



UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION



OZONE · UNIDO · CLIMATE
KIGALI AMENDMENT

Vienna Talks 13 – 15 June 2017

WAY TO GO WITH UNIDO MAPPING THE HFC PHASE-DOWN

KIGALI AMENDEMENT
adopted on 15 October 2016

Blazing a trail: UNIDO and the HFC phase-down

With the Kigali Amendment, the Montreal Protocol will be an even more powerful instrument against global warming. UNIDO is well-equipped to guide the Parties towards the Kigali Amendment's goals. Since 1992, UNIDO has avoided the use and potential emission of 338 million tons of CO₂-equivalent, which is comparable to the annual CO₂ emissions of 99 coal-fired plants.

UNIDO and the Kigali Amendment

UNIDO specializes in the transfer to natural refrigerants (or alternatives) with low or zero global warming potential, as well as the safe management of flammable substances. We are experienced in promoting energy efficiency, and introducing low-carbon and low-emission technologies and practices. **UNIDO is especially well-suited to the Amendment's following pillars:**



Pillar 1: Flexible implementation

The Kigali Amendment allows Article 5 countries the flexibility to prioritize HFCs, define sectors, select technologies and alternatives, and design and implement their own strategies for HFC phase-down. UNIDO aims to guide and provide technical assistance in order to maximize opportunities for successful implementation.

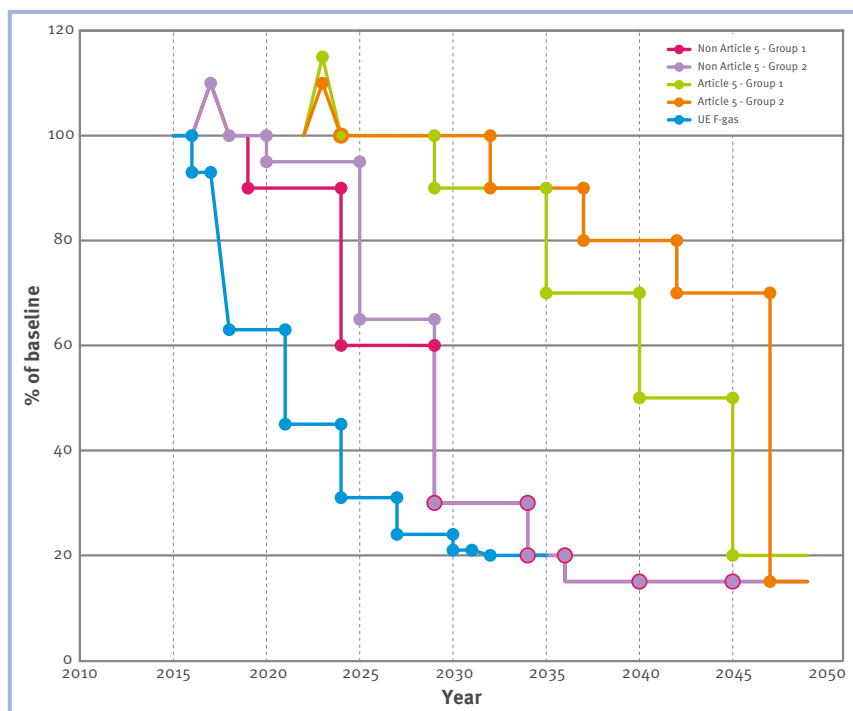
Pillar 2: Financial and technical cooperation

UNIDO has extensive experience arranging effective financial and technical cooperation, which includes new vital funding opportunities for fast-start and enabling activities, particularly in technology transfer.

Pillar 3: Energy efficiency (EE) and safety standards

UNIDO's expertise in energy efficiency leads to substantial investment potential for Montreal Protocol and climate action projects, opening up opportunities in RAC sector transition and supporting international standards for flammable, low-GWP refrigerants.

HFC phase-down schedule for A5 and non-A5 Parties



Level of HFC consumption is expressed in CO₂-equivalent, which is calculated in the following way:
 Consumption = (import – export + production) × GWP

Baseline formula for all country groups

Non-A5 Parties

Average HFC consumption for 2011-2013 + 15% of HCFC baseline

Non-A5 Parties Special Group*

Average HFC consumption for 2011-2013 + 25% HCFC component of baseline

A5 Parties Group 1

Average HFC consumption (or production) for 2020-2022 + 65% of HCFC baseline

A5 Parties Group 2

Average HFC consumption (or production) for 2024-2026 + 65% of HCFC baseline

* Non-A5 Parties (special group): Belarus, Kazakhstan, Russian Federation, Tajikistan, Uzbekistan.

The same phase-down schedule and formula apply to production and consumption

The road ahead: Why partner with UNIDO?



- Demonstrated experience
- In-house expertise, including energy efficiency
- Strong partnerships and alliances

On track with UNIDO: Our experience

UNIDO has completed **over a thousand projects** to assist developing countries and economies in transition to comply with their obligations under the Montreal Protocol. We have **decades of experience** working in industrial development and technology transfer. Most of UNIDO's work occurs in the refrigeration and air conditioning sector, which comprises over 95% of hydrofluorocarbon (HFC) consumption. Our other target sectors include foam manufacturing, agro-industry, solvents and healthcare.



A one-stop shop: Our expertise

UNIDO possesses diverse, comprehensive in-house expertise, essential to achieving the goals of the Kigali Amendment. We specialize in the following areas:

Environment

- Montreal Protocol implementation
- Cold chain improvements
- Industrial resource efficiency
- Chemicals management (e.g. flammable, toxic)

Energy

- Industrial energy efficiency
- **Climate policy** and networks

Agri-business

- Food processing development in agro-industry
- Business development

Trade, investment and innovation

- Investment decision support and innovative Industrial development
- Standards and trade facilitation



Cross-cutting service:
Circular economy

Come for the ride: Our partnerships and alliances

UNIDO develops and implements programmes that support industry players not only to switch to environmentally friendly technologies, but also to promote capacity building, and improve products, economic performance and employment opportunities. Successful projects have been completed by UNIDO with the financial assistance of the Multilateral Fund, the Global Environment Facility, bilateral contributions from developed countries, donors, the private sector and multilateral organizations.

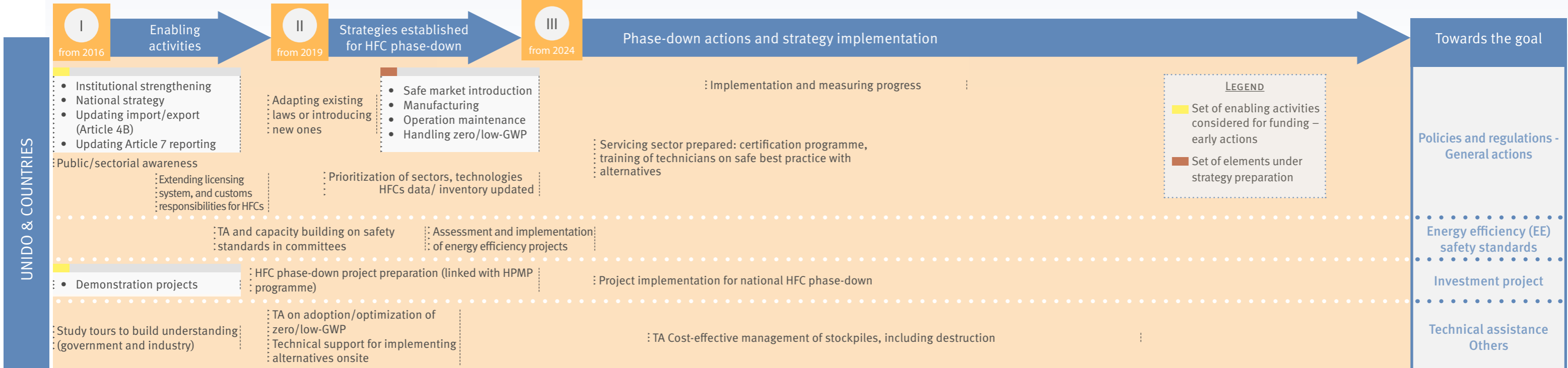
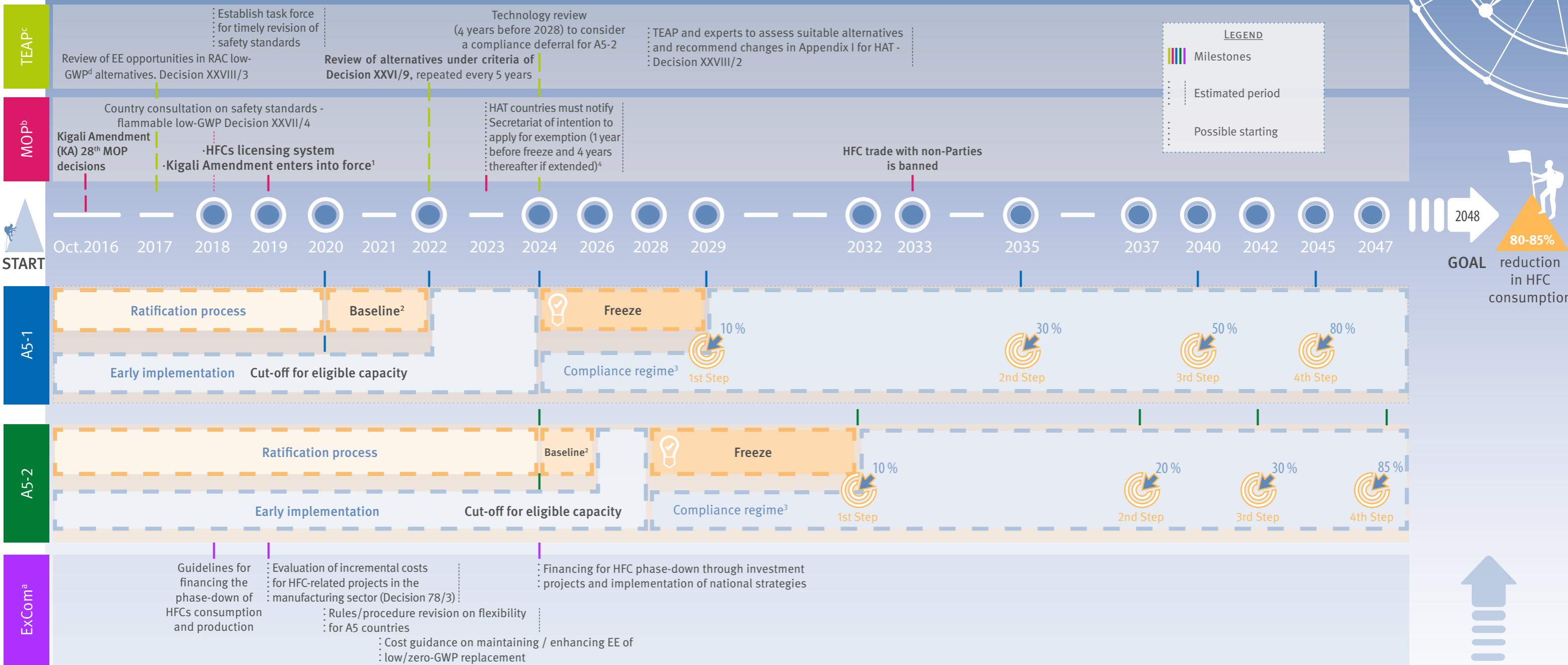
Some private sector partners: Metro Group, Volvo, Heineken, Scania.

For more information:
www.unido.org



KIGALI AMENDMENT ARTICLE 5

MAPPING THE HFC PHASE-DOWN GROUP 1 and 2



Relevant Notes:

1. Entry into force: in 2019 or three months after the Amendment is ratified by 20 countries
2. Baselines: will be calculated from past HCFC consumption / production baseline plus consumption / production of HFCs in the period established for each group of Parties.
3. No change to the methods for calculating levels of consumption, production, imports and exports except levels are now expressed in tonnes CO₂ equivalent (as opposed to ODP-tonnes) using the GWP reported in Annex A, C and F of Protocol.
4. High Ambient Temperature (HAT) exemption: this allows for a delay in HFC freeze date and initial control obligations by the fourth year. Countries should report production and consumption data separately for each exempted sector.



A5-1: Article 5 Group 1 (The majority of Article 5 Parties).

A5-2: Article 5 Group 2 (Bahrain, India, Islamic Republic of Iran, Iraq, Kuwait, Oman, Pakistan, Qatar, Saudi Arabia, and the United Arab Emirates).

HAT High ambient temperature countries: with peak monthly average temperature above 35°C for an average of at least two months per year over ten consecutive years, for sub-sectors where suitable alternatives do not exist (Algeria, Bahrain, Benin, Burkina Faso, Central African Republic, Chad, Côte d'Ivoire, Djibouti, Egypt, Eritrea, Gambia, Ghana, Guinea, Guinea-Bissau, Islamic Republic of Iran, Iraq, Jordan, Kuwait, Libya, Mali, Mauritania, Niger, Nigeria, Oman, Pakistan, Qatar, Saudi Arabia, Senegal, Sudan, Syrian Arab Republic, Togo, Tunisia, Turkmenistan and United Arab Emirates).



a. ExCom: Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol

b. MOP: Meeting of the Parties of the Montreal Protocol

c. TEAP: Technology and Economic Assessment Panel

d. GWP: Global Warming Potential

HFCs - Controlled substances

Substance*	100-year GWP**	Safety Class	Common Applications
HFC-134a	1,430	A1	1, 2, 3, 4, 5, 6, 7, 8,10,11,12
HFC-245fa	1,030	B1	4
HFC-365mfc	794	–	4, 10
HFC-227ea	3,220	A1	8, 9
HFC-236fa	9,810	A1	9
HFC-43-10mee	1,640	–	10
HFC-32	675	A2L	2, 5, 11
HFC-125	3,500	A1	3, 5, 9, 11
HFC-143a	4,470	A2L	3
HFC-152a	124	A2	4, 7
HFC-23***	14,800	A1	2, 9

Source: Kigali Amendment (Annex F); Proklima GIZ; USEPA-SNAP; and others

* Annex F also contains the following substances: HFC-134, HFC-143, HFC-236cb, HFC-236ea, HFC-245ca, HFC-41, HFC-152.

** GWP values reported in Annex F of the Amendment. Source: Kigali Amendment.

*** Substance controlled under group

II of Annex F. This is a byproduct from HCFC-22 production. A small amount is consumed in very low temperature refrigeration (mostly industrial) fire suppression, plasma-etching processes in semiconductor manufacturing.

HFC Blends (commonly used)

HFC Blend ^(a,b)	100-year GWP ^(c)	Safety Class	Common Applications
R-404A	3,922	A1	2, 3
R-407A	2,107	A1	2, 3
R 407C	1,774	A1	2, 3, 5
R-407F	1,825	A1	2, 3, 5
R-410A	2,088	A1	2, 5, 12
R-507A	3,985	A1	2,3

(a) Annex F does not list HFC blends, however once a component of the blend is listed, it is assumed that the blend is controlled even if the GWP of the mixture is significantly lowered.

(b) Currently commonly used blend refrigerants. TEAP XXVII/4 Task Force Report. September 2016.

(c) GWP values estimated in accordance with Annex F of the Amendment.



Common applications

1. Domestic refrigeration
2. Industrial refrigeration
3. Commercial refrigeration
4. Foam blowing agent
5. Stationary air conditioning
6. Mobile air conditioning
7. Aerosol (technical, domestic propellant)
8. Aerosol MDI (metered dose inhalers)
9. Firefighting agent
10. Solvent
11. Heat pumps
12. Chillers