OzonAction

Compliance Assistance Programme (CAP)

UN Environment Implementing Agency &
Clearinghouse function
Montreal Protocol since 1991

30 MONTREAL PROTOCOL
caring for all life under the sun

OzonAction CAP mandate

- UN Environment became an Implementing Agency of Montreal Protocol's Multilateral Fund on 19 June 1991
  - Article 10 of Protocol established the financial mechanism (Multilateral Fund) to meet agreed incremental costs of developing countries' compliance & to finance clearinghouse function

- UN Environment was given the Clearinghouse mandate, which is delivered through OzonAction
  - OzonAction strengthens the institutional capacity of governments - particularly the operational focal points for Montreal Protocol known as National Ozone Units (NOUs) - & industry in 145 developing countries to elaborate & enforce the policies required to implement the Protocol & to make informed decisions about alternative technologies
  - Goal is to enable countries to meet & sustain their compliance obligations under the treaty
  - Part of the Chemicals & Health Branch, Economy Division
  - Deliver projects & services to developing countries through Compliance Assistance Programme (CAP) teams located in UN Environment's Regional Offices and Paris HQ

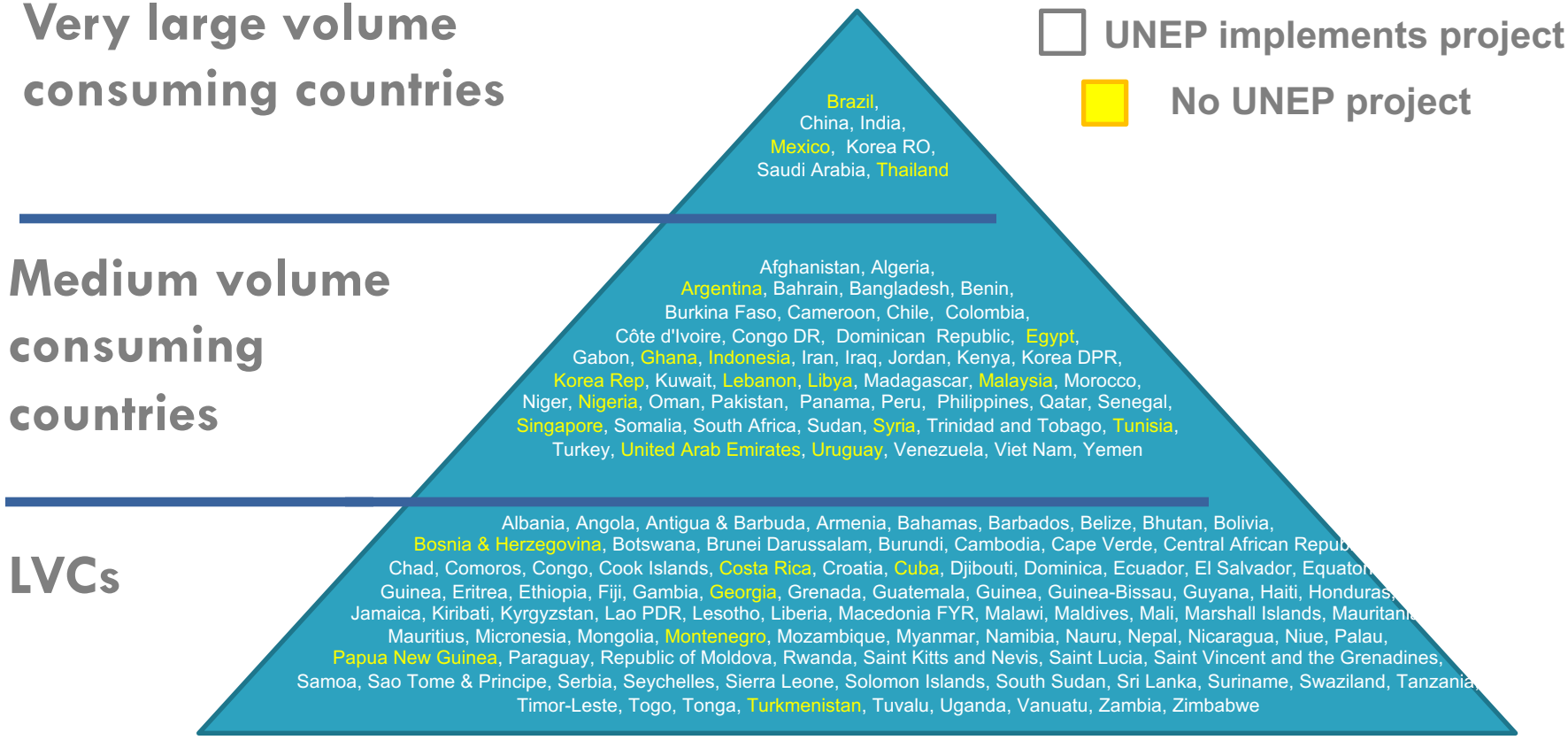
Assist developing countries to achieve & sustain compliance with Montreal Protocol on phase out of ozone depleting substances (ODS)

OzonAction is fully financed by Multilateral Fund

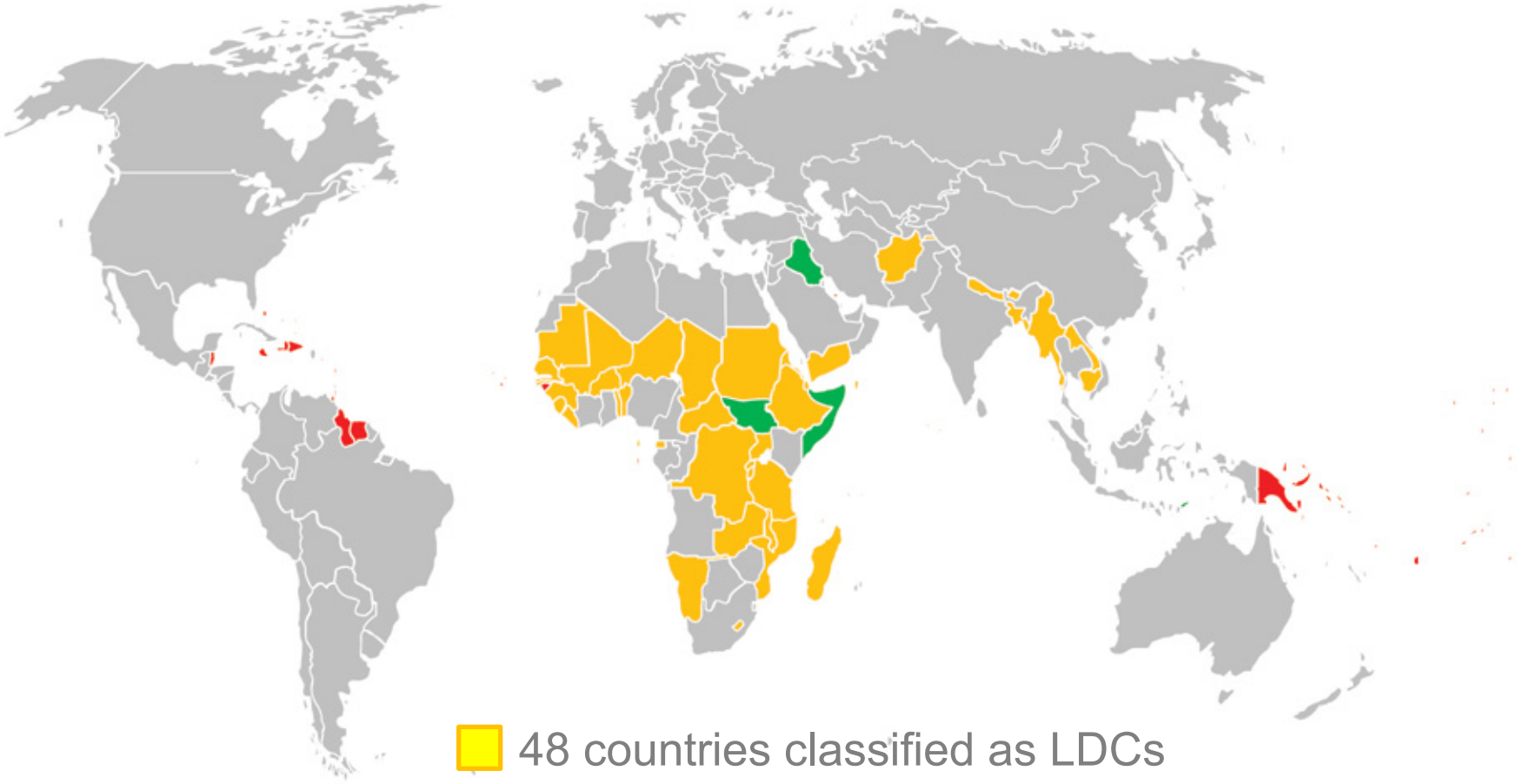
Current approved Multilateral Fund resources for UNEP

- UNEP 2017-2019 three year rolling Business plan approved for US$ 75.39 million
- 2017 Compliance Assistance Programme & Budget US$ 10.5 million
  - CAP staff (48) salaries & operational costs, Paris and 4 duty stations
  - Operation of 10 Regional Networks of Ozone Officers in 147 developing countries
  - Deliver annually over 650 compliance assistance services to 147 countries
  - Provide regional and national training, capacity building and outreach
    - establish national ODS phase out policy and legislation
    - technical assistance in non ODS and climate friendly technology choices
    - National Ozone Officers, Government officials, refrigeration/air conditioning technicians, customs officers
- 2017- 550 ongoing country projects - Institutional Strengthening & ODS HCFC phase out projects in 120 developing countries
- 2016- China refrigeration servicing sector project for ODS phase out - US$ 19.7M
- 2016 – 83 country projects – first non ODS alternative surveys (GHG - HFCs, etc)

OzonAction's project clients

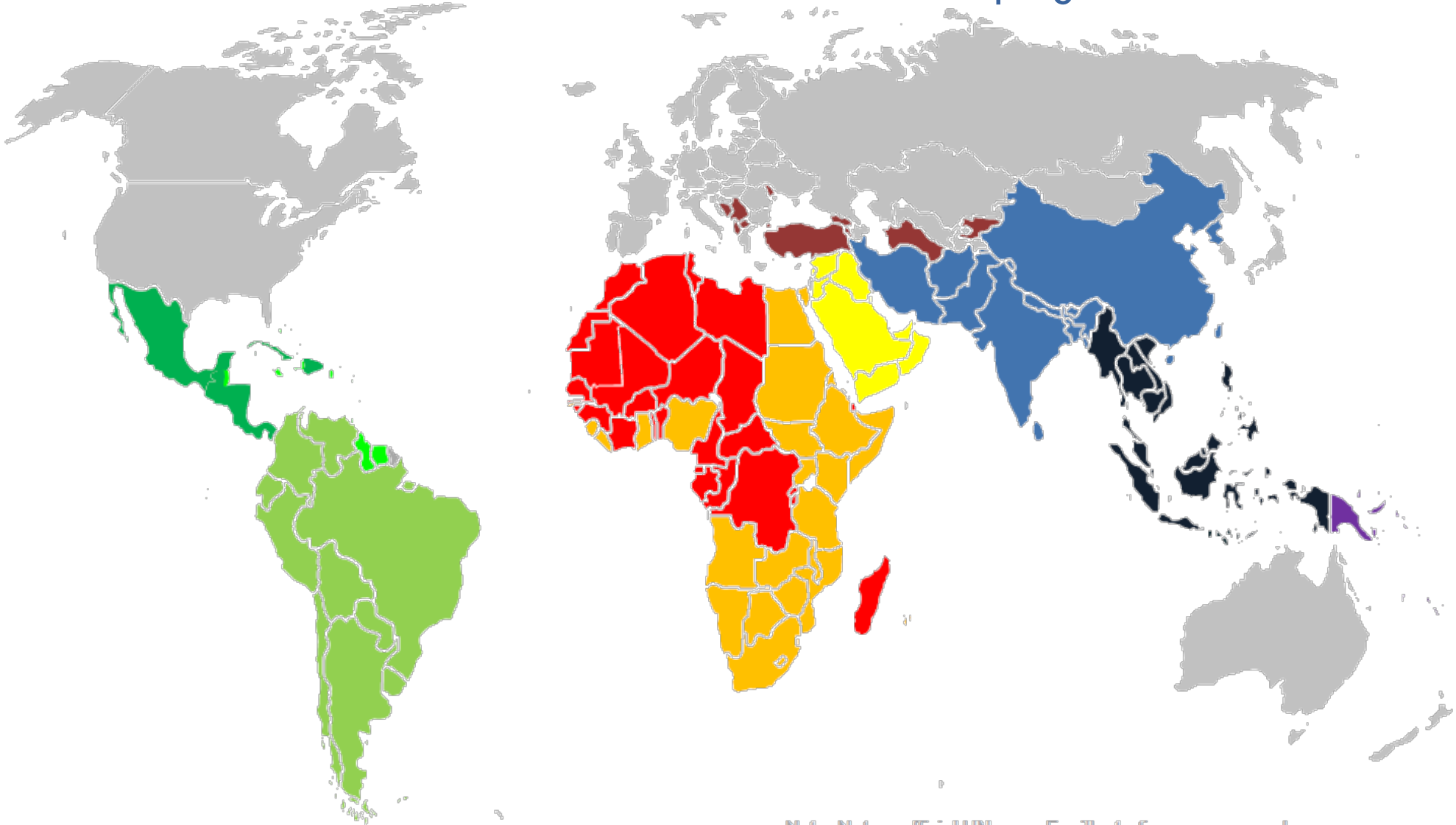


A challenging work environment145 developing countries



10 Regional Networks

National Ozone Officers -145 developing countries



Types of Networking CAP Services

Assist developing countries to achieve & sustain compliance with Montreal Protocol on phase out of ozone depleting substances (ODS)

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- 2017- 550 ongoing country projects - Institutional Strengthening & ODS HCFC phase out or HPMP projects in 120 developing countries
- 2016- China refrigeration servicing sector project for ODS phase out - US$ 19.7M
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Strategic Elements of The future Compliance Assistance Programme or "enabling" components

Policy & Enforcement Framework

- Regulatory and market mechanism to promote manufacture and import/export of non-HCFC based equipment - low GWP.
- Enforcement capacity building to tackle emerging challenges of HCFC phase-out.
- Border dialogue countries and sub regions in Asia to curb cross border illegal trade
- Focus on import/export information sharing through iPIC.
- Standards for safe handling of non-HCFC alternatives
- Strengthening public procurement of non-HCFC based low GWP alternatives equipment.

Strategic elements of *Enabling* components

Awareness, Outreach and Communication

- Awareness workshops for new stakeholders like National and Regional Cold Chain Development, Energy Efficient Services, etc
- Knowledge products for technicians and new stakeholders
- Industry Roundtable & Technology Exhibition with ISHRAE- ASHRAE
- Strengthening the national HPMP implementation
- Partners: Industry associations, large manufacturers, dealers and vendors


LE MONDE
CANADA
ETATS-UNIS
RUSSIE
CHINE
BRESIL
AUSTRALIE
OCEAN PACIFIQUE
OCEAN ATLANTIQUE NORD
OCEAN ATLANTIQUE SUD
OCEAN INDIEN

The strategic elements of the *Enabling* component under HPMPs

Sector Based ODS Policy Development and activities in 134 A5 countries

- Public Procurement policies for non-HCFC alternatives
- Building sector interventions
- Cold Chain Sector
- Servicing Sector
- Strengthening of the RAC Associations
- Energy Efficiency in RAC Service Sector Practices
- Standards for Flammable HCFC alternatives

COLD CHAIN

Basic health care services, food safety - security

bringing food safely from farms to markets

- One third of the food produced is lost or wasted; of that amount- two-thirds is lost between the farm and the markets, and a further third lost between the markets and the consumers
- The majority is lost in developing countries….
- In developed countries it is mainly food waste that is the concern…
- How to safely feed **7.4 billion in the world today?**
- 400 million tonnes of food loss a year- lack of reliable and adequate cold chain facilities is one of the main causes of losses of perishable products

reliable food cold chain could significantly reduce food losses and aid in better feeding nations

COLD FOOD CHAIN SUPPLY

- How can industry link the issue of food protection-health with climate-friendly refrigerants in the food cold chain? beneficial to do so!
- Are there particular technology issues/challenges with the cold chain that is international, eg with refrigerated containers/equipment crossing country borders?
- Are there currently any **significant barriers to market penetration - adoption of low GWP energy efficient options that are specific to the food cold chain?** (***regulatory framework, availability of alternatives, standards, codes of good practice etc***)
- **Servicing sector needs**: technicians qualified / certified to service equipment and handle flammable?; training, certification and seasonal technicians?

Building sector and Refrigerants

- Today, more thank half of world's population live in cities
- Existing buildings and new buildings are major consumers of HCFC based RAC systems, fire extinguishers, insulation, foams and solvents.
- Experts predict that 70 percent of the buildings in India that will be standing in 2030 have yet to be built.
- Future growth in buildings presents a tremendous opportunity to reinvent the way we build – to benefit the economy, society and enable humanity and nature to thrive together
- Such growth presents significant opportunities, but also challenges
- Cooling capacity and choice of refrigerants?
- Building sector HCFC phase-out related policy and capacity-building needs to be addressed in the HPMP Stage-II strategy

Partnerships and Initiatives

AREA-UNEP

Universal Training Kit on Alternative Refrigerants

Design a specialized "**Universal Training Kit on Alternative Refrigerants**" for the use of training institutes and centres in developing countries with the aim of offering state-of-art information and knowledge on the best practices and techniques in managing and handling future, mainly flammable, refrigerants in sound and safe manners by different stakeholders of the RSS sectors

ASHRAE- UNEP
Online Courses

Menu Notes

Refrigerants Literacy (55:04 / 2:47:15)

Resources

Alternative Refrigerants for Domestic Refrigeration

There is wide-spread use of hydrocarbons or HCs in this market sector. It is estimated that 75% of new domestic refrigeration appliances globally will use R-600a by 2020, without any further regulatory intervention. In the EU over 90% of new domestic refrigeration appliances already use R-600a. Low GWP alternative refrigerants for domestic refrigeration appliances are summarized on this screen.

Alternative Refrigerants for Domestic Refrigeration

Refrigerant	GWP	Flammability	Comments
R-600a	3	3	R-600a is already in widespread use in most regions
R-1234yf	4	2L	These refrigerants are not currently used, but are being investigated for use in countries with HC restrictions and for use in systems with refrigerant charges larger than 0.15 kg.
R-1234ze	7	2L	

Source: UNEP. 2015. Fact Sheet 3: Domestic Refrigeration. Workshop on HFC Management: Technical Issues, 20-21 April 2015, Bangkok

< PREV NEXT >

UN environment

United Nations
Environment Programme

Refrigerant Management

M1 M2 M3 M4 M5

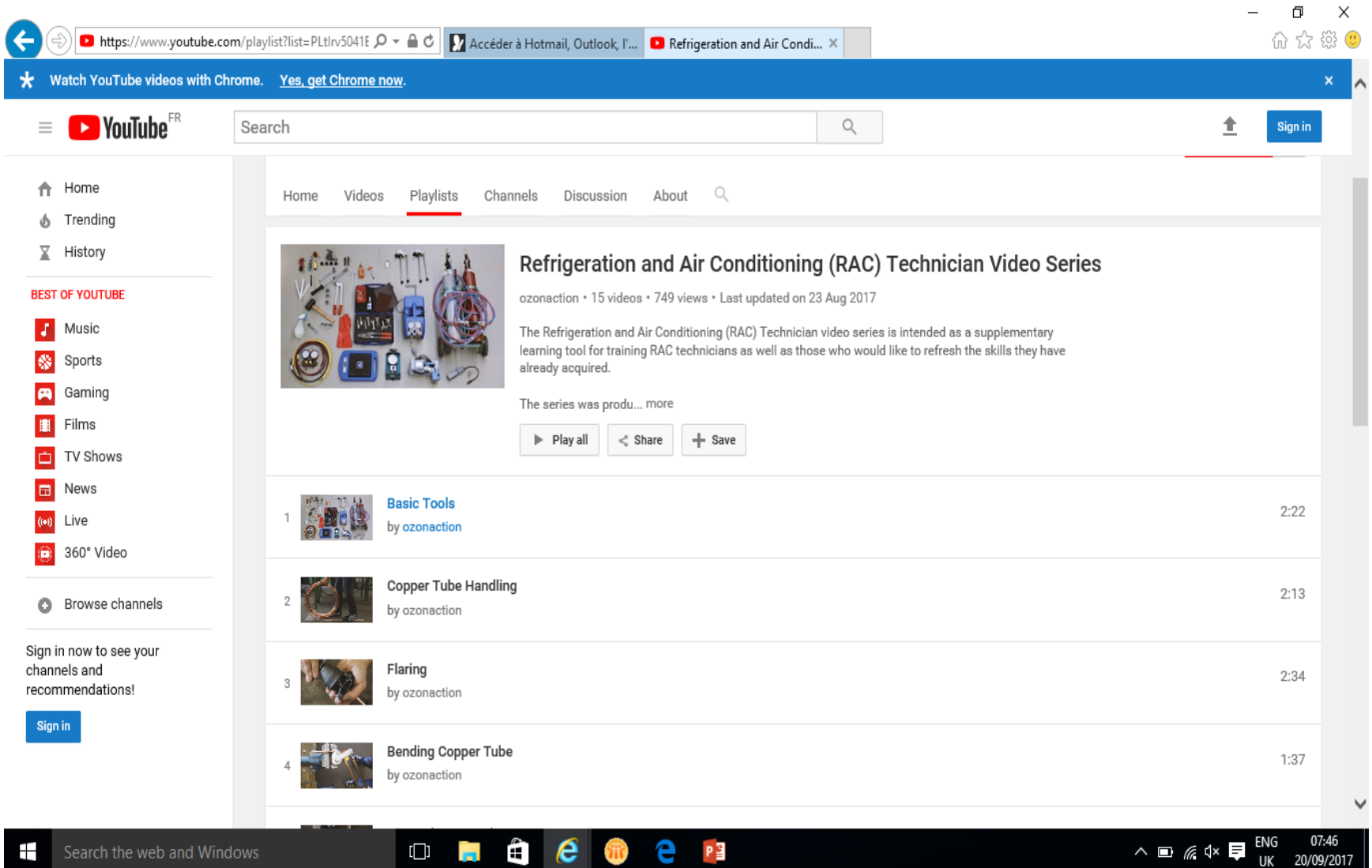
Special University Course for
Future Engineers

Example from the cooperation in conferences and events

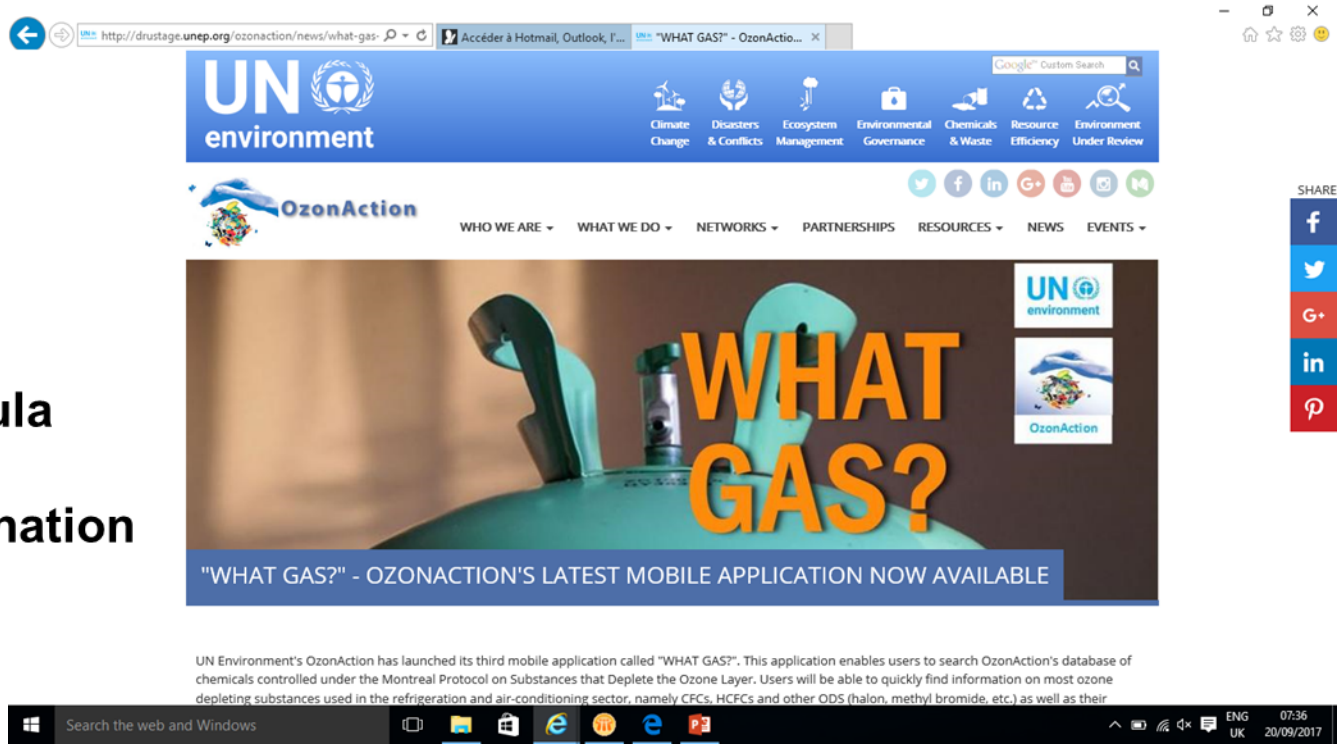
UN ENVIRONMENT CONVENES THE FIRST INTERNATIONAL CONFERENCE ON SUSTAINABLE MARINE AND FISHERIES REFRIGERATION TECHNOLOGIES FOR OZONE AND CLIMATE PROTECTION

1. International Conference on Sustainable Technologies of RAC in Marine/Off-Shore Fisheries Sectors, Bangkok- Thailand (April 2017)
2. International Conference on District Cooling for Urban Development, Sharm Al-Sheikh, Egypt (Sept 2017)
3. ASHRAE Developing Economies Conference, Delhi, India (Nov 2017)
4. Sixth International High Ambient Symposium, Dubai, UAE (March 2018)

OzonAction
refrigeration technician training tools



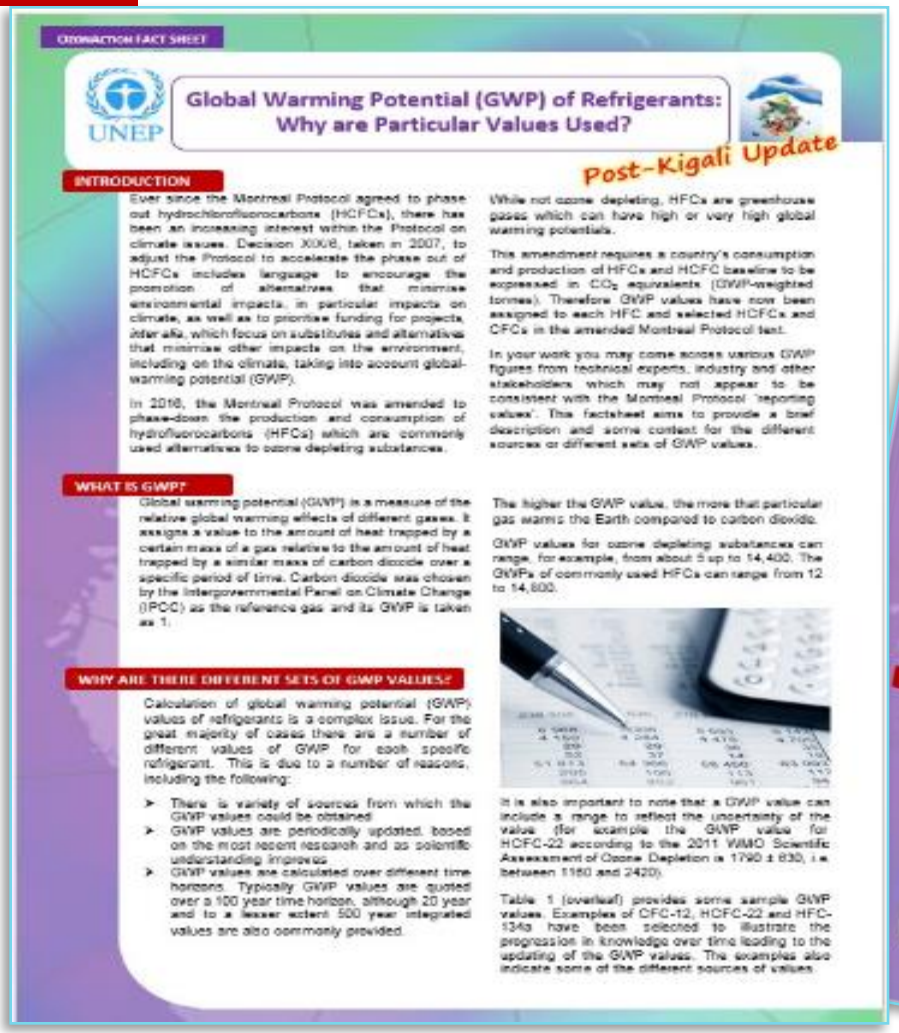
OzonAction smart app



- ☐ Chemical name
- ☐ Chemical formula
- ☐ Chemical type
- ☐ ASHRAE designation
- ☐ Trade names
- ☐ HS code
- ☐ CAS number
- ☐ UN number
- ☐ Montreal Protocol Annex and Control measures
- ☐ Ozone depleting potential (ODP)
- ☐ Global warming potential (GWP)
- ☐ Blend components
- ☐ Toxicity and flammability class
- ☐ Main uses

OzonAction smart app

GWP Values



OZONACTION FACT SHEET

UNEP

Global Warming Potential (GWP) of Refrigerants: Why are Particular Values Used?

Post-Kigali Update

INTRODUCTION

Ever since the Montreal Protocol agreed to phase out hydrochlorofluorocarbons (HCFCs), there has been an increasing interest within the Protocol on climate issues. Decision XXI/6, taken in 2007, to adjust the Protocol to accelerate the phase out of HCFCs includes language to encourage the promotion of alternatives that minimise environmental impacts, in particular impacts on climate, as well as to prioritise funding for projects, inter alia, which focus on substitutes and alternatives that minimise other impacts on the environment, including on the climate, taking into account global-warming potential (GWP).

In 2016, the Montreal Protocol was amended to phase-down the production and consumption of hydrofluorocarbons (HFCs) which are commonly used alternatives to ozone depleting substances.

While not ozone depleting, HFCs are greenhouse gases which can have high or very high global warming potentials.

This amendment requires a country's consumption and production of HFCs and HCFC baseline to be expressed in CO_2 equivalents (GWP-weighted tonnes). Therefore GWP values have now been assigned to each HFC and selected HCFCs and CFCs in the amended Montreal Protocol text.

In your work you may come across various GWP figures from technical experts, industry and other stakeholders which may not appear to be consistent with the Montreal Protocol 'reporting values'. This factsheet aims to provide a brief description and some context for the different sources or different sets of GWP values.

WHAT IS GWP?

Global warming potential (GWP) is a measure of the relative global warming effects of different gases. It assigns a value to the amount of heat trapped by a certain mass of a gas relative to the amount of heat trapped by a similar mass of carbon dioxide over a specific period of time. Carbon dioxide was chosen by the Intergovernmental Panel on Climate Change (IPCC) as the reference gas and its GWP is taken as 1.

The higher the GWP value, the more that particular gas warms the Earth compared to carbon dioxide.

GWP values for ozone depleting substances can range, for example, from about 5 up to 14,400. The GWPs of commonly used HFCs can range from 12 to 14,800.

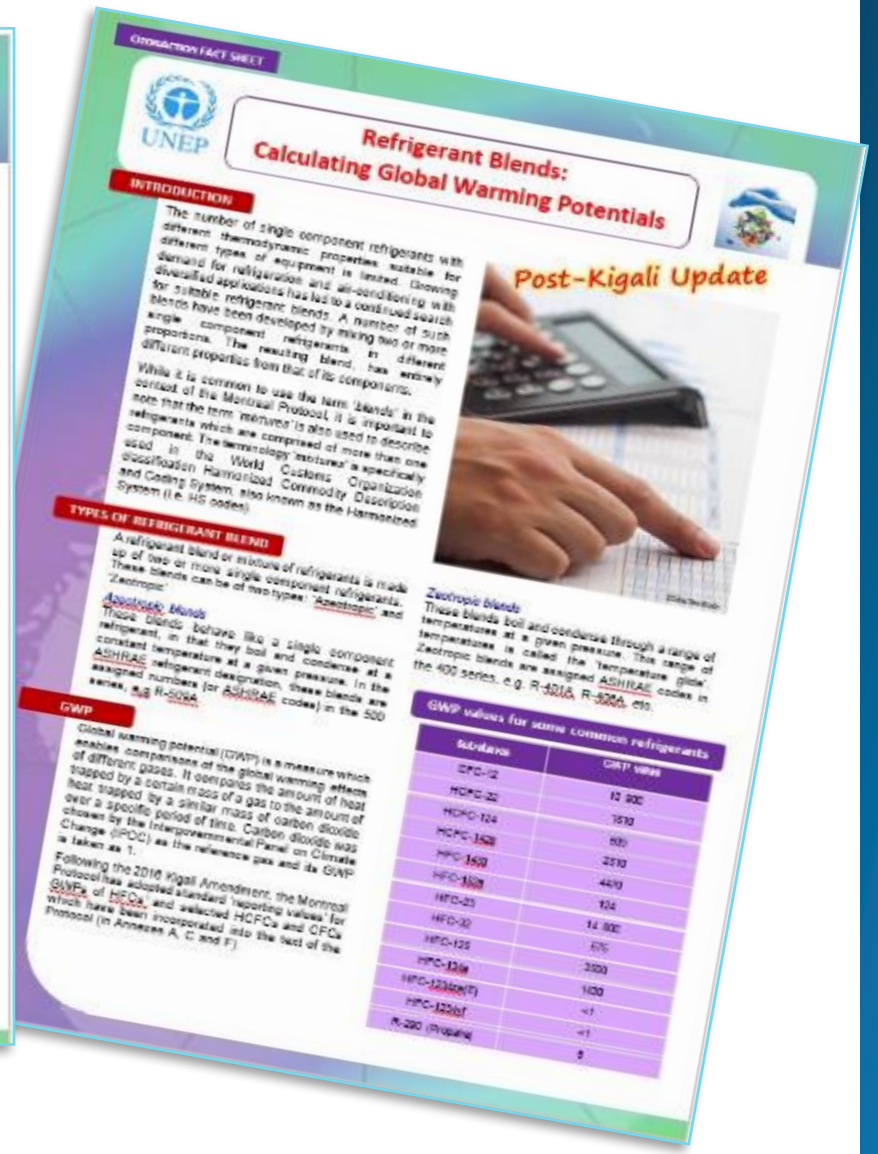
WHY ARE THERE DIFFERENT SETS OF GWP VALUES?

Calculation of global warming potential (GWP) values of refrigerants is a complex issue. For the great majority of cases there are a number of different values of GWP for each specific refrigerant. This is due to a number of reasons, including the following:

- There is variety of sources from which the GWP values could be obtained
- GWP values are periodically updated, based on the most recent research and as scientific understanding improves
- GWP values are calculated over different time horizons. Typically GWP values are quoted over a 100 year time horizon, although 20 year and to a lesser extent 500 year integrated values are also commonly provided.

It is also important to note that a GWP value can include a range to reflect the uncertainty of the value (for example the GWP value for HCFC-22 according to the 2011 WMO Scientific Assessment of Ozone Depletion is 1790 ± 830, i.e. between 1160 and 2420).

Table 1 (overleaf) provides some sample GWP values. Examples of CFC-12, HCFC-22 and HFC-134a have been selected to illustrate the progression in knowledge over time leading to the updating of the GWP values. The examples also indicate some of the different sources of values.



OZONACTION FACT SHEET

UNEP

Refrigerant Blends: Calculating Global Warming Potentials

Post-Kigali Update

INTRODUCTION

The number of single component refrigerants with different thermodynamic properties suitable for different types of equipment is limited. Growing demand for refrigeration and air-conditioning with diversified applications has led to a continued search for suitable refrigerant blends. A number of such blends have been developed by mixing two or more single component refrigerants in different proportions. The resulting blend has entirely different properties from that of its components.

While it is common to use the term 'blends' in the context of the Montreal Protocol, it is important to note that the term 'mixtures' is also used to describe refrigerants which are comprised of more than one component. The terminology 'mixtures' is specifically used in the World Customs Organization Harmonized Commodity Description and Coding System, also known as the Harmonized System (i.e. HS codes).

TYPES OF REFRIGERANT BLEND

A refrigerant blend or mixture of refrigerants is made up of two or more single component refrigerants. These blends can be of two types: Azeotropic and Zeotropic.

Azeotropic Blends

These blends behave like a single component refrigerant, in that they boil and condense at a constant temperature at a given pressure. In the ASHRAE refrigerant designation, these blends are assigned numbers (or ASHRAE codes) in the 500 series, e.g. R-507A.

Zeotropic Blends

These blends boil and condense through a range of temperatures at a given pressure. This range of temperatures is called the 'temperature glide'. Zeotropic blends are assigned ASHRAE codes in the 400 series, e.g. R-407A, R-407C, etc.

GWP

Global warming potential (GWP) is a measure which enables comparisons of the global warming effects of different gases. It compares the amount of heat trapped by a certain mass of a gas to the amount of heat trapped by a similar mass of carbon dioxide over a specific period of time. Carbon dioxide was chosen by the Intergovernmental Panel on Climate Change (IPCC) as the reference gas and its GWP is taken as 1.

Following the 2016 Kigali Amendment, the Montreal Protocol has adopted standard 'reporting values' for GWPs of HCFCs and selected HCFCs and CFCs which have been incorporated into the text of the Protocol (in Annexes A, C and F).

GWP values for some common refrigerants

Substance	GWP value
CFC-12	10 900
HCFC-22	1810
HCFC-124	609
HFC-134a	1430
HFC-143a	4470
HFC-23	14 800
HFC-32	675
HFC-125	3500
HFC-134a(f)	1430
HFC-152a(f)	<1
R-290 (Propane)	5

Vienna Convention- Montreal Protocol for phase out of ozone depleting substances (ODS) and *"sustainable, inclusive and resilient human development"*

MP and health

↓ ozone layer =
↑ UV radiation
↑ skin cancer
↑ eye damage, cataracts
↓ immune system
⇒ ODS in refrigeration sector, cold chain for medicines /vaccines, primary health care

MP impact on food security

↓ ozone layer =
↓ plankton in oceans
↓ agricultural productivity

ODS use in refrigeration sector

•extends shelf life of food products
•is essential for sustainable food production systems

OzonAction:

- supports industrial enterprises & technicians to transition to non ODS

⇒ implications

- business continuity,
- job creation, competitiveness
- increase productivity and industry innovation for ODS alternative technologies

Montreal Protocol twin goals:

ozone protection and GHG mitigation

- 8 Giga Tons of CO2-eq/ year
- 5xs > 1st commitment period of Kyoto Protocol target as a result of CFC phase-out
- OzonAction promotes low GWP climate friendly alternatives to ODS & energy efficient alternatives

ODS uses e.g. in refrigeration/air conditioning sector = cornerstone to modern life

'At this historic moment, as we embark on the exciting journey of nation building and democracy, it is a unique opportunity for society to negotiate a new understanding with scientists and engineers, an understanding based on a shared desire to fulfil social and economic goals.'

Nelson Mandela, 1993

OzonAction