

Workshop Title :

Evaluating Low-GWP Refrigerants for Air-Conditioning Industry in High Ambient Temperature Countries

Participants :

	Name	Chair/Speaker	Affiliation
1	Ayman Eltalouny	Chair/Speaker	UNEP, Program Officer
2	Ole Nielsen	Speaker	UNIDO, Chief, Montreal Protocol Unit
3	Bassam Elassaad	Speaker	Consultant, UNEP/UNIDO - High-Ambient Project
4	Walid Chakroun	Speaker	Kuwait University, UNIDO Consultant - High-Ambient Project



Abstract :

- Objective

To address the specific challenges of high ambient countries in finding alternatives for the widely used HCFC-22 in residential A/C applications, a project was launched to test locally built A/C units optimized for different low-GWP alternatives. This session discusses the process of these tests and an expectation of the results. While the results will be by no means an endorsement of any of the tested refrigerants, they do shed a light on what might be considered as workable refrigerant alternatives for high ambient operation from a performance point of view. Other aspects of the project dealing with economics, technology transfer and the challenges of implementation will be introduced including recommendations of further required investigation.

- Background

Over the last two decades, the refrigeration and air-conditioning industry witnessed rapid changes and developments in response to the global environmental calls and conventions in particular those related to the preservation of the stratospheric ozone layer and combating climate change. In September of 2007, the Parties to the Montreal Protocol agreed to accelerate the phase-out schedule for HCFCs in developing countries. Parties agreed to reduce Hydrochlorofluorocarbon (HCFC) consumption in developing countries through an accelerated scheme that included freezing consumption levels, based on 2009-2010 averages, in the year 2013 followed by cuts, to the same level, of 10%, 35%, 67.5% & 97.5% for the years 2015, 2020, 2025 & 2030 respectively allowing 2.5% to continue during the period 2030-2040 as service tail which will be further assessed and modified in the year 2025.

On the other hand Hydrofluorocarbons (HFCs), the primary commercially available alternative to CFCs and HCFCs since the early 90s, are currently doubtful to continue playing the same role given their contribution to global warming. Most of high/higher GWP HFC refrigerants have started to be less welcomed or accepted over the last few years in several places in the world.



Countries with high-ambient temperature characteristics and high dependency on refrigeration and air-conditioning applications are mainly located in the Middle East and particularly in the Gulf region. Those countries have traditionally been recipients of globally proved refrigeration technologies. This trend is witnessing a change lately with movement of regional industry to enhance their research and selection capacities but it remains framed with what is commercially available worldwide in terms of the raw materials.

Additionally, most of the governments in the region have started to apply new energy efficiency requirements for air-conditioning equipment. Known as MEPS (Minimum Energy Performance Standards), these standards will certainly have impact on the choice of refrigerant as well as design and operating characteristics of air-conditioning units. Meeting those conditions for high-ambient climates is another challenge for countries where air-conditioning consume 50-60% of the domestic power supply.

As a response to the above issues, UNEP & UNIDO designed and launched a regional project to assess the feasibility of Low-GWP Alternatives for the air-conditioning industry in high-ambient countries which is globally known today as PRAHA. The project aims to practically assess next-generation low-GWP refrigerants taking into account energy efficiency, environmental impact, performance, safety, and cost. The project involves partnerships of 13 international/regional technology providers and equipment manufacturers, aiming to independently assess and evaluate the techno-economic feasibility of low-GWP refrigerants in comparison with existing commercially available refrigerants i.e. HCFC-22 and HFC-410 for different domestic and medium size commercial air-conditioning applications.

- Presentations

- **Challenges in promoting low-GWP Refrigerants in High-Ambient Countries (Ayman Eltalouny)**
- **Promoting low-GWP Refrigerants for Air-Conditioning Industries (Ole Nielsen)**
- **PRAHA-Methodology and Related Research (Bassam Elassaad)**
- **PRAHA-Testing and Preliminary Results (Walid Chakroun)**

- Discussion

Questions 1: **What Challenges Need to be Overcome When Implementing the Results of PRAHA in high-ambient countries?**

Question 2: **Is the Industrial Market Mature Enough to Make the Shift to Low-GWP Options?**

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