The Italian HVACR Experience
An international overview of alternative and climate friendly solutions in the A/C Sector

Side Event, MOP 31
Rome, November 6, 2019

Presented by:
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Kigali amendment
HFC Phase-down

- Annex F substances

<table>
<thead>
<tr>
<th>Substance</th>
<th>100-year GWP**</th>
<th>Safety Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>HFC-134a</td>
<td>1,430</td>
<td>A1</td>
</tr>
<tr>
<td>HFC-245fa</td>
<td>1,030</td>
<td>B1</td>
</tr>
<tr>
<td>HFC-365mfc</td>
<td>794</td>
<td>–</td>
</tr>
<tr>
<td>HFC-227ea</td>
<td>3,220</td>
<td>A1</td>
</tr>
<tr>
<td>HFC-236fa</td>
<td>9,810</td>
<td>A1</td>
</tr>
<tr>
<td>HFC-43-10mee</td>
<td>1,640</td>
<td>–</td>
</tr>
<tr>
<td>HFC-32</td>
<td>675</td>
<td>A2L</td>
</tr>
<tr>
<td>HFC-125</td>
<td>3,500</td>
<td>A1</td>
</tr>
<tr>
<td>HFC-143a</td>
<td>4,470</td>
<td>A2L</td>
</tr>
<tr>
<td>HFC-152a</td>
<td>124</td>
<td>A2</td>
</tr>
<tr>
<td>HFC-23***</td>
<td>14,800</td>
<td>A1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HFC Blend(a,b)</th>
<th>100-year GWP(c)</th>
<th>Safety Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>R-404A</td>
<td>3,922</td>
<td>A1</td>
</tr>
<tr>
<td>R-407A</td>
<td>2,107</td>
<td>A1</td>
</tr>
<tr>
<td>R 407C</td>
<td>1,774</td>
<td>A1</td>
</tr>
<tr>
<td>R-407F</td>
<td>1,825</td>
<td>A1</td>
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<tr>
<td>R-410A</td>
<td>2,088</td>
<td>A1</td>
</tr>
<tr>
<td>R-507A</td>
<td>3,985</td>
<td>A1</td>
</tr>
</tbody>
</table>
Regulatory certainty

![Graph showing regulatory certainty over years from 2020 to 2048. The graph is a line chart with years on the x-axis and regulatory certainty percentage on the y-axis. The percentage drops sharply from 100% in 2020 to 0% in 2048.](image-url)
A/C industry in transition

- HCFC-22 being phased-out
  - With or without external support;
- HFC-410A phased in;
- HFC-32 phased in:
  - Reported global sales of 80 million units;
- R-454B being considered; and
- R-290:
  - Global sales of approx. 1 million units.
Some UNIDO programs in A/C sector

- Many industries in developing countries depend on SKD/CKD kits from China
- Egypt: Conversions into HFC-32 and R-454B:
  - Sustainability is key issue
- Bahrain: Cancelled;
- Tunisia: Designed for R-290 but cancelled;
- Pakistan: One company - R-290
- Brazil: 3 companies – R-290
UNIDO China program in A/C sector

- Support comprise:
  - Factory conversions
  - Technical assistance / research
- Current installed capacity: 6 M units annually;
- Future installed capacity: 6 M units annually;
- Total sales with subsidy from FECO (IOC):
  - Approx. 180,000 split A/C’s
Barriers for R-290 market penetration

• Restrictive standards:
  • R-290 charge limitations;
  • Current upper limit for R-290 is 7 kW;
  • R-290 products sensitive to charge in terms of energy efficiency.

• Marketing:
  • No financial incentive to market R-290 as a gas;
  • Consequently no technical support from R-290 manufacturer;
  • Technical expertise at A/C manufacturer level.
Barriers for R-290 market penetration

• Liability:
  • Flammability;
  • Difficult to control use/maintenance/EOL for manufacturer;
  • Uncertainty on skill level of service technicians.

• Cost:
  • Technical solutions to mitigate flammability risks has extra costs;
  • Not yet reached the level of economy of scale;
  • Additional operations needed for installation and servicing.
Barriers for R-290 market penetration

• Visibility/availability:
  • Despite interest in R-290 products; they are not available through regular sales channels.

• Important to capture lessons learnt from current market introduction in China.
Italian bilateral component in China

• Integrated into the HPMP stage II;

• Main focus areas:
  • Identification of export barriers;
  • Risk assessment for R-290;
  • Standards;
  • Training; and
  • CO$_2$ HPWH demo.
China program in A/C sector

• Portable A/C:
  • R-290 technology established and accepted;
  • Italian influence through JV’s with China in combination with EU f-gas regulation.
Thank you for the attention!