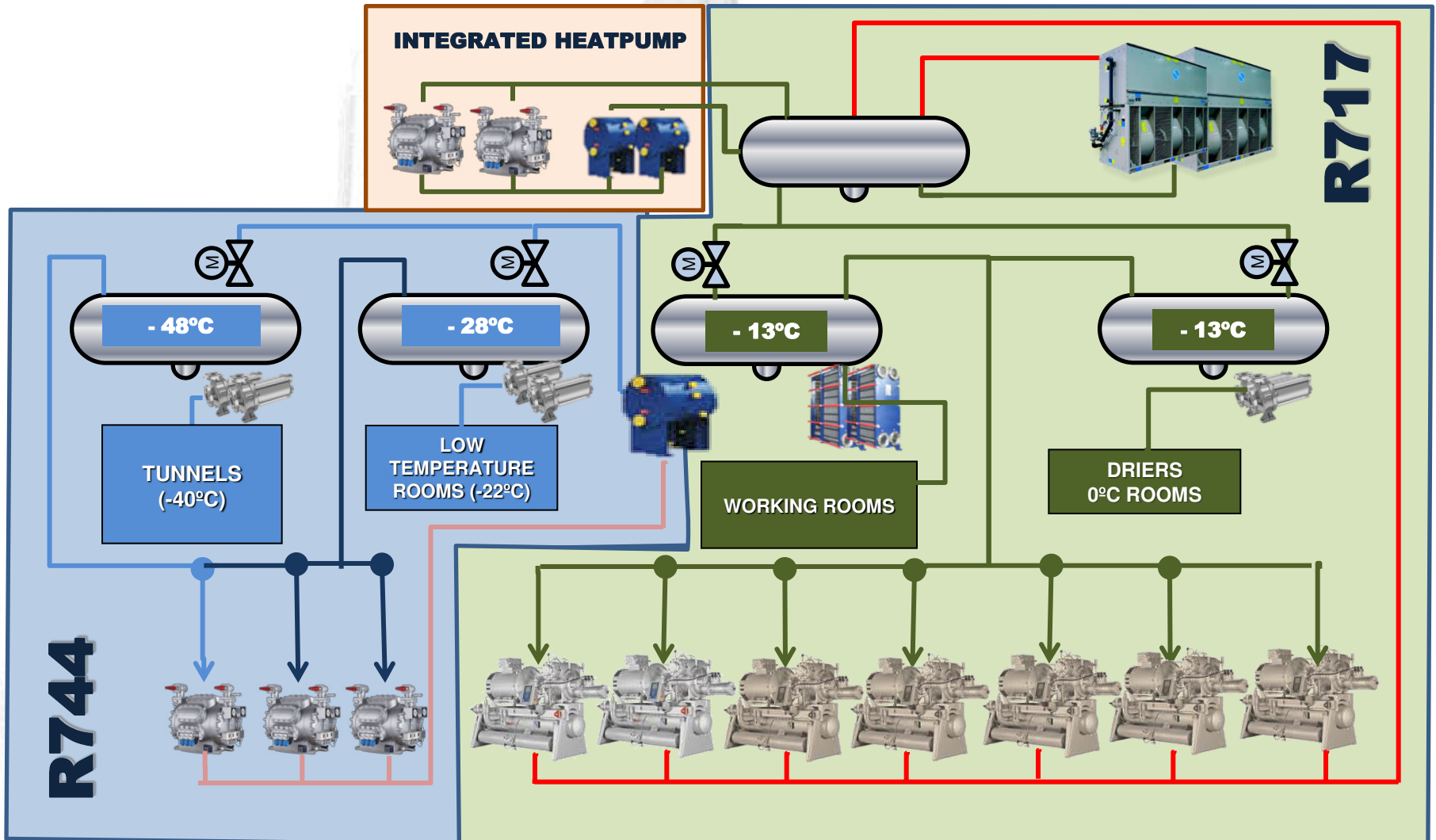
New secondary coolant system for working rooms



New integrated ammonia heatpump (2comp.)



# Current situation



## Refrigeration Plant Savings

Compressors COP improvement (2.5 -> 2.7)	1.600.000	kWh/year
Condensation improvement	750.000	kWh/year
Non condensable removal	250.000	kWh/year
<b>TOTAL</b>	<b>2.600.000</b>	<b>kWh/year</b>
	<b>235.000</b>	<b>€/year</b>

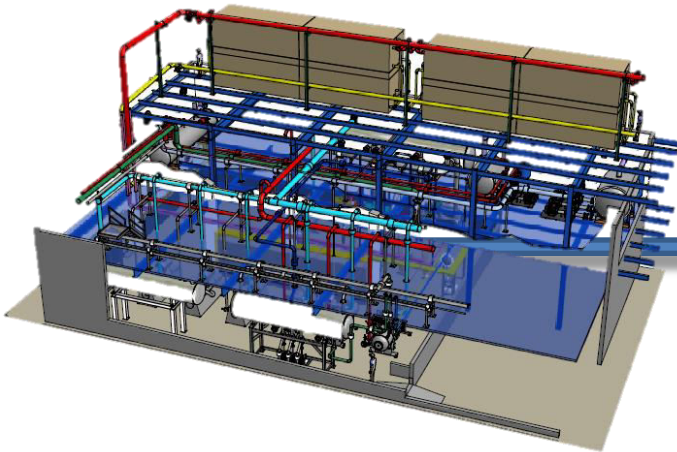
## Heat Pump Implementation Savings

145.000	€/year
---------	--------

↓ 32% ELECTRICITY CONSUMPTION

↓ 100% GAS CONSUMPTION

↓ 29% CO<sub>2</sub> EMISSIONS





## FRIBIN Future plans



1 new CO<sub>2</sub> for -48°C Future Tunnel (250 kW)



New Ammonia separator + compressors



New compressor in Ammonia Heat Pump

**OTHER** Johnson Controls  **CO<sub>2</sub> PROJECTS**



4 New Industrial Refrigeration Plants  
(2 in the design phase)





solutions for europe

---

**natural refrigerants**

---

**16-17 March 2015 in Brussels**

---

Thank you very much!