



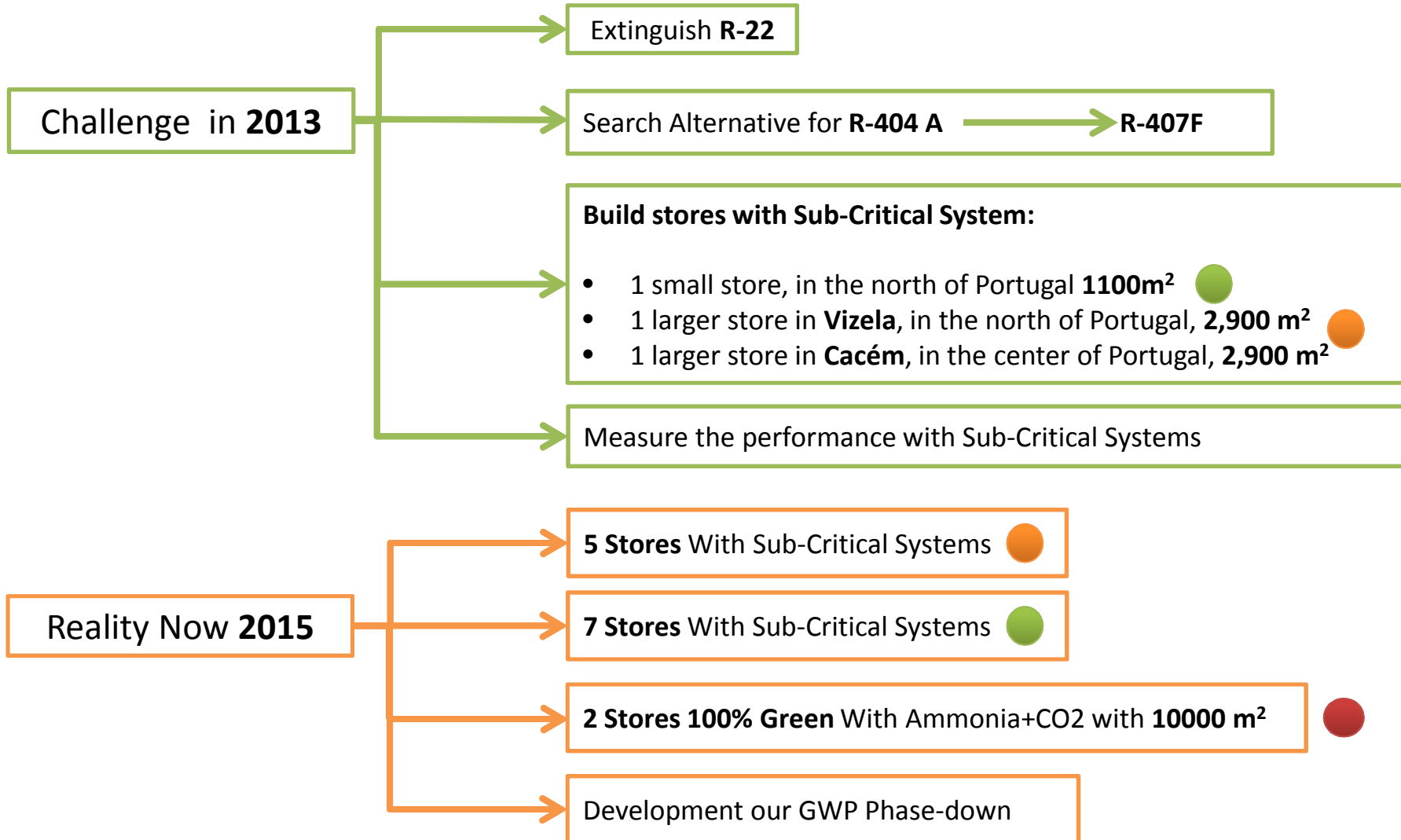
SONAE'S Experience with Sub-critical Systems

Southern Europe

Overview

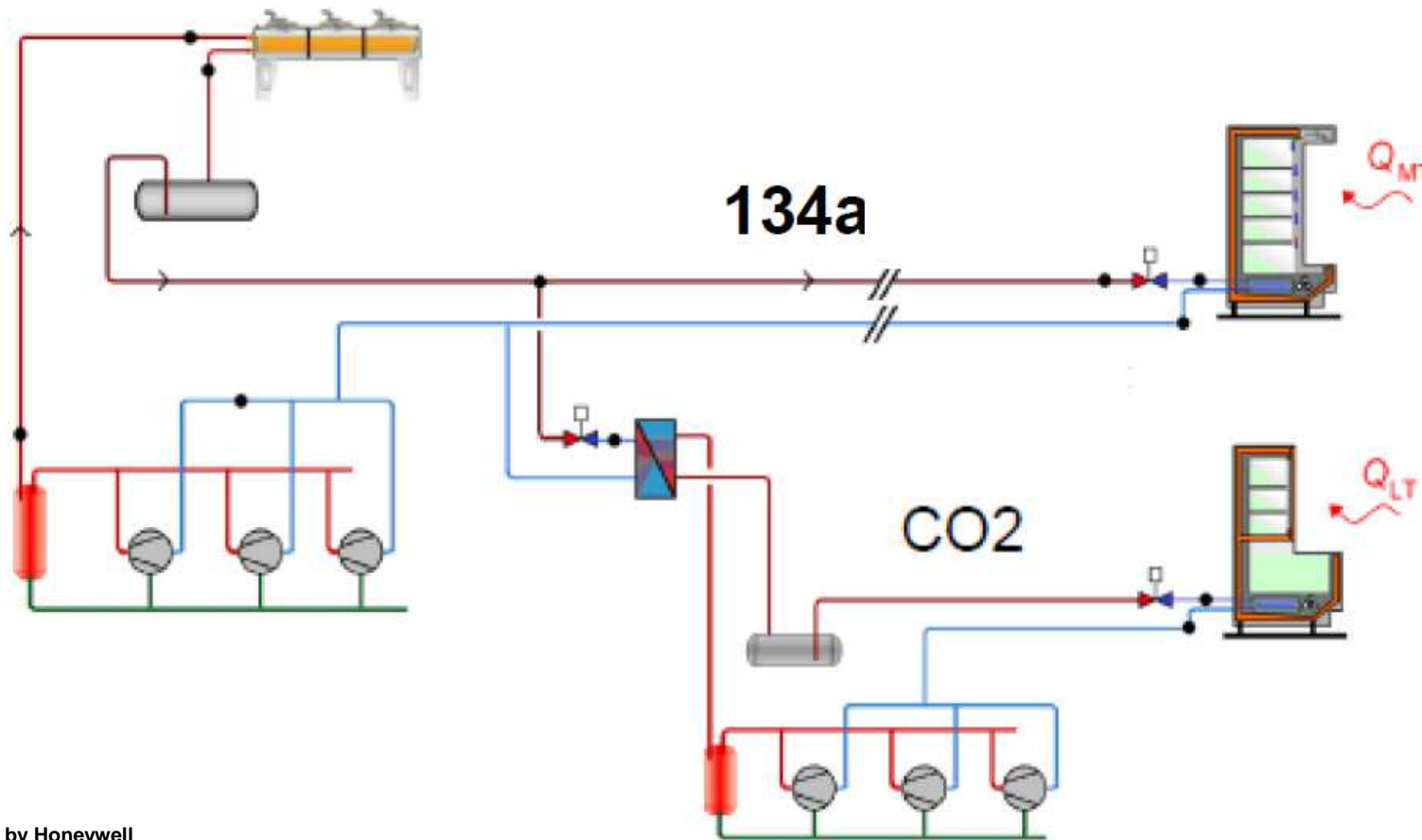
- Reality 2013 Versus 2015
- SONAE´S experience with Sub-Critical Systems
- Future- Our Plan until 2020

Reality 2013 Versus 2015



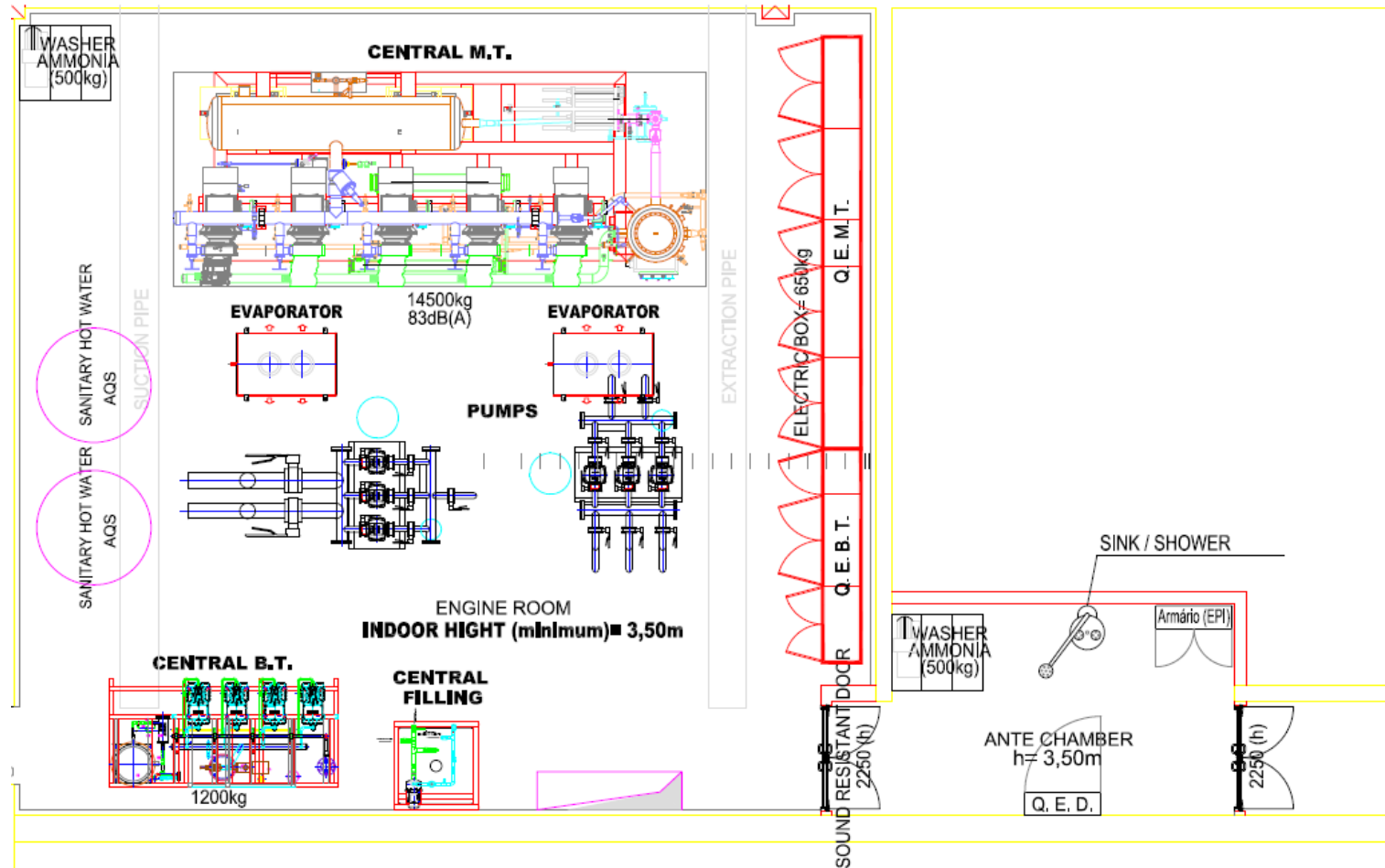
Reality 2013 Versus 2015

Cascade System used in 2013/2014



* Source by Honeywell

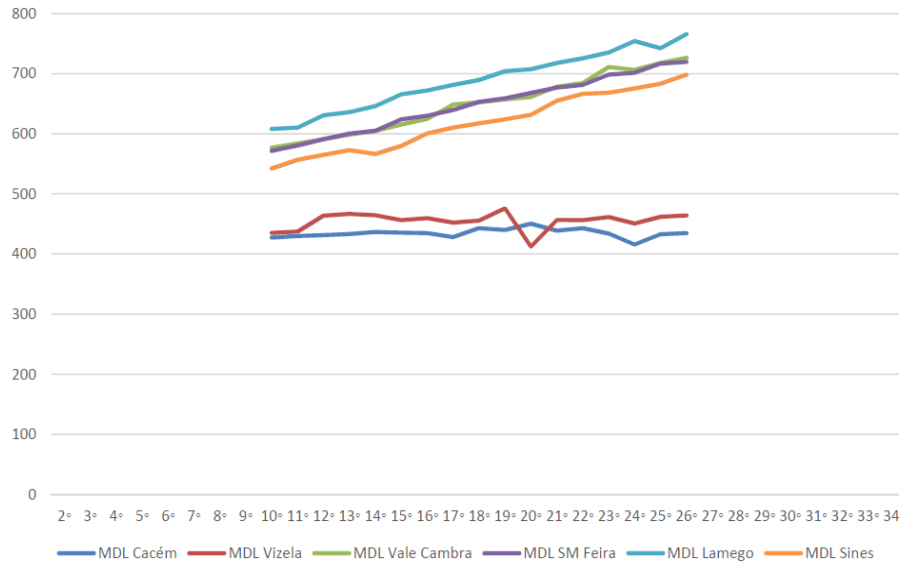
Reality 2013 Versus 2015
100% Green With Ammonia+CO2



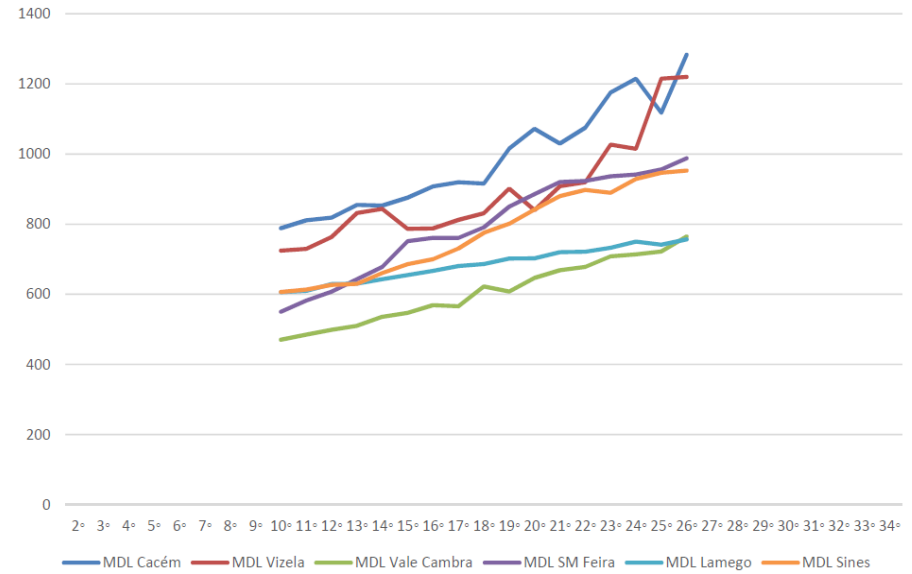
- CNT Matosinhos North of Portugal
- CNT Coimbra Center of Portugal

SONAE'S experience with Sub-Critical Systems

Low Temperature



Middle Temperature

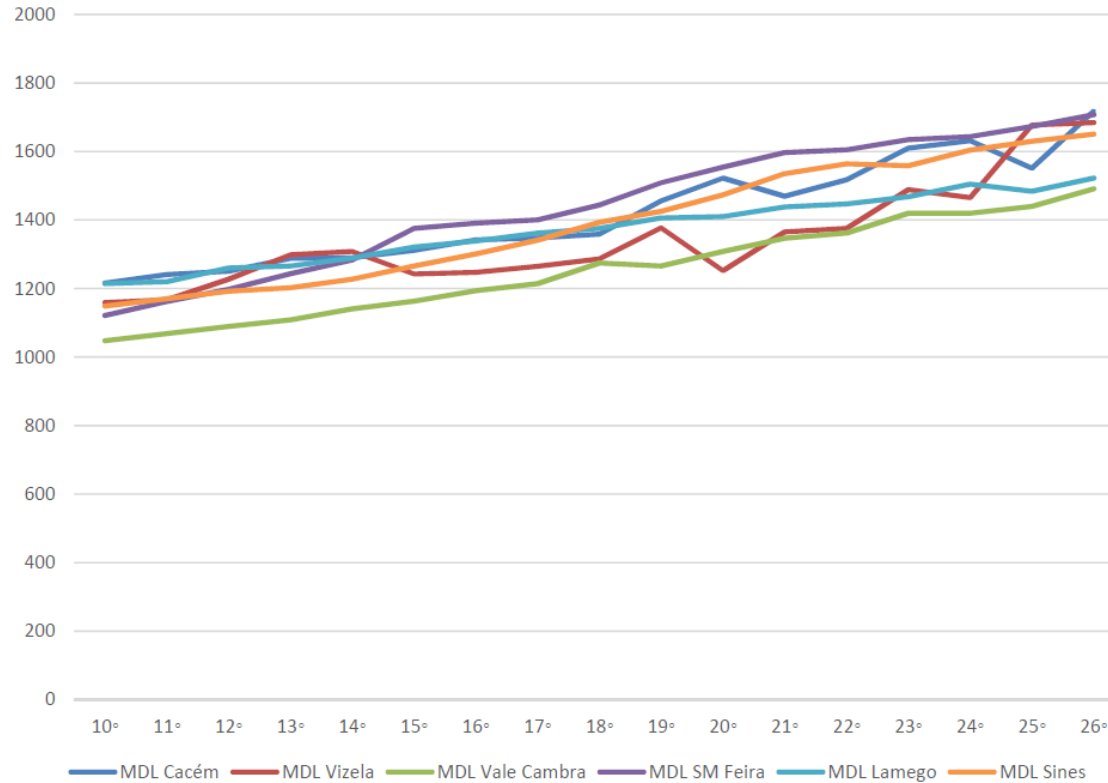


- MDL CACÉM: R-134A +CO2
- MDL VIZELA: R- 134A+CO2
- MDL VALE CAMBRA: R-404A+R404A
- MDL SM FEIRA: R-404 A+ R404A
- MDL LAMEGO: R-404A+ R404A
- MDL SINES: R-134A+ R404A




SONAE'S experience with Sub-Critical Systems

Global (LT+MT)



- MDL CACÉM: R-134A +CO2
- MDL VIZELA: R- 134A+CO2
- MDL VALE CAMBRA: R-404A+R404A
- MDL SM FEIRA: R-404 A+ R404A
- MDL LAMEGO: R-404A+ R404A
- MDL SINES: R-134A+ R404A

Future- Our Plan until 2020

- Phase-Down GWP Plan  Extinguish R-404 A;
- Continue to use CO2 Sub-Critical Systems, but find an alternative gas to R-134 A;
- Regulation 517/2014 Annex III point 13, needs to be clear regarding what is a Cascade System;
- Measure the performance of 100% Green Solution (Ammonia+CO2);
- European Governments should Financially Stimulate End-Users in Europe;



solutions for europe
natural refrigerants

16-17 March 2015 in Brussels

Thank you very much for your attention

Amad Hafez

SONAE MC