



UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION



SUSTAINABLE DEVELOPMENT GOAL 9
INDUSTRY, INNOVATION AND INFRASTRUCTURE

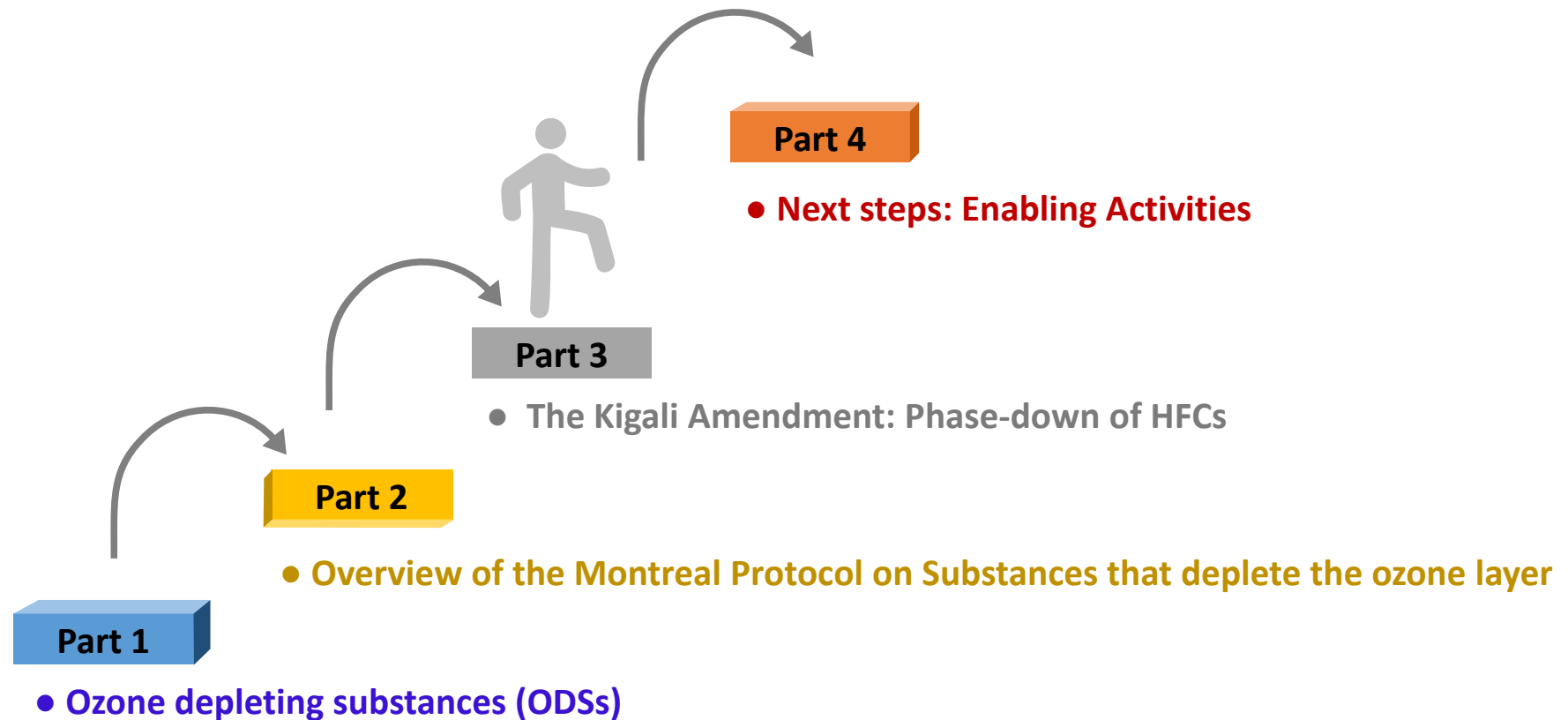
The Kigali Amendment to phase down HFCs and related projects in the Philippines



Ms Franziska Menten, Project Coordinator, UNIDO
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Presentation contents



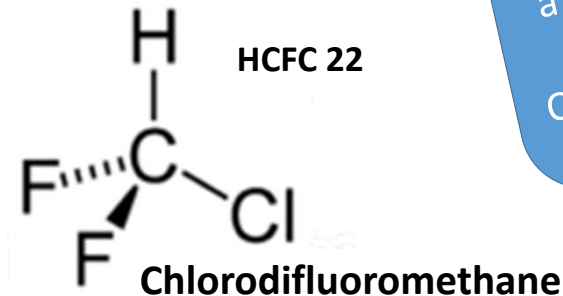
Ozone-depleting substances (ODSs)

- chemical substances (chlorinated/fluorinated/brominated hydrocarbons)
- Have potential to react with ozone molecules in the stratosphere

ODS include:

- Chlorofluorocarbons (CFCs)
- Hydrochlorofluorocarbons (HCFCs)
- Halons
- Hydrobromofluorocarbons (HBFCs)
- Bromochloromethane
- 1,1,1-trichloroethane (methyl chloroform)
- Carbon tetrachloride
- Methyl bromide

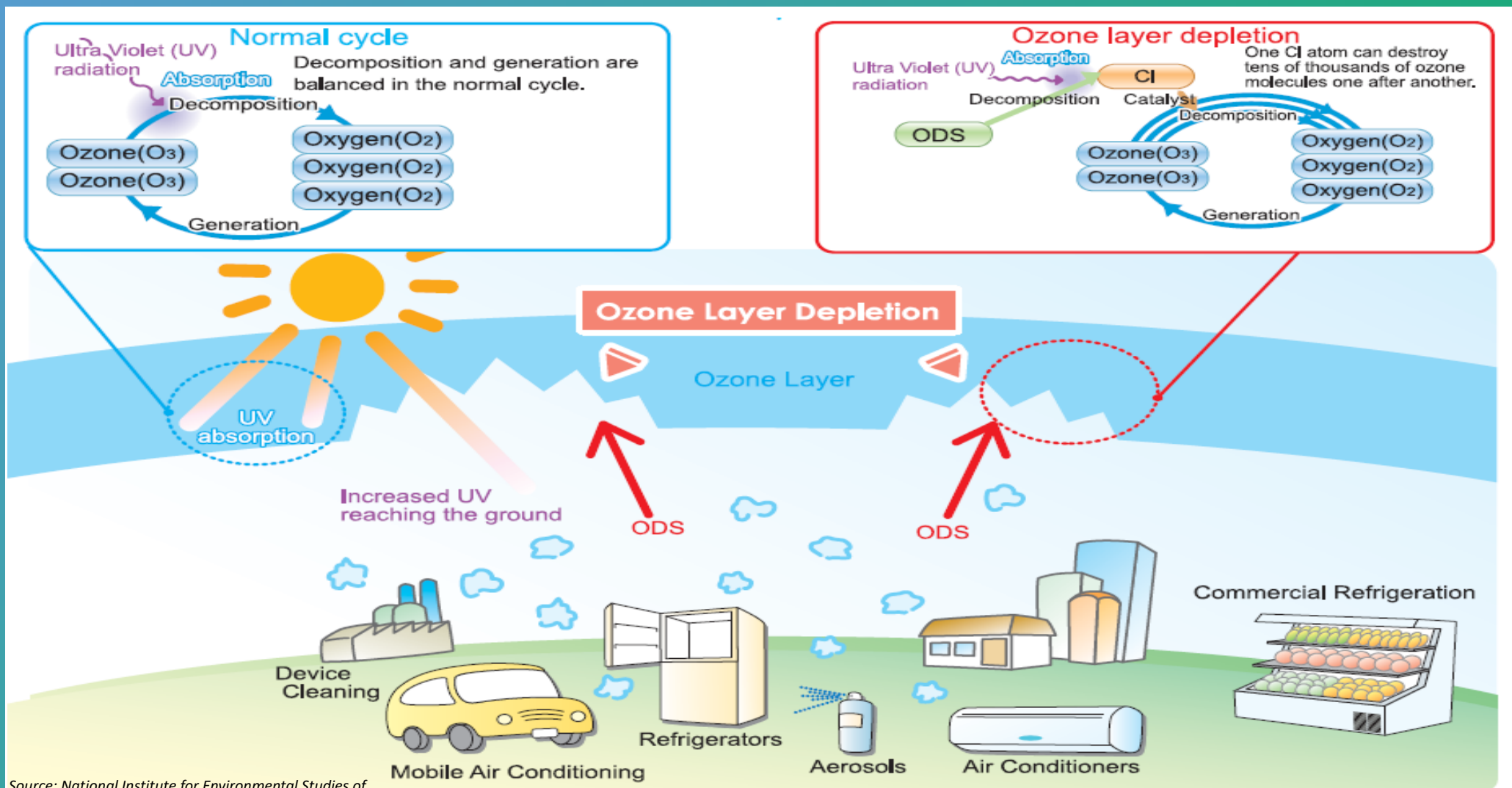
The ability of these chemicals to deplete the ozone layer is known as their ODP



Ozone Depleting Potential
(ODP)
Measure of the capability of
a refrigerant to deplete the
ozone layer.
Calculated relative to CFC-11
which has an ODP=1

ODP values of selected ODS

CFC-11	1.0
CFC-12	1.0
Halon-1301	10.0
Carbon tetrachloride	1.1
Methyl chloroform	0.1
HCFC-22	0.055
HBFC-22B1	0.74
Bromochloromethane	0.12
Methyl bromide	0.6



Source: National Institute for Environmental Studies of Japan

Global Action needed!!!

Overview of the Montreal Protocol



Vienna Convention for the Protection of the Ozone Layer (1985)

- 1st attempt to provide the framework: co-operative activities aimed at protecting the ozone layer; *agreed to 'take appropriate measures to protect human health and the environment against adverse effects resulting or likely result from human activities which modify or are likely to modify the ozone layer'.*

Montreal Protocol on Substances that Deplete the Ozone Layer (1987)

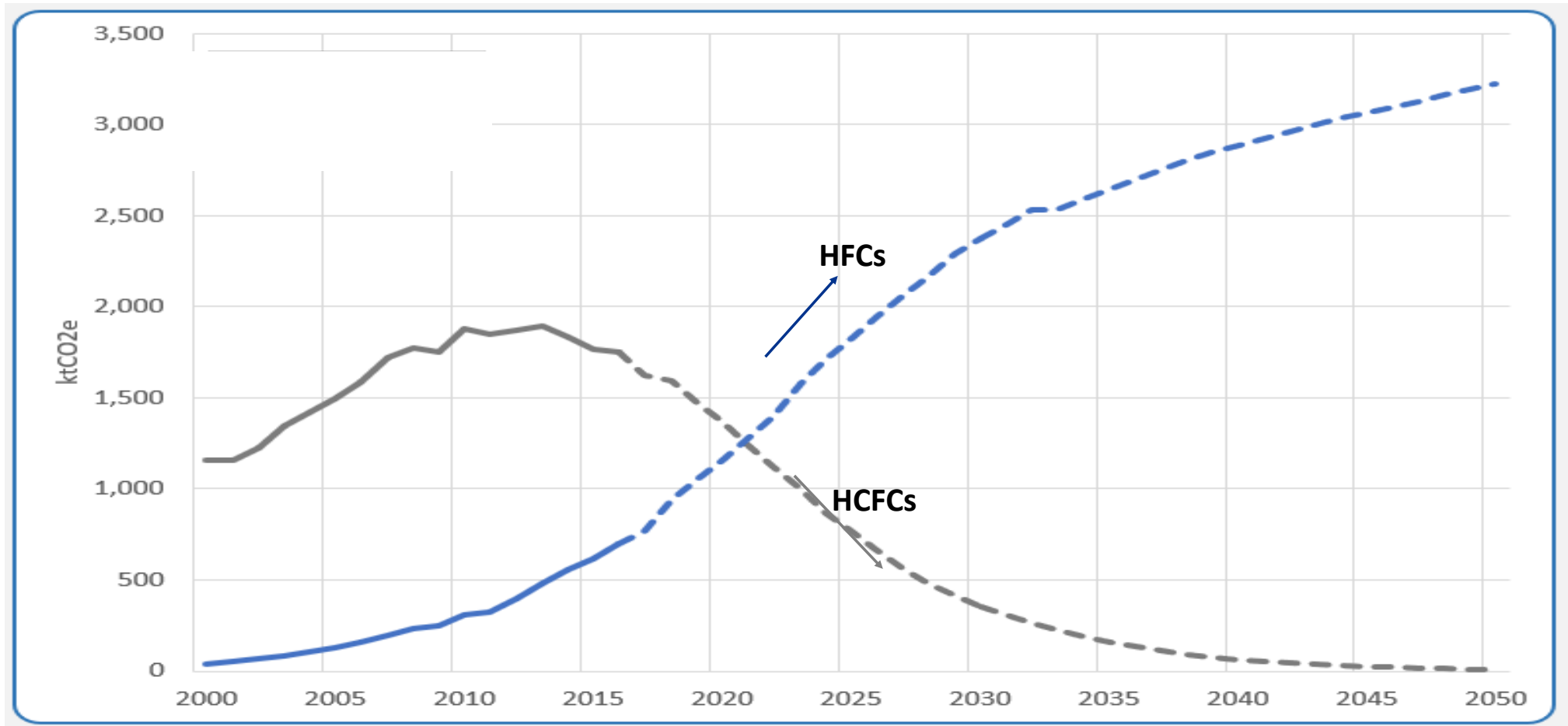
- Protocol to the Vienna Convention
- International treaty
- **Phasing out** production and consumption of numerous ODSs
- Lists controlled ODSs and control measure to reduce



controlled substance: a substance in Annex A, B, C or E of the Montreal Protocol, whether existing alone or in a mixture. It includes the isomers of any such substance, except as specified in the relevant Annex, but excludes any controlled substance or mixture which is in a manufactured product other than a container used for the transportation or storage of that substance.

Annex D: list of products containing controlled substances specified in Annex A.

Global HCFC phase-out and HFC growth scenario



Source: Gluckman Consulting

ODS alternatives surveys – annual growth rate of HFC consumption in the RAC sector 2012-2015

Source: ExCom document 80/54 on ODS alternatives surveys in **119 Article 5 countries**

All HFCs / blends: **22,2% annual growth**

R410A (GWP 2088): **40,2% annual growth** **47,3% of consumption**

R134a (GWP 1430): **8,3% annual growth** **35,6% of consumption**

Particulars	Consumption in mt				Percentage (%) of consumption in sectors	Annual growth rate (%)
	2012	2013	2014	2015		
RAC						
HFC-134a	46,548	47,586	54,481	59,167	35.6	8.3
HFC-152a	1	0	2	2	0.0	26.2
R-404A	9,194	10,142	13,694	12,409	7.5	10.5
R-407C	4,456	4,504	5,213	10,394	6.3	32.6
R-410A	28,453	35,023	53,856	78,490	47.3	40.2
R-507A	770	879	1,799	1,358	0.8	20.8
Other HFCs	84	77	489	1,255	0.8	146.3
HFC blends	1,570	1,690	1,975	2,939	1.8	23.2
Sub-total	91,076	99,902	131,509	166,014	100.0	22.2

Source: UNEnvironment

Commonly used HFCs and HFC blends

HFC or HFC blend	HFCs included (if blend)	Uses	GWP (100 years) ⁶
HFC-125		Fire suppression	3,500
HFC-134a		Chillers, domestic, commercial and transport refrigeration, stationary and mobile air-conditioning, aerosols	1,430
HFC-227ea		Fire suppression	3,220
HFC-23		Fire suppression	14,800
HFC-32		Stationary air-conditioning (including room air-conditioning)	675
R-404A	HFCs 125, 134a, 143a	Commercial, industrial and transport refrigeration, bus and train air-conditioning	3,900
R-407A	HFCs 32, 125, 134a	Stationary air-conditioning	2,107
R-407C	HFCs 32, 125, 134a	Chillers, stationary air-conditioning	1,800
R-410A	HFCs 32, 125	Chillers, stationary air-conditioning (including room air-conditioning)	2,100
R-507A	HFCs 125, 143a	Industrial refrigeration	4,000

GWP values taken from IPCC, *Climate Change 2007* (4th Assessment Report).



HIGH GWP REFRIGERANTS GLOBAL WARMING!

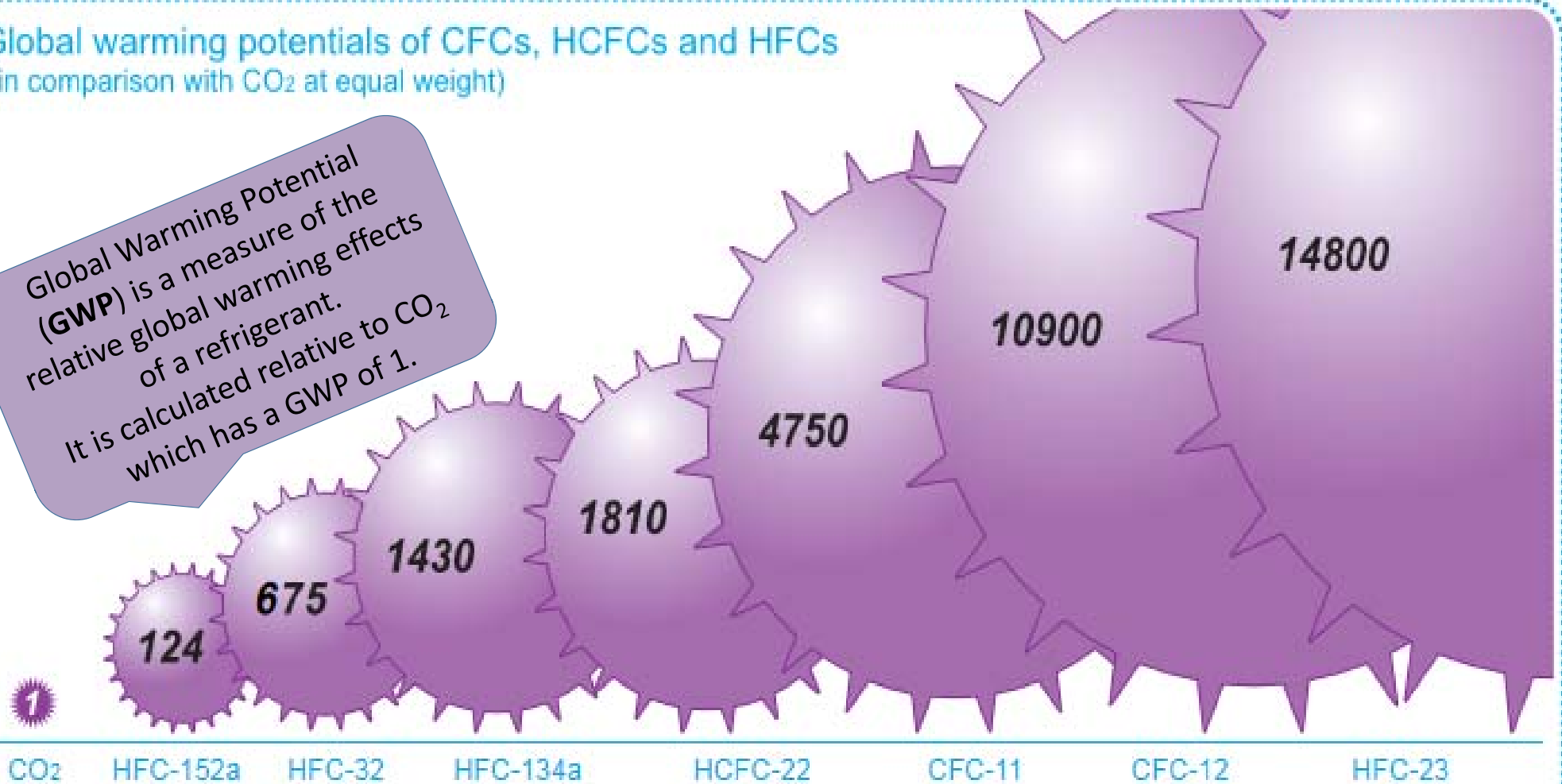
**Increase of the average temperature of the Earth
(water/ocean surfaces)**

“Greenhouse effect”!

Gases which warm up the Earth trap heat in the atmosphere which leads to global warming

Global warming potentials of CFCs, HCFCs and HFCs (in comparison with CO₂ at equal weight)

Global Warming Potential
(**GWP**) is a measure of the
relative global warming effects
of a refrigerant.
It is calculated relative to CO₂
which has a GWP of 1.



Figures have been taken from IPCC fourth assessment report (2007)




Action expresses priorities.

Mahatma Gandhi

“quoteology”

HFC PHASE-DOWN (KIGALI AMENDMENT)

ExCom Decision XXVIII/1

- 
- HFC emissions are estimated to be growing by about 7% annually, potentially jeopardizing the substantial climate benefits achieved by the MP
 - Reducing HFC use would result in substantial reductions in CO₂ equivalent emissions and energy efficiency gains for the industry

Kigali Amendment (October 2016)

- All countries (developed and developing) to **phase-down** the production and consumption of **high GWP HFCs** following various **specific schedules**.
- Countries are obligated to limit and reduce HFCs starting from 2019
 - **New Annex F**: lists HFCs, into 2 groups
 - Annex F, Group I: all HFCs (except HFC-23 and HFOs)
 - Annex F, Group II: HFC-23
 - Non-saturated HFCs (HFOs) plus HFC-161** not included
- No change to calculation of consumption, production, imports and exports except **units expressed in CO₂ equivalents** using the global warming potential (GWP)

Kigali Amendment Annex F: Group I and II

ANEX F GROUP I

Substance	GWP
HFC-32	675
HFC-41	92
HFC-125	3,500
HFC-134	1,100
HFC-134a	1,430
HFC-143	353
HFC-143a	4,470
HFC-152	53
HFC-152a	124
HFC-161	12
HFC-227ea	3,220
HFC-236cb	1,340
HFC-236ea	1,370
HFC-236fa	9,810
HFC-245ca	693
HFC-245fa	1,030
HFC-365mfc	794
HFC-43-10mee	1,640

The substances listed in the Annex F Group I are produced for specific industrial applications such as refrigeration, air conditioning, polyurethane foam, solvents, aerosols, etc.

ANEX F GROUP II

HFC-23 14,800

The substance listed in the Annex F Group II (HFC-23) is a co-product of the production of HCFC-22 (controlled by the Montreal Protocol), for that reason its production depends on this other substance.

Groupings as specified in decision XXVIII/2



Kigali Amendment phase-down schedule

Non-Article 5 parties

Baseline formula

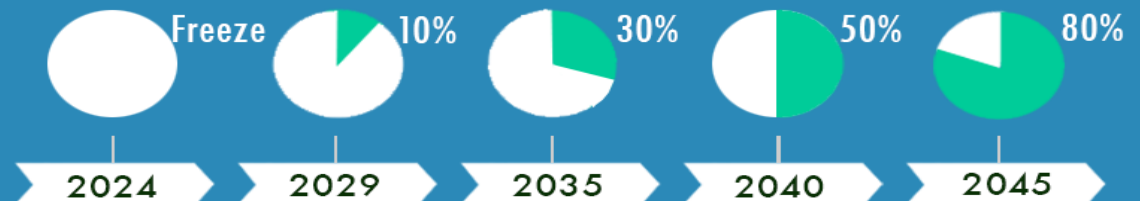
Average HFC consumption for 2011-2013 + 15% of HCFC baseline*



A5 parties – “Group 1”

Baseline formula

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



A5 parties – “Group 2”

Baseline formula

Average HFC consumption for 2024-2026 + 65% of HCFC baseline

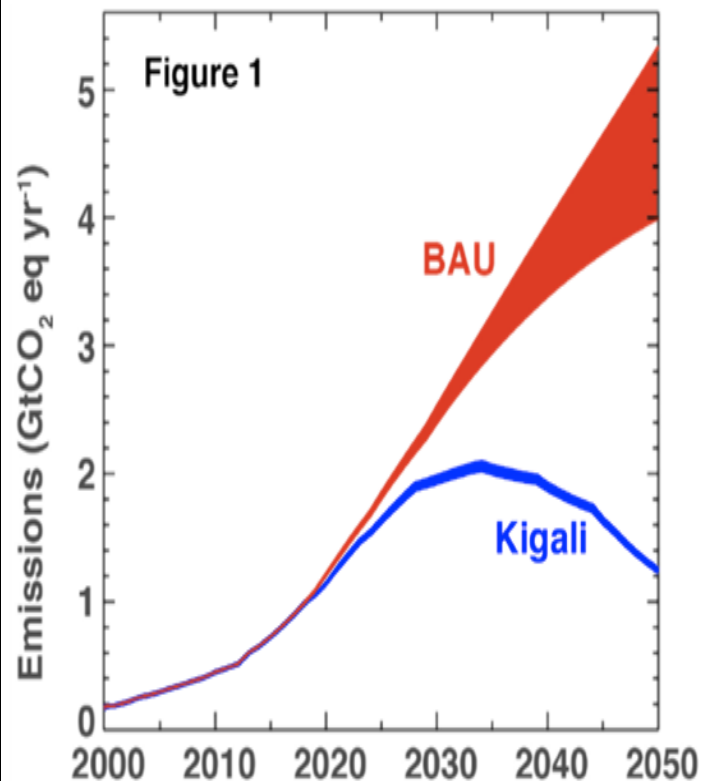


Kigali Amendment - IMPACT

What is the expected impact of the Kigali Amendment?

- Article 5 and non-Article 5 parties are required to phase-down the production and consumption of the HFCs listed in Annex F
- HFC phase-down is expected to prevent the emission of up to **105 million tonnes** of CO₂ eq. of greenhouse gases
- Helping to avoid up to 0.5 degree C of global temperature rise by 2100, while continuing to protect the ozone layer

Kigali Amendment – expected impact on climate

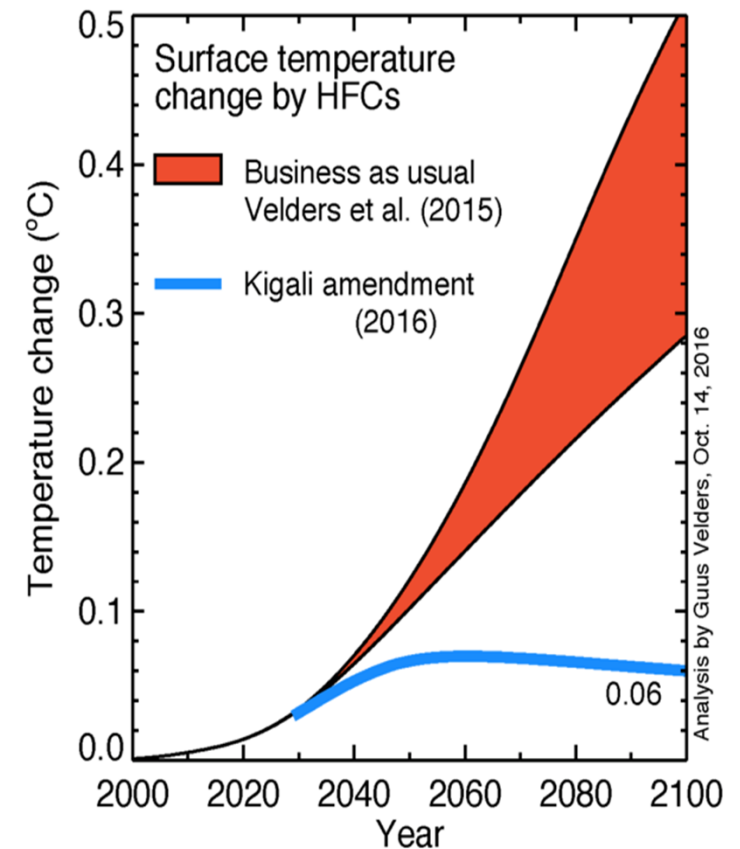


Source: [Guus Velders, RIVM](#)

Business as usual (BAU) emissions: 4-5 gt of CO₂ equivalent in 2050 with continuing increase;

Temperatures to increase slightly, but **with Kigali Amendment** peak mid-century at about 0.07°C;

Without Kigali Amendment, HFCs add up to 0.5°C temperature increase on top of other climate forcings by 2100.



Kigali Amendment – BENEFITS

- Kigali Amendment is an important element of the national commitment to maximize climate benefits under the wider portfolio of Climate Change (mitigation, adaptation, renewable energy etc.)
- Development of the HFC phase-down strategy to achieve the targets (HFC alternative survey update)
- Provide legal basis for the country to leap-frog technology and policy choices during HPMP implementation and strategize synergies that would benefit HFC phase-down
- Political and market signal for increasing the penetration of low-GWP technologies

Kigali Amendment – BENEFITS

- **Avoidance of trade controls:** Kigali Amendment will restrict trade in HFCs between parties and non-parties from 2033 (exception, in Article VI(2))
- **Leaving behind obsolete technologies:** Kigali Amendment non-party may use technologies that are becoming obsolete, placing it at an economic disadvantage
- **Phase-down NOT phase-out:** recognition that in some circumstances HFC use will be appropriate
- **Continuation of the institutions of the MP** as is the case with the National Ozone Officers, building on their experience

Requirements for the Kigali Amendment can be considered as extensions to existing legislation and administrative procedures!

Kigali Amendment – OBLIGATIONS

- Import and export licensing systems for HFCs must be in place latest by January 1, 2021
- Monitoring and reporting of HFC production and consumption, and HFC-23 emissions where relevant, is required

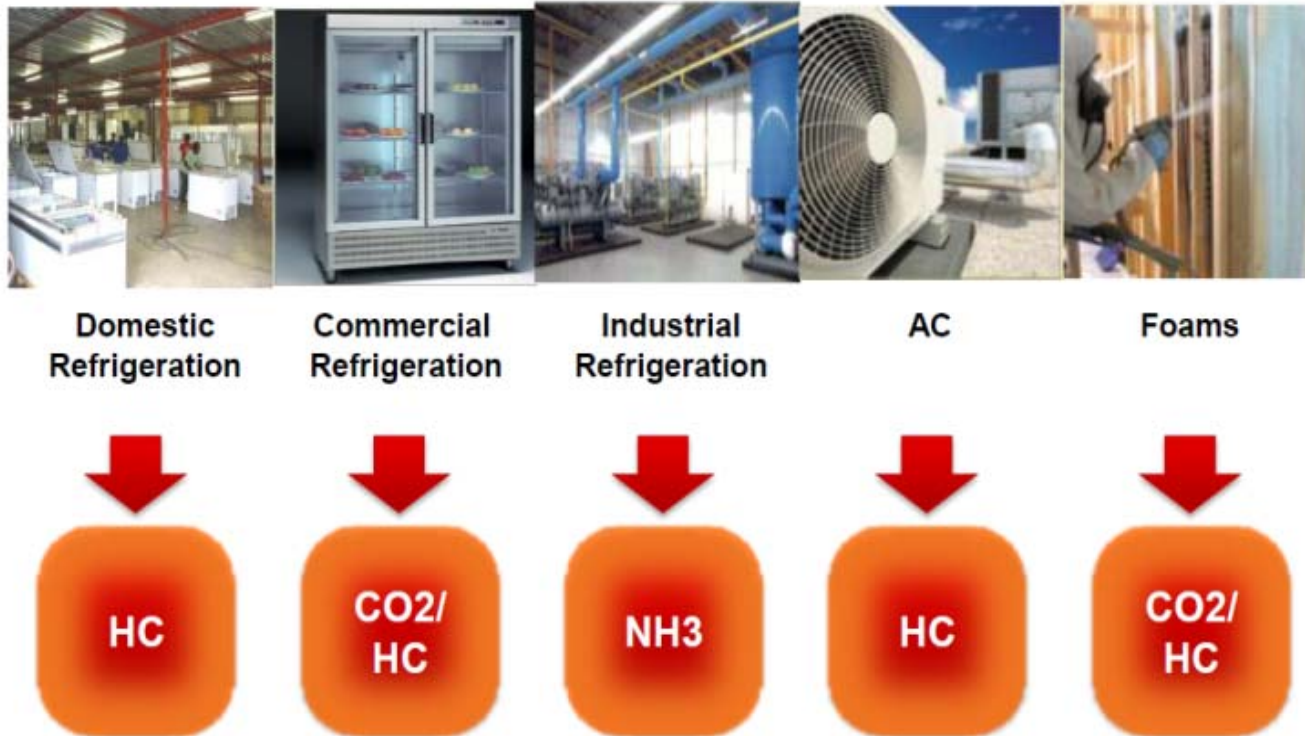
Kigali Amendment – CHALLENGES

- Confusion to the industry as there are more refrigerants
 - Availability of fluids and technologies
 - Higher costs of new fluids and technologies
- Illegal trade of ODS & ODS alternatives to become more complex
- Promoting energy efficiency in parallel with low GWP alternatives
- Lack of training on low-GWP alternatives and natural refrigerants (safety aspects and capacity building of the service sectors on ODS alternatives)
 - Restrictive safety codes and standards

Kigali Amendment – WAYS FORWARD

- Strengthen /establish/integrate institutional frameworks for implementation of compliance with the Kigali Amendment
- Update/upgrade the HFC surveys (*reduction scenarios*)
- Engage all stakeholders to ensure a smooth HFC phase-down process
- Conduct studies on penetration of low-GWP alternatives in local markets to guide the development of a national strategy for the HFC phase-down
- Adapting regulations and standards, controls and trainings of technicians is a key issue for the success of the phase down of HFCs
- Build on existing experience in development of policies, strategies and regulations (synergizing the HPMP activities and HFC phase-down)

non-HFC refrigerants in RAC equipment



Source: GIZ



Stakeholder involvement

AND PROTECT THE CLIMATE!

Stakeholder involvement

Engagement with **already established** stakeholders to assist in ratification and implementation of the HFC phase-down strategy

During process of setting up required legislation and administrative systems important to engage:

- **Very important: Customs/Enforcement agencies** – monitoring of imports of HFCs, control illegal trade
- **Government officials** (“treaty unit – Ministry of Foreign Affairs, Trade Ministry – HFC licensing, ‘quota’, Ministry of Environment – enabling legislation to MP, focal point of UN FCCC Paris Agreement on climate change)
- **Private sector companies** – importers, distributors/retailers, equipment manufacturers, RAC servicing
- **Private sector experts and representatives of civil society** – RAC association, training institutes, standards bodies, environmental org.

ENABLING ACTIVITIES

Enabling Activities for the early ratification of the Kigali Amendment

Based on Decision 79/46- of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol

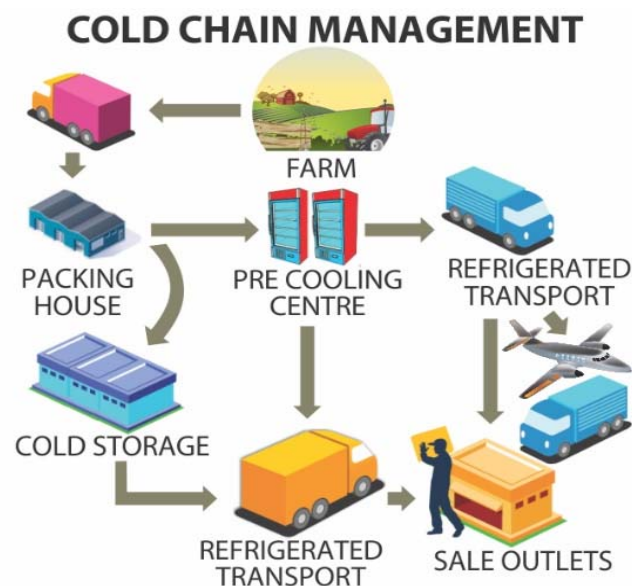
- **Activities to support the early ratification of the Kigali Amendment**
 - **Support to the institutional arrangements**
 - **Review of the licensing systems**
 - **Review of the data reporting systems on HFC consumption**
 - **Preparation for national strategies**

ENABLING ACTIVITIES

Workshop targets

1. Extend licensing system to include HFC and HFC Blends
2. Adapting HS Codes
3. Prepare Customs and enforcement officers on their extended responsibility (HFC importation)
4. Capacitate the participants on the Montreal Protocol and the Kigali Amendment

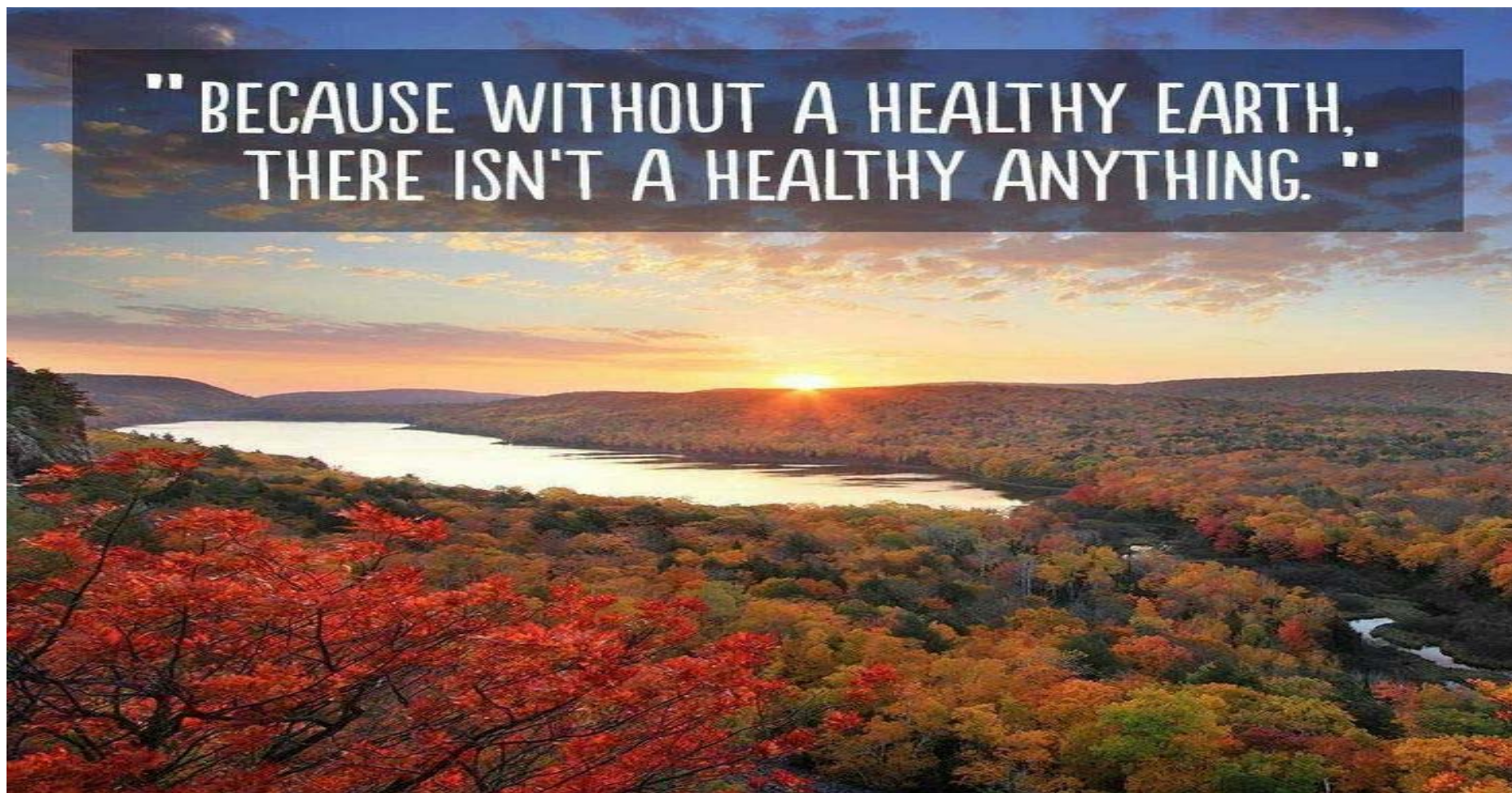
Global Partnership for improving the Food Cold Chain in the Philippines



Identify, develop and stimulate the application of:

- **Low-carbon, energy efficient refrigeration innovation technologies and business practices** for use throughout the food cold chain whilst increasing food safety and security
- Establishment of global partnership with national and international **private sector** and collaboration with **financing institutions** for promotion of investment and support of best available energy-efficient design technologies and practices transfer

" BECAUSE WITHOUT A HEALTHY EARTH,
THERE ISN'T A HEALTHY ANYTHING. "





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SUSTAINABLE DEVELOPMENT GOAL 9
INDUSTRY, INNOVATION AND INFRASTRUCTURE

Thank you for your attention!

Ms Franziska Menten

Project Coordinator

Department of Environment

UNIDO

E-mail: f.menten@unido.org

Tel: +43 1 26026 3854

