Key Principles for Global Action to Reduce & Control HFC Emissions

By Andrea Voigt, EPEE
EPEE: the voice of the heating, cooling and refrigeration industry in Europe

1. Small – medium – large size entreprises
2. Over 200,000 direct employees, over €30bn turnover
3. Production throughout Europe
4. Using all types of refrigerants
5. Representing the full value chain of the heating, cooling and refrigeration sector
1. Introduction
The Goal and How to Get There

(1) Containment
(2) Competence
(3) Lower GWP
(4) Standards

HFC Emission Control & Reduction

✓ Safety
✓ Energy Efficiency
✓ Affordability
(1) Why Containment

Leaks ...

- Increase cost
- Increase emissions
- Increase energy use

Source: IIR 2010
(2) Why Competence

- Systems with high share of manual work on site have highest leakage rates
- Leakages occur often at joints and pipework due to vibrations and pulsations

Source: Ökorecherche et al. 2014
(3) Why Lower GWP

- Containment allows **stabilising** emissions in Europe
- **For further reduction**, a move towards lower GWP refrigerants is needed

Source: EU Commission
(4) Why Standards & Codes

- Safety is non-negotiable
- Standards & Codes need adaptation to allow for increased use of flammables
- Workforce needs skills
Two Approaches – One Goal
Phase-down in the EU and Japan
The Phase-Down Concept

• **Not refrigerant specific: Based on CO2-equivalent**
• Technology neutral
• Accelerates move towards lower GWP refrigerants
• Encourages containment & end-of-life recovery
• Promotes recycling
• Fosters innovation and competitiveness yet helps to reach environmental objectives

Photo: BSRIA
The Principle of CO$_2$-Equivalent

**CO$_2$-eq reduction:**
- Reduce GWP
- Reduce charge
- Containment
- Recovery

R-404A

39.22t CO$_2$-eq*

10 kg
GWP 3922

R-134a

14.30t CO$_2$-eq*

10 kg
GWP 1430

*kg x GWP
HFC Phase-Down rules in the EU & Japan: Two Approaches – One Goal

- The Phase-down targets **bulk refrigerant** producers & importers in EU
- Start from **historic baseline** 2009-2012 = CO$_2$-equivalents placed on the market
- Emissions increase due to market growth „compensated“ by containment & competence measures, end of life recovery
- The shape of the Phase-down is **determined top-down** by calculating reduction steps from the historic baseline.

- The Phase-down targets **equipment** manufacturers & importers of equipment in Japan
- **Target Index of weighted GWP** per equipment application segment
- The shape of the phase-down is a **bottom-up result** of applying the Target Indexes, containment and competence measures, end of life recovery.
- No top-down reduction steps are calculated from historic baseline.
The EU Phase-Down

2015 2016 2018 2021 2024 2027 2030
0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%
-7% -37% -55% -69% -76% -79%
The Japanese Phase-Down

<table>
<thead>
<tr>
<th>Equipment Category</th>
<th>Target Index (TI)</th>
<th>Target Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential a/c</td>
<td>750</td>
<td>2018</td>
</tr>
<tr>
<td>Light commercial a/c</td>
<td>750</td>
<td>2020</td>
</tr>
<tr>
<td>Car a/c</td>
<td>150</td>
<td>2023</td>
</tr>
<tr>
<td>Condensing Units &amp; stationary ref.</td>
<td>1500</td>
<td>2025</td>
</tr>
<tr>
<td>Large ref. Warehouses</td>
<td>100</td>
<td>2019</td>
</tr>
<tr>
<td>Hard Urethane foam</td>
<td>100</td>
<td>2020</td>
</tr>
<tr>
<td>Dust blower</td>
<td>10</td>
<td>2019</td>
</tr>
</tbody>
</table>

\[
TI = \frac{\sum (\text{kg} \times \text{GWP})_{\text{refrigerant}}}{\sum \text{kg}}
\]

Source: JRAIA
Conclusions from the EU & JP

All Roads lead to Rome ...

- A phase-down can be achieved in a variety of different ways;
- Containment, Competence and End of Life recovery are part of the equation;
- To ensure energy efficiency, safety and affordability, a thorough segmentation of the market and the development of technology roadmaps are crucial.
EPEE Principles for Global Action
The 5 Key Principles for Global Action

1. **A strong emphasis on energy efficiency**
   - Use Life Cycle Climate Performance (LCCP) to assess alternatives

2. **Control measures to reduce HFC consumption**
   - Containment
   - Competence
   - Phase-down principle

3. **A flexible approach**
   - Distinguish between Article 2 and Article 5 countries
   - Set „adaptive“ baseline to incorporate growth

4. **The establishment of solid data**
   - Segment the market
   - Establish technology roadmaps per segment
   - Build on existing experience

5. **Maintain regulatory certainty about ODS**
   - Do not delay phase-out of ozone-depleting substances
A Flexible Approach

- Art. 5 ≠ Art. 2
  - Population growth, fast urbanisation, electrification and changes in consumer behaviour
  - Development of the cold chain, especially commercial refrigeration, and the automobile industry (MAC)
- Measures need to be tailored to regions, climate and market dynamics
- Dialogue with local players in both Art. 5 and Art. 2 countries is crucial

Source: Velders et al.
A Thorough Segmentation of the Market as the Basis for Technology Roadmaps

Examples: New UNEP Factsheets – HFC Workshop 2015 (available here); SKM Enviros HFC phase-down study (www.epeeglobal.org)
An „Adaptive“ Baseline

- **HFC phase-down ≠ HCFC / CFC phase-out**
  - Many HFC alternatives are flammable, or toxic or operate at high pressure

- **The Baseline (in particular Art. 5 countries) needs to incorporate growth**
  - Model market growth („Business-as-Usual“ - BAU)
  - Model refrigerant choices by segment to identify total refrigerant needs over time
  - Calculate reduction steps from BAU Scenarios based on anticipated refrigerant needs

Example: Modelling of refrigerant choices for MT Condensing Units
Source: SKM Enviros 2012
Conclusions

EPEE calls for Global Action to Reduce HFC Emissions

- A **global framework** will give additional impetus to large scale market evolution
- **Containment, competence and consumption control** measures complement each other in reducing HFC emissions
- A **phase-down can be achieved in a variety of different ways**
- A thorough **segmentation** of the market, **assessment** of alternatives and anticipation of **market growth** will prevent policy makers from making mistakes
- Any framework needs to provide for **time** to adapt standards, building codes and the skills of the workforce

Industry has solutions, experience and a solid track record
Thank you for your attention!

Contact details:

EPEE
46 Avenue des Arts
1000 Brussels, Belgium

email: a.voigt@epeeglobal.org
Web: www.epeeglobal.org
Twitter: @EPEESecretariat
Linkedin: EPEE Secretariat