Challenges to commercializing alternatives in developing countries

Managing low-GWP refrigerants at the servicing sector

SUSTAINABLE TECHNOLOGIES FOR STATIONARY AIR CONDITIONING WORKSHOP
LAS VEGAS CONVENTION CENTER
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The Magnitude of the sector in developing countries

HFC projected demand in NA5 and A5 for 2011-2040

TEAP REPORT DECISION XXVII/4 TASK FORCE UPDATE REPORT
FURTHER INFORMATION ON ALTERNATIVES TO OZONE-DEPLETING SUBSTANCES - SEPTEMBER 2016
The Magnitude of the sector in developing countries

Global A/C demand (Residential and Commercial)

92.46M units
The difference amongst developing countries; **HPMPs**
**HPMPs Vs. Phase-down of HFCs**

**Time-line**

- **2015**
- **2017**
- **2020**
- **2024**
- **2025**
- **2028**
- **2030**
- **2040**
- **2047**

**HPMPs**

**HFCs Plans**

- **2017**
- **2020**
- **2024**
- **2025**
- **2028**
- **2030**
- **2040**
- **2047**

**How to manage HFCs while phasing out HCFCs**

- An overlapped commitment period with challenges but also opportunities

Less interaction between HCFCs and HFCs
The difference amongst developing countries

Nature of Consumption in A/C sector

- A5 with A/C Industry
  - Large A/C Industry
  - Medium/Small A/C Industry

- A5 with Servicing Only
  - Can include Assemblers
  - Servicing only

- Ability to influence technology selection
- Technology Recipient
Addressing the servicing sectors
Timeline of refrigerants based products in A5 countries

CFCs, HCFCs & HFC (mainly R134a)

1995-2005

2005-2015/2020

CFCs (limited), HCFCs & HFCs (134a, 407C & 410A)

PLUG & PLAY Period

2020 – 2040/2050

HCFCs, HFCs & low-GWP Options (HC, CO2, HFOs, others)

Business not as usual
Specific Considerations Markets and Servicing

Managing markets with multiple refrigerants

Safety and technical considerations

Economics of services

- Good Practice Skills
- R/R/R Capacities
- Retrofitting limitations
- Safety measures
- Leakage/Emissions Control
Managing markets with multiple refrigerants

Between 2020 – 2040 most of markets in A5 countries will have units operate with HCFC-22, HFC-410A, HFC-32, HC-290 and others

What’s needed...

• Skills of identifying and handling different types of refrigerants

• Tools to do job safely and efficiently

• Proper labeling and logging (record keeping) measures

• Standards and Codes

• Integrated institutional and regulatory approach
Skills of identifying and handling different types of refrigerants

• Mandatory certification schemes
  – Development
  – Enforcement

Challenges:
- Apparently, typical certification programs for RAC professions are not as effective as designed, or intended, in most of A5 countries.
- Enforcement is another big issue, modalities and technical capacities to enforce and monitor is a big question mark

Opportunities:
- International standard (ISO) are being considered at the moment for setting competencies and skills required benefiting of EN13313
- Some A5 countries started to consider building special refrigerant certification program (environmental) similar for example to F-gas certificate
- Industry initiatives to address skills requirements for the supply chain network through voluntary programs like GRMI/RDL
Tools to do job safely and efficiently

**Challenges:**
- Different than existing in terms of being designed for different refrigerants
- More cautious arrangements towards leakage, flammability, brazing, charging, etc. practices

**Opportunities:**
- A lot similarities in the practice techniques
- Less time for some cases especially when using zero/very low GWP refrigerants like HCs in small applications. (venting instead of recovery)
- Increased number of resources; materials, manuals and guidelines started to be available
<table>
<thead>
<tr>
<th>Tool</th>
<th>R32</th>
<th>R410A</th>
<th>R22</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gauge manifold</td>
<td>Slightly different scale for HFC32 and R410A so check with tool supplier if manifold is shareable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Charge hose</td>
<td>Common</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scale</td>
<td></td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td>Pipe bender</td>
<td></td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td>Pipe cutter</td>
<td></td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td>Flaring tool</td>
<td></td>
<td>Common</td>
<td>R22 type can be used by changing the work process</td>
</tr>
<tr>
<td>Torque wrench</td>
<td></td>
<td>Common</td>
<td>Some flare nut widths are different, others can be shared</td>
</tr>
<tr>
<td>Cylinder thread adaptor</td>
<td>Depends on the cylinder — some have different thread for flammable gases</td>
<td>Not applicable</td>
<td></td>
</tr>
<tr>
<td>Vacuum pump</td>
<td></td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td>Recovery pump</td>
<td></td>
<td>Check with tool supplier if shareable</td>
<td></td>
</tr>
<tr>
<td>Electr. Leak detector</td>
<td></td>
<td>Check with tool supplier if shareable</td>
<td></td>
</tr>
<tr>
<td>Refrigerant recovery cylinder</td>
<td></td>
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</tr>
</tbody>
</table>
Integrated institutional and regulatory approach

**Challenges:**
- Absence of comprehensive regulatory frameworks that address the whole issue of refrigerant management i.e. import, use, service, RRR, disposal, etc.
- Need for Risk Assessment Model for developing countries especially for LVCs

**Opportunities:**
- Chance to update policies due to Kigali amendment and HFCs commitments
- Stage-II of HPMPs is an opportunity to incorporate HCFCs/HFCs business from the regulatory perspective (as feasible)
- Model of Risk Assessment for Logistics of A/C in HAT countries is ongoing under PRAHA-II (UNEP-UNIDO) in cooperation with international associations
- South-South cooperation opportunities benefiting of advance research in other A5 countries like China HPMP
Technical & Institutional Considerations

#1 Standards & Codes
- RAC Codes
- Buildings Codes
- MEPS
- Refrigerants Standards
- Containers
- Equipment
- Others

#2 Certification of Technicians
- Code of Practice
- Certification Scheme
- Accrediting training institutes/center
- Enforcement and Monitoring

#3 Supporting Policies
- Obligatory R&R
- Leak detection monitoring
- Registering refrigerants traders
- Ban use of non-refillable containers
- Licensing servicing companies and workshops

#4 Strengthening local institutions
- RAC Associations
- Engineering Societies
- Industry associations or federations
- Research institutes
- Relevant NGOs