Bahrain – Kuwait

HFC Outlook

Visualizing scenarios for envisaging actions
Acknowledgements

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• the **EPEE experts** for their support and input to the discussions
Who is EPEE?

1. Small – medium – large size companies

2. Over 200,000 direct employees, over €30bn turnover

3. Production throughout Europe

4. Main Activities:
   - Promote Energy Efficiency
   - Ensure responsible refrigerant management
   - Raise awareness on market surveillance

5. Use of all types of refrigerants
1. Introduction: Modelling the HFC Phase-Down in Europe
   – the *EPEE Gapometer* Project

2. Development of *HFC Outlook*
   – a tool to model HFC phase-down scenarios
   – a project between EPEE, UNEP, Bahrain and Kuwait

3. Using *HFC Outlook* to Visualize the Phase-Down
   – insights available from a comprehensive modelling tool
THE EU HFC PHASE-DOWN & THE EPEE GAPOMETER
An additional 22 MT CO₂ (12%) for precharged equipment expected
EPEE’s EU Model and Gapometer Project

• **Modelling in 2012**
  – to support the negotiation of EU F-Gas Regulation
  – provided excellent insights into what was achievable
  – enabled EPEE to develop a position on EU phase-down proposals

• **Model used in 2015 – 2017 for the Gapometer project**
  – to prepare a Roadmap to show how phase-down steps can be achieved
  – to measure progress in the market and compare to the Roadmap requirements
  – to communicate key issues to policy makers and industry stakeholders
How to achieve the phase-down? Priorities of the EPEE Gapometer Roadmap

1. **Actions for new equipment**
   - use lower GWP alternatives
   - design for less refrigerant charge and low leakage

2. **Actions for existing equipment**
   - leak prevention
   - retrofit with low GWP alternatives

3. **Use of reclaimed refrigerant**
   - recovered from equipment at end-of-life
   - recovered during retrofit of existing equipment
Contributions from core actions

Reduction in MT CO₂

- New equipment: -36
- Existing equipment: -30
- Reclaimed refrigerant: -24

Baseline | 2018 | 2021
---|---|---
Million tonnes CO₂ equivalent | | |
200 | -64 | -39
150 | -36 | -20
100
50
0
Key Messages

2018 & 2021: Biggest challenge

• 44% and 60% reduction required

Roadmap shows priorities

• Refrigerants with lower GWP in new equipment
• Leakage reduction in existing equipment
• R404A retrofits
• Recovery and reclaim of refrigerants

Major risks if no action

• Refrigerant prices could jump by factor >20
• Some high GWP refrigerants could become unavailable
• Quality of installation could suffer if rapid action needed
• „Good“ EU countries still exposed to any shortages
DEVELOPMENT OF HFC OUTLOOK:
Why do we need a model?

Kigali HFC phase-down amendment agreed

Governments need to develop phase-down plans

HFC markets are complex

_HFC Outlook_ provides countries/regions with:

✔ in-depth understanding of historic / current use

✔ scenarios that predict possible future use

✔ a platform to develop a national / regional strategy

✔ a tool to develop stakeholder communication materials
Differences between EU and A5 countries

**Timetable**
- Phase-down timetable is much faster in the EU
- Developments in EU available to A5 via “international pull-through”

Will support transition in A5

**HCFCs**
- EU has stopped using HCFCs; HFC markets are mature
- Significant use of HCFCs in A5 countries + growing HFC use

Potential for leapfrogging in A5

**Extra rules**
- Mandatory leakage reduction, technician training, gas recovery
- Various additional product bans

Some of these could be considered in A5
Future A5 Baseline

- Baseline has HFC and HCFC components – 65% for A5
- The HFC component is based on future use – 2020 to 2022 for A5 (1), 2024 to 2026 for A5 (2)

Without a way of forecasting future consumption it is impossible to estimate the baseline or phase-down steps

HCFC vs. HFC phase-down

- HCFC phase-out requires a switch towards alternative gases, including HFCs
- Economic growth drives increased demand for RAC equipment

To develop a strategy, governments need to understand the split of HCFC/HFC use in each market sector, refrigerants/technologies, sectors with greatest potential for cost-effective actions ...
**HFC Outlook** for Bahrain and Kuwait

Pilot project with support and encouragement from UN Environment

**The process:**

- Data gathering from Bahrain and Kuwait NOOs, UNEP, industry stakeholders in Bahrain and Kuwait, EPEE experts
- Adapting the software of the EU model to the Kigali Amendment
- Tuning the “bottom-up” model outputs to “top-down” data
What is a „bottom-up“ model?

Total HCFC and HFC usage for countries based on national Montreal Protocol reporting

„Bottom-up“ outputs from HFC Outlook modelled to build realistic current estimate and future forecasts

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„Top down“ data reported from past years

Market sub-sector definition
Application, unit size (kW), charge size (kg), life cycle

Market sub-sector size
number of units in the sub-sector, and growth over time

Refrigerant choices in new equipment
these change over time e.g. CFC to HCFC to HFC

Refrigerant leakage rates per application
in new equipment; in older equipment; in response to policy change

End of life recovery & reclaim
**HFC Outlook Structure**

- **Input Module**: Data to characterise market sectors and future scenarios
- **Computation Module**: Analysis of input data to build detailed bottom-up model of requirement for HCFCs and HFCs
- **HFC Outlook Analyser**: Tool to present a wide range of technical & policy implications

- *HFC Outlook* is based on **8 main market sectors** and **up to 40 market subsectors** which can vary by country
- Each market sub-sector is characterised on an annual basis **between 1990 and 2050**
USING HFC OUTLOOK TO VISUALIZE PHASE-DOWN SCENARIOS
What does **HFC Outlook** show?

- **Modelling of historical data**
  - With comparison to reported data

- **Forecasts to 2026**
  - Kigali Baseline
  - Kigali phase-down steps

- **Forecasts to 2050**
  - Degree of compliance with phase-down steps
  - For each scenario

→ The following slides show data for an anonymised A5 country „X“
Bottom-up HFC Outlook model predicts the reported data
Gives confidence in model accuracy
HCFC forecast shown to 2050
HFC forecasts for 5 scenarios shown to 2030
Total baseline shown at time of freeze (2028 to 2031)
Phase-down steps to 2050 shown
Forecast to 2050 under Scenario 2 (compliant BAU)
Forecasts for all 5 HFC scenarios
More Detailed Analysis

• The **HFC Outlook** Analyser provides much detail
• The user can quickly select many parameters e.g.
  – Units
    • physical tonnes, CO$_2$(e), ODP tonnes
  – Main sector analysis
  – Sub-sector analysis
  – Output variables
    • e.g. gas consumption, gas bank, gas in new systems
  – Gases to be included
    • e.g. all gases, HFCs only, HCFCs etc.

• Can provide answers to many detailed questions
Consumption Forecast in kTonnes CO₂

Data displayed by “gas type”
Ray Gluckman, Gluckman Consulting, will demonstrate the model with 'real-time' simulations:

Inter-regional thematic and network meetings for National Ozone Officers

Paris, France
15-19 January 2018
Conclusions

The phase-down is feasible:
But it won’t be a walk in the park

Success depends on many factors:
• Technology
• Competence
• Careful planning
• Recovery

HFC Outlook provides useful input into strategy development
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Thank you for your attention – Questions?