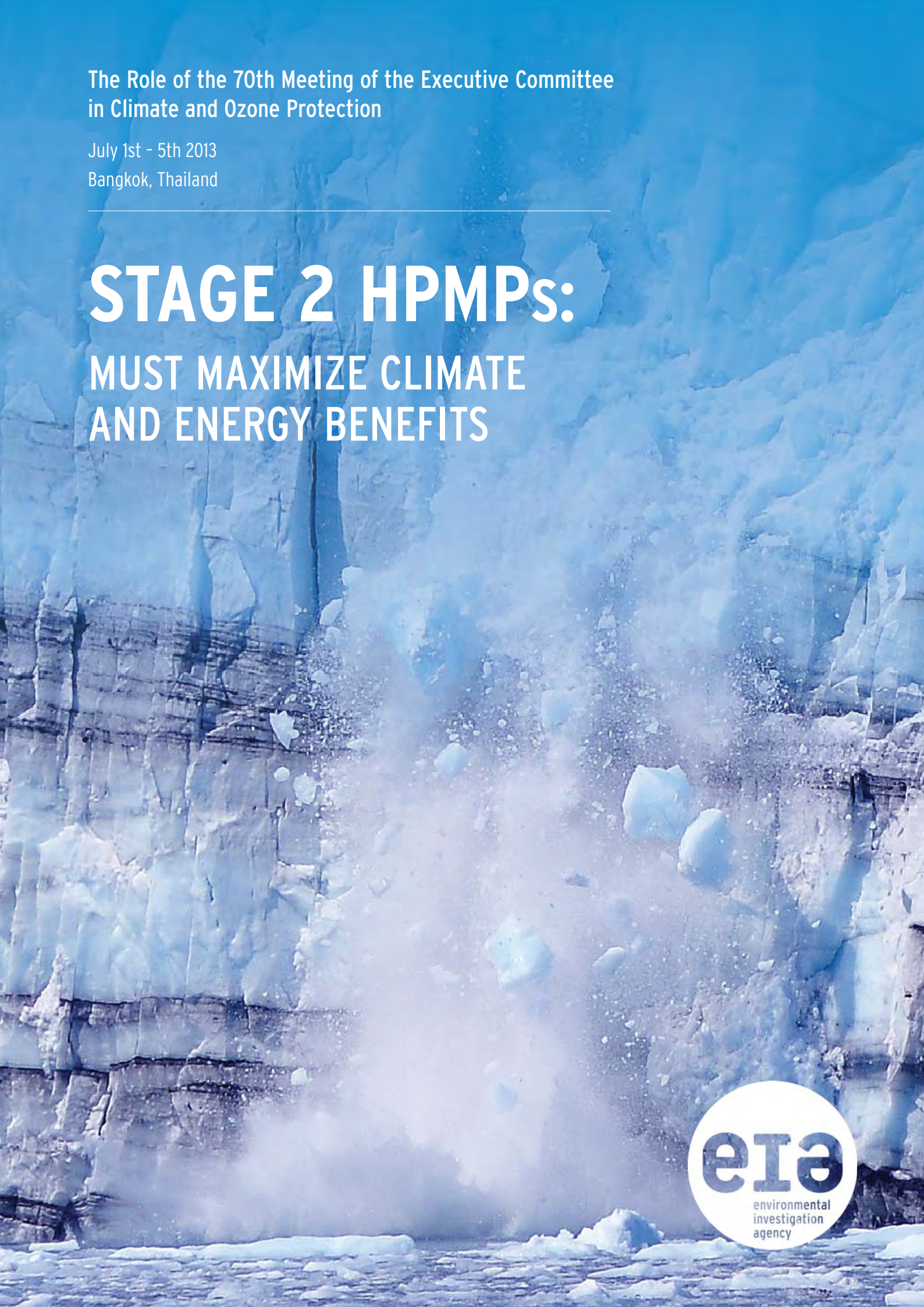
The Role of the 70th Meeting of the Executive Committee in Climate and Ozone Protection

July 1st - 5th 2013

Bangkok, Thailand

STAGE 2 HPMPs:

MUST MAXIMIZE CLIMATE AND ENERGY BENEFITS



environmental investigation agency

The Role of the 70th Meeting of the Executive Committee in Climate and Ozone Protection

Stage II HPMP Guidelines – An Opportunity to maximize the Climate Benefits of the HCFC Phase-Out

At its 53rd and 54th meetings, the Executive Committee (ExCom) decided that all HPMPs should capture the spirit of decision XIX/6 and address the benefits for the climate when looking at alternatives[1]. A vast majority of stage I HPMPs took into account decision XIX/6 and transitioned from HCFCs to climate-friendly substitutes and technologies. The 25% incentive for transitions to low-GWP alternatives included in the Stage I Funding Guidelines was key to many of these transitions but not enough to prevent some transitions to HFCs.

Decision XXI/9(7) requested the ExCom, when developing and applying funding criteria for projects and programs regarding the phase-out of HCFCs:

> *(b) To consider providing additional funding and/or incentives for additional climate benefits where appropriate;*
> *(c) To take into account, when considering the cost-effectiveness of projects and programs, the need for climate benefits;*

Paragraphs 9 and 11 of Decision XIX/6:

> *9. [Encouraged] Parties to promote the selection of alternatives to HCFCs that minimize environmental impacts, in particular impacts on climate, as well as meeting other health, safety and economic considerations;*
> *[…]*
> *11. [Urged Parties] To agree that the Executive Committee, when developing and applying funding criteria for projects and programs, and taking into account paragraph 6, give priority to cost-effective projects and programs which focus on, inter alia:*
> *[…] (b) Substitutes and alternatives that minimize other impacts on the environment, including on the climate, taking into account global-warming potential, energy use and other relevant factors;*
> *(c) Small and medium-size enterprises;*

[1] Draft Guidelines for Funding the Preparation of Stage II of HCFC Phase-Out Management Plans (Decision 66/5(C)), UNEP/OzL.Pro/ExCom/69/33, p.7.

It is critical that the Parties ensure that the ExCom swiftly adopts guidelines and policies to ensure that stage II HPMPs promote transitions to low-GWP technologies and avoid the prolonged negotiations and acrimony that surrounded the negotiations leading to the Stage I Guidelines.

Throughout the analysis of Stage I HCFC phase-out Management Plans (HPMPs), the ExCom has been conducting cost-effectiveness calculations based solely upon the HPMPs' contribution to reducing ozone depleting substances (ODS). However, Decisions XIX/6 and XXI/9 make it clear that this analysis should be modified to take into account "… global warming potential, energy use and other relevant factors." Therefore, in the guidelines for stage II HPMPs, the ExCom must evaluate the cost-effectiveness of Stage II HPMPs taking into account both ozone depletion potential (ODP) as well as direct and indirect climate impacts of the HCFC substitutes.

As part of the development of the guidelines for Stage II HPMPs, the ExCom should, at a minimum, preserve the 25% climate incentive, but should evaluate this incentive to determine whether it is adequate to fund the transitions to low-GWP alternatives and achieve the climate benefits promised when the accelerated HCFC Phase-out was adopted. The Secretariat's review of projects to date suggests that it is not. Additionally, the evaluation of the climate incentive should assess whether more can be done to assist small and medium-sized enterprises (SMEs) and low volume consuming (LVC) countries to transition to low-GWP alternatives as directed in paragraphs 6 and 11(c) of Decision XIX/6. For example, consideration could be given to providing a choice of a fixed sum or 25%, whichever is higher, or allowing a higher percentage incentive for LVCs. Provision could also be made for countries with servicing-only HPMPs to receive the climate incentive to allow them to transition the existing equipment to low-GWP solutions as HCFCs are phased out in servicing.

EIA recommends the Guidelines for Stage II HPMPs at a minimum:

- Preserve the 25% climate incentive;
- Provide a more flexible approach to the climate incentive that allows SMEs and LVCs to receive more flexible and creative funding for low-GWP transitions; and
- Allow the climate incentive to be used by countries that only consume HCFCs for servicing to retrofit and/or change out equipment with low-GWP, energy efficient alternatives.

The ExCom Should Fund Additional Demonstration and Pilot Projects

Decision XXI/9(7) requested the ExCom, when developing and applying funding criteria for the phase-out of HCFCs:

(d) to consider in accordance with decision XIX/6, further demonstrating the effectiveness of low-GWP alternatives to HCFCs, including in air-conditioning and refrigeration sectors in high ambient temperature areas in Article 5 countries and to consider demonstration and pilot projects in air-conditioning and refrigeration sectors which apply environmentally sound alternatives to HCFCs;

The ExCom did fund some pilot and demonstration projects prior to Stage I commencing, but the window for such projects has now closed. Given the rapid development of substitution technologies, and the clear need for the further development of alternatives in certain refrigeration and air conditioning end uses, the ExCom should fund additional pilot and demonstration projects to aid the Parties to understand the whole range of the choice of technology for Stage II HPMPs. Special attention should be paid to alternatives that work in the RAC sector in high-ambient climates.

Desk Study finds accelerating Phase-out requires environmentally friendly low-GWP alternatives

The MLF Secretariat conducted a desk study to assist the ExCom in drawing up the guidelines and requirements for stage II HPMPs. The study evaluated a representative sample of fifteen countries selected from several regions, classified as LVC countries as well as non-LVC countries, with one or several HCFC consuming sectors, and assisted by one or several bilateral and implementing agencies.

The desk study found the following, which is relevant to the preparation of Stage II HPMPs and needs to be addressed by the ExCom:

- The total preparation time of Stage I HPMPs ranged from 24 to almost 32 months which indicates that countries need to start implementation of their Stage II HPMP by 2016.

- Many Article 5 parties wanted to engage in more ambitious HCFC phase-out schedules than those proposed by the Montreal Protocol; therefore, the MLF should plan for this and make sure funding is in place to help Parties maximize the climate benefits of their HPMPs by reducing the use of HCFCs faster than current phase-out schedules.

- All of the countries in the study mentioned low-GWP and environmentally friendly substances as their HCFC alternative of choice. Nevertheless, six of them had to choose unsuitable, high-GWP alternative technologies for the manufacturing sector (HFC-410A for air- conditioning, HFC-245fa for foam, etc.) for the lack of more environmentally safe, sustainable and commercially available alternatives. The ExCom should therefore be funding demonstration and pilot projects to prove additional low-GWP alternatives. Additionally the ExCom should identify sectors where alternatives are proven and commercially available, and urge countries to phase out in those sectors as a priority.

- The strategy for Stage II HPMPs becomes more challenging in the refrigeration servicing sector when the end user must choose an alternative refrigerant or technology. It is at this point that up-to-date, simple and practical guidelines for technology selection and environmental impact evaluation in the RAC servicing sector would be extremely useful to assist in overcoming these challenges. To expedite the anticipated phase-out in the RAC servicing sector during Stage II, the ExCom should develop updated, simple and practical guidelines for technology selection and environmental impact evaluation in cases of refrigerant drop-in replacement, and equipment retrofitting, conversion or replacement, with the understanding that such guidelines would be used by the countries in the context of comprehensive programs for training, demonstration, piloting and outreach.

- The desk study strongly recommends a staged approach as the best option for HPMP implementation in view of the uncertainties that some countries may face with regard to alternative technologies due to variation in key respects including availability, maturity, cost-effectiveness, energy efficiency, and other environmental considerations. The staged approach envisages the development of an overarching strategy that provides an overall direction and a series of sequential shorter stages where specific action plans can be developed and implemented progressively thus allowing time for pending policy issues to be resolved. EIA urges the ExCom to change its current rules and allow staged HPMP implementation.

- LVC countries have had more difficulty than bigger countries in securing co-funding to maximize the climate and environmental benefits of their stage I HPMPs. This situation is not expected to change in the future. The ExCom should explore the viability of brokering initiatives for regional umbrella projects to increase co-funding opportunities to maximize the environmental benefits of stage II HPMPs for LVC countries.

The desk study gives the ExCom multiple suggestions on ways to smoothly implement the Stage II HPMPs and to maximize the related climate benefits. **As noted above, EIA recommends the ExCom should fully implement all of these suggestions.**

<u>Consumption Sector Phase Out: Low-GWP alternatives must continue to be chosen when available</u>

At the 60th meeting of the ExCom, a review was required to include a review of second-stage conversions in the consumption sector "no earlier than the last meeting in 2013" (Decision 60/44). At the 69th meeting, the Secretariat was requested to prepare an information document for this review at the 70th meeting. This information document includes a summary of the funding approvals for 138 Article 5 countries. In this review, a simplified calculation to determine the effect caused by the eventual emissions of the refrigerants was performed to

assess the direct impact on the climate of the currently approved HPMPs. The review determined that annual HCFC consumption to be phased out in the manufacturing sector was approximately 107 million tonnes CO_2e annually, whereas the alternatives phased in represented approximately 27.7 million tonnes CO_2e annually. Although these reductions are significant, as Table 7 shows below, when conversions were made to HFCs from HCFCs, emissions in some sectors increased considerably. For example, in the RAC sector, the conversion of equipment running on HCFC-22 to low-GWP alternatives secured annual emissions savings of over 21 million tonnes CO_2e, whereas the conversions to HFCs resulted in an increase in emissions of over 2 million tonnes CO_2e. These figures would be even more polarized if indirect emissions were taken into account by calculating energy efficiency losses/gains. Parties should therefore encourage the Montreal Protocol and its Multilateral Fund to promote transitions to non-HFC, low-GWP alternatives.

Table 7. Simplified calculation of the impact on the climate from HCFC and their replacements for every year of manufacturing

Application*	HCFC	Alternative technology**	HCFC		Emissions (tonnes CO_2 equivalent)		
			(ODP t)	(mt)	Current	Alternative	Avoided
PU foam	HCFC-141b***	L	4,176.1	37,964.6	27,068,786	531,505	(26,537,281)
		H	124.9	1,135.5	809,644	818,728	9,084
XPS foam	HCFC-142b	L	394.8	6,073.8	13,787,631	72,886	(13,714,745)
		H	120.0	1,846.2	4,190,769	137,354	(4,053,415)
XPS foam	HCFC-22	L	413.4	7,516.4	13,379,127	90,196	(13,288,931)
		H	75.2	1,367.3	2,433,745	101,725	(2,332,020)
Solvent ****	HCFC-141b	L	132.0	1,200.0	855,600	24,000	(831,600)
		H	-	-	-	-	-
RAC	HCFC-22	L	656.4	11,934.5	21,243,491	214,822	(21,028,669)
		H	719.2	13,076.4	23,275,927	25,656,627	2,380,700
Manufacturing	Subtotal		6,812.0	82,114.7	107,044,721	27,647,844	(79,396,877)
Servicing	HCFC-22		1,098.2	19,967	35,541,745		
	HCFC-142b		141.8	2,182	4,953,140		

(*) For PU foam, the amount of the alternative blowing agent is 70 per cent of the amount of HCFC-141b. For XPS foam, the amount of the alternative blowing agent is 60 per cent of the amount of HCFC-22 and HCFC-142b. For refrigeration manufacturing, the amount of alternative refrigerant is 90 per cent of the amount of HCFC-22.
(**) In the context of the present document, alternative technologies "L" include hydrocarbon (blowing agent and refrigerant), and methyl formate, methylal, HFO and water based foam blown agents; and alternative technologies "H" include HFC-245fa for PU foam; HFC-152a for XPS foam; and HFC-32 and HFC-410A for refrigeration manufacturing.
(***) Including 289.7 ODP tonnes (2,633.6 mt) of HCFC-141b contained in imported pre-blended polyols.
(****) Including 59.9 ODP tonnes (544.5 mt) of HCFC-141b used for flushing refrigeration equipment.

The review identified low-GWP alternatives currently being used by countries as a result of their HPMPs, showing that alternatives in these sectors are available in a variety of climates, geographies, and country conditions. For example, the use of hydrocarbon-based pre-blended polyols has been assessed through two demonstration projects in Egypt and China, showing capital and operating savings. CO_2 was noted to be successful in "tropical climates (i.e., Colombia) and at different altitudes."

In air-conditioning and refrigeration, there must be increased focus on updating standards, training, and system optimization in order to catch up with the observed use of propane (HC-

290) and other natural refrigerants, as "the Secretariat noted that hydrocarbon-based technologies were the preferred choice of most enterprises, irrespective of the size of the enterprise." EIA also notes the increasing use of ammonia, hydrocarbons, and CO_2 in air-conditioning and refrigeration units worldwide.

Finally, barriers must be removed to continue safe and effective transitions to low-GWP alternatives. The Secretariat notes "low-GWP technologies are facing challenges in their penetration of local markets, despite that for several applications technically sound technologies are available," and notes that these challenges are in part due to the " lack of regulations, codes and standards allowing the operation of such technologies in most Article 5 countries." Countries can also share best practices to encourage changes in standards, codes, and regulations.

EIA recommends:

- Implementing low-GWP alternatives whenever practicable in all consumption HPMPs
- Increased focus on identifying and removing barriers to implementation of low-GWP alternatives
- Including technician training, especially for SMEs, in HPMPs

Refrigeration servicing: a crucial sector where refrigerant choice is key to minimising the climate impact of the HCFC phase-out

The Executive Committee requested the MLF Secretariat, in consultation with the bilateral and implementing agencies, to prepare a discussion paper for ExCom 70 outlining key issues and considerations involved in further promoting strategies, approaches and technologies to minimize any adverse climate impacts of the HCFC phase-out in the refrigeration servicing sector in the context of decision XIX/6 of the Nineteenth Meeting of the Parties (decision 68/11).

The resulting report provides an overview of the current situation in the refrigeration servicing sector and recommendations to Article 5 countries with a view to improving the uptake of low-GWP alternative to HCFCs.

According to the Secretariat, between 20-60 per cent of HCFC servicing sector consumption relates to initial refrigerant charge, i.e. not to equipment maintenance. However, the report notes the almost complete lack of data regarding the distribution of service-sector consumption between actual servicing on the one hand and assembly, installation, initial charging and commissioning on the other, which makes it difficult to assess the breakdown with any degree of accuracy. The report also remarks that HCFC use related to the installation and initial charge of refrigeration equipment is absent from almost all HPMPs.

It is important to note that for the majority of Article 5 countries, the refrigeration servicing sector continues to be the largest (and in some cases the only) consumer of ozone-depleting substances, with a sizeable installed base of HCFC-22. It is therefore a key sector in terms of securing a successful and timely phase-out of HCFCs.

As noted in the Secretariat's overview, refrigerants are "emitted in substantial quantities" during equipment manufacturing, installation, operation, servicing and disposal in Article 5 countries. Many of these refrigerants have a GWP superior to 1,000 but there is a worrying lack of reliable historical data on direct and indirect emissions related to the refrigeration servicing sector.

The report assesses various ways of minimising the adverse climate impacts of the HCFC phase-out in the refrigeration servicing sector, including:

- Influencing a shift in technology choice toward technologies with lower climate impact for new, factory-charged refrigeration systems (this is deemed the most effective approach, however this would not address the servicing sector so is only examined briefly)
- Influencing a shift in technology choice toward lower climate impact technologies for new refrigeration systems where the servicing sector performs, in particular, initial charging and commissioning, but frequently also assembly and/or installation (through awareness raising and training)
- Reducing charge size
- Reducing refrigerant emissions during servicing
- Improving product quality, installation quality and service quality
- Improving energy efficiency of equipment through better maintenance
- Retrofitting refrigeration equipment to technologies with a lower GWP, when feasible

Given the increasingly urgent imperative to take action on climate change, the global warming potential (GWP) of any refrigerant used to replace HCFCs in the servicing sector should be a key consideration for Article 5 countries. Replacing HCFCs with high-GWP substitutes must be avoided at all costs.

Multiple studies have identified numerous commercially available, technically feasible, safe and energy efficient alternatives already in use. These vary depending on the application, but mostly consist of natural refrigerants such as hydrocarbons (isobutane, propane *inter alia*), carbon dioxide and ammonia. These alternatives often have improved energy efficiency and significantly reduced running costs over the lifetime of the equipment.

The Secretariat's report notes that pure hydrocarbons are commercially available and that the performance and energy efficiency of equipment operating with propane (HC-290) "could be comparable to that of HCFC-22 but there is less experience in manufacturing." Recent

developments in India, China and Mexico mean that the market for equipment (specifically air conditioning equipment) running on HC-290 will increase in the coming years. Likewise, in the refrigeration sector, low-GWP, HFC-free refrigerants are carving out an expanding share of the market, both in Article 2 and Article 5 countries. Increased demand for HFC-free refrigeration will in turn create economies of scale by stimulating the manufacturing of systems, components and refrigerants.

The Secretariat reports that in several Article 5 countries, mainly in Africa and the Caribbean, HC-290 is being used for retrofitting, operating, and/or filling HCFC-22-based equipment. Furthermore, "It appears that market conditions may be favourable for [*sic*] this practice, as it is taking place independently of efforts under the HPMPs, in some cases by enterprises that are promoting the practice and providing related training to technicians." This leads to the recommendation that implementing agencies continue to give priority to providing training to technicians in the safe handling of hydrocarbon technologies and to developing codes and standards on the use of HCs.

The report also examines some fluorinated replacements for HCFC-22, including HFC-32 and the family of unsaturated HFCs (also known as "HFOs"). It notes that HFC-32 has a GWP of 716 and its flammability would also require adoption of regulations, standards and codes of practice. It remarks that HFOs and HFO-based mixtures are not yet commercially available in most Article 5 countries and that costs are expected to be similar to or higher than to those of HFCs

EIA recommendations:

- Given the crucial importance of the servicing sector to the success of the HCFC phase-out in Article 5 countries, steps must be taken to ensure that transitions are to climate-friendly, genuinely low-GWP alternatives wherever feasible

- Article 5 countries must also adapt national codes and standards where these impede the adoption of low-GWP alternatives, such as hydrocarbons, to service equipment. This is all the more urgent in countries where the servicing sector has already moved ahead with retrofitting ODS-based equipment with hydrocarbons

- Training and awareness-raising programmes also need to reflect the reality of increasing use of HFC-free alternatives to ODS