

MADE TO TRADE.

METRO's global high-GWP F-gas Exit Program

Holger Guss 09.04.2015 | © METRO AG 2015



Who we are:

766 Metro Cash & Carry wholesale stores in 27 countries

Typically:

Sales area:
5.000 -15.000 m²

refrigeration capacity:
≈ 100/300/150 KW (LT/NT/HT)



Our Aims and Commitments:

Commitment to use natural refrigerants starting from 2015 (CGF 2010)

20% reduction in METRO GROUP specific greenhouse gas emissions by 2020*

~50% of MCCs specific CO2 footprint is related to refrigeration (refrigerant leakages and electricity consumption)



Decision of the Metro AG Sustainability Board (2013)

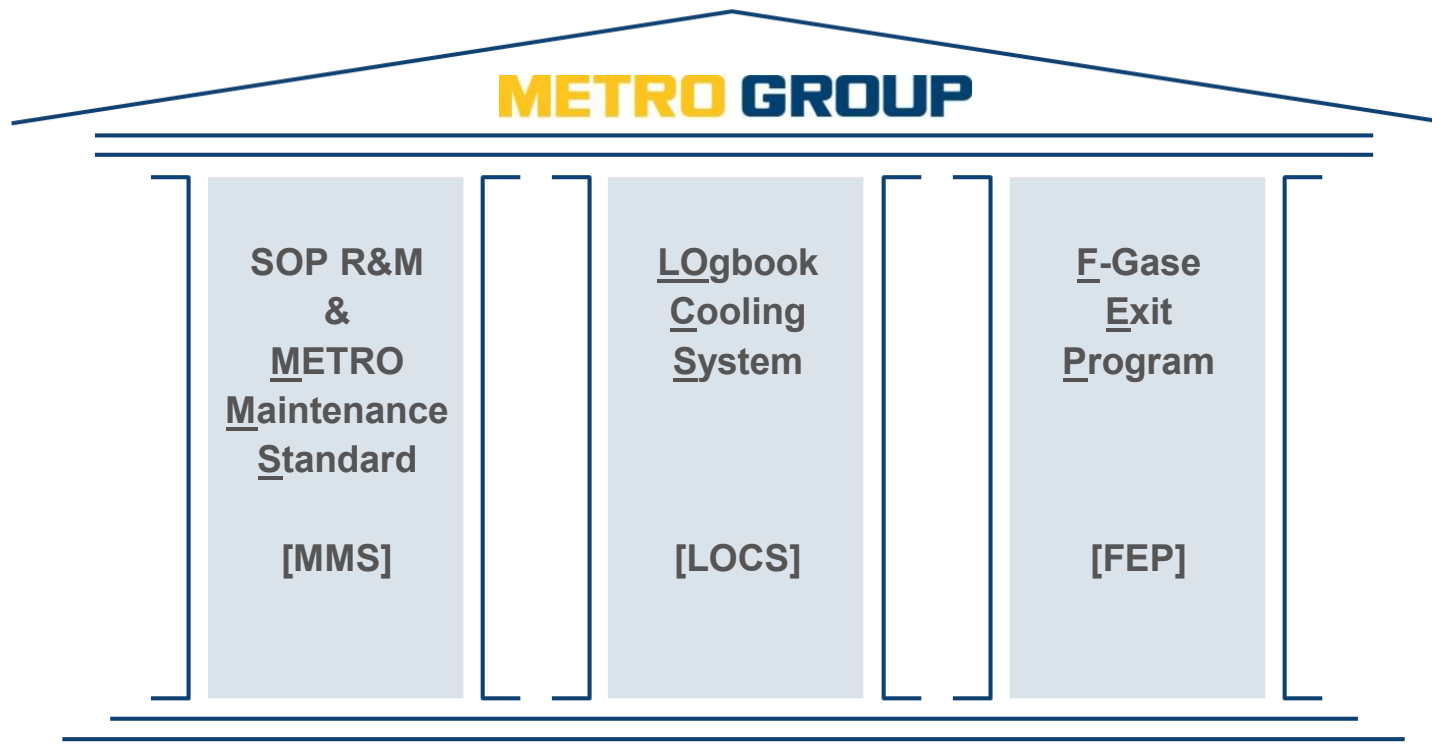
In NSO as well as in remodeling natural refrigerants are to be used where technically possible

Otherwise at least refrigerants with a GWP < 2500 are to be used

*per square metre sales floor compared to 2011 for emission from electricity, heating energy, refrigerant leakages, paper, company cars, business travel

How to achieve our aims:

F- GAS – Avoidance & Exit Programs



Standardized processes are granting a sustainable handling of resources!

High GWP F-Gas Exit Program:

The F-Gas Exchange Program has the overall objective to install the most modern and innovative technique

680 stores are affected till 2025

Applicable to all Metro Countries (independent of national regulations)

Strategy tailored for regions and countries (according climate and availability)

Priority of using natural refrigerants

Priority on exchanging refrigeration equipment

FEP Analysis: MCC Locations affected:

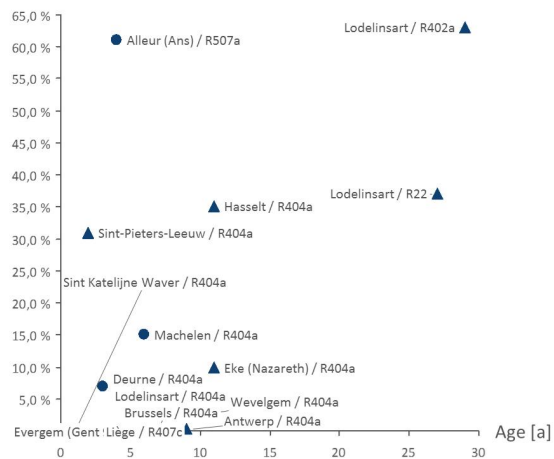


High GWP F-Gas Exit Program: Store Analysis

For analyzing all installed systems (incl. A/C*) at the MCC stores the following factors have been taken in consideration and rated with credits like

- 1.Refrigerant agent type
- 2.Age of the system
- 3.Leakage rate / Volume
- 4.Depreciation status
- 5.EU / Non-EU – State

Leakage Rate [%]



Country Ranking	Store Location	Country Rating	MCC Ranking
1.	Lodelinsart / R22	47	<u>1.</u>
2.	Antwerp / R404a	9	115.
3.	Eke (Nazareth) / R404a	8	
4.	Hasselt / R404a	8	
5.	Wevelgem / R404a	8	
6.	Deurne / R404a	6	
7.	Machelen / R404a	6	
8.	Alleur (Ans) / R507a	6	
9.	Sint-Pieters-Leeuw / R404a	6	
10.	Brussels / R404a	6	
11.	Liège / R407c	6	
12.	Evergem (Gent 9) / R404a	6	
13.	Sint-Katelijne Waver / R404a	6	

Based on this ranking approx. 40 - 70 stores per year will get a new modern refrigeration system

* Air Conditioning System

Where are we so far:

Milestones:

- 2008 Hamburg (D) (full CO₂ installation)
- 2010 Pasing (D) (CO₂ cascade /geothermal heat pump)
- 2010 Schwelm (D) (Gas-CHP; NH₃ & LiBr absorber; CO₂ cascade)
- 2012 Toulouse (F) (trans-critical CO₂ system warm climate)
- 2014 Weifang (CN) (first CO₂ cascade system in China)



Progress of implementation (by 03/2015):

CO ₂ trans critical systems:	19 (+20 / +20) (planned for 2015/2016)
CO ₂ subcritical (hybrid) systems:	16 (+10 / + 22)
R290 plug-in cabinets:	app. 4.500
NH ₃ systems (MGL*):	13

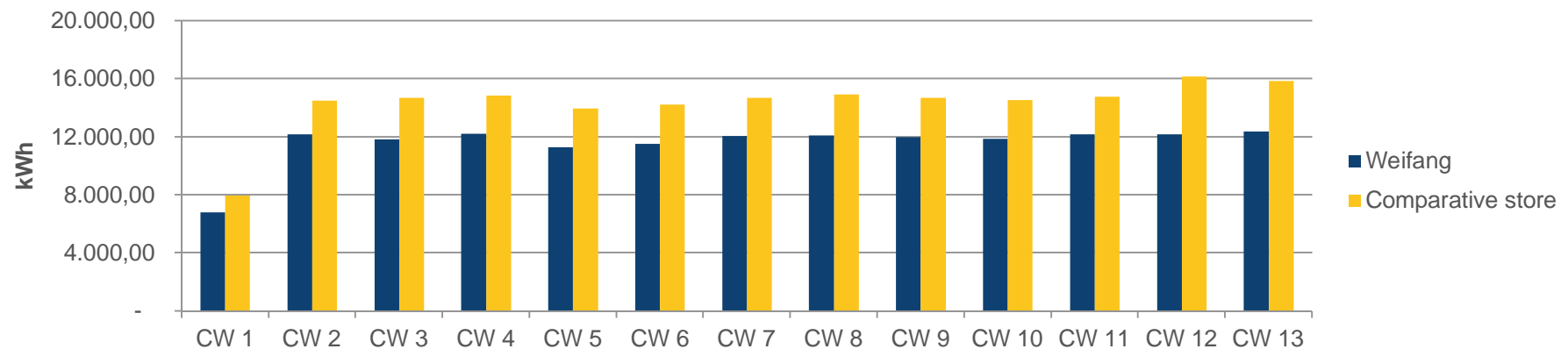
Conclusion: Cooling equipment operated with natural and low GWP refrigerants is reliable and energy efficient

Situation in China:

- 2006: Change from R22 to R404a in new stores
- 2013: Use of refrigerants GWP < 2500 (no R404a) in new stores
- 2014: First Metro CO₂ hybrid system installed in Weifang
- 2015: 1 NSO + 5 remodeling stores with CO₂ hybrid concept
- 2016: CO₂ hybrid should become Metro standard in China
- 2016: 5 NSO + 6 remodeling stores with CO₂ hybrid concept
- 2016-2017: aiming for Metro's first CO₂ trans critical system in China



CO₂ hybrid system in Weifang store 4 month in operation:



18% energy saving in comparison with a comparative store build in 2012.

Obstacles and Outlook for China:

Obstacles to overcome:

Service availability

Lack of trained and qualified staff

Available solutions for warm climate

Uncertainty of the use of Propane

Expectations:

Improved availability of reliable services and trained service staff expected / requested

Higher market implementation of natural and low GWP refrigerants

After market implementation of trans critical systems, advanced technologies will push the 'CO₂ equator' south



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