Recap Day 1

Technical workshop
Climate-friendly technology alternatives to HCFC/HFC”

Bernhard Siegele
GIZ, SV Proklima
28th May 2015, Tel Aviv, Israel

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- Deutsche **G**esellschaft für **I**nternationale **Z**usammenarbeit GmbH
- An international cooperation enterprise for sustainable development with worldwide operations
- Owned by the German Government
- Established in 1975
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- With 67 own offices.
- ~18,000 employees
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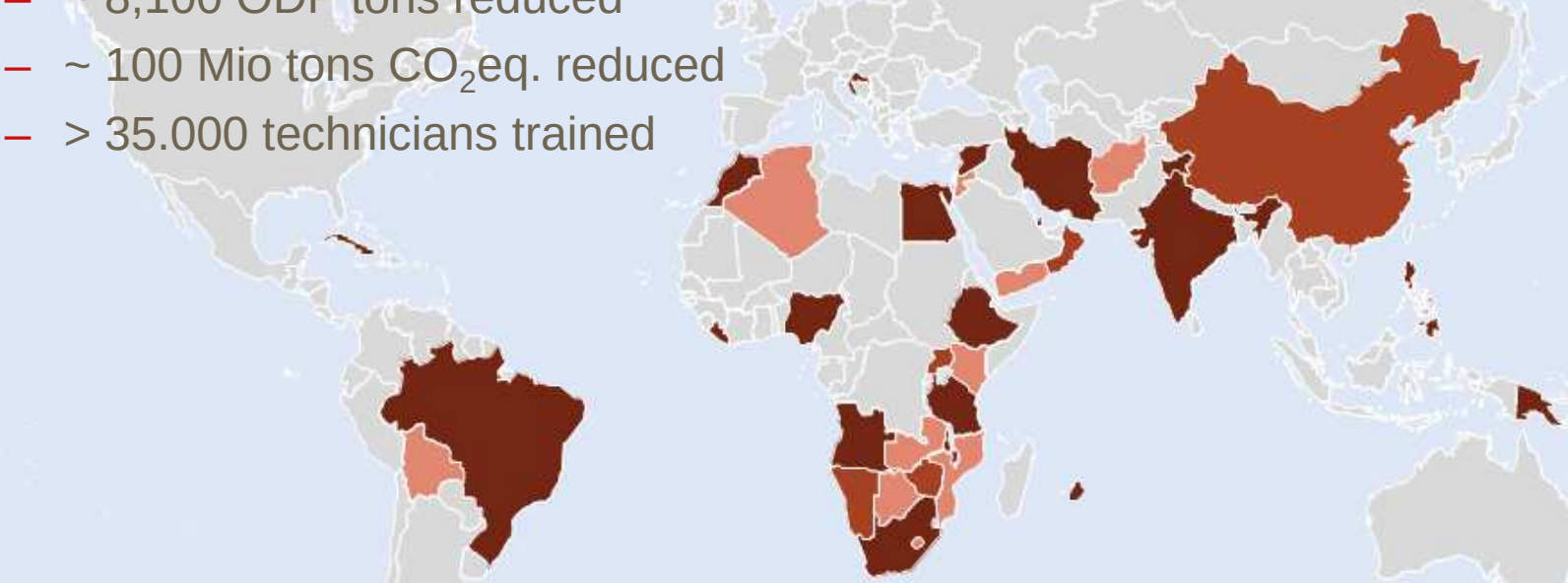
Proklima worldwide

On behalf of BMZ Federal Ministry for Economic Cooperation and Development

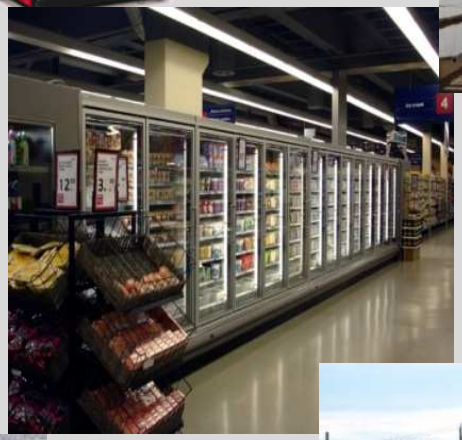
On behalf of Federal Ministry for the Environment, Nature Conservation and Nuclear Safety of the Federal Republic of Germany

- ~ 19 years worldwide initiatives
- ~ 245 projects
- ~ 40 Partner countries
- ~ 8,100 ODP tons reduced
- ~ 100 Mio tons CO_2eq. reduced
- > 35.000 technicians trained

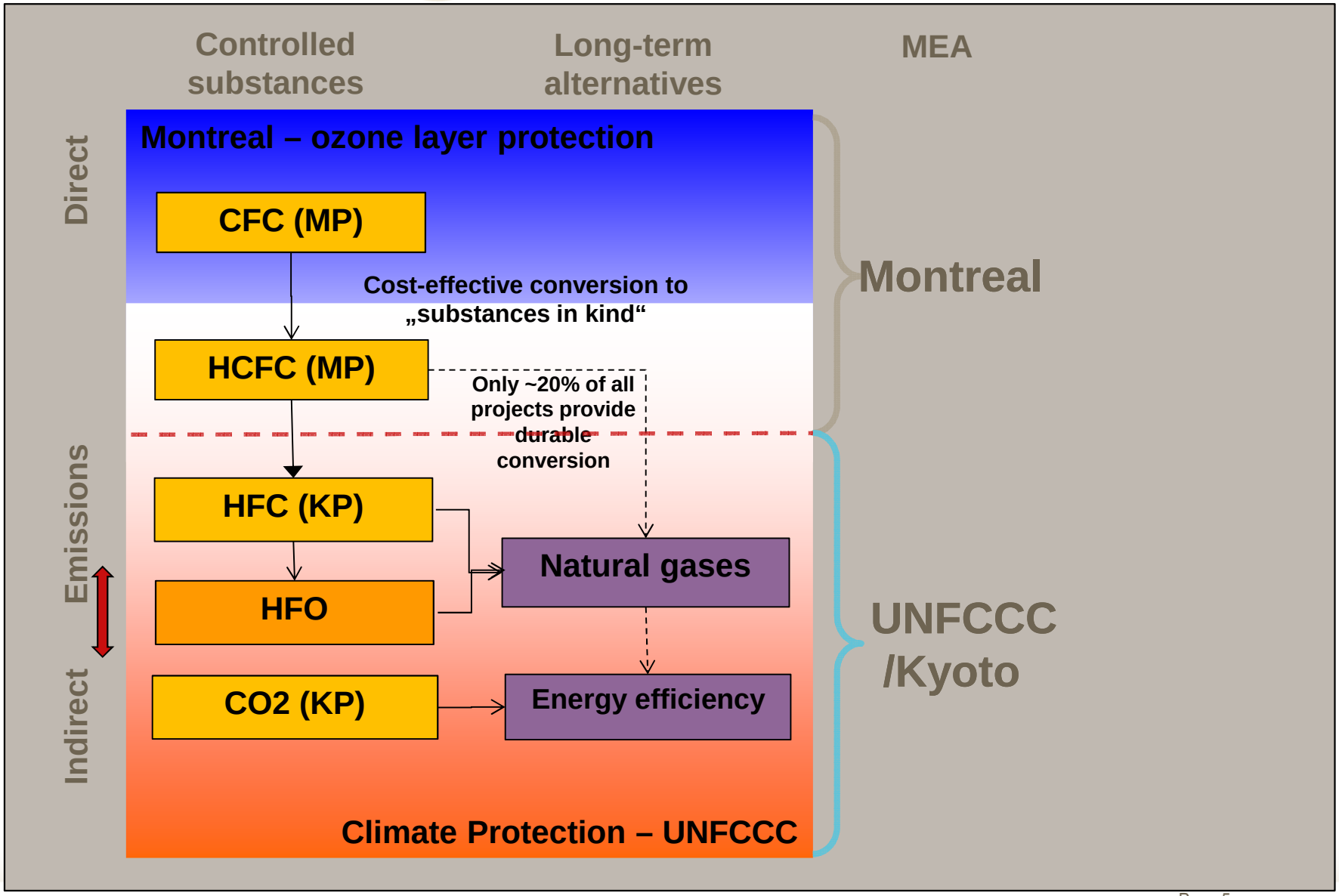


Integrated ozone and climate protection with focus on natural refrigerants with low-GWP and energy-efficient applications

Applications in refrigeration, air conditioning and foam technology



MEA (MP & UNFCCC)



ExCom Interventions

Technology	Comments	Safety Group
HFC-410A, HFC-407c,	GWP	A1
HFC/HFO blends (drop in)	GWP, no ICC, IPR	A1
HFC-32	GWP, IPR	A2L
HFC/HFO blends	GWP, IPR, IOC	A2L
HC-290, HC-1270, HC blends	ICC, up to 40% bonus	A3
CO2, NH3, non VC	ICC, up to 40% bonus	A1, B2

TEAP: low GWP <300

Increasing direct and indirect GHG emissions in the RAC&FB Sectors

Refrigeration & air condtioning

foams

CFC, HCFC

Direct emissions

ODP

CO2 eq.

HFC

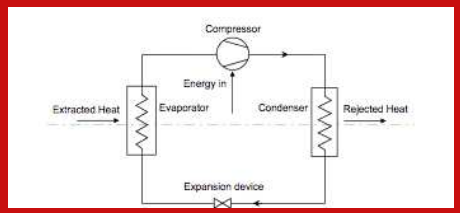
Indirect emissions

CO2

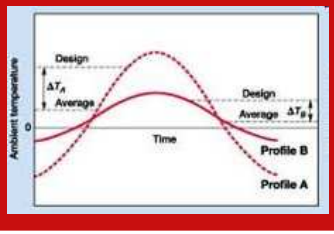
15-20% of global electricity consumption

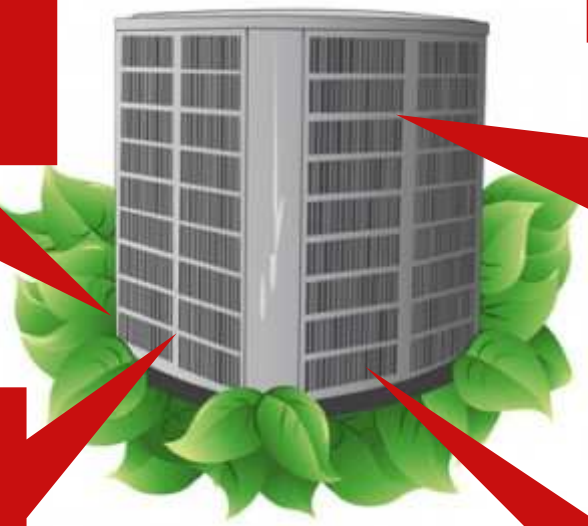
Reducing RAC Energy Use

Improve the Refrigeration Cycle



Optimize Transient Effects





Behavioural Changes

Reduce Parasitic Losses

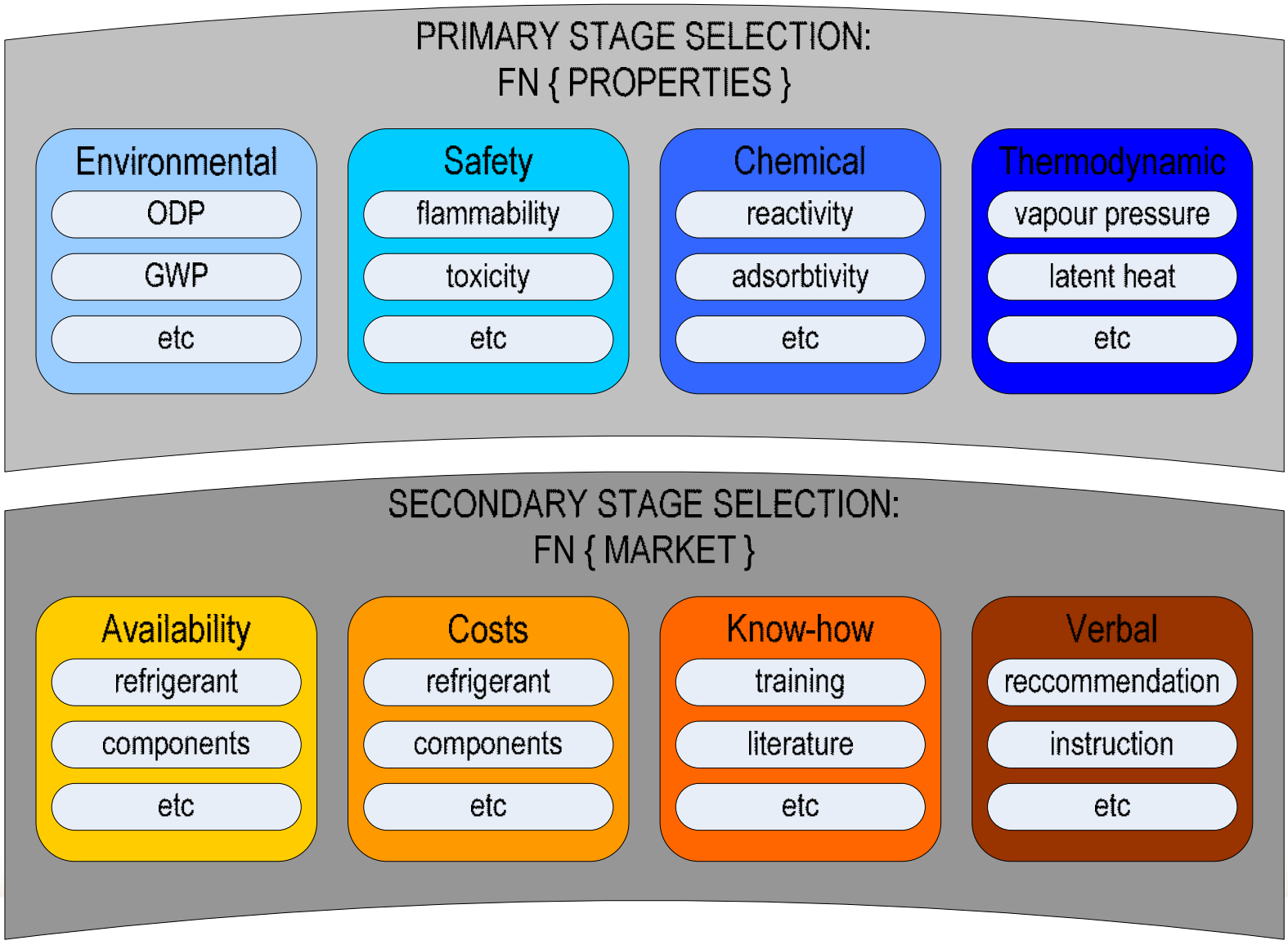


Servicing/ Training

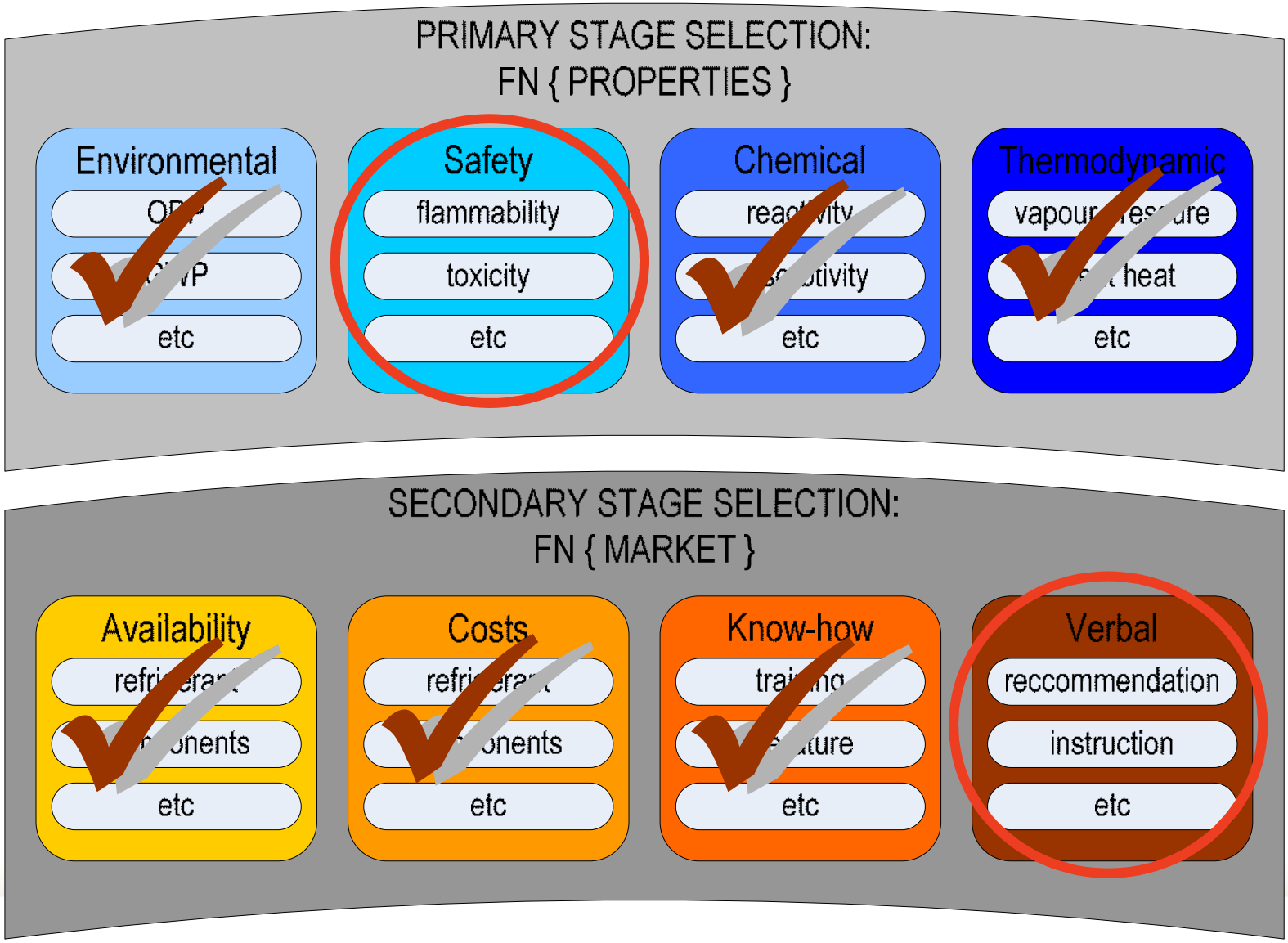
Technology Demonstration / Case Studies

Production + R&D	Split AC India & China		• Key Subsector • Low GWP natural refrigerant • Improved energy-efficiency • Local servicing capacity
	HC/ Solar Refrigeration Swaziland		• Production + capacity building in Africa • Natural refrigerants • Renewable energy (solar)
Use	Supermarkets South Africa		• Transform end-user sector • Low GWP natural refrigerant • Improved energy efficiency • Local engineering & servicing capacity
Post-Use	Refrigeration Recycling Brazil		• Sustainable end-of-life treatment • Collection of old appliances • Recovery and destruction (CFC, HCFC) • Local network /take-back system

Complex choice: Aspects of refrigerant selection



Aspects of refrigerant selection

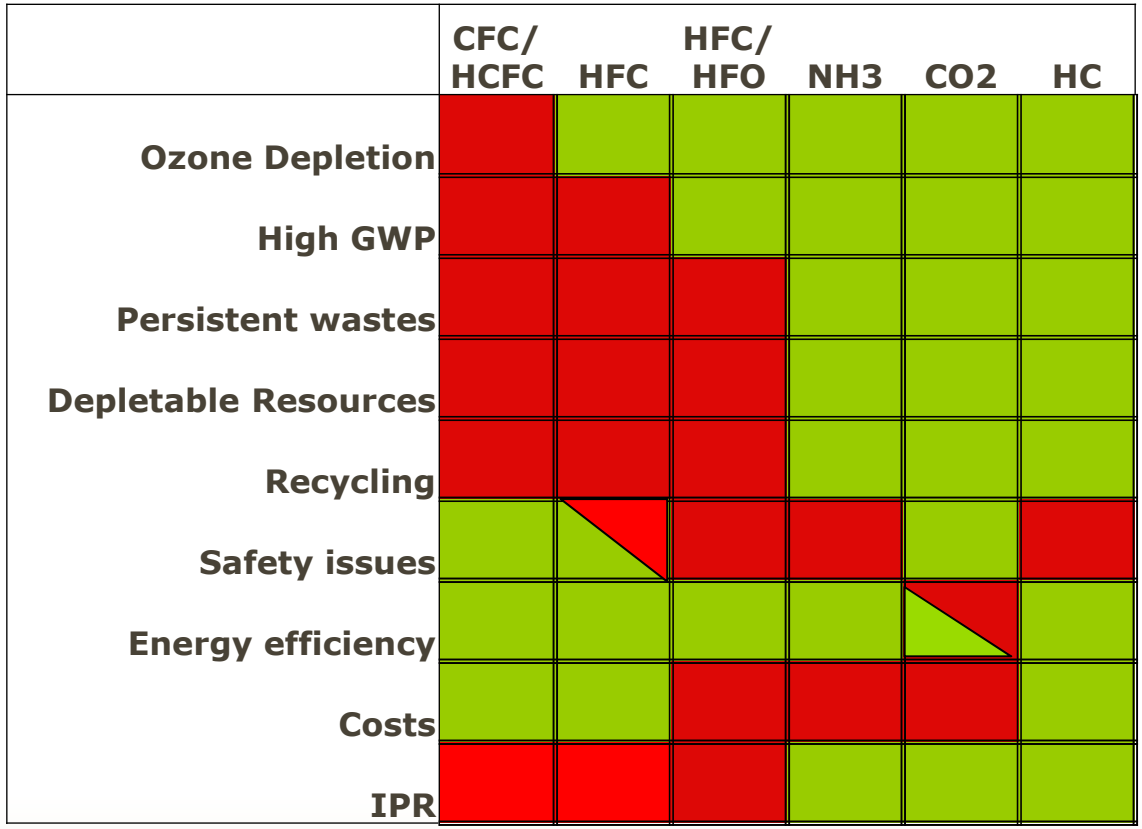


Moving from environmental harmful to environmentally benign substances has a cost

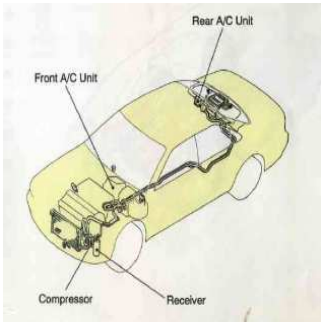
→ new complexities for the application

From all alternatives HC offer the best options for developing countries, in particular also for high-ambient temperatures.

The main barrier is to address flammability issue of HC.



There are climate-friendly, sustainable alternatives for (nearly) all applications!

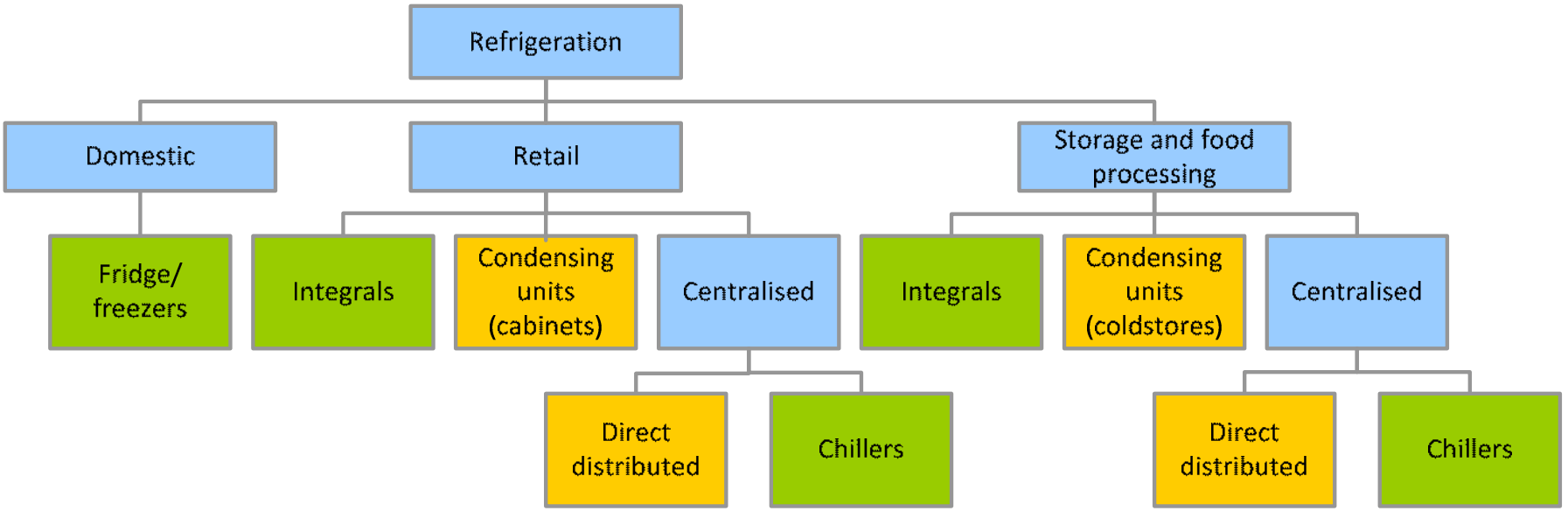


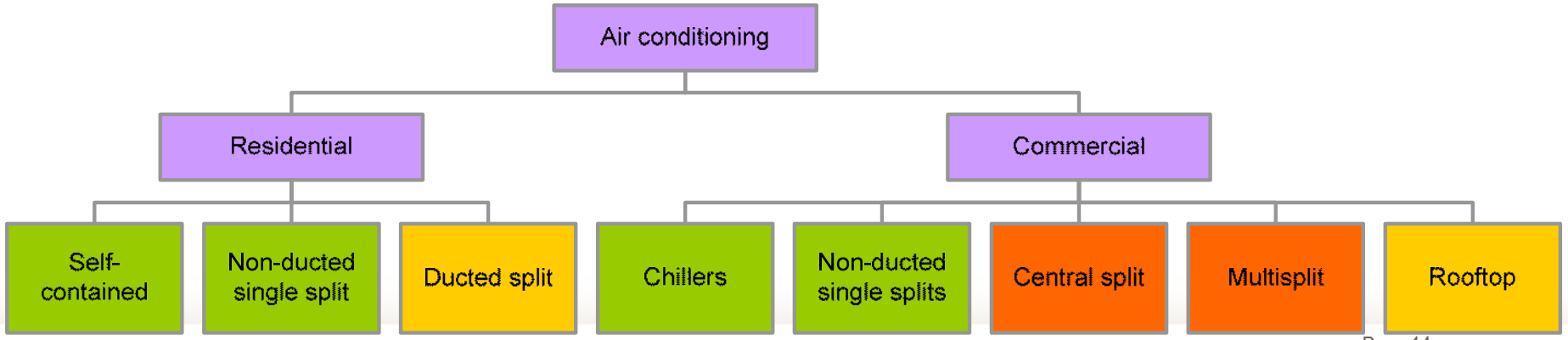




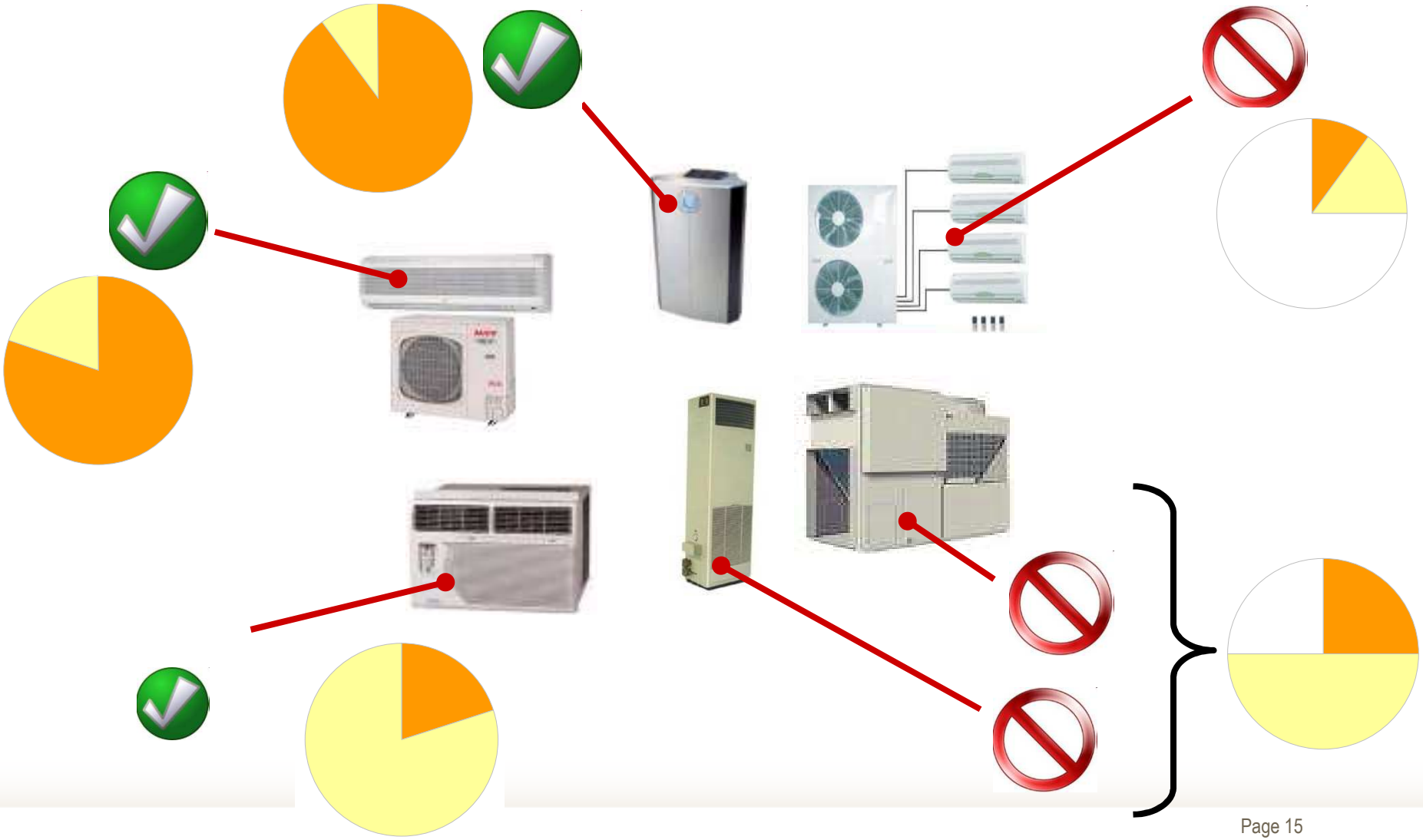
Mobile AC	Domestic Ref.	Comm. Ref.	Industr. Ref.	AC	Foams
CO2, HC	HC	CO2, NH3, HC	NH3, HC	HC, NH3	CO2, HC

Ease of application of natural refrigerants

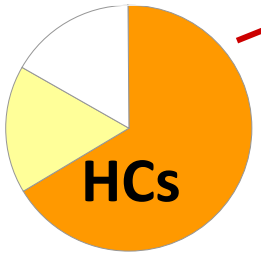


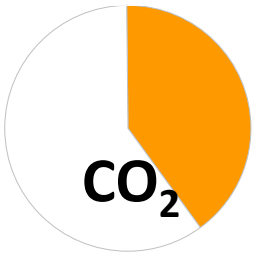


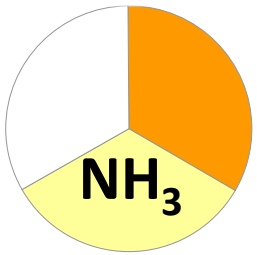
Viable application in air conditioners



Chillers







Viable application in commercial refrigeration

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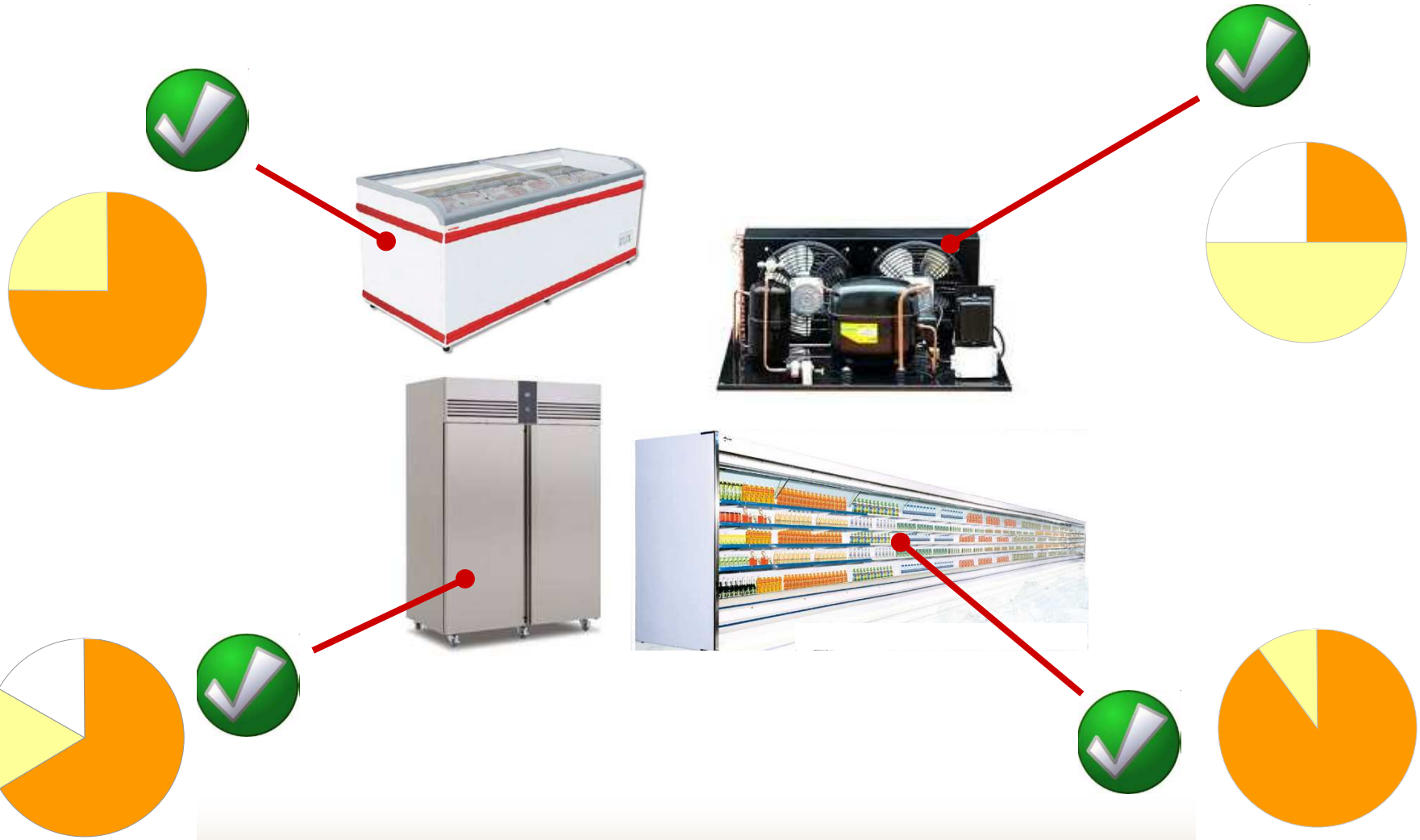
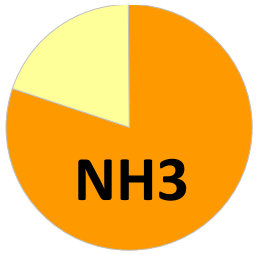
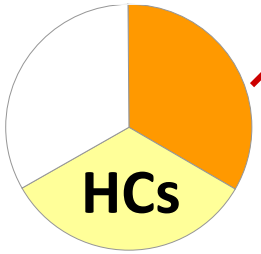
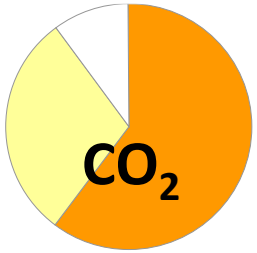


Viable application in larger coldstores







Centralised supermarket systems

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- **Options for different systems**

	Conventional	Alternative				
Type	Direct expansion, multi-compressor pack	Cascade	Indirect (liquid sec)/ cascade	Indirect (phase-change sec)/ cascade	Trans-critical booster	Distributed water cooled
Medium temp	R404A, R507A, R407F	Lower GWP HFC, (HC-290, HC-1270)	HC-290, HC-1270, R-717, brine	HC-290, HC-1270, R-717, CO2	R744	HC-290, HC-1270, R-717, brine
Low temp	R404A, R507A, R407F	R744	CO2	CO2	R744	HC-290, HC-1270

Conclusions

- HFC phase-down just matter of few years to come,
- Sector needs sustainable transformation, not yet again another transition,
- Energy efficiency is a key element of improving the sector
- Technology alternatives are available that provide efficient, sustainable solutions based on natural refrigerants

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Thank you for your attention!

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