Briefing Note on the Workshop on HFC Management

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BRIEFING NOTE ON THE WORKSHOP ON HFC MANAGEMENT: 11-12 JULY 2014

The Workshop on Hydrofluorocarbon (HFC) Management convened from 11-12 July 2014 in in Paris, France. The workshop was convened in response to discussions held at the twenty-fifth Meeting of the Parties (MOP 25) to the Montreal Protocol on Substances that Deplete the Ozone Layer. The sessions addressed four topics related to HFC management, namely: technical aspects; legal aspects; finance and technology transfer; and policies and measures. Over 300 participants from governments, UN agencies, non-governmental organizations, academia and industry attended the workshop, which was convened to provide an opportunity for focused and in-depth discussions on key issues related to HFC management.

This briefing note summarizes the discussions that took place and is organized according to the agenda.

OPENING SESSION

On Friday morning, Tina Birmpili, Executive Secretary, Ozone Secretariat, observed that the history of the Montreal Protocol (MP) is based on mutual trust, good process and decisions taken based on the best available scientific and technical information. She explained that the workshop would begin with briefings on the current situation from the Protocol's three assessment panels.

Ibrahim Thiaw, Deputy Executive Director, UN Environment Programme (UNEP), noted that the Intergovernmental Panel on Climate Change has warned that ozone layer depletion contributes to climate change, and that climate change contributes to ozone layer depletion. He said UNEP projections suggest that HFC growth over the next 20-30 years may "wipe out" all progress achieved thus far in combating climate change due to the high global warming potential (GWP) of HFCs. Observing that the MP has the experience, expertise, institutions and reputation needed to find solutions to HFC use, he urged Protocol experts, together with the UN Framework Convention on Climate Change (UNFCCC), to address HFC concerns and issues collectively and cooperatively.

Paul Newman, Co-Chair, Scientific Assessment Panel, discussed lessons from the treatment of hydrochlorofluorocarbons (HCFCs) under the Protocol and how the decision taken in 2007 to phase out HCFCs contributed to the growth in HFC use. He pointed out that while HFCs, as with HCFCs, have a lower ozone depleting potential (ODP) than chlorofluorocarbons (CFCs), they still have higher GWPs.

A.R. Ravishankara, Co-Chair, Scientific Assessment Panel, highlighting the MP's success, said that during their first phases, the MP was five times more successful than the Kyoto Protocol (KP) in combating climate change. Should HFC usage continue at current rates, Ravishankara noted that they would comprise 25% of future emissions in 2050. He said that there are alternatives to high-GWP HFCs, highlighted a number of alternatives, and suggested that more research is needed.

Lambert Kuijpers, Co-Chair, Technology and Economic Assessment Panel, noted that in recent years, there has been a significant increase in HFC demand due to growth in emerging markets. Cautioning that HFC demand cannot be accurately predicted due to unreported emissions, he reported that growth in HFC demand is estimated to be 10-12% per annum. He urged establishing more reliable estimates of HFC demand.

Janet Bornman, Co-Chair, Environmental Effects Assessment Panel, discussing the effect of HFCs and HCFCs on the biosphere, said that one of the key elements for the effect HFCs have on the atmosphere is ultraviolet radiation. She noted that the degradation of HFCs and HCFCs produces trifluoroacetic acid (TFA). TFA, Bornman highlighted, can have a negative effect on plant growth, but has minimal effect on mammals. She cautioned that if hydrofluoroolefins (HFOs) are used to replace HFCs, TFA concentrations could increase and suggested continued monitoring of TFA concentrations should this occur.

SESSION 1: TECHNICAL ASPECTS

Facilitator Peter Adler, independent consultant, opened the session on the technical aspects of HFC management on Friday morning. He explained that the session would seek to identify: issues of emerging convergence; challenges; and creating a "toolbox" of potential solutions.

Miguel Quintero, independent consultant, discussed alternatives to HFCs in the production of polyurethane (PUR) foam. He explained that two large segments account for most of the HFC use in foams: PUR foam for insulation; and extruded polystyrene foam for board. He stressed that a critical segment of the PUR foam industry are small- and medium-sized enterprises (SMEs), who rely on local HCFC formulators (system houses), and generally have low technology competencies and poor operating discipline. He reviewed current low-GWP alternatives, such as hydrocarbons, that are flammable and have high investment costs, with non-flammable options such as carbon dioxide (CO2) in water, which have high incremental operating costs (IOCs). He suggested that strategies to phase out HCFCs and HFCs could divide the market into three segments: large

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enterprises using hydrocarbons; medium-sized enterprises using more economical hydrocarbons and reducing IOCs with partial replacement by CO2 in water; and SMEs.

Daniel Colbourne, independent consultant, discussed alternatives to HFCs for refrigeration and air conditioning (RAC). He said that based on the criteria of a GWP of 200 or less, with a balance of efficiency, safety and cost, the majority of refrigeration applications can find substitutes with a lower GWP, with the notable exception of a few subsectors. With regard to barriers, Colbourne urged distinguishing between commonly cited beliefs versus actual technical hurdles, saying that in most cases engineers are confident that they can find alternatives that are highly efficient, safe and have medium costs over time. He cautioned against a "one-size-fits-all" mind-set, stressed the need to increase training for technicians and formalize the refrigeration service sector, and suggested that avoiding procrastination in deciding to phase out HFCs will minimize the overall transition costs.

Roberto Peixoto, Maua Institute of Technology, provided an overview of the challenges and barriers to ensuring the economic and commercial availability of HFC alternatives, saying they must provide environmental sustainability, performance, safety and take into account total cost of ownership. He said that some low-GWP options are not fully mature and their application cannot be immediately achieved. He cautioned that using flammable refrigerants requires assessing procedures and establishing standards on good practices. He noted that high ambient temperatures generate more stringent and restrictive conditions on refrigerant choices. He also urged assessing the climate impact of RAC equipment during their lifecycle.

Stephen Yurek, Air-Conditioning, Heating, and Refrigeration Institute, said that the RAC industry is aware of and acting on the need to move from high- to lower-GWP refrigerants. Yurek noted factors when considering refrigerants include efficiency, cost, availability, stability, and that most refrigerant candidates are at least mildly flammable. He said that transition will take time as commercial availability needs to be ensured, and further underscored a global approach for education, training and awareness raising.

Mike Thompson, Alliance for Responsible Atmospheric Policy, said that there has been dramatic progress with a number of HFO and HFC products introduced during the last year, including the release of next-generation foams, solvents and aerosols. He highlighted that research and development is taking place to address how low-GWP alternatives will work in high ambient temperatures. He said that in many instances change is being driven by regional and sub-regional policies. He urged consistent and flexible policies with a global approach to achieve more progress. He stressed the importance of ensuring that there is refrigerant service supply over the lifetime of the equipment.

During the panel discussions, one panelist noted that flammable hydrocarbons are being used more frequently in refrigeration, centralized cooling systems in supermarkets, and foam manufacture. Another suggested that since foam manufacturers are switching to flammables or high-GWP alternatives, removing HFCs from foam manufacture may be a smaller challenge.

A panelist said good-practice capacities are important for developing countries, particularly when discussing flammable or toxic alternatives, and urged focusing on training and long-term education for service workers. One audience member asked for clarification on capacity-building initiatives currently in place, with one panelist saying that while some initiatives were underway, more needs to be done at a global level.

An audience member said his Middle Eastern country had difficulty finding compressors using alternatives that can cool properly at ambient temperatures approaching 50°C. A panelist cautioned that there is no single solution to the high ambient temperature issue: in water-cooled systems low-GWP alternatives are readily available commercially, but not yet for air-cooled systems. He suggested that one challenge for industry is to hone down the number of HFC alternatives, as there are currently too many. Another panelist suggested that any regime on HFCs should contemplate differentiated treatment for countries with high ambient temperatures.

Responding to an audience member, a panelist suggested that alternatives in cooling systems should weigh GWP, safety, and the costs at time of purchase as well as maintenance costs over the life of the system, although he added that the latter will come down as the marketplace gains more experience.

The facilitator asked if there are low-GWP "drop-in" coolant technologies available. A panelist responded that flammable drop-ins should never be used in equipment not designed for them.

One panelist suggested that the MP should focus on its official priorities rather than taking on the priorities of other bodies.

The facilitator asked what outstanding issues need to be concentrated on most. One panelist suggested revisiting the 1 January 2015 phase-down deadline for Article 5 countries, and setting a target for alternatives that gives industry certainty to plan around. Others suggested: safety and flammability, with some encouraging more research on this issue; environmental issues other than GWP or ODP, such as air quality; demonstration projects; coordinating market signals and regulation; and not restricting alternatives to a single choice.

Summarizing, the facilitator noted that discussions addressed, *inter alia*: how all the substitution issues are "addressable"; increasing practical knowledge of new refrigerants in developing countries; how best to support SMEs to compete with the larger enterprises in the market; and the feasibility of alternatives that have negligible GWP in all applications across all sectors.

SESSION 2: LEGAL ASPECTS, PARTICULARLY MUTUALLY SUPPORTIVE MEASURES BETWEEN THE OZONE AND CLIMATE REGIMES

This session was facilitated by Maas Goote, independent consultant, on Friday afternoon. Arancha Hinojal, UN Office of Legal Affairs, discussed how the Vienna Convention on the Law of Treaties could affect synergistic work between the ozone and climate regimes. She concluded that if the current UNFCCC/KP regime and an eventual MP regime on HFCs are complementary, there would be no conflict between their norms. If a conflict should arise, Hinojal suggested a clause be introduced in the MP amendment clarifying the amendment's effects on the relevant provisions of the UNFCCC/KP, and if a conflict clause is not incorporated into the amendment and does arise, Article 30(4)

(Application of Successive Treaties Relating to the Same Subject Matter) of the Vienna Convention on the Law of Treaties governs which instrument would prevail.

José Pons, independent consultant, reviewed the lessons learned from the history of the MP, including that: a global commitment is needed to succeed, which entails recognizing common but differentiated responsibilities (CBDR); parties that are well-informed are better able to tackle the issues; different solutions tailored to each situation should be used; the final stages of phase-out can be reached without problems if the change is controlled and gradual; and the special provisions of the Protocol regarding technology transfer has enabled compliance and full partnership from Article 5 countries. He concluded by noting that ozone layer depletion and climate change affect each other, both issues involve long response times, but the MP has important resources that can manage the phase down of HFCs.

Dan Bondi Ogolla, UNFCCC Secretariat, discussed the role of the UNFCCC in controlling HFC emissions. He noted that each regime has a "jurisdictional carve-out," with the UNFCCC addressing greenhouse gases (GHGs) not controlled by the MP. He said that since HFCs are not, technically speaking, ozone depleting substances (ODS), they are not presently covered by the MP but are addressed by the UNFCCC. He questioned if the climate change regime would continue to cover HFCs if they are included under the MP's jurisdiction. He suggested that the MP could best address HFCs by discouraging their production and consumption, and providing a means of implementation via the Multilateral Fund (MLF) for these issues. He suggested that parties in both regimes identify and develop complementary approaches based on a clear understanding of the scope and competencies of each regime.

Jake Werksman, European Commission (EC), said that there is no legal barrier preventing the climate and ozone regimes to act on HFCs. He also said there is also no legal conflict between the two regimes. Werksman underscored that the combination of the two regimes' efforts thus far has been insufficient to send the right signals to reduce HFC usage. He posited that a lack of political readiness has prohibited progress and also suggested that many concerns can only be addressed through the negotiating process.

In the ensuing discussion, one panelist said that the predicted effect of HFCs in the future should be sufficient to encourage action, suggesting that the UNFCCC deal with banks and emissions while the MP address consumption and production issues.

Another suggested that articles under the MP and the Vienna Convention on the Law of Treaties provide a means to overcome legal complexities.

In response to a question from the audience, one panelist cautioned that no regime is better or worse than another, but rather that each has different benefits. Another noted that due to complexity of the issues addressed by the UNFCCC, it is already accustomed to cooperating with other organizations. As to whether the climate and ozone regimes can address HFCs simultaneously, one panelist pointed out that many instruments address different aspects of biodiversity and work together constructively. Another panelist suggested that it was possible for the MP and UNFCCC/KP to adopt a decision on synergies regarding HFCs without amending the underlying regimes. She called for a holistic analysis of HFCs and the two regimes involved, so that responsibilities can be allocated intelligently, while respecting the autonomy of each regime. A third panelist urged looking at the synergies question as involving not just HFCs, but the precedence it may set for handling other substances where the responsibilities of the two regimes overlap. Another panelist suggested that countries could agree to take on HFC production and consumption matters under the MP, and emissions aspects under the climate change regime to be agreed in 2015.

Regarding whether a MP amendment on HFCs would entail changes for the climate regime, two panelists cautioned that amending the MP to address HFCs would entail "legal wrinkles" for the climate regime that would need to be addressed. Another suggested these could be worked out during amendment negotiations.

One participant queried if more regulatory signals are needed, with a panelist noting that the MP can be effective in sending the right regulatory signal. An audience member asked if a legal solution was really necessary, when the issue was about prompting industry to create and find viable substitutes for HFCs. Another audience member suggested providing financial incentives for countries wishing to address HFCs. A panelist responded that the history of the MP suggests that legal and non-legal approaches are mutually reinforcing, and a second panelist suggested funding is more likely to come when a binding legal obligation is involved.

An audience member cautioned that if the amendment is negotiated, parties might be expected to forego the CBDR principle. The facilitator asked if there was a way to amend the MP to reflect the climate regime's emphasis on CBDR. A panelist pointed out that the CBDR principle is already reflected in the MP in a variety of ways, and suggested that it need not emulate the climate regime. Another panel member cautioned that the way CBDR is reflected in any MP amendment may set a precedent for Article 5 country obligations vis-à-vis other GHGs.

On whether the MP can address a substance that is not an ODS, a panelist pointed out that Vienna Convention for the Protection of the Ozone Layer's Article 2(2)(b) calls for parties to cooperate regarding human activities found to have adverse effects resulting from the modification or likely modification of the ozone layer. He said HFCs were created specifically as a substitute for ODS, but have contributed to an adverse effect covered by the Vienna Convention—climate change—so it is the duty of parties to address their impacts. Another panelist agreed that MP parties have a moral and legal obligation to address HFCs since "this is a mess the MP created."

SESSION 3: FINANCE AND TECHNOLOGY TRANSFER

Facilitator Peter Adler opened Saturday morning's session on finance and technology transfer by summarizing key takeaway messages from the first day's discussions, saying that in terms of the technology, no one size or shape fits all situations. He noted there are many "chicken and egg" situations, where the market is waiting for signals from regulators and regulators are looking for signals from the market.

Erik Pedersen, independent consultant, surveyed projected costs of conversion to non-HFC technologies, with a focus on mobile air conditioning (MAC), domestic refrigeration, commercial refrigeration, and PUR foams. Regarding challenges, he noted: many non-HFC technologies require high upfront investments and safety requirements linked to their adoption that can be seen as a barrier to adoption; the high costs of servicing existing chemicals and new non-HFC flammable alternatives; examining whether technology transfer will serve as a barrier to converting to non-HFCs; and identifying barriers to leapfrogging directly to non-HFC technologies for Stages II and III of the HCFC Phase-out Management Plans.

John Thompson, Vice Chair, MP Executive Committee (ExCom), discussed the mechanisms and policies of the MLF relevant to HFC management. He recalled that Decision 19/6 of 2007 regarding HCFC acceleration, which included provisions calling for, promoting the selection of HCFC alternatives that have a minimized impact on the environment, including climate change, and for the ExCom to give priority to cost-effective projects and programmes that meet this goal. He characterized the results of that decision's implementation as mixed, with some countries choosing low-GWP non-HFC alternatives to HCFCs, but others adopting high-GWP alternatives. He said that in the future the MLF needs to deal with the installed base in MAC and refrigeration, make a full effort in HCFC transitions that guide away from high-GWP and/or HFC alternatives, and address non-transition HFC growth in air conditioning. He closed by suggesting that, given their remarkable past successes, only the MP and MLF can comprehensively address HFCs, and while they cannot address all parts of the climate change problem, they are best suited to address this aspect.

Chandra Bhushan, Centre for Science and Environment, discussed elements he believed were needed in a possible agreement on HFC phase-down, and the resultant finance and technology transfer implications. He started by discussing "ground realities" in developing countries, namely the huge increase in energy consumption and GHG emissions in the building sector, particularly with regard to cooling demands. He suggested that any HFC agreement must address not only in-kind alternatives to HFCs and HFC emissions reductions, but also energy efficiency. He said this should be carried out under the MP. He called for: a "leapfrog" deal for Article 5 countries that includes a decision on a target year for freezing HFC consumption and allowing continued HFC use in certain sectors where viable cost-effective alternatives do not yet exist; a "leadership deal" for non-Article 5 countries providing for a stricter phase-down schedule and sector-specific guidelines; and provisions addressing financing for the transition from HFCs, the role of patents, technology transfer and research and development support. He also urged having an open discussion about concerns regarding TFA and HFOs.

During the ensuing discussion, panelists acknowledged that the MLF has been a largely successful mechanism, saying that its experience will inform steps going forward. One panelist suggested that if the MP wanted to incorporate HFCs, the MLF may need to reassess its methodologies. She also queried if incentives from the MLF are sufficient to encourage users and industries to change to lower-GWP chemicals. Panelists also outlined financial tools available in this regard including the Green Climate Fund, the Global Environment Facility, the Clean Technology Fund and the Clean Development Mechanism, which currently has 19 HFC-related projects under it.

An audience member highlighted the importance of incentives, which one panelist said could be limited under the MP due to HFCs not currently being dealt with in a formal manner. Another participant suggested establishing methodologies to maintain financial stability, as part of incentivization methods.

On high ambient temperatures one panelist noted that a demonstration project funded by the MLF is underway. Another suggested that some alternatives have a low efficiency and capacity in high ambient temperatures.

One participant queried what steps need to be taken to bolster technology transfer, help meet commitments and phase out ODS. One panelist suggested establishing a mechanism for SMEs to access suitable technology more easily. On a question from Facilitator Adler on barriers to accelerating technology transfer, one panelist said that technology transfer also extends to "tweaking" currently used technology to suit local conditions and ensuring that there is sufficient capacity to operate the technology.

Others suggested: South-South cooperation for technology transfer; ensuring a "whole package" is in place for successful technology transfer; making sure key and advanced technologies are available; and implementing open and fair procurement practices. One panelist commented that the technology discussion has focused too much on manufacturing aspects and not enough on the user side.

Asked by Facilitator Adler to clarify their offer, an industry representative explained that his company is opening royalty-free access to its basic technology patents regarding R-22 for manufacturing in Article 5 countries, whether the manufacturer originates in an Article 5 country or is simply domiciled there.

One audience member queried the use of sectoral phase-out approaches. Another asked if current funding levels to transfer to certain technologies are sufficient. An audience member voiced concern about Article 5 countries being asked to phase down or avoid HFCs with no evidence of a credible financial plan to support HFC phase-down.

Panelists also urged greater focus on baseline data for HFCs, which is needed before discussing targets, and cautioned that some companies may offer technology transfer deals as part of a marketing strategy to steer more countries towards their particular technology.

Asked by the facilitator to offer parting thoughts, panelists said: leapfrogging is already occurring in some market segments, but not always at higher costs; consideration on how to accelerate change is needed; the international community can make greater efforts to facilitate faster, more effective technology transfer; incentives for technology choices need to be deliberated on more fully and cautiously, while perverse incentives to avoid "good" technologies need to be addressed; the HFC challenge has to be addressed sectorally; the MLF has a unique and important role to play in steering countries away from and/or phasing down HFC usage; the big challenge is air conditioning, where demand is strong, decisions involve long-term impacts, and existing alternatives are not always low-GWP; and the MP

needs to address not just chemical choices, but also related issues such as energy efficiency.

SESSION 4: POLICIES AND MEASURES FOR HFC MANAGEMENT

This session was facilitated by Karin Shepardson, independent facilitator, on Saturday afternoon. Philip Owen, European Commission, reviewed European Union (EU) work relevant to HFC reduction and promotion of alternatives, focusing first on 2006 measures that combined: limited and specific use and marketing restrictions; labeling requirements; targeting proper maintenance and disposal; measures on emission prevention and leakage checks, along with staff training and certification; eco-design requirements; a directive on waste electrical and electronic equipment; a GWP limit of 150 for MAC; and public procurement measures to influence the market. He said in 2014, the EU committed to a general HFC phase-down to 20% of current levels by 2030. Among the challenges he highlighted were how to best: support innovation; enhance industry acceptance; and promote a global level playing field. He also cited deciding on whether to pursue legislation or voluntary systems as a challenge.

Masafumi Oki, Japan, reviewed three policy measures in Japan. He said the first involved promoting lower-GWP products, where the Ministry of Economy, Trade and Industry (METI) "designates" low-GWP or non-fluorocarbon products, taking into consideration safety, energy efficiency, and affordability. He explained the second involves requiring manufacturers and importers to make plans to conduct an HFC phase-down, with METI evaluating their accomplishments every five years. He said the third measure focused on reducing "in-use leakage" from commercial products, requiring users to keep records, per piece of equipment, of maintenance, repair and refilling.

Agustín Sánchez, Mexico, discussed a survey conducted in 2012 by the Environment Secretariat establishing good baseline data for HFCs. He outlined how the General Law on Climate Change affects HFCs and described elements of the Special Programme on Climate Change addressing HFCs, including the development of National Appropriate Mitigation Actions to reduce short-lived climate pollutants.

Cindy Newberg, US, highlighted the US Environmental Protection Agency's (EPA) Significant New Alternatives Policy (SNAP) and two recently proposed rules regarding: low-GWP refrigerants as acceptable subject to conditions; and listing as unacceptable certain high-GWP HFCs for specific end uses. She commented that these little changes will have big impacts, and explained that the proposals are subject to public comment, with final rules expected in early 2015.

Facilitator Shepardson suggested that commonalities among the four approaches are sectoral focus, motivation from climate concerns, consideration of technical feasibility, emphasis on tackling leakage, and a combination of both mandatory and voluntary measures.

An audience member, noting differences between the various approaches, wondered if a global approach was feasible. One panelist suggested the EU approach might serve as a model, offering several different options.

Premhans Jhugroo, Mauritius, reviewed his country's MP implementation, its efforts to leapfrog to natural refrigerants and energy efficiency projects under the MP and KP, demonstration and trial projects underway, two projects involving a deep ocean water cooling system, and a survey on HFCs in appliances and in use in the country. Among the challenges he identified were Mauritius' remoteness as a small island developing state, technology transfer, financial constraints, and the need to destroy phased-out ODS such as CFCs.

Inese Chang-Waye, Seychelles, said that due to a HCFC shortage, the import of HFCs has increased, with the main consumer being the hotel industry. She noted government efforts to decrease HFC consumption and promote natural refrigerants consumption through imposing a high level of taxation on HFCs, from 15% to 100%, and removing the tax on natural refrigerants. She underscored the importance of training refrigerant technicians, particularly on the safety aspects of hydrocarbons. She stated that the impetus to start this conversion and leapfrog is because of their vulnerability to climate change and other negative environmental impacts.

Blaise Horisberger, Switzerland, provided an overview on Swiss policies and measures for phasing down HFCs, saying that the government wanted to act before the problem became bigger and more expensive to address. He said that they used an industry-oriented approach based on the availability of alternatives, and insisted that new equipment is used. He underscored the need for training to service new equipment and refrigerants. He said that they regulate these substances and, in the last set of results, they achieved the necessary phase-down.

Shamila Nair-Bedouelle, UNEP, presented an overview of policies and measures in developing countries, noting that national ODS policy regimes are a critical factor for success. She said that policy setting for the CFC/HCFC phase out has been successful under the MLF, but cautioned that policies can also be barriers or enablers for introducing low-GWP alternatives. She stressed that key challenges going forward include assistance for developing countries with respect to HFCs and low-GWP alternatives and coordinating policies between different sectors

Discussion on industry's reaction to signals from the Montreal Protocol, including CFC and HCFC experience and future challenges with HFCs: One panelist suggested that signals to encourage up-take of certain technologies by industry can either come from the market or through regulatory mechanisms. One audience member queried if "a global signal" would be sufficient to provide a framework for cooperation to phase down HFCs. A panelist suggested that a global signal is important for early action. Others suggested market mechanisms as a policy tool would allow industry and users to select the best solutions given local conditions. One panelist queried if this would be sufficient to send signals to industry.

Panelists urged: addressing challenges more quickly; harmonizing regulations; and allowing standards organizations to more easily use new technologies.

One panelist underscored the risk associated with products can be harmful to reputations. Another said that one of the biggest risks is performance, recommending a process to confirm performance and then address other associated risks. Panelists also mentioned that funding needs to be available and in place to ensure controls are being carried out, and standards and regulations must be policed at all levels

Panelists also said: global agreements will enable demand and economies of scale thereby lowering the price; it is important to understand the difference between market and regulatory mechanisms; and that, generally speaking, industry "is on board" with an HFC phase-down.

CONCLUSIONS AND IDENTIFICATION OF FURTHER DISCUSSION POINTS

Executive Secretary Birmpili opened the closing session on Saturday afternoon by explaining that the rapporteurs from the four sessions would summarize the key takeaway ideas. Annie Gabriel, Australia, on Session I, said that the participants:

- noted that many HFC alternatives exist with low or no GWP, but most are flammable and require careful risk management;
- suggested that the wide variety of technical alternatives presents a challenge to industry, particularly SMEs;
- noted that some subsectors in refrigeration, air conditioning and foam do not yet have commercialized low or no-GWP alternatives to HFCs;
- noted countries with high ambient temperatures pose a specific challenge;
- noted factors affecting timelines for adopting alternatives to HFCs include commercial viability, regulatory approvals, standards and codes, while hurdles include market segmentation due to differing national regulations and a lack of global consensus;
- noted industry's call for certainty from policy makers; and
- noted the desire for demonstration projects, the need for technical support to build the skills of technicians handling new refrigerants, and the challenge of finding sources for financial incentives and assistance.

Donnalyn Charles, Saint Lucia, reported that session 2:

- recognized that the UNFCCC/KP and Vienna Convention/MP have synergies and are complementary, allowing obligations under both regimes to be fully and simultaneously implemented by countries, but cautioned that this depends on identifying and resolving any potential conflicts between the two;
- recognized that once political will exists to address HFCs, any and all identified issues could be resolved;
- identified issues to be deliberated on carefully during any negotiations including, but not limited to, defining high- and low-GWP ranges for alternatives, finance issues, the application of the CBDR principle, and defining the respective capabilities of the climate and ozone regimes;
- identified the importance of sending the right signals to industry; and
- cited the MP as a good example of putting CBDR into practice, while suggesting that application of the principle would have to be considered afresh during any HFC negotiations.

Gudi Alkemade, Netherlands, on Session 3, said participants:

- characterized the MP and MLF as effective, with the knowledge, experience, expertise and reputation needed to deal with the HFC issue;
- noted the importance of addressing energy efficiency in any HFC phase-down regime;
- stressed the importance of and the need to assess barriers to technology transfer involving alternatives to HFCs;
- acknowledged the importance of demonstration projects;
- underscored the difficulty of providing financing without clear control targets;
- stressed the need for the MLF to address technology transfer, capacity building, enabling environments and barriers; and
- emphasized that going forward the priorities should be setting clear targets, approaching the HFC issue with an open mind, using the experience of the MP and the MLF to leapfrog HFCs, identifying options for a holistic approach to energy efficiency in financial mechanisms, and assessing ways to effectively scale up alternative technologies.

Bitul Zulhasni, Indonesia, on Session 4, said participants acknowledged that where policies already adopted are relevant to HFCs, they, generally speaking, were:

- driven by the climate change agenda;
- seek to avoid high-GWP alternatives;
- take into account climate impact, energy efficiency, safety, affordability, and impacts on competitiveness; and
- have a sectoral focus based on the specific country situation and technology availability.

She said industry participants identified the focus of manufacturers as conversion from high- to low-GWP alternatives, while for the servicing sector standards were important, as were good maintenance and servicing practices. She noted the session's discussion of different market mechanism options and experiences. She said participants agreed globalization is needed in order to provide a level playing field, differed on the value of general harmonization of measures, but agreed that segmented markets reduce economies of scale and that some standards and codes need to be harmonized. She added that some participants also noted the risks involved for "early movers" choosing technologies to replace HFCs.

Executive Secretary Birmpili closed the workshop at 6:00 pm.

GLOSSARY

CBDR	Common but differentiated responsibilities
CFCs	Chlorofluorocarbons
GHGs	Greenhouse gases
GWP	Global warming potential
HCFCs	Hydrochlorofluorocarbons
HFCs	Hydrofluorocarbons
HFOs	Hydrofluoroolefins
KP	Kyoto Protocol
MAC	Mobile air conditioning
MLF	Multilateral Fund
MP	Montreal Protocol
ODP	Ozone Depleting Potential
ODS	Ozone Depleting Substances
PUR	Polyurethane
RAC	Refrigeration and air conditioning
SMEs	Small and medium-sized enterprises
TFA	Trifluoroacetic Acid
UNEP	UN Environment Programme
UNFCCC	UN Framework Convention on Climate Change