EU F-gas Regulation

Ready for the future HVAC-R market

No HFC ban but a phase-down, why?

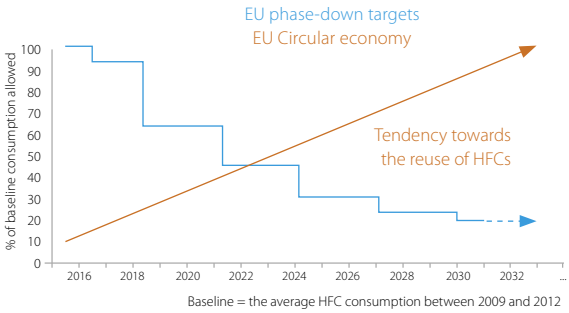
Why a phase-down?

› The EU wants to reduce the environmental impact of f-gases, by reducing the CO_2 equivalent consumption of HCFs

No ban nor phase-out:

› HFCs are important in many applications because of their energy efficiency, safety and economic benefits
› HFCs are phased-down to a level that allows sustainable growth & investments, beyond 2030

There are **3 main areas** with specific actions which can be taken to achieve this phase-down:



Baseline = the average HFC consumption between 2009 and 2012

1. **Minimising the impact of new equipment**, by reducing the use of high GWP F-gases
   › Changing to lower GWP HFCs and non-HFC gases for specific sectors
   › Reducing refrigerant charges

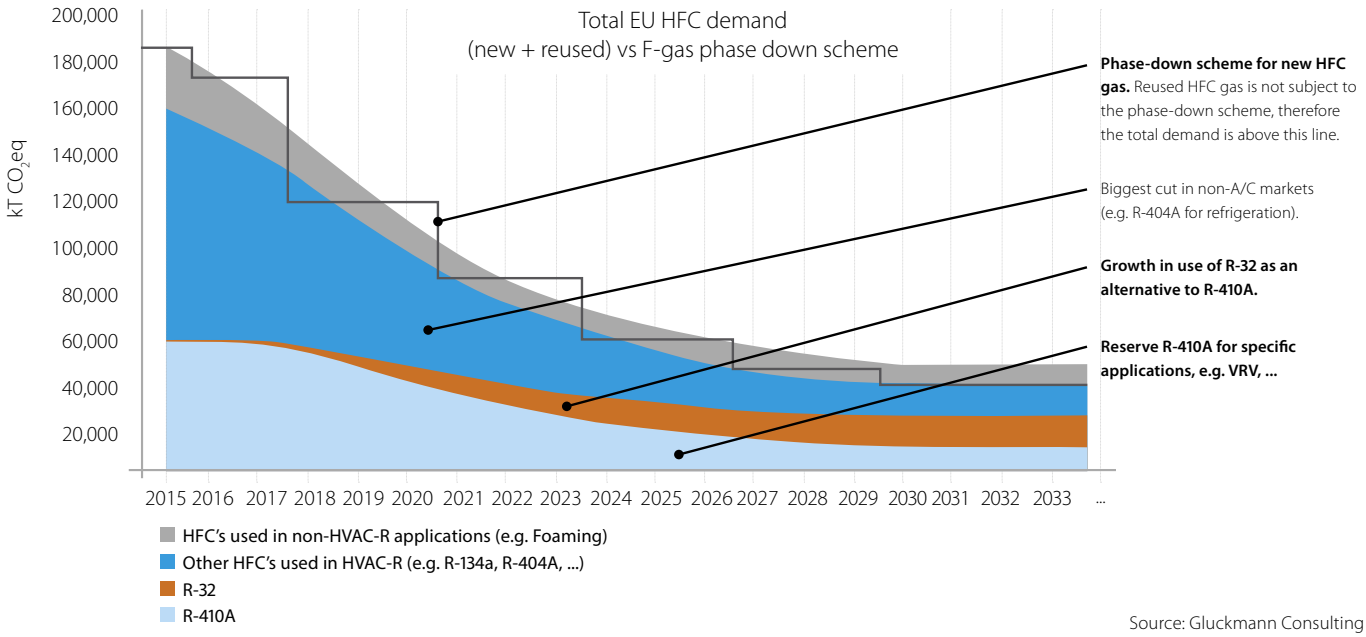
2. **Reducing the use of refrigerants for servicing HVAC-R equipment**
   › Reducing leakages
   › Retrofit equipment with lower GWP refrigerants

3. **Increasing the recovery and reuse of HFCs**
   › The phase down scheme only applies to refrigerants newly placed on the market
   › Recovered refrigerants can be re-used in addition to new refrigerants

Why is the target expressed in CO_2 equivalents?

The phase-down targets are expressed in CO_2 equivalents [= kg x GWP] and are not refrigerant-specific. **The legislation doesn't ban any specific refrigerant completely. This means that there is no doubt that the relevant refrigerants will be available during any equipment's lifetime** (e.g. R-410A for DX systems).

Where does the main HFC contribution come from?



Source: Gluckmann Consulting

No general ban on refrigerants, but some applications have GWP limits

Examples of the GWP limits in the HVAC-R sector ▶ Daikin already has the answer today!

GWP limits in new applications

Single split air conditioners with a refrigerant charge below 3kg
› GWP limit of 750 from 2025
› **Daikin's market-leading action**, switching from R-410A to R-32 (GWP 675)
› Portable air conditioners GWP limit: 150

No limit on single split above 3kg
No limit on multi split/VRV systems

Stationary refrigeration equipment
› From 2020: a ban on refrigerants with GWP > 2,500
› From 2022: GWP limit of 150 on multipack centralized refrigeration systems for commercial use with a capacity of 40 kW or more
› Except for cascade systems where the primary refrigerant circuit has a GWP limit of < 1,500

Daikin's alternatives for 75kW MT
a. Use 2 x Daikin ZEAS condensing units of 20HP (<40kW) with R-410A
b. Use a TEWIS Booster rack of 75kW MT with R-744 (CO_2)
c. Use a TEWIS cascade system with R-134a in primary circuit and CO_2 for MT/LT circuit

GWP limits on servicing installations

No Service ban for heating sector
No Service ban for A/C sector

Service ban for all stationary refrigeration equipment with refrigerant charge > 40 TCO2 eq (e.g. R-404A system ≥ 10kg)
› Use of recycled refrigerant allowed until 01/01/2030
› Use a low GWP refrigerant to replace existing refrigerant (e.g. Daikin: use R-407H to replace R-404A)

Some product bans or GWP limits also apply to fridges, freezers, aerosols, fire protection and other sectors.

Daikin's challenge for achieving a sustainable refrigerant and equipment lifecycle

In addition to refrigerant selection, the way in which a refrigerant is managed through its lifecycle, including recovery and reclamation, is also very important. And while we strongly support the Kigali amendment, and the effort to phase down CO_2 eq consumption, GWP is not the only measurement for evaluating refrigerants, even within this framework. A comprehensive approach, including leakage prevention and recovery and reclamation is required. We will also continue to improve the energy efficiency of each of our products to reduce their overall environmental footprint.

Action on refrigerant and goals

1 Role as a refrigerant manufacturer

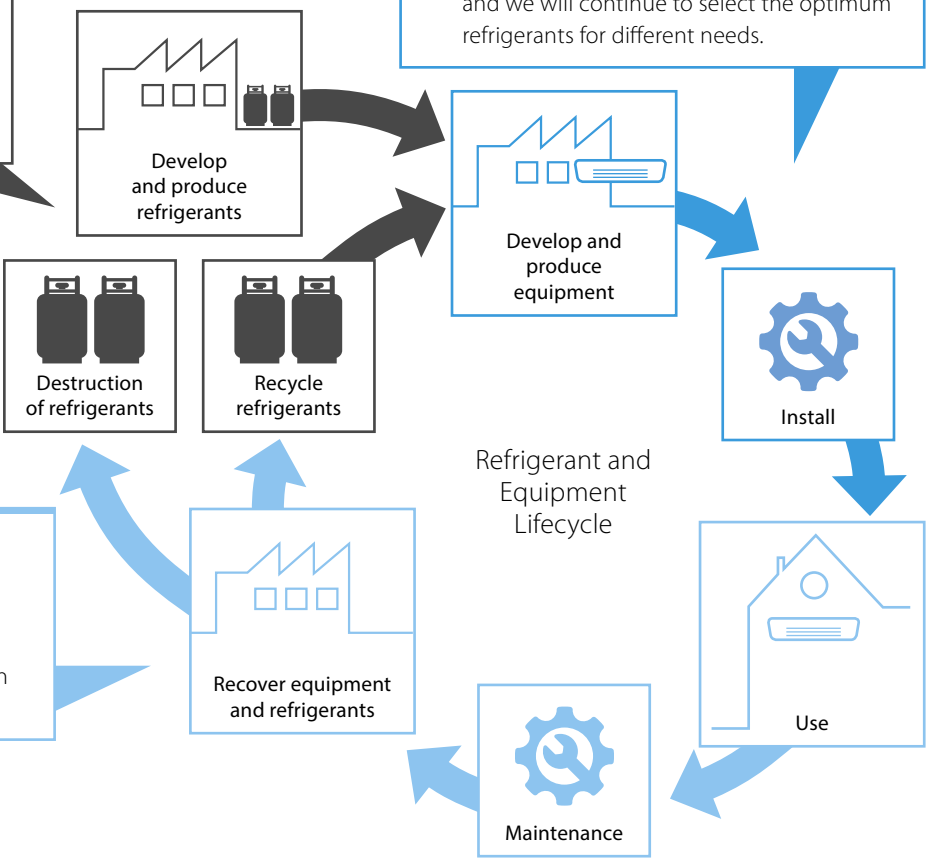
Daikin is committed to using and providing refrigerants which meet diverse needs, aiming to achieve a more sustainable air conditioning, heating and refrigeration sector.

2 Role as an equipment manufacturer

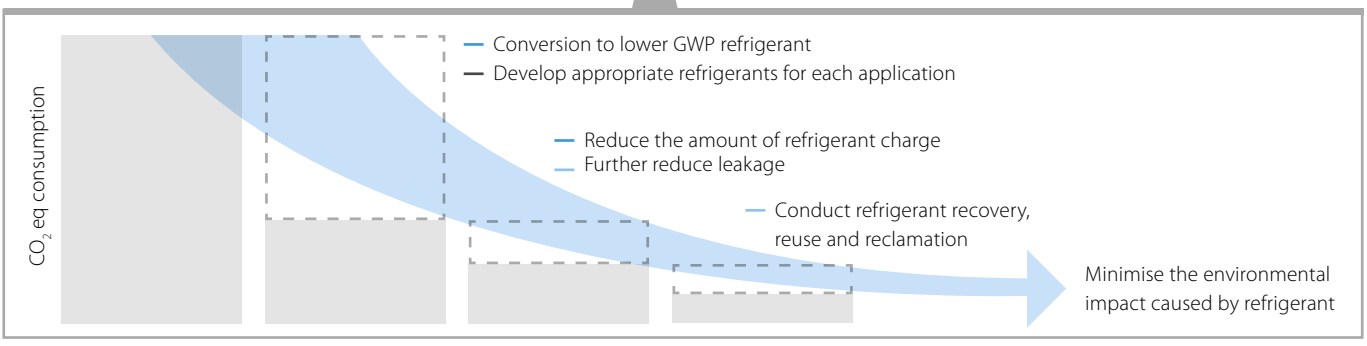
Daikin will continue to improve the energy efficiency of its equipment and systems, and we will continue to select the optimum refrigerants for different needs.

3 Collaborating with other stakeholders

Daikin continues to work with related stakeholders towards a sustainable air conditioning, heating and refrigeration industry.



Comprehensive approaches towards CO_2 eq consumption phase-down



Cf. DAIKIN's refrigerant policy (public since 2015)

Daikin's strategy for achieving the HFC phase-down goals

The environment has a special place in our heart. An integral part of our corporate philosophy is to be a company that leads by applying environmentally-friendly practices. Not only are we ahead of legislation, we are also ahead in environmental innovation, thus challenging our competitors.

Daikin product portfolio in the EU: conversion to lower GWP refrigerants, fully in line with F-gas regulation

The right refrigerant for the right application
There is no ideal "one size-fits-all" refrigerant for all applications. In future there will be a **diversity in refrigerant choices**, in which existing HFCs, new HFCs and non-HFC refrigerants each play a role

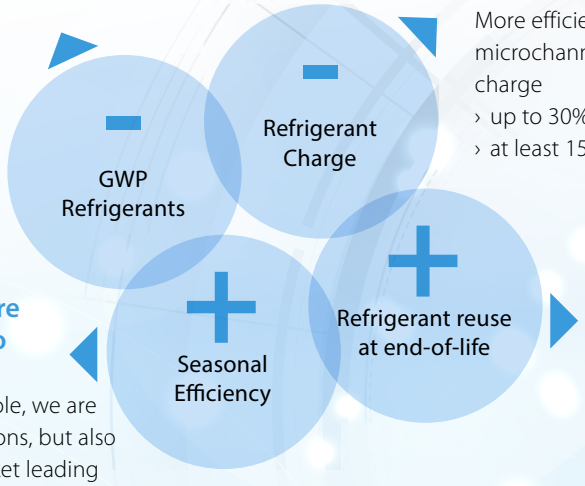
	Today	Future launches
Air conditioners and heatpumps	R-410A → R-32 Full range of Split, Sky Air and Daikin Altherma systems	
VRV, chillers and air side equipment	R-410A, R-32, R-134a, R-1234ze(E), Ammonia	Under investigation: blends, R-32, other HFO
Refrigeration	R-404A, R-410A, R-134a, R-448a, R-449a, CO_2, Ammonia, HC: R-290, R-600a	Under investigation: R-407H, R-32, HFO
Marine containers	R-134a	Under investigation: R-32, HFO, R-513
AC and refrigeration for vessels	R-404A → R-407C , R-407H	Under investigation: Lower GWP
Truck and trailer refrigeration	R-404A	Under investigation: R-452A, Lower GWP

Striving to become the lowest CO_2 equivalent manufacturer

Daikin actions to reduce CO_2 equivalent impact of our systems

CO_2 equivalent reductions thanks to the use of lower GWP refrigerants

› R-410A (2,087,5) → R-32 (675): - 68%
› R-404A (3,922) → R-407H (1,495): - 62%
› R-134a (1,430) → R-1234ze(E) (7): - 95%



Reduced charge in new equipment

More efficient refrigerants such as R-32 and microchannel technology reduce the refrigerant charge
› up to 30% reduction thanks to R-32
› at least 15% reduction thanks to microchannel

Achieve sustainability over the entire lifecycle of the installation thanks to market leading efficiencies

To reduce environmental impact as a whole, we are not only looking at refrigerant CO_2 emissions, but also at total system efficiency. We deliver market leading efficiencies thanks to:
› A+++ efficiencies of our residential products
› Energy-saving VRV systems, with Variable Refrigerant Temperature
› Inverter technology on our chillers and refrigeration units

Circular economy of refrigerants

Promotion of refrigerant recovery and re-use
› R-410A will be available during lifetime of installations

Reducing servicing and maintenance use

Even further reduction of leakage rates
› VRV, Split and Sky Air systems already have proven leakage rates of below 1,5% on average

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