EPEE Side-Event
30th Meeting of the Parties to the Montreal Protocol, Quito

Nov. 2018
Ecuador
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<tr>
<th>Time</th>
<th>Topic</th>
<th>Speaker</th>
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<tr>
<td>18:00 – 18:10</td>
<td>Welcome and introduction</td>
<td>Andrea Voigt, EPEE</td>
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<tr>
<td>18:10 – 18:20</td>
<td>EPEE Lessons Learned from the EU F-Gas Regulation</td>
<td>Andrea Voigt, EPEE</td>
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<td>18:20 – 18:30</td>
<td>The Australian approach</td>
<td>Greg Picker, Refrigerants Australia</td>
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<td>18:30 – 18:40</td>
<td>The Japanese apprach</td>
<td>TBD</td>
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<td>18:40 – 18:50</td>
<td>Update on the EPEE-UNEP HFC Outlook Model</td>
<td>Shamila Nair-Bedouelle, UNEP OzonAction</td>
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<td>18:50 – 19:00</td>
<td>Conclusions</td>
<td>Andrea Voigt, EPEE</td>
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Networking Cocktail
INTRODUCTION

HVACR QUO VADIS?
Who is EPEE?

Founded in 2000, headquartered in Brussels

Currently 48 members from three continents:
• OEMs: heat pumps, a/c, refrigeration
• Component manufacturers
• Gas producers
• Installers
• National & international associations
Global Trends: Opportunity & Responsibility

- Climate Change
- Population Growth
- Urbanisation
- Standard of living
How HVACR can contribute:
Refrigerants are just one part of the puzzle!

SDGs
- Paris Climate Agreement
- Montreal Protocol / Kigali

Sustainable Heating & Cooling

- Renewables
- Ressource Efficiency
- Energy Efficiency
- Refrigerants
- IAQ/IEQ

Electrification
- Thermal Systems and Storage
- SMART BACS IoT
- MEPS
- Service Maintenance
- Low GWP

Everything is interlinked
The EU F-Gas Regulation

KEY PRINCIPLES AND STATUS
The 4 main pillars of the F-Gas Regulation

- Sectoral bans
- HFC phase-down
- Competence
- Containment
The EU HFC phase-down vs. Kigali

- EU phase-down much steeper than Kigali
- Baseline: average quantities placed on EU market between 2009 and 2012 (‘grandfathering’)
- 10% New Entrants Reserve
- Only bulk gas manufacturers and importers can apply for quota
- Importers of precharged equipment need authorisations for HFC contained in equipment

Source: UNIDO
How does the phase-down work?

The phase-down is based on CO2-equivalents and it is not sector specific

• It does not ban specific refrigerants but impacts particularly those with a high GWP

• Calculation of CO2-equivalents: kg x GWP

• There are several ways to ease the pressure of the phase-down:
  1. Reduce the GWP of the refrigerant
  2. Reduce the refrigerant charge size of the equipment
  3. Reduce leakages
  4. Recover, recycle and reclaim refrigerants
On track: Progress under the EU Phase-Down

Stockpiling in 2014 led to a false feeling of security in 2015/2016

EU Price Monitoring

- Stockpiling in 2014
- Lack of understanding
- Lack of anticipation

Source: Ökorecherche 10/2018, Monitoring of HFC prices in the EU
The European Experience

7 LESSONS LEARNED FROM EUROPE
Preliminary remarks

• The full paper can be downloaded on the EPEE website: [www.epeeglobal.org](http://www.epeeglobal.org)

• The EU approach is ONE of MANY ways to achieve HFC consumption reduction steps. There is no one-size-fits-all solution and rules always need to be adapted to the particularities of the respective country and market.

• Developed and developing countries have different characteristics and need tailor-made measures considering many different factors such as market size, manufacturing base or relying on imports, etc.
Containment & Competence should be the basis of any measure targeting direct f-gas emissions

How to achieve containment:
- Design
- Quality of manufacturing
- Quality of installation & maintenance

The F-Gas Regulation requires:
- Regular leak checks
- Leak detectors for larger systems
- Certification requirements for technicians
- Labelling
Lesson #2: Data & Communication

Governments should reach out to the entire supply chain to ensure successful design and implementation of regulation.

To ensure the safe and efficient operation of HVACR equipment:

- **Cooperation**: Governments need to reach out to industry to understand the market.

- **Data**: Policy measures need to be based on solid data: e.g., EPEE commissioned several studies (Armines, SKM Enviros, Gluckman Consulting).

- **Communication**: All stakeholders need to be aware of the new measures and understand how they will impact them to anticipate compliance.

Otherwise risk of disproportionate price increases, refrigerant shortages, illegal imports ...
Lesson #3: Governance

The phase-down principle works but requires excellent governance.

- Communication: Ensure understanding by all stakeholders.
- Anticipation: Put in place measures early enough to achieve phase-down steps.
- Design: Ensure level playing field for OEMs (‘precharged’).
- Flexibility: Allow for some flexibility to adapt to market situation.
- Enforcement: Establish market surveillance and penalty schemes.

Put in place measures early enough to achieve phase-down steps.
Lesson #4: Alignment

When combining different measures, they need to be aligned and their respective role clearly communicated to the market.

- Opinions diverge whether sectoral bans are necessary & when they should kick in.
- Stakeholders must understand that the phase-down will force the move twds lower GWP refrigerants.
- Sectoral bans must not be used as an excuse by market players to hold back on necessary action to comply with the phase-down.
Lesson #5: Anticipation

Building codes and standards need to be ready for and aligned with national legislation.

- **EU Level**
  - F-Gas Regulation

- **National Level**
  - Building Codes

- **Local Level**
  - Fire fighting departments etc.

- The lower the GWP of a refrigerant, the more likely it will be flammable.

- Building codes at national level or at local level are mandatory and sometimes prohibit the use of flammable refrigerants.

- National and local building codes need to be adapted to the use of flammable refrigerants.
Recovery, recycling, reclaim and reuse of gases are crucial elements to achieve HFC consumption and emission reductions.

- Adequate infrastructure
- Waste legislation needs to allow for the transport of used refrigerant across borders
- Careful monitoring to avoid that virgin product is filled in cylinders that are labelled as “reclaimed”: buying from reputable sources will reduce that risk
Lesson #7: Indirect Emissions

Energy efficiency should not be compromised by F-Gas rules and should be addressed in dedicated legislation.

➔ The largest share of emissions from HVACR equipment is due to the energy use (‘indirect’ emissions)

➔ To effectively reduce emissions, dedicated legislation is indispensable, e.g. for buildings (EPBD) and products (MEPS, energy labelling)

➔ When designing phase-down measures, the need for refrigerants that allow for higher efficiency needs to be considered.
• HVACR is indispensable for a safe and comfortable life in today’s society.

• The HVACR market will grow significantly in the coming decades: this is an opportunity for the industry but also a huge responsibility.

• There are many top of the line, sustainable technologies readily available.

• Refrigerants are just one piece of the puzzle and the HFC phase-down is just one tool among others to achieve emission reductions.

• Direct measures such as containment, recycling/reclaim and charge size reduction can be very effective and should be prioritized.

• Indirect emissions represent the largest share and need to be addressed in dedicated legislation.
The Australian Approach
Australia’s HFC Phasedown

Greg Picker
What is the back story?

- Impact of carbon price
- Dramatic impact on prices
- Market went haywire
- Lower GWP gases won
Australia’s domestic HFC phasedown

- Australia’s first level is 8mt – more than 20% less than allowed
- Steps every 2 years and reasonably consistent
- 2029 required a revamping of initial phase down plan
- Australia phasedown ends at same point as Kigali phasedown
Australian legislation – other issues

• Passed 2017
• Covers bulk gases only
• Government can implement product bans. Note 3 types
  • Service ban (not allowed)
  • Proactive product ban
  • “Rats & Mice” product ban
• Consideration of possible ban on R134a in motor vehicles
Australian legislation - quota

- Began 1 January 2018
- Bulk imports only
- 90% grandfathered – baseline 2009 to 2014
- 10% “additional”: divided equally if possible – license required to bid
- Half of additional quota will be made grandfathered in 2020
- 5% remains temporary

"Only two cookies? What is this — a quota system?"
Figure 1: Refrigerant bank (actual) by species from 2016 to 2030 in tonnes.
Projections: change in market ($CO_2$)

Bank (actual) by species from 2016 to 2030 (Mt CO$_{2e}$)

Figure 1: Refrigerant bank (actual) by species from 2016 to 2030 in Mt CO$_{2e}$. 
Thank You

Greg Picker
greg.picker@refrigerantsaustralia.org
The Japanese Approach
### Designated Products

<table>
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<tr>
<th>Designated Products</th>
<th>Target GWP (Weighted Average GWP)</th>
<th>Target year</th>
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<tbody>
<tr>
<td>Residential A/Cs (Mini-Split)</td>
<td>750</td>
<td>2018</td>
</tr>
<tr>
<td>Commercial A/Cs (Split / smaller than 6HP*)</td>
<td>750</td>
<td>2020</td>
</tr>
<tr>
<td><strong>Larger Commercial A/Cs</strong> (Split / exclude VRF)</td>
<td>750</td>
<td>2023</td>
</tr>
<tr>
<td>Centrifugal (Turbo) Chillers</td>
<td>100</td>
<td>2025</td>
</tr>
<tr>
<td>Mobile A/Cs</td>
<td>150</td>
<td>2023</td>
</tr>
<tr>
<td>Condensing unit &amp; refrigerating unit</td>
<td>1500</td>
<td>2025</td>
</tr>
<tr>
<td>Cold storage warehouses</td>
<td>100</td>
<td>2019</td>
</tr>
<tr>
<td>Urethane foam</td>
<td>100</td>
<td>2020</td>
</tr>
<tr>
<td>Dust blowers</td>
<td>10</td>
<td>2019</td>
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Regulated by “Act on Rational Use and Proper Management of Fluorocarbons”

**RACHP sectors**

*To be added in April 2019*

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**Japan: a ‘bottom-up’ approach to achieve HFC consumption reductions**
Japan and the Kigali Amendment

We are here!

HFC phase down

Expected consumption of HFCs in Japan if target GWP values and years are met
Actions to shift low-GWP refrigerants

**EQUIPMENT**

Energy Saving
- Energy Efficiency
- Emission control on CO₂ basis

**REFRIGERANTS**

Direct Emission Control
- Promotion of recovery
- Measures against leakage (proper management of refrigerants)
- Reduction of amount charged into equipment

**ALTERNATIVE REFRIERGANTS**

Acceleration to shift to new refrigerants
- Research of low GWP refrigerants
- Risk Assessment

- Energy Conservation Law
- Top Runner Program
- Act on Rational Use & Proper Management of Fluorocarbons
- Home Appliances Recycling Act
- EoL Automotive Recycling Act
- High Pressure Gas Safety Act
EPEE-UNEP OzonAction
HFC Outlook Model

Shamila Nair-Bedouelle & Ayman ElTalouny
OzonAction, Law Division
UN Environment Programme, OzonAction
What are the Issues...

- Unconstrained Scenarios
- Collecting information on market direction
- Selection of technology for investment projects to be funded

ODS Alternatives Surveys

- Better understand historical and predicted consumption trends for ODS alternatives
- Forecasts of future use (2016-2030)

- Longer list of candidates
- Different technology directions for key industry and technology providers
- Policies for local vs export markets at technology providers origins

Complexity of Trends

HPMPs
ODS Alternative's Surveys

Data analysis and assessment

(a) Growth patterns in consumption of ODS alternatives by substance:

(i) growth patterns of sector and subsector where ODS alternatives are used (up to 2030);

Develop a methodology for forecasting growth of ODS alternatives used in each sector/subsector;

(ii) Review the historical (from 2012) data for the use of each ODS alternatives and forecast their growth (up to 2030);

(iii) Estimate

(b) Analysis of the data on the production of ODS alternatives to determine trends, where applicable;

(c) Describe opportunities and challenges for introducing low-GWP alternatives for the applications: review national regulations and standards; identify barriers that limit the introduction and how these could be addressed, (e.g., safety concerns related to flammable alternatives, lack of domestic standards); and

(d) Describe linkages to the HCFC phase-out management plan (HPMP), giving due consideration to how the phase-out of HCFCs has influenced the introduction of ODS alternatives and the difficulties encountered.
Lessons Learned

HCFC phase out management plans (HPMPs) and Surveys

1. Trend analysis and foreseeing technology penetration is not straightforward exercise, it needs to take into consideration
   a) Each sector technology availability
   b) Source of technology (local vs. imported), even source of import
   c) Understanding economics of each subsector

2. Linking trend with Socioeconomics and local development plan and forecast for growth rates
   a) Growth rate differ from one sector to another i.e. residential vs. commercial
   b) Understand how mega projects may impact on some subsector

3. Impact of International policies on the projection of alternatives penetration to local market
• Countries that ratify the Kigali Amendment need to prepare for the required consumption reduction steps.

• The examples of Europe, Australia and Japan show that there are many different ways to do so.

• Solid data gathering and projection tools are a precious support for governments to identify the best way forward for their specific country.

• It’s in this context that the *HFC Outlook* Model was developed by EPEE, Gluckman Consulting and UNEP OzonAction.
The development of **HFC Outlook**: Reasons and benefits

**Kigali HFC phase-down amendment**

**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
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
Phase 1: **HFC Outlook** for Bahrain and Kuwait

Pilot project with support and encouragement from UNEP OzonAction - completed

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
Phase 2: 8 more countries join the project

- Guatemala
- Honduras
- Senegal
- Dominican Republic
- Gabon
- Bosnia-Herzegovina
- Sri Lanka
- Mali
Thank you for your attention – Questions?

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