



Refrigerant Fluids
SONAE´S & MERCADONA
Perspective
2013
Amad Hafez

About SONAE



- SONAE is a Portuguese company that operates in Food and Non Food Retail Businesses;

- With Food Retail stores only in Portugal;
- With Non-Food Retail stores, in 20 countries throughout the world;
- The largest retailer in Portugal;
- Food retail Business, to December 31, 2012:

N.º Stores- 478

Sales Area [K m2]- 575

Employees- 23.394



About MERCADONA

- MERCADONA is a Spanish company that operates in Food Food Retail Businesses;

- The largest retailer in SPAIN;
- Food retail Business, to December 31, 2012:
- N.º Stores- 1411



F – Gases at SONAE – Efforts towards minimizing potential negative environmental impacts

1^o Step: Extinguish the R22

- Application of R-404A;
- Application of R-404A with Glicol solution;
- Retrofit with R-427A;

2^o Step: Application of solutions with natural fluids

- Application of Gas R-290, in the frozen autonomous cabins;

3^o Step: Searching for a fully sustainable alternative, to replace R-404 A (with natural fluids).

F- Gases

N° of cold production equipment

CURRENT REALITY SONAE			
Fluid	Positive Cold	Negative Cold	Total
R22	2	2	4
R404A	134	163	297
R404/Glicol	35	-	35
R427A	10	15	25
R290 *	-	14	14

CURRENT REALITY MERCADONA			
Fluid	Positive Cold	Negative Cold	Total
-	-	-	-
R404A	1411	1411	2822

* Stores equipped with frozen autonomous cabins

F – Gases – SONAE’S Experience

Alternatives to R-22

New Stores and refurbished stores:

R-404 A

R-404 A + Glicol (Positive Temperature)

R-404 A + Glicol proved to be more energy consuming (15%-20%) than R-404A.

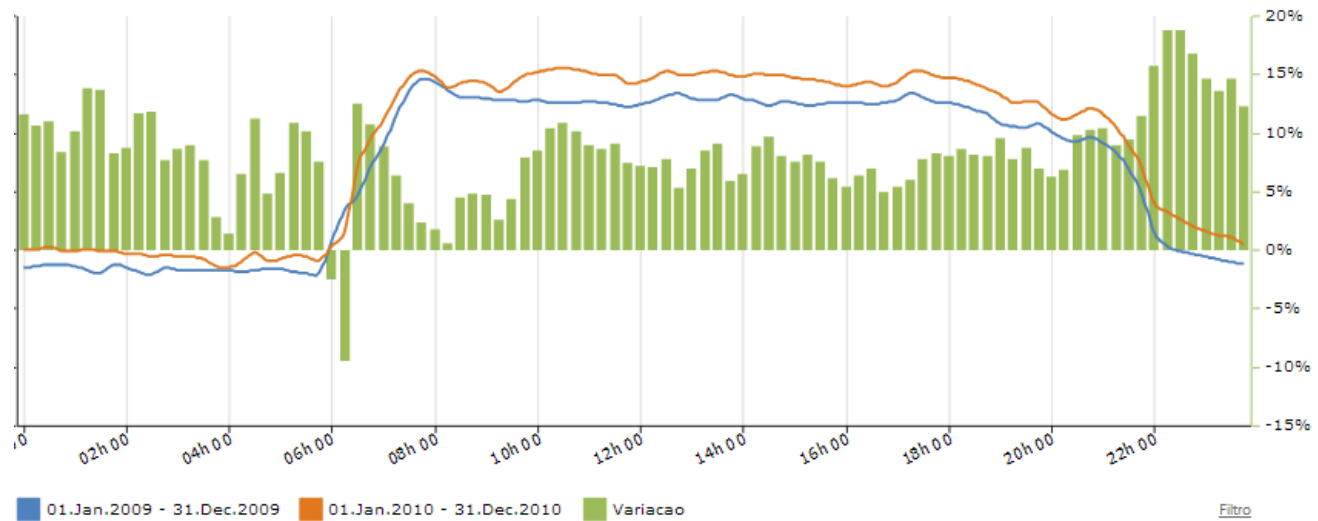
F – Gases – SONAE’S Experience

Alternatives to R-22

Existing Stores:

Retrofit using R-427 A

R-427 A proved to be more energy consuming (10%-15%) than R-22



Exemple diagramme consumption store: R-22 (2009) Vs R-427 A (2010)

F – Gases – SONAE’S Experience

Alternatives to R404A

Application in new Stores:

R-290

Application of R-290 is limited to in the frozen autonomous cabins, because:

- R290 is a flammable gas (induces risk);
- Application only acceptable in very low volumes/charges;

Existing Stores:

Retrofit using R-407F

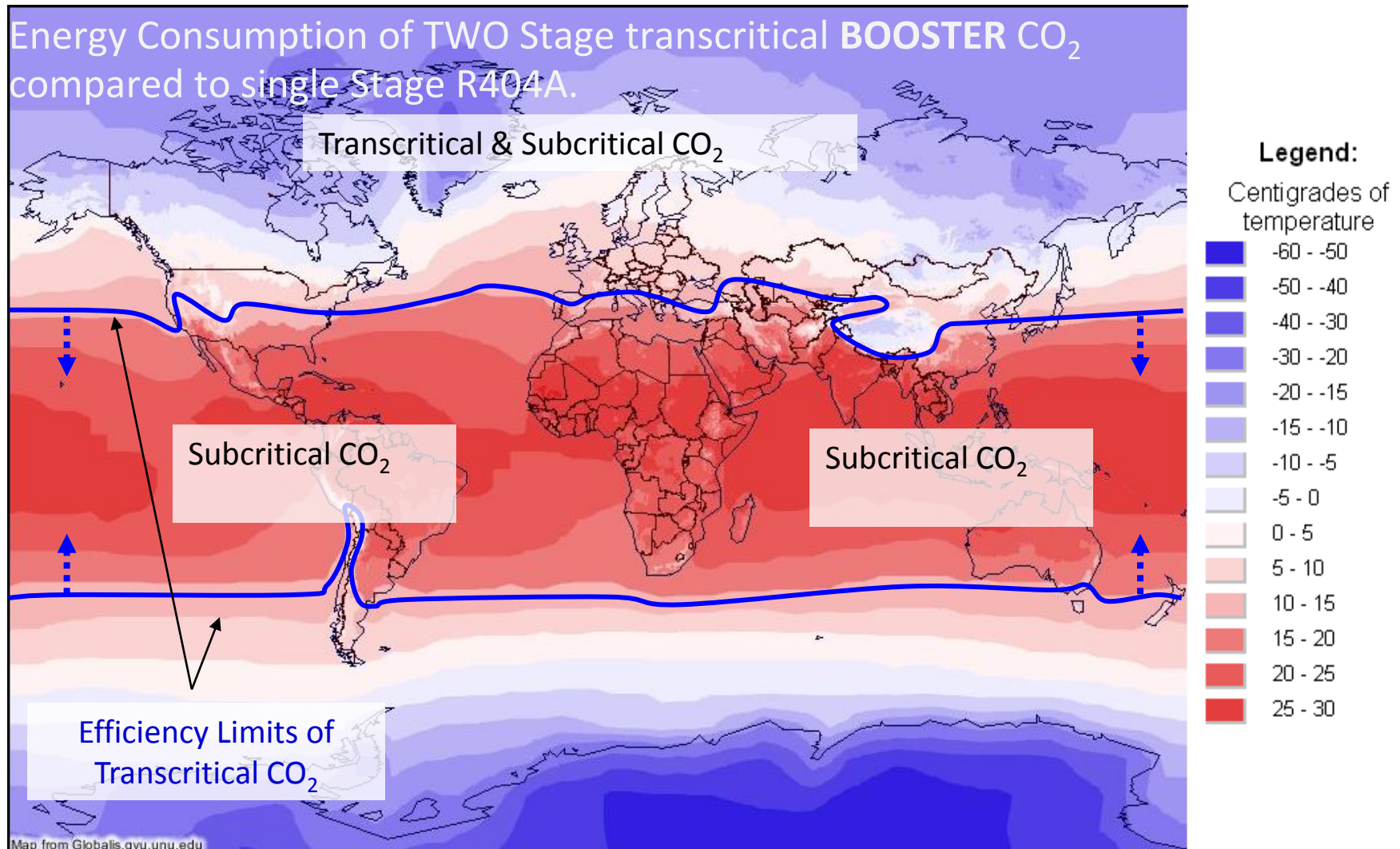
- No experience at SONAE;
- No experience at any retailer operating in Portugal;
- We have no knowledge of any experience in other EU Southern Countries

However, retrofit means:

- To use a compatible gas;
- Compatible does not mean suitable;
- At least some additional problems can be expected (as our past experience have proven)

Natural Fluids – R744 (CO₂)

Transcritical CO₂ / CO₂ subcritical vs. single stage 404A



Conclusion:

Known natural fluids technologies in large cooling production systems in hot climates:

R-717 (Ammonia) : Not suitable for retail stores/ Urban areas;

R 290 (Propane) : Not suitable for retail stores/ Urban areas;

R 744 + R 134 : Apparently suitable but with a GWP > 150;

The State of Art still don't have a standard, reliable, eco-efficient and cost acceptable natural fluids based solution for hot climates.

This is our challenge for the next couple of years. We leave this event with a more positive perspective.



ATMO
sphere
solutions for europe
natural refrigerants
15-16 October 2013, Brussels

Thank you very much for your attention

Amad Hafez



SONAE MC