Achieving the EU HFC Phase Down: The EPEE “Gapometer” Project

EU Phase Down Roadmap:
Understanding the actions required by each HFC end-user sector
What is the EPEE Gapometer Project?

A 2-stage project to understand and monitor the phase down of HFCs in the EU

• **Stage 1:** EU Phase Down Roadmap (developed 2015)
  – to show how the challenging phase down targets can be met
  – creating a good understanding of what actions must be taken

• **Stage 2:** Monitoring progress (in 2016 and 2017)
  – market research to assess the actions being taken
  – and to identify any significant “gaps” between required and actual progress
The Phase Down Journey and the EPEE Roadmap

Current HFC consumption

Intermediate Milestones

2030 Target

Where does the journey take us?
Baseline does not include pre-charged imports – a further 22 MT CO₂ (12%). From 2017, included in quota.

2015: Start point
183 MT CO₂
Based on average EU HFC consumption 2009-2012

2030: Final target
38 MT CO₂
- a cut of 79%
Early milestones in 2018 and 2021 are very challenging
The challenges in 2018 and 2021

This Roadmap illustrates one route to achieve these challenging cuts

Intermediate Milestones

60% cut -123 MT CO₂

44% cut -90 MT CO₂
"Core Actions" to achieve the EPEE 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
Drivers of HFC Demand: the 8 Main Market sectors

Baseline Split (of 205 MT CO2)

- Commercial Refrig: 28.7%
- Stationary AC & HP: 23.0%
- Mobile AC: 14.8%
- Non RAC: 13.3%
- Industrial Refrig: 10.0%
- Chillers & Hydro-HP: 8.6%
- Domestic Refrig: 0.2%

20 sub-sectors add granularity to roadmap modelling

- Small hermetic
- Condensing units
- Large pack systems
- Cars and small vans
- Other MAC (buses, trains etc.)
- Foams
- Aerosols (technical)
- Aerosols (medical)
- Fire protection
- Solvents

- Small hermetic
- Large A/C chillers
- Small A/C chillers
- Domestic heat pumps
- Commercial heat pumps
- Small/medium/large DX
- Pumped/flooded
- Process Chillers
- Small/medium/large splits
- VRF/Packaged
- Small hermetic
- Small/medium/large splits
- VRF/Packaged
Roadmap Scenario: Contributions from Core Actions

Cuts in MT CO₂

- New Equipment: -64
- Existing Equipment: -39
- Reclaimed Refrigerant: -20

Baseline: 200
2018: 100
2021: 50

Million tonnes CO₂ equivalent
Roadmap Scenario: Contributions from Main Market Sectors

Cuts in MT CO₂

-47 Commercial Refrigeration
-12 Industrial Refrigeration
-15 SAC
-15 Mobile AC
-20 Non RAC

Chillers
Transport
Taking a step back: is the Roadmap Scenario achievable?

- it is based on **feasible but challenging** assumptions
- needs concerted effort from numerous stakeholders
  - end users
  - installation / maintenance contractors
  - equipment suppliers
  - refrigerant manufacturers
  - refrigerant supply chain (for recovery and reclaim)
  - authorities / institutions (standards, legislation, training)
- needs early action
  - before certain ban dates
  - before refrigerant price rises
Examples of Roadmap Scenario Modelling Assumptions

- early switch from R-404A to lower GWP alternatives
- small split air-conditioning: switch from R-410A to R-32 and HFC/HFO blends
- retrofit of R-404A systems affected by service ban
- significant efforts made to reduce leakage in large commercial refrigeration systems
- significant use of reclaimed refrigerants between 2017 and 2025
Average GWP of refrigerants in new commercial refrigeration
R-404A is quickly phased out in new commercial refrigeration equipment. It is replaced with a range of different low GWP alternatives.
GWP trend as market moves away from R-410A

Average GWP of refrigerants in new small / medium split air-conditioning
New Equipment

R-410A is phased out in new small / medium split air-conditioning equipment. It is replaced with lower flammability refrigerants such as R-407C, R-32, and R-32 / HFO blends.
Leakage assumptions for 3 market sectors

By 2018 we need average leakage from commercial refrigeration below 10%
We need nearly half of supermarket packs retrofitted by end 2017 – a tough challenge.
Assumed reclaim rates can be improved if proper action is taken.

If reclaim rate is doubled the impact on the required cuts will be very significant – an extra 20 MT CO₂ cut in both years.

But, significant new infrastructure required to support active reclaim industry.
Key risks to missing the 2018 and 2021 targets

- Continued use of R-404A in new equipment
- Poor customer awareness of low GWP alternatives
- Concerns over using lower mildly flammable refrigerants (standards, building codes are not ready yet; adaptation will take time)
- Lack of products and components for key market sectors
- Slow phase-out of HFCs in foam blowing

- Slow progress to retrofit R-404A in commercial and industrial refrigeration
- Inadequate improvement to current leakage levels
- Lack of available contractors

- Lack of infrastructure to collect and re-process recovered refrigerants
- Inadequate use of reclaimed / recycled HFCs

- Impact of restrictive safety codes and legislation on flammable refrigerants
- Lack of adequately trained installation / maintenance engineers
- Impact of baseline being too small (HCFCs, unreported HFCs, pre-charged import)
- Lack of quota enforcement and low HFC prices
Possible ways to speed up HFC phase down

- Small and medium sized split air-conditioning: faster introduction of HCs, R-32 and HFO / HFC blends
- Condensing units and VRF air-conditioning: earlier introduction of mildly flammable refrigerants
- Chillers: faster introduction of HFOs, HCs, ammonia and HFC-32
- Commercial, industrial and transport refrigeration: faster introduction of CO₂ and other low GWP options
- Monobloc heat pumps: earlier introduction of HCs and other low GWP options
- Aerosols, foam blowing, fire protection: replacement of HFCs ahead of bans

- Early and increased retrofit of R-404A systems with lowest GWP possible
- Retrofit of medium and large sized systems using R-410A and R-134a
- Faster leakage reduction in existing systems

- More significant use of reclaimed and recycled HFCs
What does the Roadmap Scenario tell us?

- an early move away from R-404A in new systems is important
- introduction of a range of new lower GWP fluids for new equipment and products needs to be done quickly – but impact will probably be after 2018
- wider use of flammable refrigerants (both A3 and A2L) is vital

- early retrofit of R-404A is crucial
- leak prevention remains important – proper implementation of rules in the EU F-Gas regulation is key

- compliance with mandatory recovery rules is important
- setting up a good infrastructure for reclaim / recycling is crucial

- safety codes / legislation and training issues must be addressed
- the 2018 phase-down step cannot be achieved if everyone waits for bans
What does the Roadmap Scenario tell us?

Current HFC consumption

Intermediate Milestones

2030 Target

It is possible to achieve the phase-down, but it will be very challenging, especially in 2018 and 2021
Thank you very much for your attention

Questions?

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