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United Nations
Environment Programme

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Energy Efficiency in the context of the Montreal Protocol and its Kigali Amendment

Promoting Efficient, Clean Cooling through Technology and Policy Innovation

Manila, 5 June 2018

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Content

Montreal Protocol and Kigali Amendment

- Montreal Protocol and energy efficiency
- Kigali Amendment – renewed opportunity for energy efficiency enhancement

Energy efficiency decisions by the parties

- Work of the Executive Committee of the Multilateral Fund
 - Assessments by the Technology and Economic Assessment Panel (TEAP)
 - Workshop on energy efficiency opportunities while phasing down HFCs
 - 40th meeting of the Open-ended Working Group and 30th Meeting of the Parties
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Montreal Protocol and Kigali Amendment

Main Achievements of the Montreal Protocol

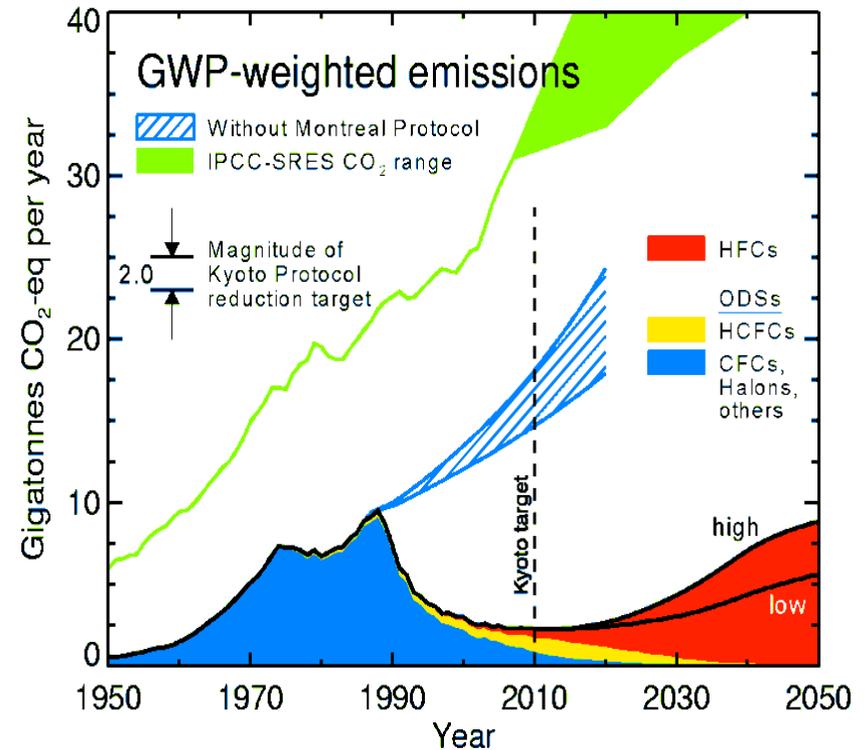
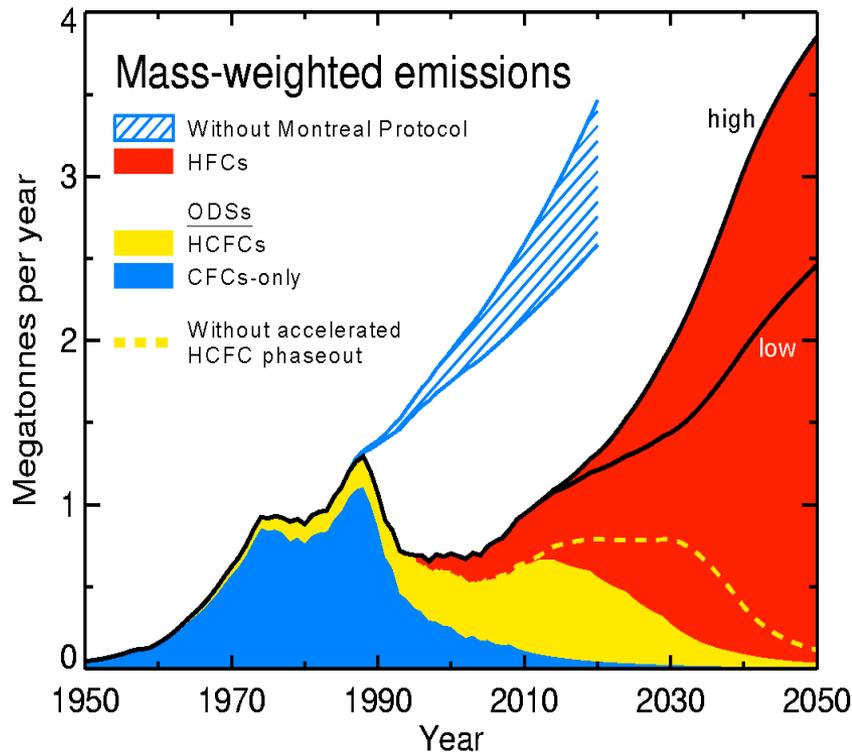
- ✓ **Achieved universal ratification**
- ✓ **99% of ODSs phased out**
- ✓ **All uses of CFCs phased out globally**, with the phase-out of the essential use of CFCs in metered-dose inhalers (MDIs) in 2016
- ✓ **The ozone layer is expected to recover** around the middle of this century
- ✓ The Montreal Protocol has **contributed significantly to climate change mitigation** (avoided 135 gigatonnes CO₂-eq between 1990 and 2010)

And...

- ✓ **The adoption of the Kigali Amendment**

Montreal Protocol Protected Climate

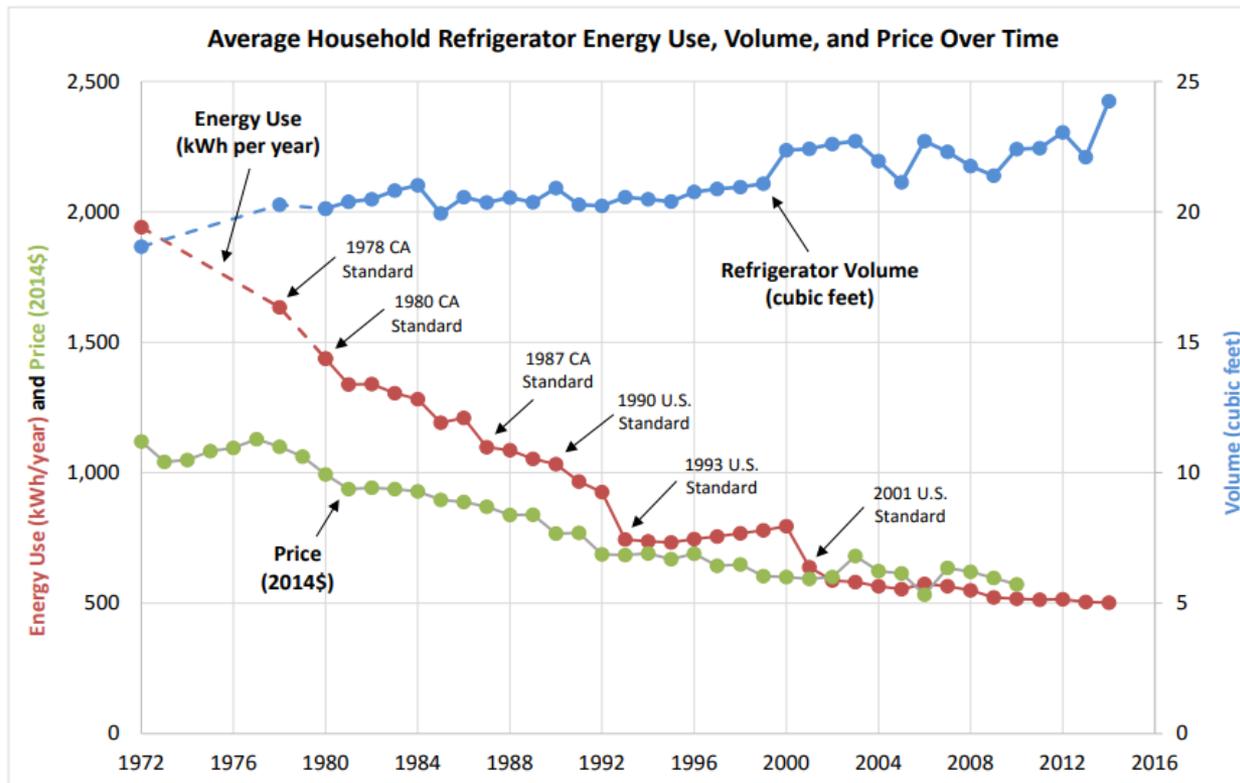
- ODSs are also powerful greenhouse gases.
- Montreal Protocol avoided about 5 times more CO₂-equivalent emissions than the first commitment period of the Kyoto Protocol.



Montreal Protocol impact on energy efficiency

- ODSs have been widely used in refrigeration and air conditioning (RAC) systems and equipment.
- In the RAC sectors, indirect CO₂-eq emissions from energy use is far greater than the direct CO₂-eq emissions of refrigerants themselves.
- Energy efficiency in RAC sectors can be achieved by improving the design and operation of systems and equipment.
- As ODS refrigerants were phased out, transition to alternatives was accompanied by improvement in design and operation, thus improvements in energy efficiency were achieved as well.

An example of energy efficiency improvements: Domestic refrigerators in the US



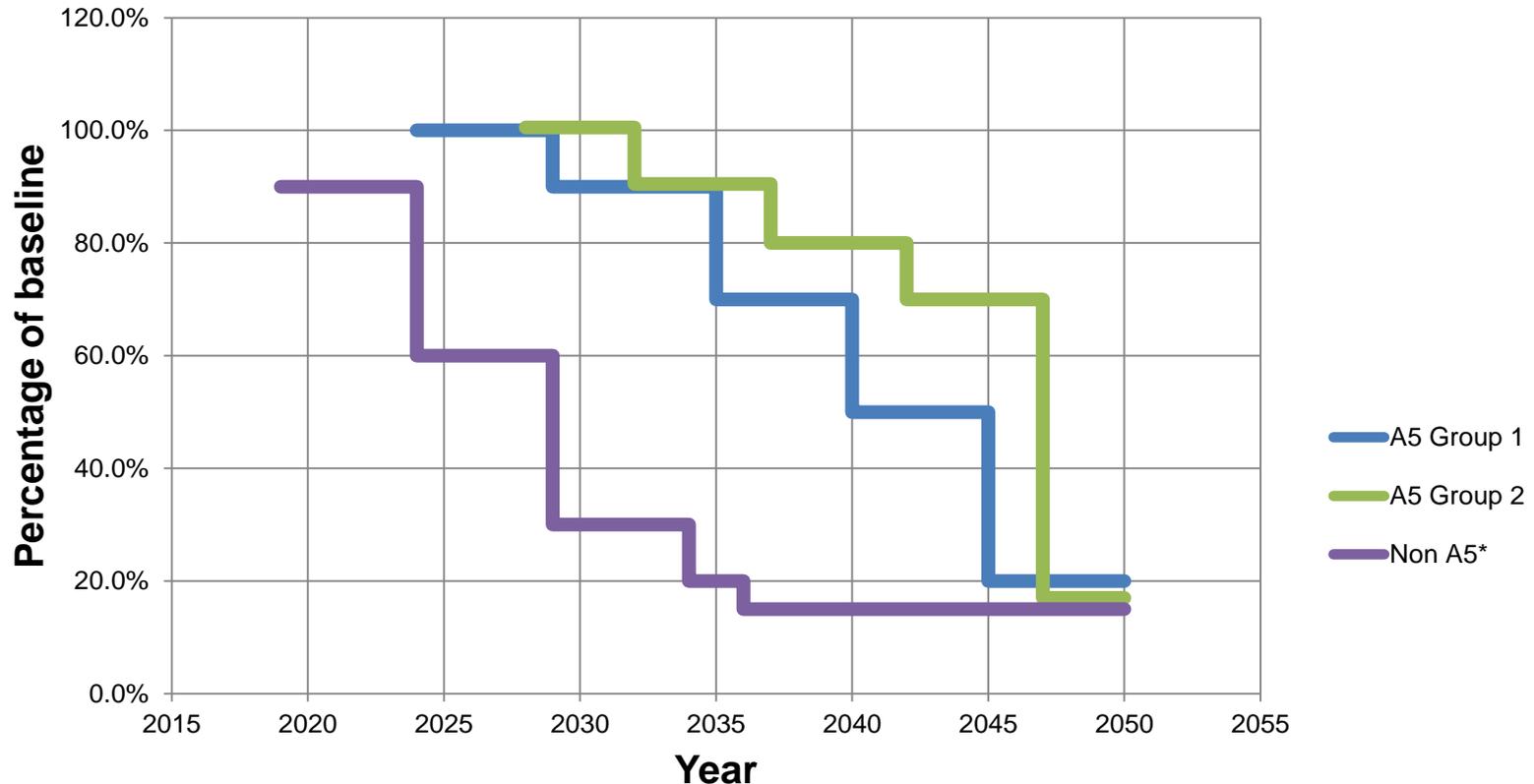
Sources: Association of Home Appliance Manufacturers (AHAM) for energy consumption and volume; U.S. Census Bureau for price.

- Notes:**
- a. Data includes standard-size and compact refrigerators.
 - b. Energy consumption and volume data reflect the current DOE test procedure.
 - c. Volume is adjusted volume, which is equal to fresh food volume + 1.76 * freezer volume.
 - d. Prices represent the manufacturer selling price (e.g. excluding retailer markups) and reflect products manufactured in the U.S.

Kigali Amendment adopted in October 2016

- HFCs are added as controlled substances, in Annex F to the Protocol, to be phased down
- Parties will reduce HFC production and consumption according to specific schedules and also reduce HFC-23 emissions
- There are groupings of parties within non-Article 5 parties (developed countries) and Article 5 parties (developing countries) with different phasedown schedules
- Consumption and production will be measured in CO₂-equivalents using specified GWPs
- Funding and exemptions are provided for, and the details are defined in Decision XXVIII/2

Agreed HFC phasedown schedule



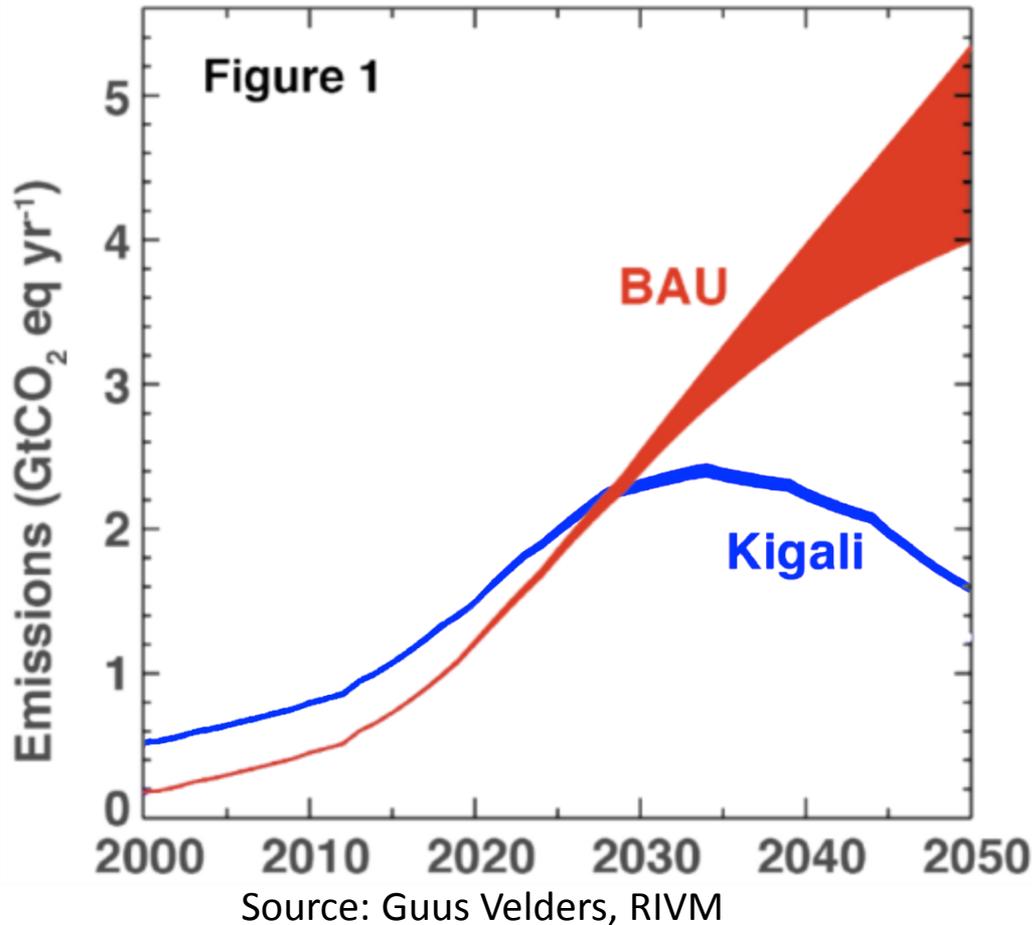
- **Baseline for Non A5** = Average HFC consumption for 2011-2013 + 15% of HCFC baseline*

*For Belarus, Kazakhstan, Russian Federation, Tajikistan, Uzbekistan, 25% HCFC component of baseline and different initial two steps (1) 5% reduction in 2020 and (2) 35% reduction in 2025

- **Baseline for A5 Group 1** = Average HFC consumption levels for 2020-2022 + 65% of HCFC baseline
- **Baseline for A5 Group 2** = Average HFC consumption levels for 2024-2026 + 65% of HCFC baseline

NOTE: The same timeframes and baseline formula apply to production and consumption

Expected climate impact



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

HFC phasedown under the Kigali Amendment would avoid up to 0.5°C temperature increase by 2100.

37 parties have ratified

Australia

Barbados

Benin

Bulgaria

Canada

Chile

Comoros

Costa Rica

Côte d'Ivoire

Democratic People's Republic of Korea

Ecuador

Finland

France

Gabon

Germany

Grenada

Ireland

Lao People's Democratic Republic

Luxembourg

Malawi

Maldives

Mali

Marshall Islands

Micronesia

Netherlands

Niue

Norway

Palau

Rwanda

Samoa

Slovakia

Sweden

Togo

Trinidad and Tobago

Tuvalu

United Kingdom

Vanuatu

Decisions of the parties and
Ongoing activities

Decision related to the Amendment: Decision XXVIII/2 (2016)

- Decision XXVIII/2 deals with solutions to challenges identified by the parties in phasing down HFCs, including
 - Principles and guidelines for funding
 - Exemptions for high ambient temperature conditions
 - Technology reviews
 - Linkages with ongoing HCFC phase-out
- In the decision parties requested ExCom to develop within 2 years, guidelines for financing HFC phase-down, including **cost guidance for maintaining and/or enhancing the energy efficiency of low- or zero-GWP replacement technologies and equipment when phasing down HFCs, taking note of role of other institutions**
- The ExCom to present its work to MOP30 for views/inputs

Decision XXVIII/3 (2016): Energy efficiency:

- Requested TEAP to review energy efficiency opportunities in the refrigeration and air-conditioning (RAC) sectors related to a transition to climate-friendly alternatives
- Invited parties to provide relevant information on energy efficiency innovations in the RAC sectors on a voluntary basis
- The TEAP report and the compilation of submissions are available on the Ozone Secretariat's website (<http://ozone.unep.org/>)

Decision XXIX/10 (2017): Issues related to energy efficiency while phasing down HFCs

- Parties requested TEAP, in relation to maintaining or enhancing energy efficiency in RACHP sectors and HAT conditions for Article 5 parties, to:
 - Assess technology options and requirements; capacity building and servicing sector requirements; and related costs including capital and operational costs;
 - Provide an overview of activities and funding by other institutions.

TEAP has prepared the final report for 40th OEWG (July), and may update that report for MOP30 (November).

- The same decision requested the Ozone Secretariat is to organize a workshop in conjunction with the 40th OEWG.

Workshop on energy efficiency opportunities while phasing down HFCs, 9-10 July 2018, Vienna

Workshop's objectives

- Provide background on energy efficiency in the RACHP sectors
- Consider how to improve energy efficiency, in new and existing equipment
- Consider how to overcome barriers through appropriate policy measures and investment activities

Workshop's design

PART A: setting the scene

PART B: the potential to improve the RACHP efficiency

PART C: investment, financial and policy measures

- Briefing notes aligned with the three parts of the workshop
- Agenda and briefing notes posted on Ozone Secretariat website
- Workshop conclusions to be presented at the 40OEWG

Meetings 2018

- **Workshop on energy efficiency opportunities while phasing down HFCs**
9-10 July, Vienna
- **40th meeting of the Open-ended Working Group (OEWG40)**
11-14 July, Vienna
- **30th Meeting of the Parties to the Montreal Protocol (MOP30)**
5-9 November, Quito, Ecuador

Thank you



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