

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

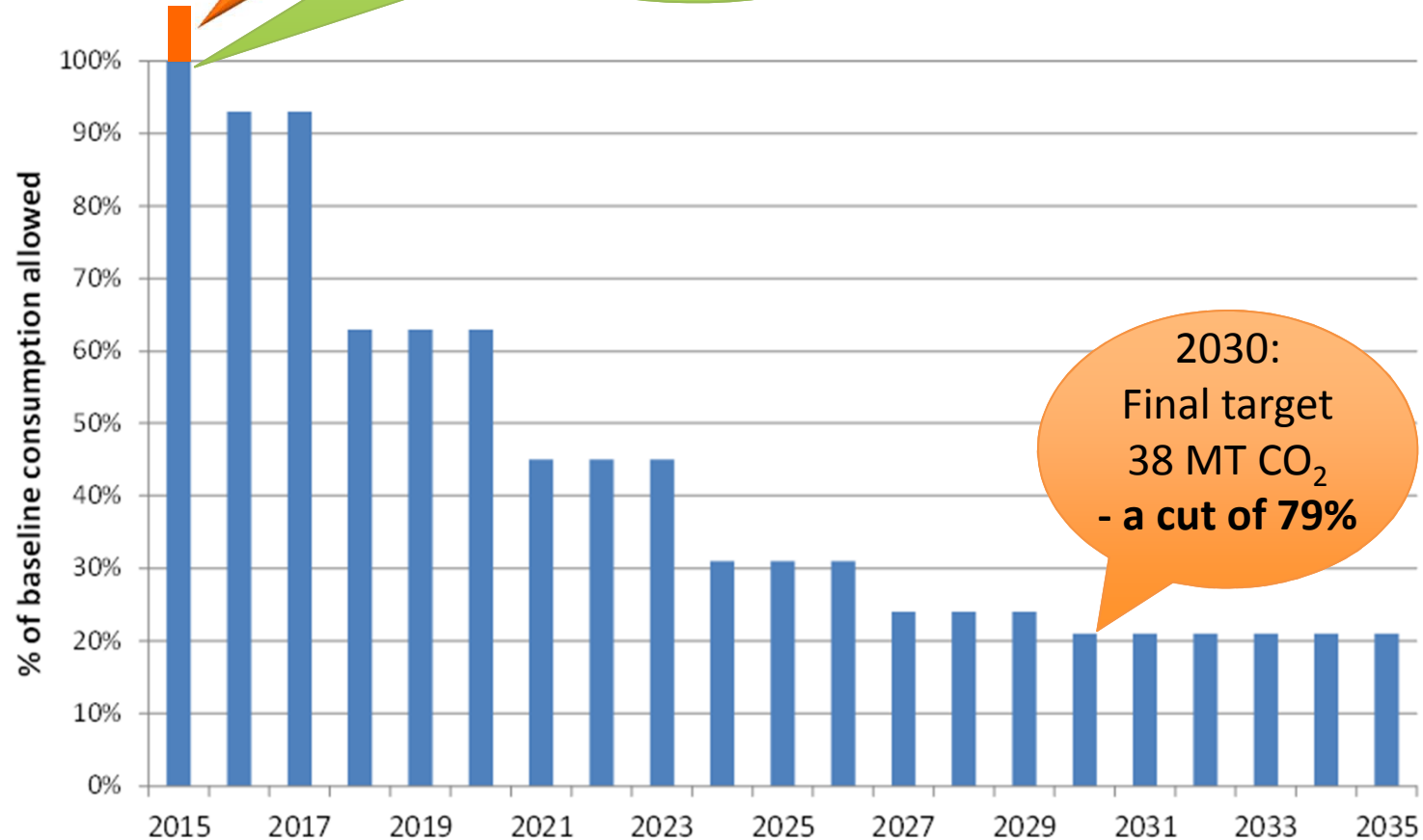
Where does the
journey take us?

The EU HFC Phase down profile



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%

The Phase Down Journey and the EPEE Roadmap



Early milestones in 2018 and 2021 are very challenging

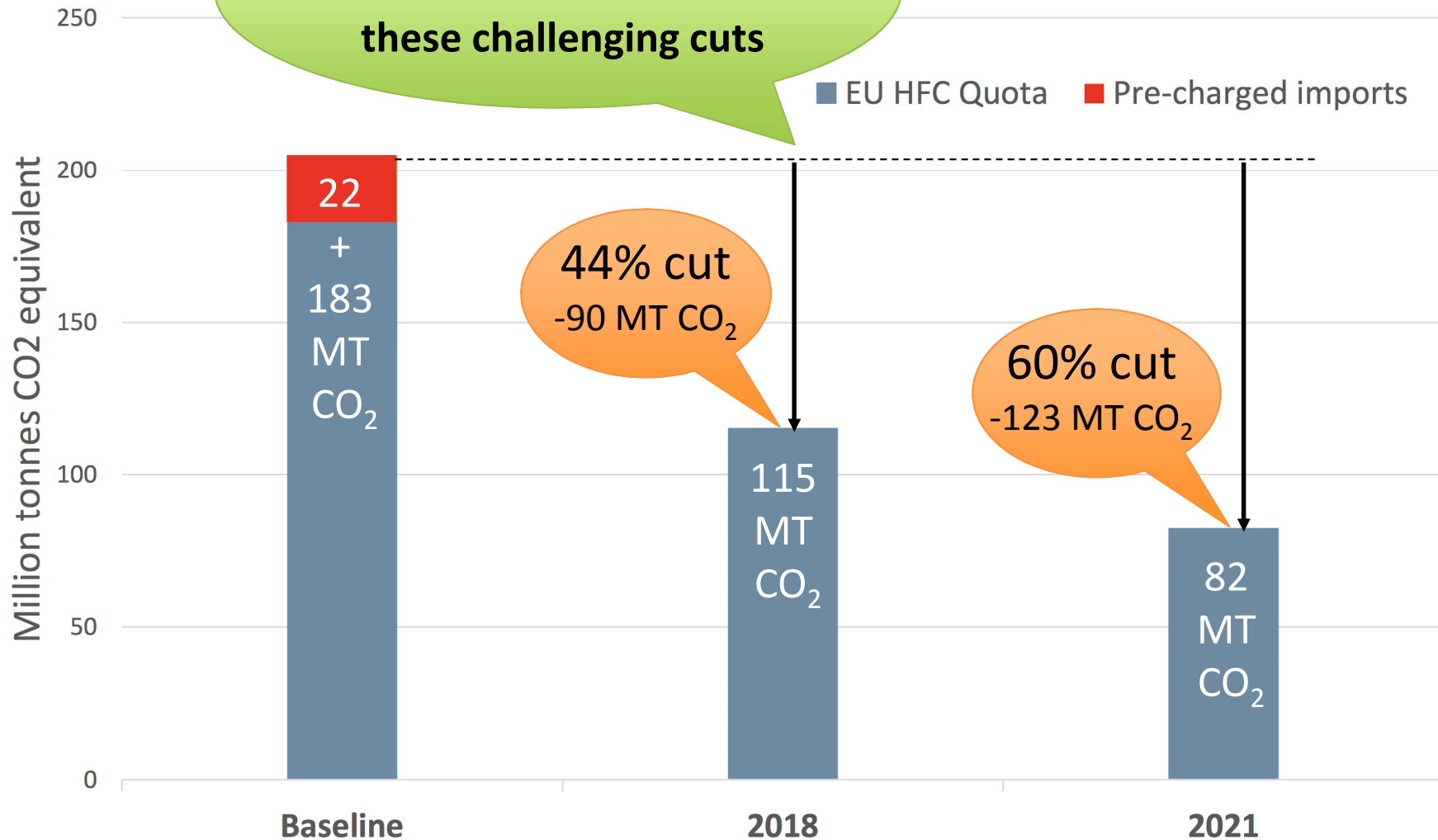
Current HFC consumption

Intermediate Milestones

2030 Target



This Roadmap
illustrates one route to achieve
these challenging cuts



"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



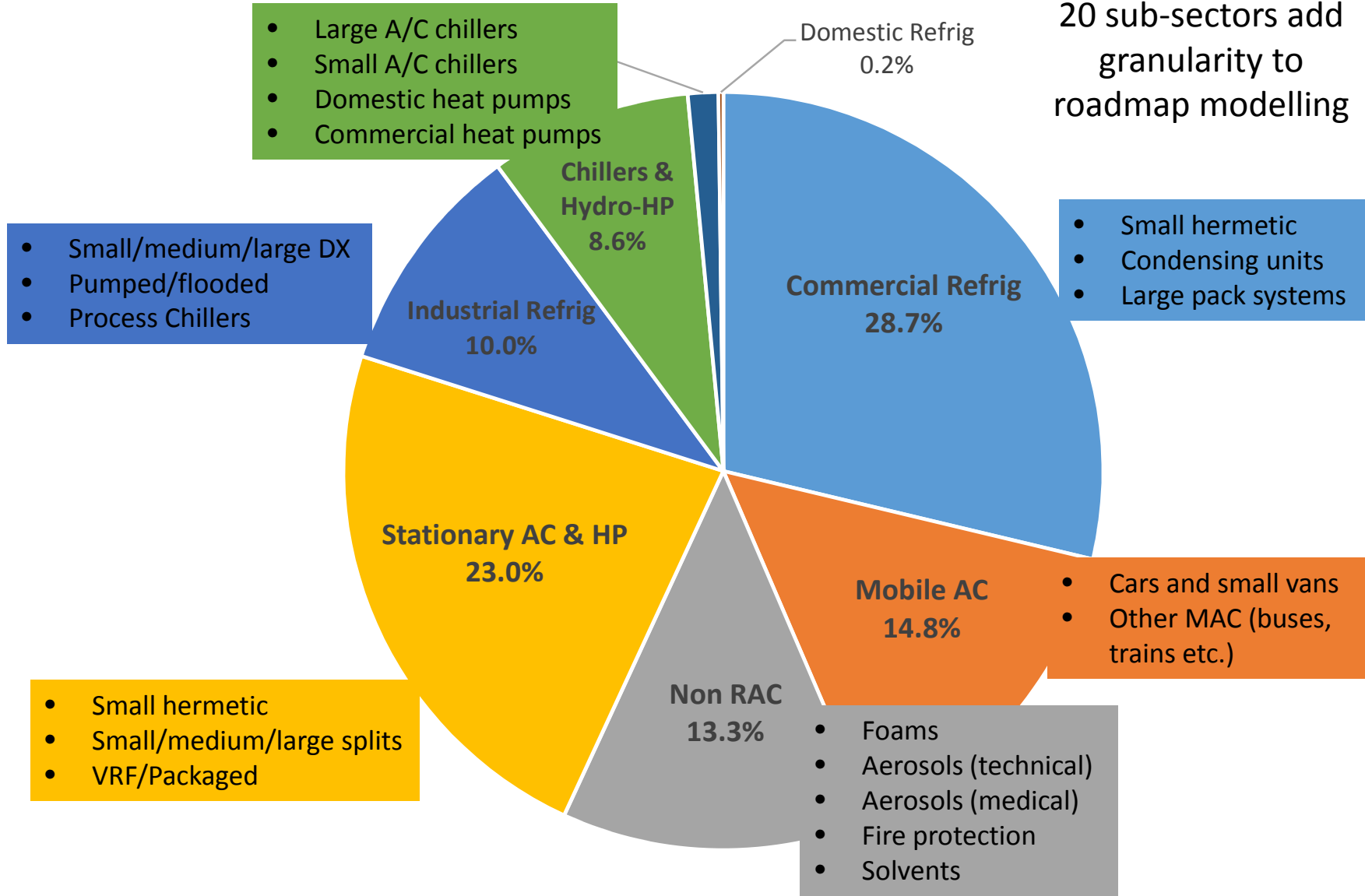
3. Use of reclaimed refrigerant

- recovered from equipment at end-of-life
- recovered during retrofit of existing equipment

Drivers of HFC Demand: the 8 Main Market sectors

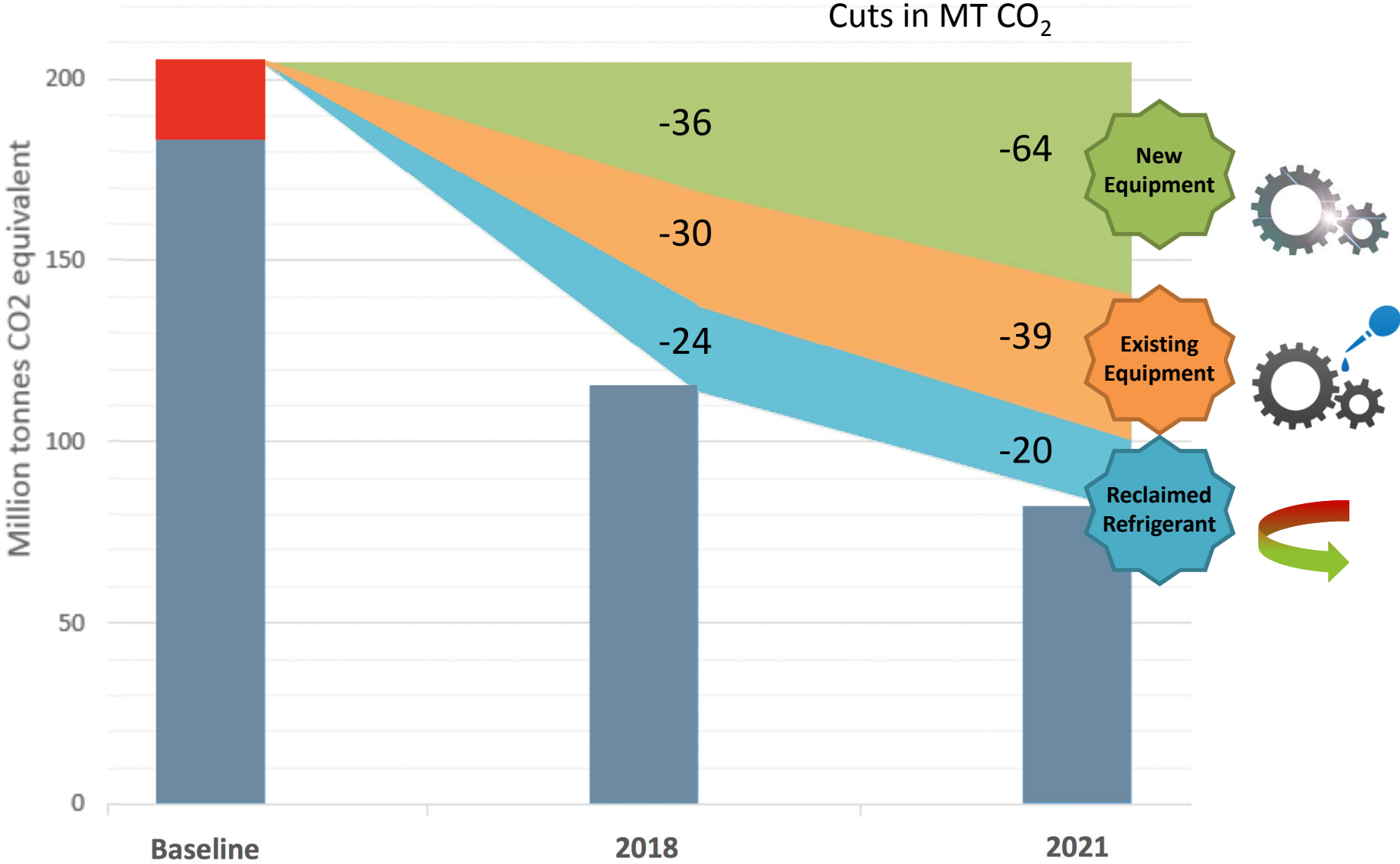


Baseline Split (of 205 MT CO2)



20 sub-sectors add granularity to roadmap modelling

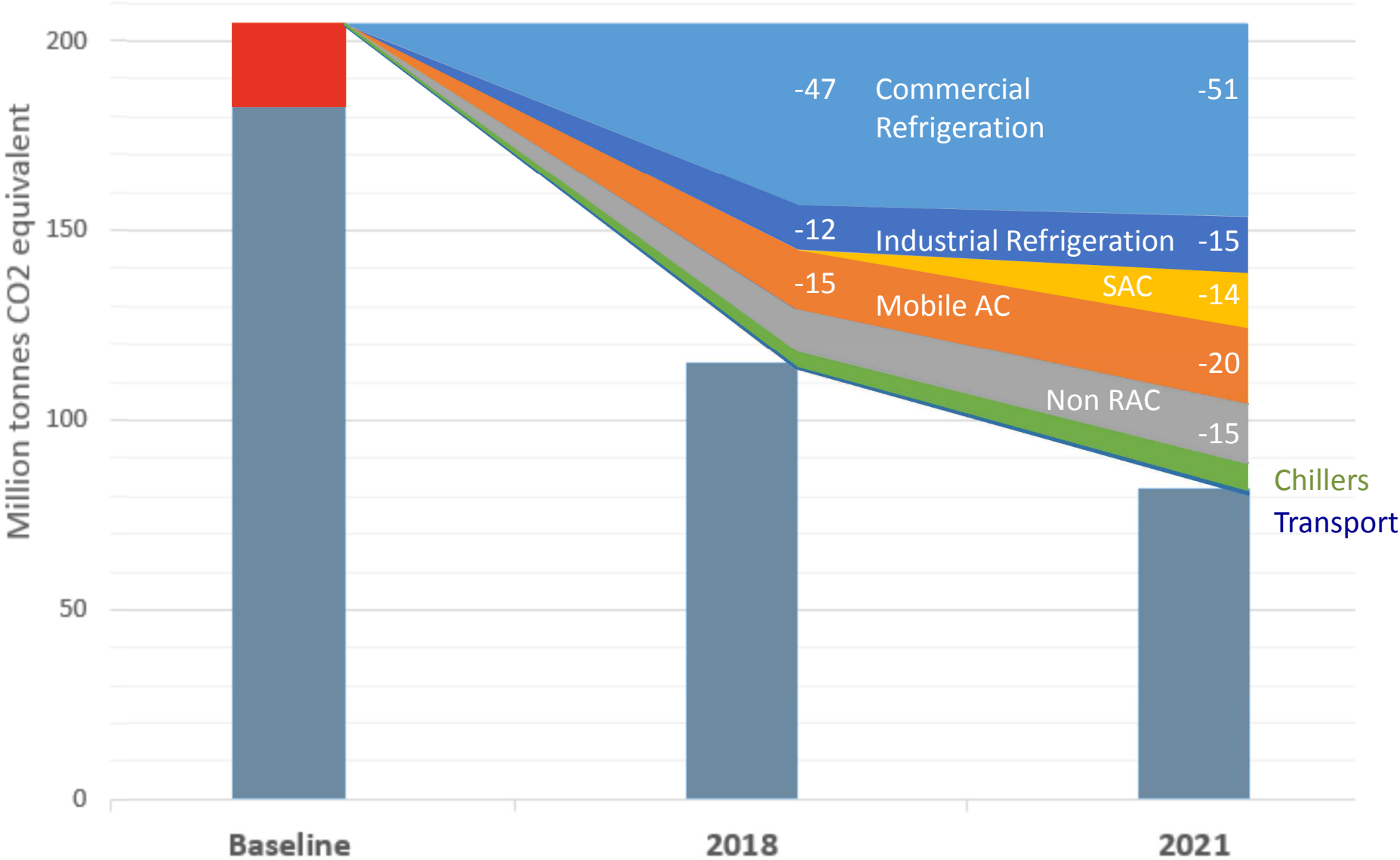
Roadmap Scenario: Contributions from Core Actions



Roadmap Scenario: Contributions from Main Market Sectors



Cuts in MT CO₂



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



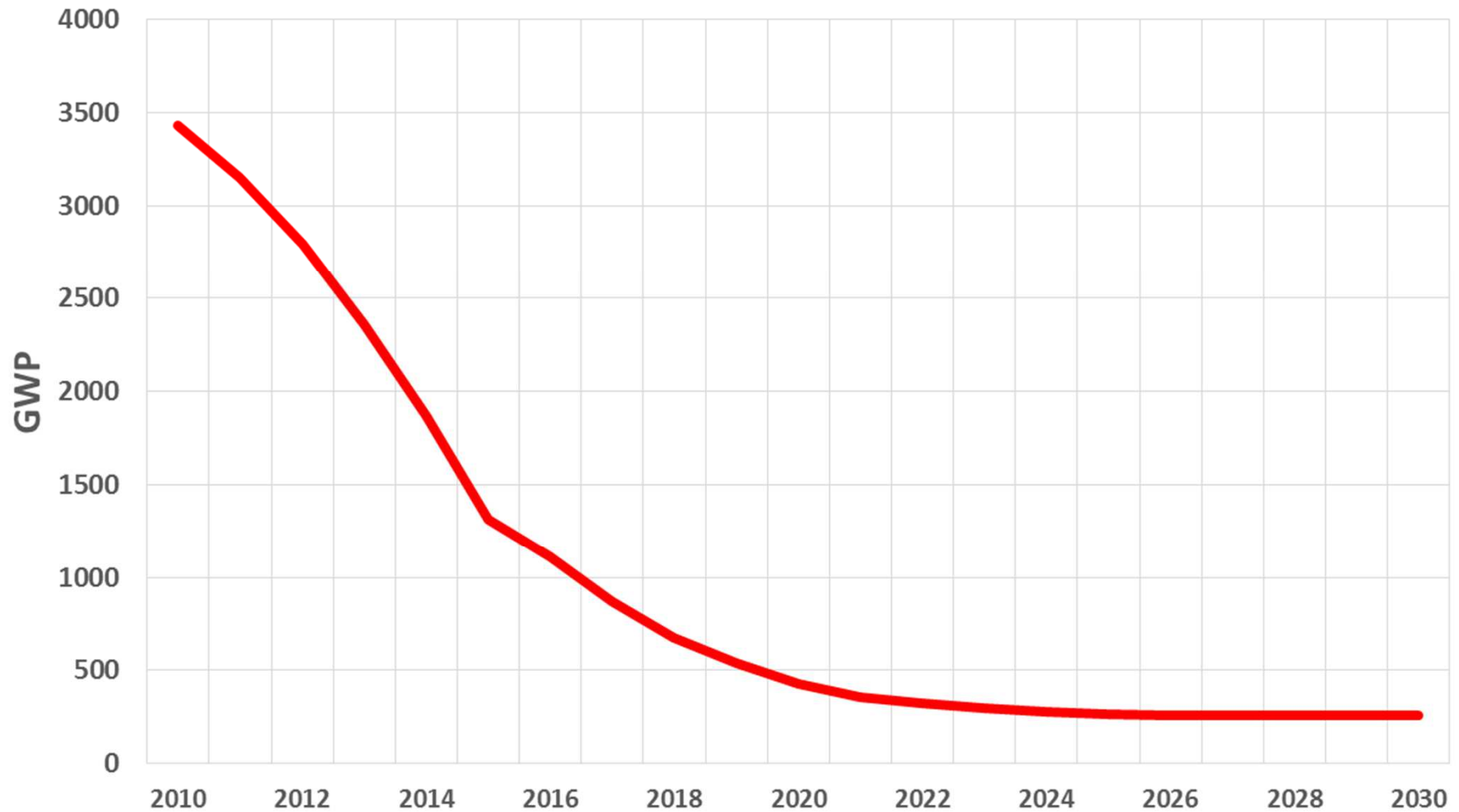
- significant use of reclaimed refrigerants between 2017 and 2025

New
Equipment

GWP trend as market moves away from R-404A

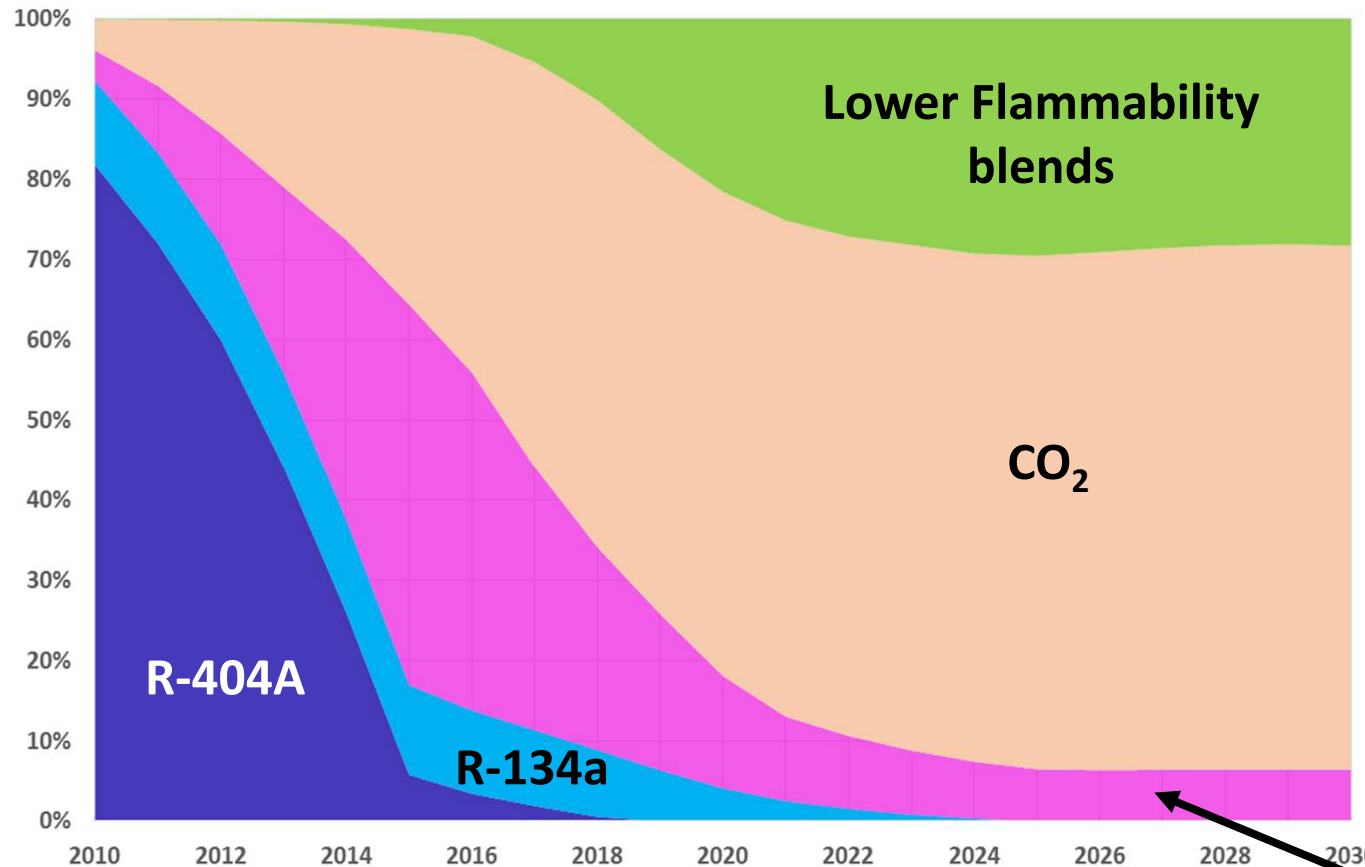


Average GWP of refrigerants in new commercial refrigeration



New Equipment

% of total tonnes of refrigerant used in new commercial refrigeration equipment



R-404A is quickly phased out in new commercial refrigeration equipment

It is replaced with a range of different low GWP alternatives

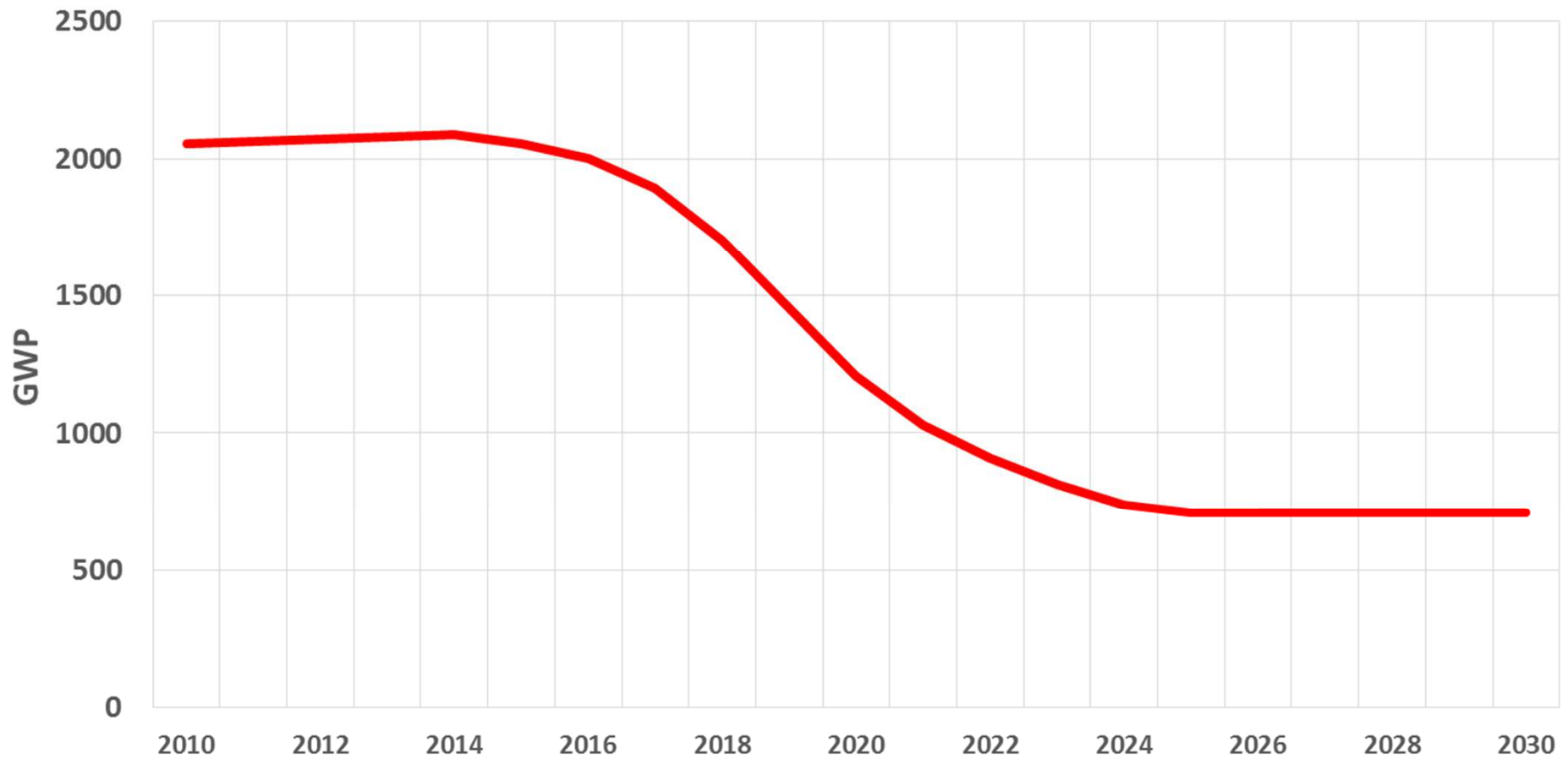
Non-flammable blends
(GWP 1400 – 2100)

New
Equipment

GWP trend as market moves away from R-410A

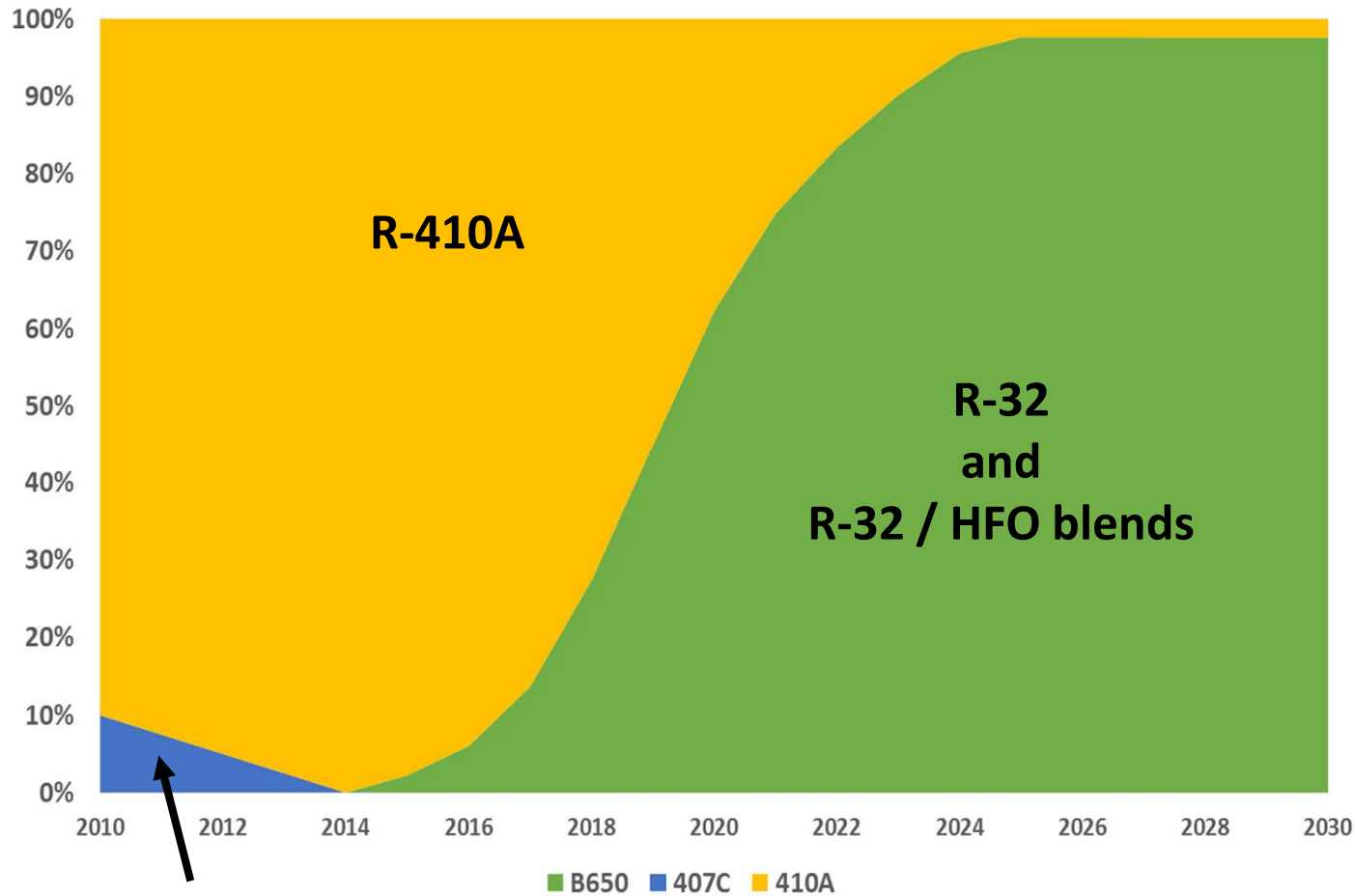


Average GWP of refrigerants in new small / medium split air-conditioning



New Equipment

% of total tonnes of refrigerant used in new small / medium split air-conditioning equipment



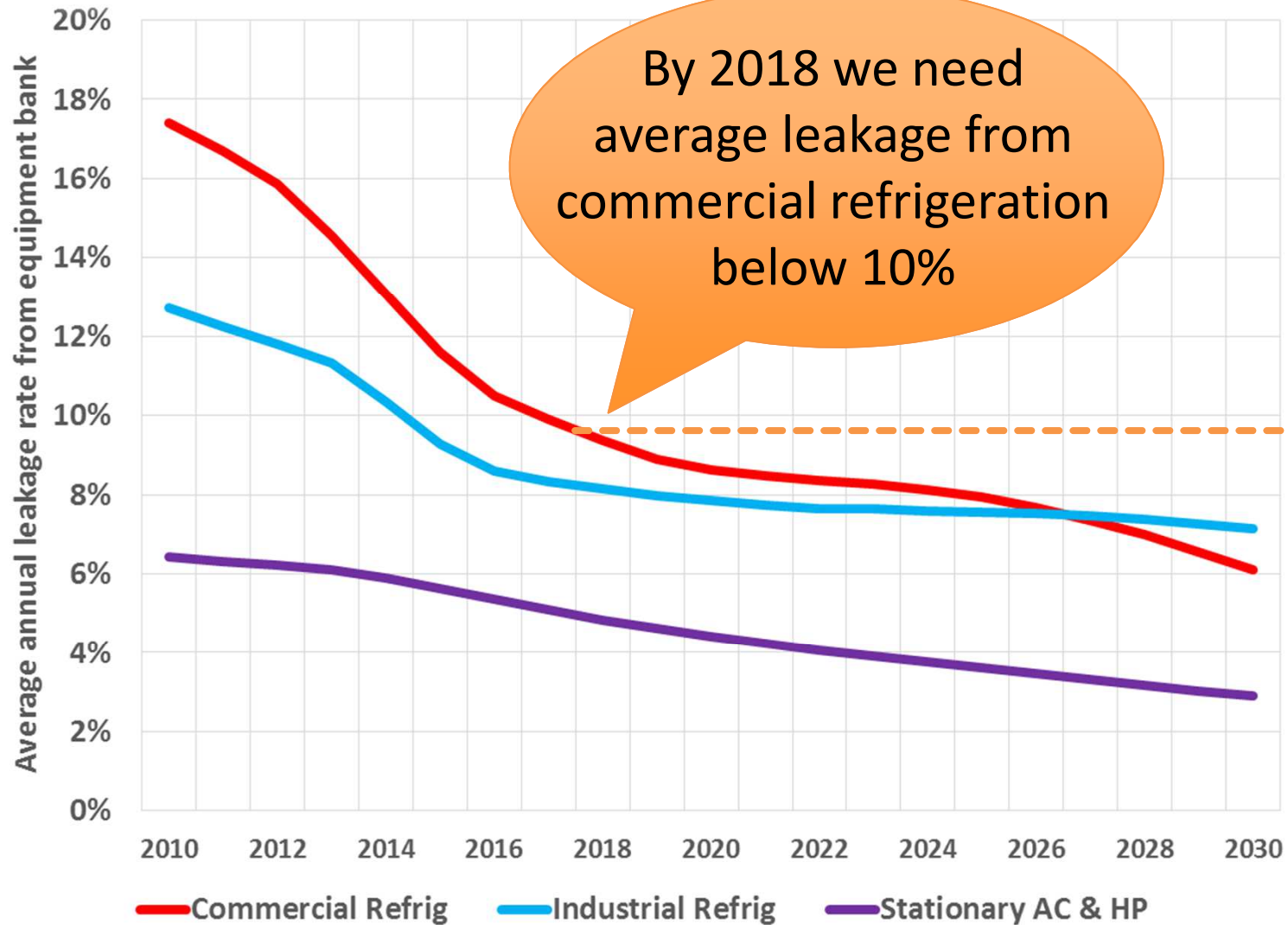
R-407C

R-410A is phased out in new split air-conditioning

It is replaced with lower flammability refrigerants

Existing
Equipment

Leakage assumptions for 3 market sectors

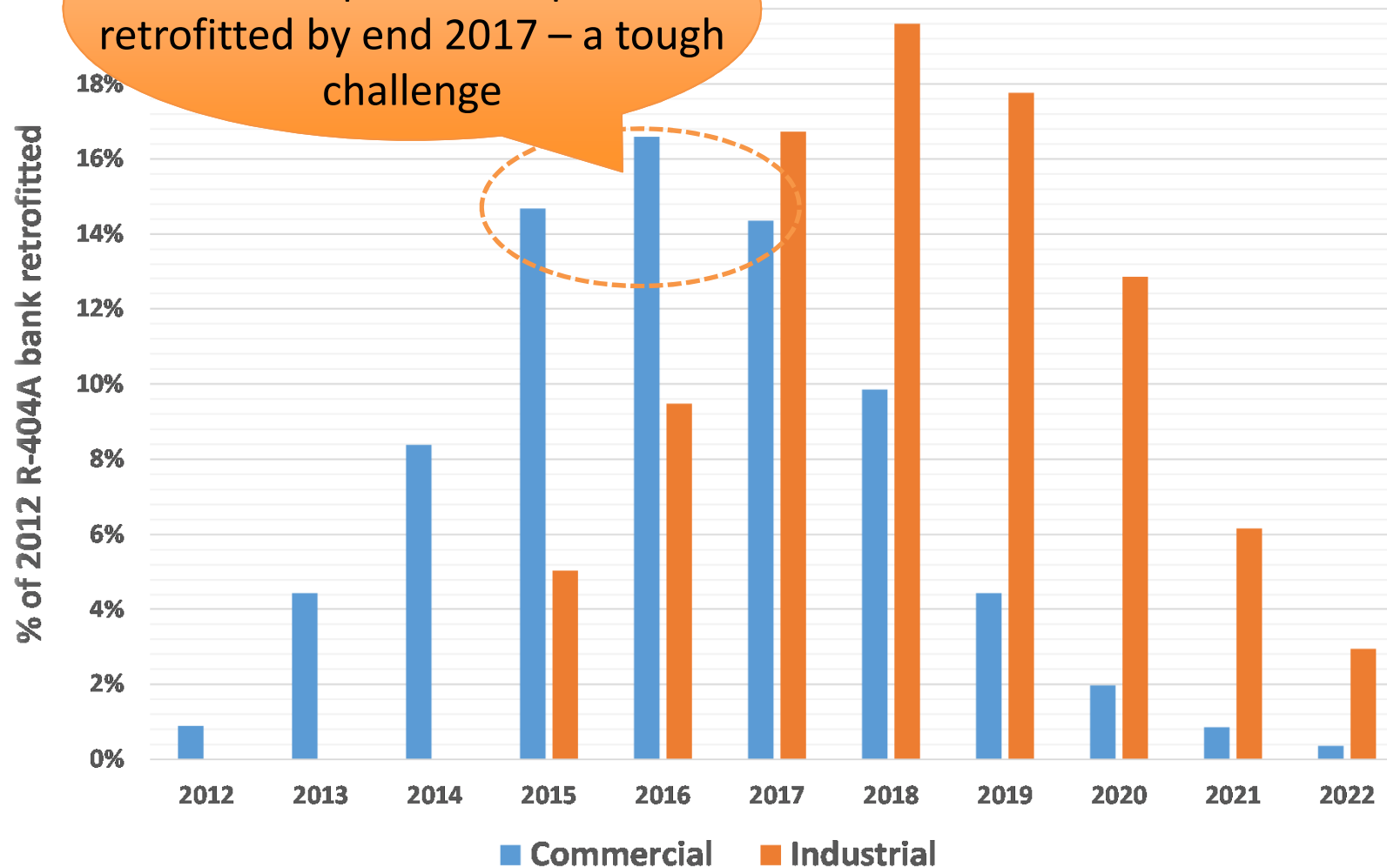


Retrofit timetable - % of 2012 R-404A bank retrofitted

Existing Equipment

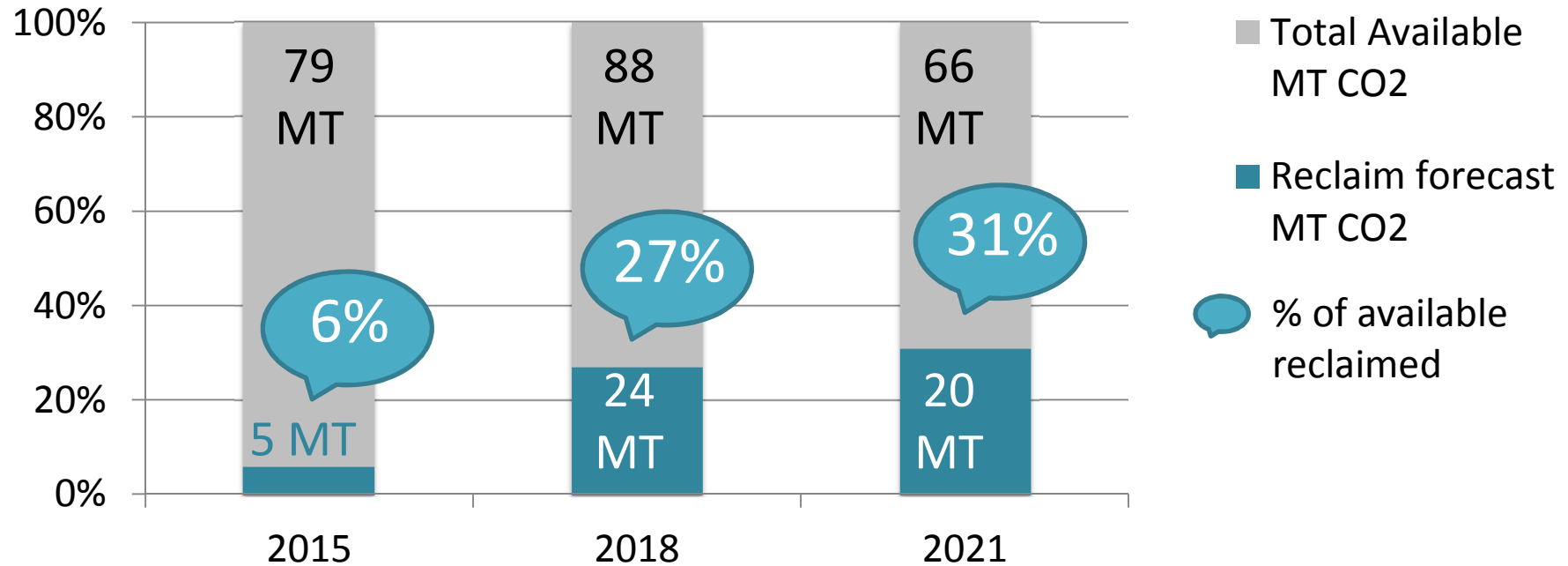


We need nearly half of supermarket packs retrofitted by end 2017 – a tough challenge



Reclaimed
Refrigerant

Amount of reclaimed / recycled refrigerant available



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



New Equipment

- 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

Existing Equipment

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

Reclaimed Refrigerant

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

Other issues

- 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



New Equipment

- 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

Existing Equipment

- 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

Reclaimed Refrigerant

- More significant use of reclaimed and recycled HFCs

What does the Roadmap Scenario tell us?



New Equipment

- 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

Existing Equipment

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

Reclaimed Refrigerant

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

Other issues

- 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?

For further information, please contact:

EPEE Secretariat: secretariat@epeeglobal.org

Andrea Voigt: a.voigt@epeeglobal.org



@EPEEsecretariat