

MOP 31 | MONTREAL PROTOCOL
ROMA 2019

ENERGY EFFICIENCY IN SERVICING SECTOR

JIM CURLIN
UNEP OZONACTION

Tuesday, 5 November 2019 | 18:00 - 20:00 | Iran room

SIDE EVENT

SERVICING INDUSTRY IN AFRICA AND IN OTHER DEVELOPING COUNTRIES
CAPACITY BUILDING FOR ENHANCING ENERGY EFFICIENCY IN RAC EQUIPMENT

Training and Certification for Improving Efficiency through Periodical Inspections

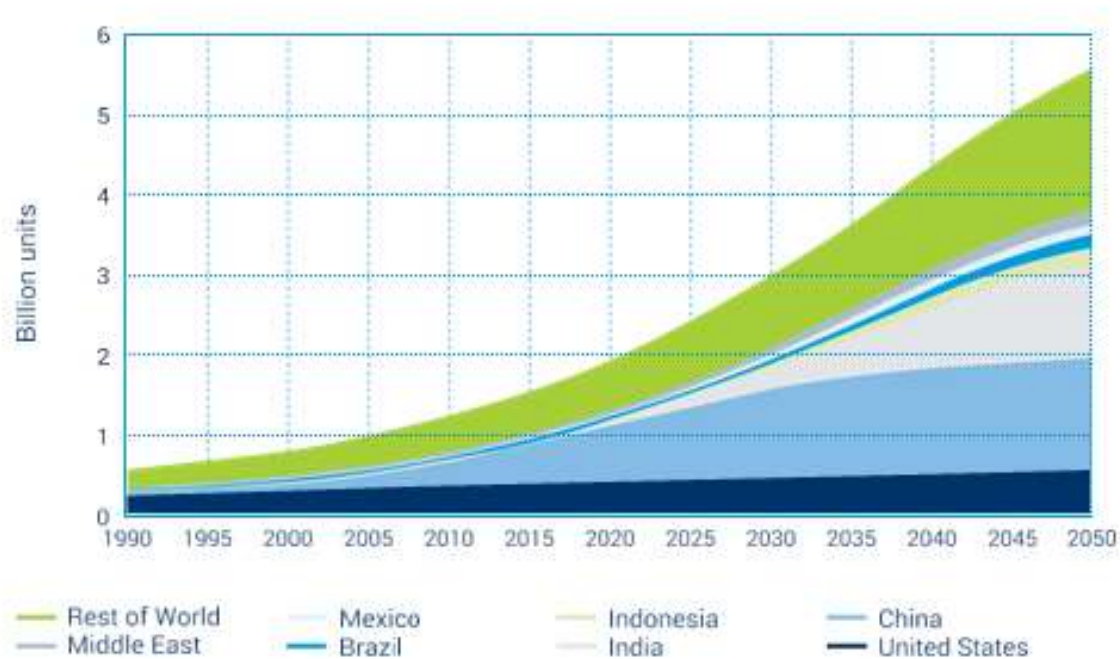
Speaker:

Marco Buoni

Secretary General ATF-Associazione dei Tecnici del Freddo

OEWG 40 – pre-session on Energy Efficiency in RAC

- Assessments made by the International Energy Agency forecast that the number of air conditioners in use globally will increase from 1.5 billion to 5.5 billion units between 2015 and 2050 (figure 1)⁵. Meanwhile, the number of domestic refrigerators would double to more than 2 billion⁶.



- Figure 1: Project growth of global air conditioner stock between 2015 and 2050 (Source: IEA)

OEWG 40 – presentation on Energy Efficiency in RAC (2)

- Many of the available energy efficiency improvements create positive financial returns for the end user. The cost of energy dominates the lifecycle cost of most RACHP equipment, as illustrated in figure 416. Over the life of the equipment, the cost of energy can be around five times the original capital cost. End users can accrue significant financial return over the lifetime of their equipment by opting for more energy efficient alternatives. Figure 4: Example RACHP lifecycle costs

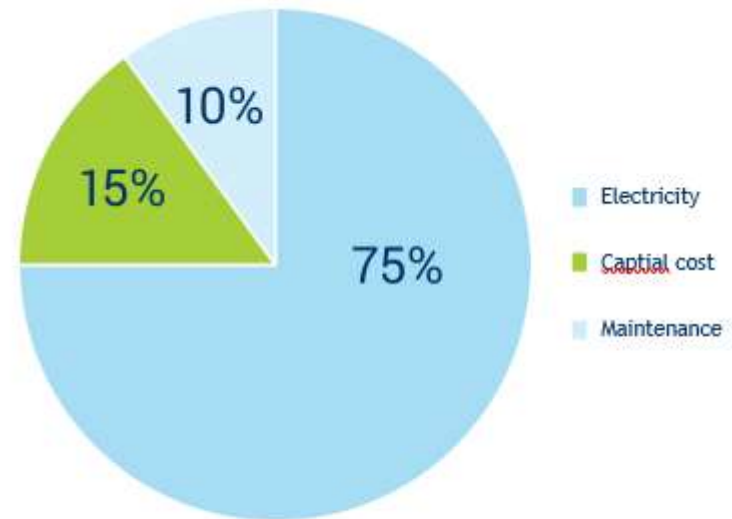
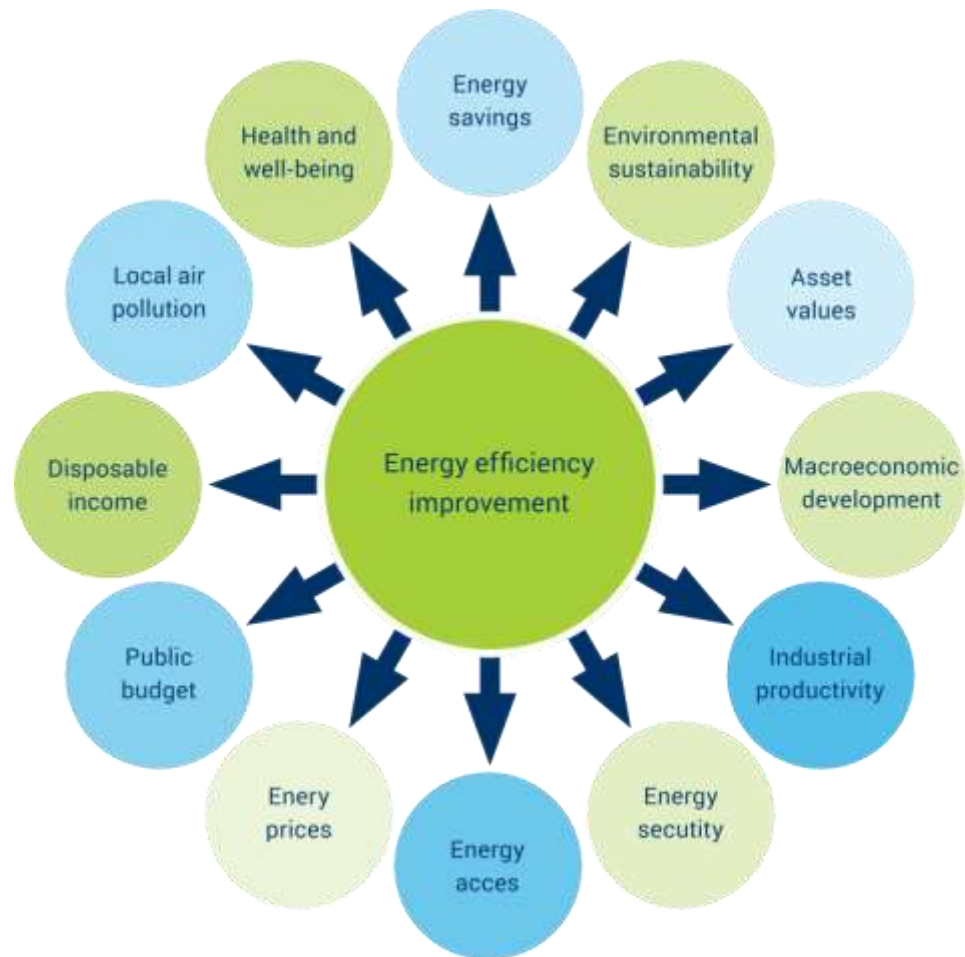


Figure 4: Example RACHP lifecycle costs

OEWG 40 – presession on Energy Efficiency in RAC (3)



Systems and buildings we have several measures at EU level

- Meps (Minimum Energy performance standards)
 - Energy Labelling
 - Ecodesign
- Maintenance
 - EPBD
 - Fgas regulation

- Recital (26) of the EPBD 2010 sets out that regular maintenance and inspection is needed to ensure maintained optimal performance of heating and air-conditioning systems. Missing inspection and maintenance leads to significant system deterioration and unnecessary energy use.
- Inspections ensure buildings & products deliver on their energy savings According to a number of can generate energy savings in buildings, ranging from 20% to more. These can also significantly contribute to improving the health-related benefits of good air quality in buildings.

Source: EPEE, EPBD Implementation Guidelines

Financial, energetic, environmental, safety & reliability: Alternative Refrigerants & Leakage

- From

Table: Range of values for charge and emission factors for RACHP systems

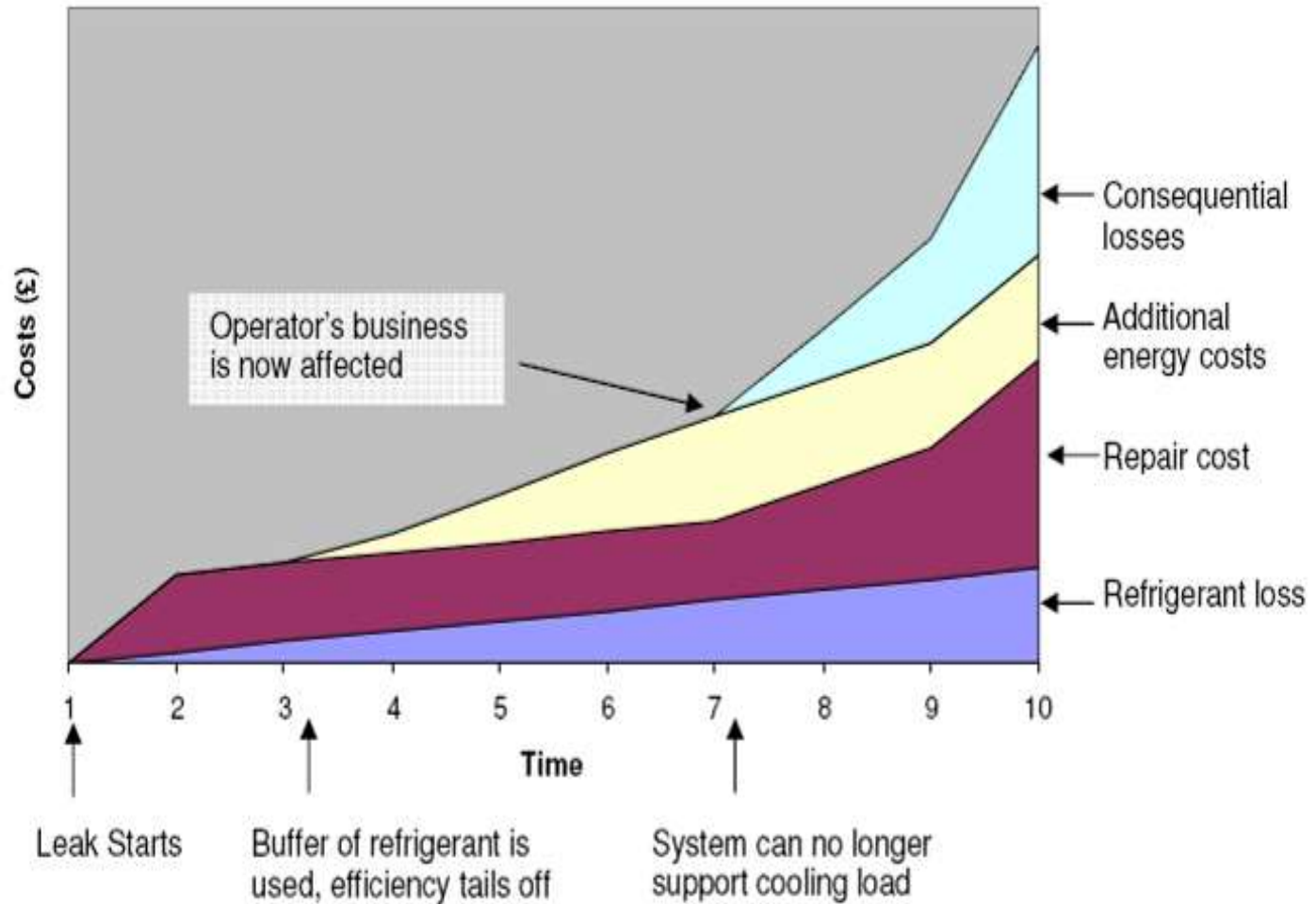
Type of Equipment	Typical Range in Charge Capacity (kg)	Installation Emission Factor (% of initial charge)	Operating Emissions (% of initial charge/ year)
Domestic Refrigeration	0.05 - 0.5	0.2 - 1.0	0.1 - 0.5
Stand-alone Commercial Applications	0.2 - 6	0.5 - 3	1 - 15
Medium & Large Commercial Applications	50 - 2,000	0.5 - 3	10 - 35
Transport Refrigeration	3 - 8	0.2 - 1	15 - 50
Industrial Refrigeration (inc. food processing and cold storage)	10 - 10,000	0.5 - 3	7 - 25
Chillers	10 - 2,000	0.2 - 1	2 - 15
Residential and Commercial A/C including Heat Pumps	0.5 - 100	0.2 - 1	1 - 10
Mobile Air Conditioning	0.5 - 1.5	0.2 - 0.5	10 - 20

Source: IPCC (2006), Guidelines for National Greenhouse Gas Inventories

- To → Stek (NL) report a leakage rate now to be as low as 4-5 %

Financial and Energetic Costs

Cost of a Refrigerant leak



The Refrigeration, Air Conditioning and Heat Pumps systems containing fluorinated refrigerants in EU should have:

- Logbook
- Periodical inspections
- Installation, repair only by certified craftsmen
- Right equipment (also suitable for alternative refrigerants)

Mandatory Certification to handle all refrigerants



2 assessment methods

Theoretical



Practical



Structure

13 activities

Table A.5 — Fluids

Fluids ^a	Tasks												
	Design 3.8	Pre-assembling 3.9	Installation 3.10	Putting into Operation 3.11	Commissioning 3.12	Operating 3.13	In-service Inspection 3.14	Leakage checking 3.15	General Maintenance 3.16	Circuit Maintenance 3.17	Decommissioning 3.18	Removing Refrigerant 3.19	Dismantling 3.20
Skills to assess													
Refrigerant behaviour	FO	BA	WK	FO	WK	WK	WK	FO	WK	FO	WK	FO	BA
Coolant, secondary loop fluid	FO		BA	WK	BA	BA	BA	BA	BA	WK	BA	WK	
Toxicity	FO		WK	WK	BA	BA	BA	BA	BA	WK			
Flammability	FO		BA	WK	BA	BA	BA	BA	BA	WK			
Fractionation											BA	BA	

Skills to assess

Each cell= level of expertise
 White = theoretical assessment
 Grey = practical assessment
 Black = not applicable

Reduction of leakage due to increase in competence and EU Fgas regulation

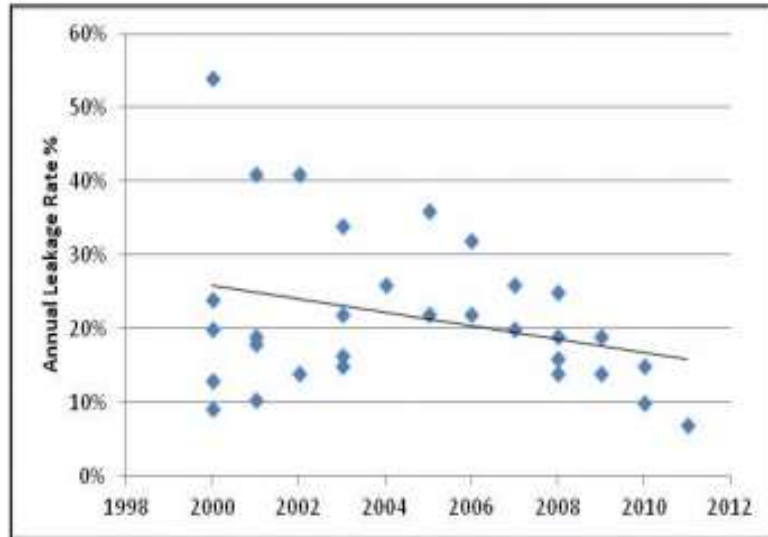


Figure 1. Reported leakage rates from studies²

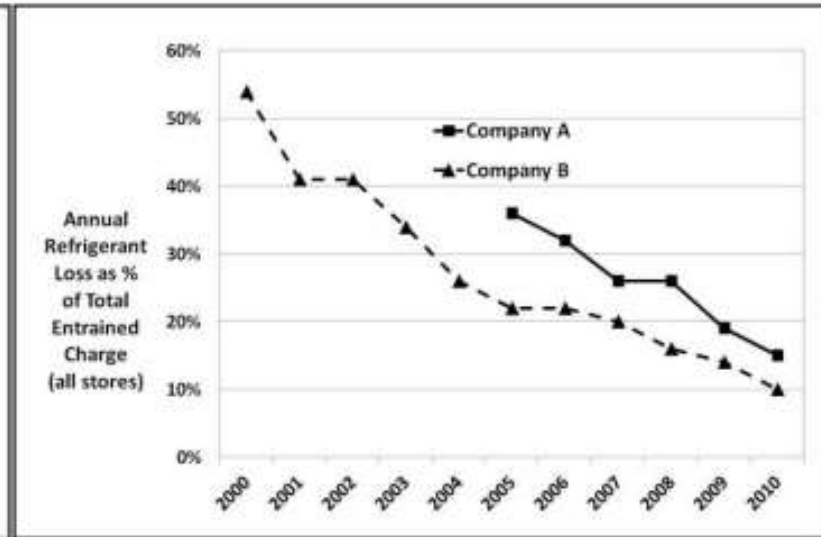


Figure 2. Leakage rates reported by two end users (supermarkets)³

Source fig.1: Updated from Cowan D, Gartshore J, Chaer I, Francis C, Maidment G. (2010), REAL Zero – reducing refrigerant emissions & leakage - feedback from the IOR project, Proceedings of the Institute of Refrigeration, Proc. Inst. R. 2009-10. 7-1
Source fig.2: Cowan D, Beermann K, Chaer I, Gontarz G, Kaar K, Koronaki I, Maidment G, Reulens W. (2011), Improving F-Gas containment in the EU – results from the REAL SKILLS EUROPE project.

Making a case for reducing leakage and change refrigerants

- Reducing leakage makes business, financial and environmental sense. The benefits to business include:
 - Compliance with legislation including the F Gas regulation;
 - Improved “green” credentials;
 - Reduced production down time / increased sales fixture availability / improved staff comfort as a result of improved reliability;
 - Less health and safety risk from refrigeration or air conditioning – directly from refrigerant emissions and, for food applications, indirectly as a result of improved reliability.
- In addition there are financial benefits:
 - Less refrigerant cost;
 - Less service cost;
 - Lower costs associated with plant down time;
 - No loss of energy efficiency associated with reduced refrigerant charge. These costs may need to be offset against increased maintenance or some additional capital expenditure, but usually the difference is positive.
- The environmental benefits are in parallel with the benefits identified above and include:
 - More efficient operation of RAC systems and hence lower emissions of CO₂ at the power station;
 - Lower emissions of greenhouse gases.

Training and certification worldwide

- Together with the UN implementing agencies UNEP, UNIDO, UNDP over the past few years AREA has been deeply involved in helping developing countries through **training RSS technicians** to install, repair, maintain and design RAC systems and **numerous Certification Sessions in Africa and Asia.**
- **Pics from top: Rwanda, Former Soviet Unit Rep, Benin, Gambia, and also Ghana, Tunisia, Eritrea, Montenegro, Saudi Arabia, Turkey... etc...).**



Assessing training centers in article 5 countries

- Gambia
- Rwanda
- Kuwait, Bahrain, Qatar
- Maldives
- Grenada (Caribbean) ...

→ Good equipment,

→ Propose a package, tools, training and certification (pushing for including in the legislation) to make it sustainable





Thank You!

- If we want things to remain as they are, things will have to change (From the book «The leopard» il Gattopardo di Giuseppe Tomasi di Lampedusa in Sicily)

Thank You!

Contacts:

Marco Buoni

buoni@centrogalileo.it

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