

SUMMARY OF THE 39TH MEETING OF THE OPEN-ENDED WORKING GROUP OF THE PARTIES TO THE MONTREAL PROTOCOL ON SUBSTANCES THAT DEplete THE OZONE LAYER: 10-14 JULY 2017

The thirty-ninth meeting of the Open-Ended Working Group to the Montreal Protocol on Substances that Deplete the Ozone Layer (OWEG 39) convened at the United Nations Conference Centre in Bangkok, Thailand from 11-14 July 2017.

It was preceded by a Workshop on Safety Standards Relevant to the Safe Use of Low Global Warming Potential (GWP) Alternatives to Hydrofluorocarbons (HFCs) held on 10 July 2017. The Workshop was mandated by the Twenty-Eighth Meeting of the Parties (MOP 28) to the Montreal Protocol, held in Kigali, Rwanda in October 2016. Its conclusions were presented to OWEG 39 for further consideration.

OWEG 39 considered, among others, nominations for essential-use exemptions (EUEs) and critical-use exemptions (CUEs). Delegates also addressed several issues linked to the implementation of the Kigali Amendment to the Montreal Protocol to phase down HFCs (Kigali Amendment), such as data reporting issues and consideration of approved destruction technologies for HFCs. OWEG 39 also considered follow-up to MOP decision XXVIII/3 (Kigali Decision on Energy Efficiency) on identifying energy efficiency opportunities in refrigeration, air conditioning and heat pump sectors related to a transition to climate-friendly alternatives. OWEG 39 examined a report by the Technology and Economic Assessment Panel (TEAP) on funding requirements for the 2018-2020 replenishment of the Multilateral Fund (MLF), and requested supplementary information from the TEAP to inform the MOP 29 negotiations on the replenishment.

A BRIEF HISTORY OF THE OZONE REGIME

Concerns that the Earth's stratospheric ozone layer could be at risk from chlorofluorocarbons (CFCs) and other anthropogenic substances first arose in the early 1970s. At that time, scientists warned that releasing these substances into the atmosphere could deplete the ozone layer, hindering its ability to prevent harmful ultraviolet rays from reaching the Earth. This would adversely affect ocean ecosystems, agricultural productivity and animal populations, and harm humans through higher rates of skin cancers, cataracts and weakened immune systems. In response, a UN Environment Programme (UNEP) conference

held in March 1977 adopted a World Plan of Action on the Ozone Layer and established a Coordinating Committee to guide future international action.

VIENNA CONVENTION: Negotiations on an international agreement to protect the ozone layer were launched in 1981 under the auspices of UNEP. In March 1985, the Vienna Convention for the Protection of the Ozone Layer was adopted. It called for cooperation on monitoring, research and data exchange, but it did not impose obligations to reduce ozone depleting substances (ODS) usage. The Convention now has 197 parties, which represents universal ratification.

MONTREAL PROTOCOL: In September 1987, efforts to negotiate binding obligations to reduce ODS usage led to the adoption of the Montreal Protocol, which entered into force in January 1989. The Montreal Protocol introduced control measures for some CFCs and halons for developed countries (non-Article 5 parties). Developing countries (Article 5 parties) were granted a grace period, allowing them to increase their ODS use before taking on commitments. The Protocol and all amendments except

IN THIS ISSUE

A Brief History of the Ozone Regime	1
Report of the Workshop	3
Report of OWEG 39	5
Kigali Amendment to the Montreal Protocol to phase down HFCs	5
Replenishment of the MLF for the triennium 2018-2020, including the TEAP Report	7
TEAP 2017 Report	8
Safety standards relevant to low-GWP alternatives ..	9
Energy efficiency	10
Consideration of HFCs not listed in Annex F to the Montreal Protocol	11
Closing Session	11
A Brief Analysis of OWEG 39	11
Upcoming Meetings	13
Glossary	13

its newest, the Kigali Amendment, have been ratified by 197 parties, representing universal ratification.

Since 1987, several amendments and adjustments have been adopted, adding new obligations and additional ODS and adjusting existing control schedules. Amendments require ratification by a certain number of parties before they enter into force; adjustments enter into force automatically.

LONDON AMENDMENT AND ADJUSTMENTS: At MOP 2, held in London, UK, in 1990, delegates tightened control schedules and added ten more CFCs to the list of ODS, as well as carbon tetrachloride (CTC) and methyl chloroform. MOP 2 also established the MLF, which meets the incremental costs incurred by Article 5 parties in implementing the Protocol's control measures and finances clearinghouse functions. The Fund is replenished every three years.

COPENHAGEN AMENDMENT AND ADJUSTMENTS: At MOP 4, held in Copenhagen, Denmark, in 1992, delegates tightened existing control schedules and added controls on methyl bromide, hydrobromofluorocarbons and hydrochlorofluorocarbons (HCFCs). MOP 4 also agreed to enact non-compliance procedures. It established an Implementation Committee to examine possible non-compliance and make recommendations to the MOP aimed at securing full compliance.

MONTREAL AMENDMENT AND ADJUSTMENTS: At MOP 9, held in Montreal, Canada, in 1997, delegates agreed to: a new licensing system for importing and exporting ODS, in addition to tightening existing control schedules; and banning trade in methyl bromide with non-parties to the Copenhagen Amendment.

BEIJING AMENDMENT AND ADJUSTMENTS: At MOP 11, held in Beijing, China, in 1999, delegates agreed to controls on bromochloromethane, additional controls on HCFCs, and reporting on methyl bromide for quarantine and pre-shipment applications.

KIGALI AMENDMENT: At MOP 28, held in Kigali, Rwanda, in 2016, delegates agreed to amend the Protocol to include HFCs as part of its ambit and to set phase-down schedules for HFCs. To date, four parties have ratified the Kigali Amendment.

MOP 21: MOP 21 took place in Port Ghalib, Egypt, in 2009, and adopted decisions on: alternatives to HCFCs; institutional strengthening; environmentally sound management of ODS banks; methyl bromide; and data and compliance issues. This meeting was the first at which delegates considered a proposal to amend the Protocol to include HFCs submitted by the Federated States of Micronesia (FSM) and Mauritius.

MOP 22: MOP 22 took place in Bangkok, Thailand, in 2010, and adopted decisions on, *inter alia*: the terms of reference for the Technology and Economic Assessment Panel (TEAP) study on the MLF replenishment and the evaluation of the financial mechanism; and assessment of technologies for ODS destruction. Delegates also considered two amendments proposed to address HFCs under the Protocol, one submitted by the US, Mexico and Canada, and another submitted by FSM.

COP 9/MOP 23: The Ninth Conference of the Parties (COP 9) and MOP 23 took place in Bali, Indonesia, in 2011, and adopted decisions on, *inter alia*: a US\$450 million replenishment of the MLF for the 2012-2014 period; updating the nomination process and recusal guidelines for the TEAP; the treatment of ODS in relation to servicing ships; and additional information

on alternatives. Delegates also discussed the two proposed amendments to the Protocol to address HFCs.

MOP 24: MOP 24 took place in Geneva, Switzerland, in 2012, and adopted decisions on, *inter alia*, the review by the Scientific Assessment Panel (SAP) of RC-316c, a CFC not controlled by the Montreal Protocol; procedural issues related to the TEAP and its subsidiary bodies; and data and compliance issues. MOP 24 did not reach agreement on two draft decisions on: clean production of HCFC-22 through by-product emission control; and an HFC amendment to the Montreal Protocol.

MOP 25: MOP 25 was held in Bangkok, Thailand, in 2013. The MOP adopted 21 decisions, including on: terms of reference for the study of the 2015-2017 MLF replenishment; implementation of the Montreal Protocol with regard to small island developing states; and a TEAP report on ODS alternatives. MOP 25 did not reach agreement on: amendment proposals; additional funding for the MLF for implementing the Montreal Protocol to maximize the climate benefit of the accelerated phase-out of HCFCs; and the harmonization and validation of the climate impact fund.

COP 10/MOP 26: COP 10/MOP 26 was held in Paris, France, in 2014, and adopted decisions on, *inter alia*: a US\$507.5 million replenishment of the MLF for the 2015-2017 period; availability of recovered, recycled or reclaimed halons; and a TEAP report on ODS alternatives. Delegates also discussed possible ways to move the HFC issue forward, deciding to convene a two-day workshop in 2015, back-to-back with an additional OEWG session, to continue discussions on HFC management, including a focus on high-ambient temperatures (HAT) and safety requirements, as well as energy efficiency.

MOP 27: MOP 27 met from 1-5 November 2015, in Dubai, United Arab Emirates. Delegates adopted a number of substantive and procedural decisions, including those on essential-use and critical-use exemptions (EUEs and CUEs), and on avoiding the unwanted import of products and equipment containing or relying on HCFCs. The MOP also established a contact group on the feasibility and ways of managing HFCs, which met throughout the week. As a result, parties adopted the Dubai pathway on HFCs (Dubai pathway), a "roadmap" for negotiating an HFC amendment including provisions for an additional OEWG meeting and an extraordinary MOP (ExMOP) during 2016.

MOP 28: MOP 28 convened in Kigali, Rwanda, from 10-14 October 2016. MOP 28's primary decision was to adopt the Kigali Amendment on HFCs. MOP 28 also adopted decisions on, *inter alia*: EUEs; CUEs; energy efficiency in the refrigeration and air conditioning (RAC) sectors; safety standards relevant for low-global warming potential alternatives; and the terms of reference for the TEAP study on the 2018-2020 MLF replenishment.

REPORT OF THE WORKSHOP

Tina Birmpili, Executive Secretary, Ozone Secretariat, opened the workshop on Monday, 10 July, by welcoming participants and outlining the fundamental questions to be addressed by the workshop.

SESSION I: OVERVIEW OF THE INTERNATIONAL SAFETY STANDARDS OF GREATEST IMPORTANCE TO THE MONTREAL PROTOCOL AND ITS KIGALI AMENDMENT AND THE PROCESS FOR DEVELOPING AND REVISING THE STANDARDS

Chandra Bhushan, Centre for Science and Environment, India, facilitated this session.

Kolin Low, International Organisation for Standardisation (ISO), explained how the ISO sets standards and how the work of ISO Technical Committee 86 is relevant to refrigerants and heat pumps. He also described efforts to encourage greater participation by developing countries.

Neil Dennis, AECOM, Australia, explained the process and issues involved in the relevant work on International Electrotechnical Commission (IEC) standard 60079 (explosive atmospheres) and ISO/IEC 80079 (explosive atmospheres) series standards on flammable gases, noting that current standards focus on commercial and industrial applications, not domestic applications, and that key standards are now coming up for revision. He described current discussions on how to divide responsibility between ISO and IEC on these standards.

Matthias Meier, Matthias Meier Consultancy, Germany, presented on progress and main issues involving IEC standard 60335-2-40 (safety of household and similar electrical appliances - particular requirements for electrical heat pumps, air conditioners and dehumidifiers). He summarized the revision of standards and the status and outlook for IEC work towards 2018.

Asbjørn Vonsild, Vonsild Consulting, Denmark, presented on the IEC working group addressing refrigerants classified as A2 and A3. He noted hydrocarbons have a very low GWP and good efficiency, but are also highly flammable. Vonsild presented three mitigation means considered by the working group: limitations on how much refrigerant can leak; air flow; and robust design.

Marek Zgliczynski, Embraco, Italy, presented on the evolution of commercial refrigeration equipment safety standards. He emphasized that the risk with more than 150 grams (g) flammable refrigerant must be no greater than the risk allowed under the current 150g limit.

Jay Kohler, Johnson Controls, US, discussed safety standard developments for refrigeration and heat pumps, referring to the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) and ISO standards, particularly ASHRAE 15 (safety standard for refrigeration systems) and ISO 5149 (safety of refrigerating systems and heat pumps). He discussed the relationship between safety and product standards, observing that safety standards can be either technology stoppers or stimulators.

Andrea Voigt, European Partnership for Energy and the Environment, stressed the need for coordination between standardization and legislation, highlighting that standards can trigger innovation in new technologies, citing the minimum energy performance standards in Europe as an example.

Bhushan summarized five key points from the presentations: most international standards will have to be translated into national standards; safety standards are voluntary, whereas building codes are mandatory, usually set by law; hydrocarbons

can be used as refrigerants now, but the charge sizes tend to be small; there are ongoing efforts to increase charge size for hydrocarbons while maintaining current safety levels; and greater participation by developing countries is needed in the standard-setting process.

In their response to audience questions, panelists explained: the financial costs associated with travel and participation in ISO standards-setting or revision meetings can be a barrier for participation, especially for participants from developing countries, although ISO is trying to mitigate this; regulations and standard-setting should be done in parallel, so that regulations do not advance beyond standards; policy maker participation in standard-setting process is low, but should increase; and a broad range of industry participation in standard setting is important to voice varying concerns and interests.

SESSION II: IDENTIFYING LIMITATIONS TO THE UPTAKE OF LOWER GWP ALTERNATIVES THAT COULD BE ADDRESSED WITH CHANGES TO EXISTING INTERNATIONAL SAFETY STANDARDS

Stephan Sicars, UN Industrial Development Organization (UNIDO), facilitated this session. He said the session will focus on offering clarity for the technical requirements to address alternative refrigerants

Karim Amrane, Air-Conditioning, Heating and Refrigeration Institute, US, stressed it is crucial to identify suitable alternative refrigerants quickly. He asserted there is a lack of publicly available research to support safety standards. Amrane added that the objective is to produce easily accessible technical results to support codes and standards activities related to the use of A2L (lower flammability), A2 (flammable) and A3 (higher flammability) refrigerants.

Torben Funder-Kristensen, Danfoss, Denmark, said the challenge to amending the existing international standards is the timely adoption of suitable standards, which enable sustainable solutions for the market. He surmised standards will be followed if they are easy, readable and unambiguous.

Martin Dieryckx, Daikin Europe, Belgium, stated that the process of standardization must consider all risks and applications within a product's scope.

James Wolf, Ingersoll Rand, US, said standards are important for installation and maintenance. Lauding consensus in creating standards, he cautioned that consensus building can be time consuming.

Omar Abdelaziz, Oak Ridge National Laboratory, US, called for robust fact-based standards

Abhijit Acharekar, Godrej, India, suggested applying international standards where a national standard does not yet exist, noting India's adaptation of a European standard where a national standard did not exist.

Ting-Xun Li, Sun Yat-sen University, China, described the development of the Chinese safety standards in the RAC sector.

Holger Koenig, Maersk Container Industry, Germany, indicated that the container shipping industry began discussing an international standard in 2015 for refrigerated containers ("reefers"), focused on a risk assessment approach.

Stating standards should prioritize human health, Jitendra Bhambure, Refrigeration and Air-Conditioning Manufacturers Association, India, suggested a focus on end users.

During the discussion, panelists explained that safety challenges posed by using flammable refrigerants under HAT conditions include the higher refrigerant pressure prompted by

higher temperatures and the fact that most HAT regions tend to use larger air conditioning equipment, requiring larger charges. Regarding use of flammables in reefers, they said the industry has already adopted tough standards to ensure leak-tight containers. On concerns about handling and maintenance, Wolf pointed out ASHRAE is conducting a global assessment of the issue to identify any possible gaps, and undertaking a project looking at the reliability of residential equipment, which impacts servicing, noting that together the assessment and project should provide a sound basis for further work.

Panelists agreed on the importance of addressing the challenge of proper training and education of technicians regarding flammable refrigerants, since even well-designed and manufactured equipment requires maintenance and can pose a risk if not properly installed.

Li pointed out that the biggest challenge in commercializing products using flammable refrigerants in China is the higher safety code and the resulting higher costs to the consumer, noting that while the enhanced environment-friendliness of the product is attractive to the consumer, many consumers are not keen to pay the higher costs. Other panelists commented that the research on safety exists, which could permit experts to design safer equipment and for the equipment to be manufactured, but the research should be peer-reviewed and easily accessible to the target audience.

Sicars asked the panel to specify general risks and explain safety standard setting, to which the panel clarified that calculating risk depends on, *inter alia*: risk probability; the size of the population in close proximity to the equipment; harm to the outside area; and risk perception.

Sicars asked if the audience understood the A1, A2L, A2 and A3 flammability rankings in refrigerants, requesting the panel explain these in “non-engineering” terms. The panel said these refer to burning rates, noting A1 is generally not flammable, while A3 is “highly” flammable. However, the panel also cautioned that universal definitions do not exist, noting under certain conditions A1 can be flammable.

Participants and panelists discussed leak detection, safety, and risk mitigation measures being explored for systems using flammable refrigerants in different applications. The panel also discussed whether the A2 and A2L differentiation is meaningful and how they are marketed by some companies.

SESSION III: RELATIONSHIP BETWEEN INTERNATIONAL AND NATIONAL SAFETY STANDARDS

Chandra Bhushan, Centre for Science and Environment, India, facilitated this session. Yan-Wei Dou, Chinese Household Electrical Applications Association, stated risk assessments determined that it is not as dangerous to use R290 in RAC as initially thought. He said from his perspective there is an acceptance that since international safety standards generally reflect the best experience, wherever possible, key players should adopt international standards rather than regional or national ones.

Carsten Hoch, TÜV SÜD Industrie Service GmbH, Germany, stressed the need in the future for a simplified and commonly accepted approach on installation site requirements for all kinds of refrigerating systems. He added this future approach should include risk assessment, based on the design of the individual design of a refrigerating system, and all types of refrigerants.

Highlighting that the market is moving towards lower-GWP refrigerants, Brian Rodgers, Underwriters Laboratories (UL), US, pointed to industry discussions on how to improve refrigerant safety. He suggested aligning standards, pointing to a binational standard for Canada and the US.

Noting Thailand adopted international safety standards directly, Aroon Eamsuyera, Federation of Thai Industries, suggested updating, *inter alia*: domestic regulations and standards; building codes; and the national industry skill standard.

Alaa Olama, Olama Consultants, Egypt, said international standards are rarely modified, except when they conflict with local regulations. He explained challenges in the Middle East, including flammability and toxicity in HAT conditions and the need to modify local practices to comply with international safety standards.

Tomaz Cleto, Yawatz Engenharia Ltda, Brazil, said it has become common to use international standards as the basis for Brazilian standards. He noted that safety standards for flammable refrigerants in domestic refrigeration do not yet exist in Brazil, and there is some resistance to adopting safety standards for industrial refrigeration and supermarkets. He stressed the importance of the proper training of technicians.

The ensuing discussion addressed: whether developing countries need to have regulation, because voluntary standards are often not taken up by industry; how the results of testing flammable refrigerants under HAT conditions can instruct emerging standards, including how a single country sometimes may need different refrigerants for different zones; how liability concerns are driving improvement in the capacity building of technicians; and how training and certification of technicians can be further improved. Bhambure noted his country has safely used ammonia as a refrigerant for over 100 years, and has developed a comprehensive standard appropriate for developing country conditions, offering support to other countries in doing likewise.

SESSION IV: HOW STAKEHOLDERS CAN WORK TOGETHER TO MAXIMIZE THE OPPORTUNITIES FOR THE SAFE USE OF LOWER GWP ALTERNATIVES

Ray Gluckman, Gluckman Consulting, UK, facilitated this session.

Kevin Fay, the Alliance for Responsible Atmospheric Policy, US, affirmed the Montreal Protocol process provides industry with the ability to plan strategically and invest globally and has been proven to deliver on both environmental and industrial goals. He added the Kigali Amendment has the potential to further the Protocol’s success.

Gabriela Ehrlich, IEC, explained the membership makeup and decision-making process for IEC. She pointed out 87 developing countries participate free of charge, and additionally that the IEC Public Commenting forum allows the public with expertise to comment and allows them to shape international standards.

The panelists were asked to offer brief observations. Arno Kaschl, European Commission, highlighted the need to recognize when standards are relevant and when they are an obstacle. Cindy Newberg, US Environmental Protection Agency, lauded the workshop for bringing the ozone family and the standard-setting bodies together. Tetsuji Okada, Japan Refrigeration and Air-Conditioning Industry Association, underscored the importance of stakeholder engagement in developing the national safety law. Karsten Beermann, IKKE, Germany, discussed

training programmes to develop procedures and competencies so refrigeration technicians can “speak the same language” on maintenance and service.

Thomas Willson, European Environmental Citizens Organisation for Standardisation, underscored the need to consider environmental aspects in standard setting. Shengchun Liu, Tianjin University of Commerce, China, described China’s standardization law, noting the need for government approval. Stating that developing countries may not have the capacity to develop additional standards, Muhammad Khalid Siddiq, Pakistan Standards and Quality Control Authority, suggested they utilize existing standards from developed countries.

Facilitator Gluckman suggested six messages from Sessions I-IV: flammable refrigerants are needed to make HFC phasedown successful; current standards slow the uptake of these refrigerants in some markets; flammability is complex and poorly understood; the Kigali Amendment and the European Union (EU) F-gas regulation are key drivers of standards, but the problem is that the regulatory and standards timetables do not match; there is a clear lack of Article 5 country involvement in the international standards process; and there is a lack of hard data on which to base the updates of standards.

In the ensuing discussion, participants addressed, *inter alia*: how to improve developing country participation in international standard setting processes, including IEC and ISO efforts in this regard; whether developing countries should simply adopt international standards, adapt them, or develop national standards; and whether and how ozone officers can act as a bridge to national and regional standard setting bodies.

SESSION V: CONCLUDING REMARKS

Stephan Sicars, UNIDO, facilitated the session, asking each rapporteur to summarize key messages.

Session I rapporteur, Helen Walter-Terrinoni, Chemours, US, noted that considerable work has gone into addressing the flammability of refrigerants, but a need remains to ensure risk does not increase as charge size increases. She recognized the need for greater developing country participation in standard setting.

Session II rapporteur, Viraj Vithoontien, World Bank, acknowledged that sometimes current safety standards are considered “too restrictive” and further research and development are needed. He noted a gap between perceived and actual risk, and that a tradeoff between safety and performance can exist, especially in HAT conditions. He suggested harmonizing, *inter alia*, legislation and building codes, and advancing technician training programmes.

Session III rapporteur, Maher Mousa, MHM Engineering, Saudi Arabia, stated that in both developing and developed countries, standardization for product safety needs to address both production and maintenance.

On advancing stakeholder engagement, Session IV rapporteur, Shamila Nair-Bedouelle, UNEP, summarized key messages, including how to: become “refrigerant savvy”; address non-technical barriers; and ensure that standards are timely, suitable and enabling. Underscoring that industry is moving quickly, she said there is a need to align policy and standard setting, especially in developing countries.

Sicars asked if there were any key messages not reflected by the rapporteurs’ reports. Participants indicated adding the need to reflect local conditions, including the conditions in which service

technicians have to operate, and common use by the intended end users; and differentiate between perceived and actual risk.

CLOSURE OF THE WORKSHOP

Sicars explained how the report of the workshop would be prepared and presented to OEWG 39 for its consideration. He closed the workshop at 6:44 pm.

REPORT OF OEWG 39

On Tuesday morning, 11 July 2017, OEWG 39 Co-Chair Cheikh Ndiaye Sylla (Senegal) opened the meeting. Somchai Harnhirun, Ministry of Industry, Thailand, expressed his country’s full support for the Kigali Amendment, but underscored the need for decisions at this OEWG and MOP 29 on key Amendment implementation questions. Harnhirun also stressed the importance of adequate MLF replenishment for 2018-2020, “which will be a key signal of whether our commitment matches the ambitious we set in the Amendment.”

Tina Birmipili, Executive Secretary, Ozone Secretariat, said that 2017 marks both the celebration of the 30th anniversary of the Protocol and the setting of the foundations of the Kigali Amendment’s implementation. She outlined the “Ozone Heroes” awareness campaign planned to celebrate the ozone story, and outlined issues facing the OEWG, including reporting and the MLF replenishment.

Co-Chair Sylla reviewed the provisional agenda (UNEP/OzL.Pro.WG.1/39/1), noting two proposed changes: deleting agenda item 9, on the eligibility of the United Arab Emirates (UAE) for financial and technical support from the MLF, at the request of UAE, which reserves the right to raise the issue instead at MOP 29; and adding under agenda item 5, addressing the 2017 TEAP Report, discussion of process agents and key messages from the TEAP report. The agenda was adopted with the amendments noted orally. Co-Chair Sylla then explained the proposed organization of work, which was approved.

KIGALI AMENDMENT TO THE MONTREAL PROTOCOL TO PHASE DOWN HFCS

DATA REPORTING UNDER ARTICLE 7 AND RELATED ISSUES: On Tuesday, OEWG 39 Co-Chair Cindy Newberg (US) opened this agenda item (UNEP/OzL.Pro.WG.1/39/3). After initial discussion, all issues under this agenda item were assigned to a contact group on data and destruction technologies co-chaired by Martin Sirois (Canada) and Margaret Aanyu (Uganda), which met from Tuesday through Friday. Discussions on updating GWP values, however, were held in an informal group that reported to plenary through the contact group.

Timelines for Reporting of Baseline Data: In Tuesday’s plenary discussion, OEWG 39 Co-Chair Newberg noted that paragraph 2 of Article 7 of the Kigali Amendment could be interpreted to mean that Article 5 parties ratifying the Amendment before their baseline year would have to report baseline data for future years, and the Secretariat was seeking clarification on whether Article 5 parties should report estimated data for future years or wait until real data became available. Saudi Arabia stated it is imperative to agree on what is obligatory and what is not. Canada, supported by Argentina, Burkina Faso, China, and the US, proposed Article 5 parties report actual data once available rather than estimates so as to avoid reporting data twice and potentially requiring revisions and adjustments later. Bahrain noted the difficulty for Article 5 parties to submit “hard data” immediately.

The EU, Brazil, and Morocco supported a “pragmatic” approach to determining the timing on reporting baseline data. Morocco noted the importance of good data for setting the regulation and phase-down of HFCs. Brazil suggested the MLF Executive Committee (ExCom) could discuss this issue with a view to helping Article 5 parties on data reporting as an enabling activity.

Egypt, with the Russian Federation, recommended a voluntary data submission when data exists. Iran sought guidance from the Secretariat on how to balance real and estimated data.

Contact group discussions on this issue focused on: how best to clarify that reporting with real data was preferable, and allow for it procedurally under the Protocol, with suggestions including through a “compliance deferral,” so that reporting would start once real data became available; whether parties had to report each baseline year separately, or all three baseline years in one batch; and the deadline during the year for data submission. Reporting to plenary on Friday evening, contact group Co-Chair Sirois indicated constructive discussions but that further work would be needed at MOP 29.

Proposed Revisions to the Article 7 Data Reporting Forms and Related Guidelines to Include HFC-Related Reporting:

During Tuesday’s plenary discussion, Mexico, with Ecuador, said the proposed reporting forms (UNEP/OzL.Pro.WG.1/39/3, Appendices I-X) are useful as is, but recognized that some parties may desire modification to the forms. Brazil suggested minor revisions for specific circumstances, as well as for blends and mixtures. Ecuador highlighted ongoing data gathering on HFC consumption.

Armenia, Australia, and Canada lauded the Secretariat for developing an online reporting system, urging for its implementation before the end of 2017.

On Thursday, contact group Co-Chair Sirois reported to plenary, stating that the group decided to ask the Secretariat to solicit more comments from parties regarding the forms, and agreed to set a deadline of 30 August 2017 for comment submissions so that the Secretariat can make appropriate changes before MOP 29.

Reporting of Mixtures and Blends Containing HFCs under Article 7:

When introducing this sub-item on Tuesday, OEWG 39 Co-Chair Newberg noted that the Secretariat suggests parties should be allowed to report the actual quantities of the mixtures or blends rather than the amounts of the different HFCs contained in them. Egypt, with Argentina, Australia and Iran, requested training so parties could calculate their data to ensure compliance, in addition to Secretariat calculations. Australia, supported by Argentina and Iran, suggested a separate tool to estimate mixture and blend consumption.

Trade with Non-Parties: Reporting Requirements: When introducing this sub-item on Tuesday, OEWG 39 Co-Chair Newberg explained that under Article 7 of the Kigali Amendment, parties would be required to report HFC trade with both parties and non-parties as part of their annual reporting obligations, which would take effect from the entry into force of the Amendment for each party. Saudi Arabia asked why reporting on trade with non-parties should begin immediately when the restriction on trade with non-parties will not be applied until 2033. The EU suggested it is important to further discuss and understand all the pros and cons of reporting on trade with non-parties. The US said there is a need to clarify when reporting on

trade with non-parties is required, observing there is a rationale for pushing reporting down the road as opposed to requiring it immediately.

In the contact group, participants concurred that: Kigali Amendment language on this issue creates problems; reporting before non-party trade restrictions came into effect would be burdensome; and some sort of administrative “fix” is necessary. The contact group recommended that this issue be further discussed at MOP 29, to which the OEWG agreed.

WORK BY THE SAP ON UPDATING THE GWP OF THE SUBSTANCES IN GROUP I OF ANNEX A, ANNEX C AND ANNEX F TO THE MONTREAL PROTOCOL: On Tuesday, SAP Co-Chairs Paul Newman, John Pyle and Bonfils Safari presented on GWP as a metric for evaluating the climate forcing of a substance relative to CO₂ over a specified period. They said the uncertainty of GWP values is approximately 40%, stating better accuracy could be achieved with dedicated laboratory experiments, which are time consuming and expensive but could be carried out for key substances. Iran asked how SAP derived its GWP figures. The SAP responded that it relies on Intergovernmental Panel on Climate Change (IPCC) figures, when available, and derives the rest based on models and laboratory work, which has been the standard method for calculating GWPs in the past.

Argentina, Egypt, Iran, and Saudi Arabia questioned whether SAP estimates will be peer-reviewed. SAP responded that many of them have already been peer-reviewed in other reports and the figures last set in 2014 will not radically change in the new report.

Several parties expressed concern on the uncertainty indicated for GWPs as a whole, the impact on values for other chemicals of changes in the heat trapping values for the reference-setting point used in setting all GWP values, CO₂, and how all this might affect country baselines over time. SAP explained there is always uncertainty in science, as there were in the original ozone depletion potential figures set by the Protocol, but that the Protocol was able to work with them nonetheless. They explained that the uncertainty in GWPs comes mostly from the few gases that cannot be measured directly in the atmosphere, not from CO₂. SAP also noted that while the heat trapping value of CO₂ has changed in the past, CO₂ is already strongly absorbed and its value is unlikely to change as much going forward.

China asked if SAP will be updating all GWPs in the Protocol control annexes, or just provide values for those substances not currently listing one. SAP clarified that all will be reviewed. The US noted that GWP values for HFCs are set by the Kigali Amendment.

OEWG 39 Co-Chair Newberg noted that the main issue flagged for parties at OEWG 39 is the six HCFCs currently without a GWP value, namely HCFC-121, HCFC-122, HCFC-133, HCFC-141, HCFC-142 and HCFC-225. She said that four of which would be given the default value of zero, foreseen in paragraph 9 (a)(ii) of Article 2 of the Protocol. She noted that for HCFCs 141 and 142, GWP values already exist for their most commonly used isomers, 141b and 142b, so the proposal is to use those GWP values for all forms of the two substances.

During Friday’s plenary session, contact group Co-Chair Sirois reported that an informal group considering this issue had constructive discussions, but was unable to resolve all outstanding issues, so there will be further discussions at MOP 29.

PROCESS FOR APPROVING DESTRUCTION TECHNOLOGIES FOR SUBSTANCES IN ANNEX F TO THE MONTREAL PROTOCOL:

On Tuesday, the EU, supported by Australia, Canada, the US, China, and Japan, signaled their intention to introduce a conference room paper (CRP) that would recommend that MOP 29 provisionally approve existing HCFC destruction technologies for HFC destruction, while requesting the TEAP further investigate the question. Argentina stressed addressing costs of HFC destruction.

On Wednesday afternoon, the EU introduced the CRP (UNEP/OzL.Pro.WG.1/39/CRP.3), which: approves existing HCFC destruction technologies for HFC destruction on a provisional basis; requests the TEAP to review and confirm if these technologies would suffice, while exploring other methods; and invites parties to share information. OEWG 39 Co-Chair Newberg suggested further discussing the CRP in the existing contact group on data and destruction technologies.

During the contact group discussions, lengthy debate ensued on whether the corresponding study by TEAP was needed. Several Article 5 parties questioned the timeliness of the study, in part because existing ODS destruction technologies already exist. A number of non-Article 5 parties countered this, stressing the “time sensitivity” of the issue, since the first compliance period for non-Article 5 parties is in 2019. Parties also discussed whether existing ODS destruction technologies could be approved on a “provisional” basis or whether they should be approved *ex post facto*. The contact group was unable to resolve differences over the draft CRP, so its text was bracketed and forwarded to the MOP 29 for further consideration.

PROGRESS BY THE MLF EXCOM FOR THE IMPLEMENTATION OF THE MONTREAL PROTOCOL IN RELATION TO DECISION XXVIII/2: Delegates took note of the Secretariat’s report on progress by the ExCom in developing guidelines for financing the phase-down of HFC consumption and production as requested by MOP 28 (UNEP/OzL.Pro.WG.1/39/2, paragraphs 16-23), with a formal report to be presented at MOP 29.

REPLENISHMENT OF THE MLF FOR THE TRIENNIUM 2018–2020, INCLUDING THE TEAP REPORT (DECISION XXVIII/5)

On Tuesday, TEAP Decision XXVIII/5 Task Force Co-Chairs Lambert Kuijpers, Bella Marañon and Shiqiu Zhang presented the TEAP report on funding requirements under the MLF replenishment for 2018-2020. After outlining all the factors taken into account and assumptions made, they presented the conclusion that US\$602.71-748.85 million was needed, of which: US\$391.77-420.90 million would be earmarked for HCFC phase-out management plans (HPMPs); \$67.2 million for HCFC production phase-out management plans; US\$114.08-124.08 million for non-investment and supporting activities; US\$21.5-44.2 million for HFC phase-down enabling activities; and US\$8-21.5 million for HFC-23 mitigation.

Noting that the decision mandating the report also called for indicative figures for the 2021-2023 and 2024-2026 periods, TEAP reported these as US\$634.8-771.0 million and US\$548.5-695.5 million, respectively, and provided a breakdown on the various components factoring into the totals.

Burkina Faso noted that the implementation of the HPMPs and the phase down of HFCs impact each other, but the TEAP report addresses them separately. TEAP responded that the two

align in the report, but certain enabling activities of HPMP implementation and HFC phase-down cannot be combined.

The US asked how the TEAP determined which activities are reserved for 2020, compared to compliance activities beyond this. The TEAP asserted that they considered HFCs in Stage II HPMPs and even Stage I HPMPs, where applicable.

Canada stated that while the HCFC phase-out continues, priority must be given to mitigating its impact on the phase down of HFCs. China urged parties to consider the production sector when there are still issues of funding in this sector for developing countries.

Saudi Arabia called for linking HCFCs phase-out and HFCs phase-down activities in the 2018-2020 MLF replenishment.

Estonia, on behalf of the EU and its member states, sought clarification regarding decisions taken by the ExCom prior to OEWG 39 that might affect the calculations, and suggested further exploring cost effectiveness.

Nigeria called for sufficient and stable funding for Article 5 parties to meet their obligations. Colombia suggested considering the service sector for the next steps on HFC phase-down.

Japan cautioned it may “not be realistic” to approve funding for HFC phase-down before the end of 2017, while confirming that their support for HCFC phase-out would be paid. The US queried the business planning funds, noting many low-volume consuming countries have already received funding.

Switzerland expressed support to the MLF, and said it would support MLF activities involving the HFC phase-down specified under the Kigali Amendment. Kuwait reminded parties of the enthusiasm in 2016 to agree on the Kigali Amendment, cautioning that without sufficient funding, momentum will be lost.

A contact group on replenishment was formed co-chaired by Agustín Sánchez Guevara (Mexico) and Davinder Lail (UK), which deliberated from Tuesday through Friday. The contact group discussed a list of issues to be taken into account by the TEAP in preparing a supplementary report for MOP 29 on the funding needs for the 2018-2020 replenishment. A list of 20 issues was developed, which included a set of general issues, such as accounting for recent ExCom decisions or distinguishing more clearly between the costs associated with the HCFC phase-out and the HFC phase-down, and other issues grouped by specific chapters of the TEAP report, namely HPMP activities (chapter 3), HCFC production phase-out (chapter 4), non-investment and support activities (chapter 5), HFC phase-down enabling activities (chapter 6), HFC-23 mitigation (chapter 7), and indicative funding requirements for 2021-2023 and 2024-2026 (chapter 9).

A particular source of debate was the proposed insertion of energy efficiency under the section on chapter 9, with some parties asserting this was essential for proper implementation of the Kigali Amendment, while others pointed out that the Montreal Protocol still does not have a specific mandate on how to address energy efficiency, so the TEAP cannot yet assess funding requirements on this aspect.

On Friday afternoon, contact group Co-Chair Sánchez Guevara reported that this issue remained unresolved. After a brief plenary debate did not result in resolution, OEWG 39 Co-Chair Sylla suspended plenary temporarily to allow for informal consultations. When plenary resumed, Kuwait, on behalf of Article 5 parties, proposed removing the three items in the chapter 9 section, including on energy efficiency. The US, on behalf of

the non-Article 5 parties, accepted the compromise. The OEWG agreed that the TEAP use the amended list as a reference for its supplementary report to MOP 29.

TEAP 2017 REPORT

Delegates addressed this agenda item during Tuesday's plenary session. Flexible and Rigid Foams Technical Options Committee (TOC) Co-Chair Paulo Altoe presented the Flexible and Rigid Foams TOC analysis of challenges in the transition to low-GWP substances in the foam sector, noting the problem that most low-GWP non-HCFC blowing agents remain more expensive than the HCFC agents.

Adam Chattaway, Co-Chair, Halons TOC, said that Halon 1301 supplies for civil aviation likely will run out by 2035. He noted HTOC's recommendation that parties should call for the International Civil Aviation Organization (ICAO) to liaise with the Halons TOC in order to quantify the installed base and emissions of halons for current and future civil aviation, with a view to reporting on it to MOP 31.

Roberto Peixoto, Co-Chair, Refrigeration, Air Conditioning and Heat Pumps TOC, observed that, with the adoption of the Kigali Amendment, research and development to improve the performance of RAC and heat pump equipment with low-GWP alternatives is accelerating.

Helen Tope, Co-Chair, Medical and Chemicals TOC (), reported that "the global transition away from CFCs in metered dose inhalers is almost complete," and recommended removing three process agents from Table A (list of uses of controlled substances as process agents) of decision X/14 and updating information on 11 others.

Methyl Bromide TOC (MBTOC) Co-Chairs Mohamed Besri, Marta Pizano, and Ian Porter noted parties reported that 99% of controlled uses of methyl bromide have been phased out, but emissions from reported consumption do not align with emissions-based measurements of atmospheric concentrations.

Both Australia and the US agreed that the MBTOC chart and statement on methyl bromide usage did not provide sufficient information or time scale, noting it did not reflect the overall decline trend.

OEWG 39 Co-Chair Sylla drew attention to key messages highlighted in the TEAP Report and discussed in the Secretariat document (UNEP/OzL.Pro.WG.1/39/2/Add.1), namely the need for updated information on: the status of currently-used blowing agents in the foam sector; the availability of recovered, recycled or reclaimed halons; methyl bromide stocks and emissions from quarantine and preshipment uses; feedstock uses of ODS; n-propyl bromide, a substance not controlled under the Protocol; and laboratory and analytical uses of methyl bromide.

The EU offered to discuss informally with the US and the Halons TOC the TEAP recommendation regarding work with ICAO.

Responding to various questions, TEAP members clarified that, *inter alia*: they have not yet evaluated technologies specifically for HFC-23 destruction, while suggesting high-temperature technologies approved for ODS destruction, such as incineration or plasma technologies, would likely suffice, but a technical review is needed; discussions with ICAO on an eventual halon replacement had only just begun; and parties should advise each other on the difference between critical and other uses.

Responding to a question about a recent scientific article regarding negative impact of dichloromethane on ozone layer recovery and whether TEAP would address the issue in its 2018

report, Tope pointed out that dichloromethane is not a controlled substance under the Protocol but the TEAP had looked at it in its 2014 report. A SAP member intervened from the floor, noting a study has found an 8% annual increase of dichloromethane in the atmosphere and observing that the scientific community is still uncertain where this growth rate is coming from and what it means for ozone recovery.

On Friday, the US reported to plenary on the results of its informal discussions with the EU and the Halons TOC co-chairs, saying the participants had developed a better understanding of the Halon TOC's ideas about improving data and possible work with ICAO, and they planned to work intersessionally on a proposal for MOP 29.

NOMINATIONS FOR ESSENTIAL-USE EXEMPTIONS FOR 2018: On Wednesday, OEWG 39 Co-Chair Newberg opened discussion on China's EUE nomination for CTC for laboratory and analytical uses. China welcomed MCTOC's recommendations. Indicating they needed clarifications about the timelines for China's proposed new standards and responding to the information recommendations from MCTOC, the EU and US requested informal talks with China. Saudi Arabia announced that it will propose a EUE nomination similar to China's regarding CTC for laboratory and analytical purposes in the near future.

On Friday evening, China presented its revised proposal (UNEP/OzL.Pro.WG.1/39/CRP.6/Rev.1), explaining revisions made since the original submission, and noting that the schedule for completing the revision of a relevant national standard remains in brackets pending confirmation of the date from the relevant ministry. The OEWG forwarded the CRP to MOP 29 for its consideration.

NOMINATIONS FOR CRITICAL-USE EXEMPTIONS FOR 2018 AND 2019: On Wednesday, OEWG 39 Co-Chair Sylla noted the MBTOC recommendations on the nominations for CUEs and opened the floor for comments. Canada and Australia disputed some of the MBTOC statements regarding the basis for the recommendation on their nominations on strawberry runners. South Africa indicated concern about the amount MBTOC recommended for fumigating structures. China said it accepted the MBTOC recommendations regarding its nomination on ginger, and indicated it did not plan to apply for CUEs in the future.

The EU urged all parties to provide MBTOC with the information it needs early enough, and reminded that methyl bromide is supposed to have already been phased out for all purposes.

OEWG 39 Co-Chair Sylla invited nominating and interested parties to consult with MBTOC. On Thursday, OEWG 39 Co-Chair Sylla reported that informal talks determined that the interested parties would continue discussions with the MBTOC until MOP 29, and that Australia will draft a CRP on the matter for the MOP's consideration.

THE PHASE-OUT OF HCFCs (DECISION XXVIII/8): On Tuesday, TEAP member Dan Verdonik explained that the TEAP was requested to update decision XXVII/5 findings and report to the OEWG 39. He said the TEAP continues to predict that HCFC consumption in 2020 will be lower than the HCFC production allowed for under the Protocol, and concluded that production by non-Article 5 parties to satisfy the Article 5 parties' basic domestic needs would not be needed after 2020.

On Wednesday morning, OEWG 39 Co-Chair Newberg noted the submission of a CRP by Australia, Canada, Japan, and the

US on essential uses of HCFCs by non-Article 5 parties after 2020 (UNEP/OzL.Pro.WG.1/39/CRP.1). The US introduced the CRP, explaining it requests the TEAP to assess non-Article 5 requirements for HCFCs between 2020 and 2039 for fire suppression, solvent applications, and “other niche uses,” and report by 1 March 2018. Stating the CRP would request non-Article 5 parties to provide information on such uses to the TEAP, he emphasized it does not presuppose a corresponding policy decision. Japan acknowledged potential uses beyond 2020. Canada, with Australia, noted potential HCFC uses by laboratories and analytical uses after 2020. The EU asked what “niche uses” entail. The US invited interested parties to discuss the CRP on the meeting’s margins.

During Friday’s plenary, the US and EU reported good progress during informal discussions, but said since they could not produce a revised CRP before the end of the OEWG, they requested CRP.1 be forwarded to MOP 29 while intersessional discussions would seek to draft a revised version for MOP 29.

PROCESS AGENTS: During Tuesday’s plenary the EU said it would introduce a CRP, which would seek to update Table A of decision X/14 on process agents and request the TEAP to provide feedback on this in due course. The EU introduced the CRP in plenary on Thursday (UNEP/OzL.Pro.WG.1/39/CRP.2), explaining it calls for eliminating three process agents from Table A of decision X/14, urges parties to update their information on the use of controlled substances as process agents and provide it to the Secretariat by 31 December 2017, and requests the TEAP report to OEWG 40 on the industrial application of alternative technologies employed by parties that have already eliminated the use of controlled substances as process agents in the processes listed in Annex A. He noted the TEAP made recommendations regarding Table B, and suggested not updating the table at this time due to insufficient information.

The US and China indicated interest in having informal discussions with the EU on this proposal.

On Friday evening, the EU introduced a revised proposal (UNEP/OzL.Pro.WG.1/39/CRP.2/Rev.1) based on its discussions with interested delegations, clarifying that the CRP now requests the TEAP report to OEWG 41, instead of OEWG 40.

ORGANIZATIONAL AND OTHER MATTERS: On Tuesday, Australia, supported by Canada, suggested the TEAP consider transitioning to the usual structure of two co-chairs for the each TOC. The US reminded the TEAP that it should provide technical and scientific information on discussed issues and avoid any entry into the policy realm, which is the domain of the parties. On Thursday, OEWG 39 Co-Chair Sylla urged parties to provide nominations for TEAP members, which would be forwarded to MOP 29 for its consideration.

SAFETY STANDARDS RELEVANT TO LOW-GWP ALTERNATIVES

RESULTS OF THE WORKSHOP ON SAFETY STANDARDS RELEVANT TO THE SAFE USE OF LOW-GWP ALTERNATIVES:

On Wednesday, Stephan Sicars, UNIDO, introduced the summary of the workshop (UNEP/OzL.Pro.WG.1/39/4). He explained that the workshop was organized to address: an overview of relevant international safety standards and the process for developing and revising them; the identification of limitations to the uptake of alternatives that could be addressed with changes to existing safety standards; relationships between international and national safety standards;

and stakeholder cooperation. Noting several issues re-emerged across sessions, Sicars explained that the workshop summary is organized along the main topics discussed.

He explained that: there are four flammability classifications, and that most low-GWP alternatives fall between lower and high flammability ratings; standard setting is a lengthy process; standards are advisory in nature; it is important to build understanding, communicate and engage stakeholders in standard-setting especially in Article 5 parties; and technical competencies vary, and there is a need for technician training.

Saudi Arabia, supported by Bahrain and Kuwait, objected to the suggestion that Protocol bodies should intervene in other processes such as standard setting, or that standards work should be accelerated to meet the Kigali Amendment schedule. He also said the workshop report did not sufficiently stress: that any standards on flammable refrigerants must require safety levels that are the same or higher than those currently in place; who would be held liable if safety standards are not set high enough for flammable refrigerants, and how these liability concerns might affect the uptake of alternatives; and training.

Sicars responded that the workshop had not advocated intervening in or pressuring other bodies, and the report will make this clearer. He agreed that the point of maintaining or raising safety levels had been stressed in the workshop, but said it was reflected in the report. He noted the liability question had been raised by participants, not by the experts.

OEWG 39 Co-Chair Newberg reminded delegates that the workshop report was intended for information purposes only.

TEAP REPORT ON SAFETY STANDARDS (DECISION XXVIII/4): On Wednesday, Fabio Polonara, Co-Chair, TEAP Decision XXVIII/4 Task Force, presented the TEAP report on standards, which examined nine relevant standards under discussion by ISO and IEC. He noted that international standards: are seldom used directly but instead are adapted to local requirements; are often expensive, complex and not available in the local language; lag behind fast-evolving technology; and are set through long and complex procedures that often lack full stakeholder participation because of the time and expense involved.

Regarding the implications for MOP decisions, he said the Task Force found that: accelerated revision of national standards would facilitate the use of lower-GWP refrigerants and help parties achieve the freeze and phase-down steps envisioned in the Kigali Amendment; given the typical lead time for product development, international safety standards published in 2019-2020 will heavily influence national regulations that will be applicable by the 2024 Kigali deadline; and currently some gaps exist in international standards regarding installation, servicing and end-of-life.

He said the Task Force recommended: providing support for the education and training of technicians handling flammable refrigerants; establishing competence on safety standards within education programmes for service and maintenance personnel; supporting national experts’ participation in international standards work; and accelerating the transfer of international standards for flammable refrigerants into national regulations.

On the MOP’s request for the TEAP to liaise with standards bodies, the TEAP sought additional guidance on how to do so and asked the Secretariat to forward its report to those bodies and initiate an information exchange process.

Saudi Arabia observed that care needs to be taken not to push for acceleration on action when appropriate technology may not be ready for 15 years, and developing countries do not yet have the capabilities to quickly adapt to safety standards. Burkina Faso, Kenya and Nigeria agreed, stating the need for assistance for more capacity building and training for technicians and the general public. Iran questioned whether the target year of 2020 to resolve scientific uncertainties regarding flammable refrigerants is realistic. The TEAP responded that appropriate risk assessments are always carried out, but as with all activities, no technology will be completely devoid of risk, so it is necessary to determine which risks are acceptable and keep Kigali Amendment implementation dates rather than attempt adjusting them to accommodate standard-setting for specific alternative technologies. In terms of capacity building and training of national technicians and the general public, the TEAP conceded that the complexities of reaching these groups with international standards are beyond their reach.

DISCUSSION OF POSSIBLE NEXT STEPS: On Wednesday afternoon, OEWG 39 Co-Chair Newberg invited parties to offer perspectives on the workshop and recommendations by the TEAP.

The EU emphasized that it is “crucial” that standards are continually updated to reflect latest technology developments, and include non-technical or chemical solutions. Supported by the US, the EU suggested the TEAP develop a synthesis table regarding the state-of-play on standards, potential barriers and future directions.

Referring to the lead up to the Kigali Amendment, Saudi Arabia and others reminded parties they had expressed understanding on the constraints regarding HFC phase-down in HAT countries. Iraq cautioned against technologies that may not be operated safely in HAT conditions.

Cautioning against “moving in the wrong way,” Kuwait lamented that HFC phase-down discussions were advancing faster than safety standards, emphasizing, with Pakistan, the need to bear in mind the behavior of end-users and households when developing standards.

Highlighting that many technicians in Article 5 parties work in the informal sector, Burkina Faso, with Djibouti, suggested training trainers and continued learning. The US expressed concern regarding the suggestion that the TEAP provide training on safety standards.

Japan, with Australia and others, cautioned against creating overlap between the Montreal Protocol and official standardization bodies, pointing to limited budgets and human resources.

Russia, with Djibouti, suggested future workshops include translation in all UN official languages.

The IEC highlighted their online communicating platform where experts can review and make comments, especially regarding standards for their country’s context.

OEWG 39 Co-Chair Newberg summarized, *inter alia*, that: parties would like additional information and engagement from standard-setting bodies; respect for the mandates between the Protocol and these bodies; and the need for additional follow-up before the upcoming MOP.

ENERGY EFFICIENCY (DECISION XXVIII/3)

On Wednesday, OEWG 39 Co-Chair Sylla opened this agenda item by noting MOP decision XXVIII/3 and the submissions by parties on the issue (UNEP/OzL.Pro.WG.1/39/INF/5). FSM,

supported by Cameroon and Grenada, requested an extension on national submissions into 2018, and suggested altering the questions put to parties to include the subject of costs and financing. The US cautioned against additional delays.

Saying energy efficiency is very important to Africa, Rwanda expressed its intent to introduce a CRP calling for a workshop on the issue. Morocco, Grenada, Senegal, Cameroon, Mozambique, FSM, Armenia and Côte d’Ivoire supported the idea. Egypt, supported by Malaysia, suggested a series of regional workshops for ozone officers instead of a single workshop. Mozambique indicated interest in Egypt’s suggestion.

The EU and US cautioned against getting the Protocol bodies too involved in the energy efficiency topic when so many other fora are already addressing the issue, and urged waiting for the TEAP report on energy efficiency at MOP 29 before deciding on a workshop or other course of action.

Kuwait, Saudi Arabia and Pakistan said that energy efficiency had been part of the mandate for the Kigali Amendment negotiations and MOP 28 had adopted a decision on the issue, so they could not accept leaving it to other fora.

India presented a CRP (UNEP/OzL.Pro.WG.1/39/CRP.4) requesting the TEAP review the technical and funding requirements of Article 5 parties to maintain and/or enhance energy efficiency in the RAC and heat pump sectors while phasing down HFCs, and to report on its findings to OEWG 40. He explained the CRP also requested the Secretariat organize a workshop on this issue back-to-back with OEWG 40.

OEWG 39 Co-Chair Sylla said the plenary would return to the topic once Rwanda submitted its CRP and delegates had time to digest both proposals.

On Thursday, Rwanda introduced its CRP (UNEP/OzL.Pro.WG.1/39/CRP.5), explaining it requested the Secretariat to organize a workshop at MOP 29 that would exchange experiences and views regarding: co-benefits between the Protocol’s protection of the ozone layer and climate change mitigation; co-benefits of the Protocol for the energy sector, namely in energy security, savings, resilience and efficiency; and opportunities for amplifying co-benefits, in particular with regard to innovation.

Argentina, Angola, Bangladesh, Benin, Burkina Faso, Cameroon, Colombia, Egypt, Grenada, Indonesia, Jordan, Lesotho, Morocco, Nigeria, Pakistan, Paraguay, Philippines, Rwanda, Samoa, Senegal, South Africa, Tanzania and Tunisia voiced supported for both CRPs.

Australia, Canada, the EU and US expressed willingness to discuss the CRPs after the upcoming TEAP report is reviewed by the MOP. Calling the workshop idea “valid” and indicating flexibility on scheduling it, Switzerland urged making sure industry and all multilateral institutions working on energy efficiency are included so that synergies can be fully explored.

Rwanda, Lesotho and Mauritius urged having the workshop back-to-back with MOP 29. FSM suggested a workshop could discuss technological options, costs and benefits, including the costs of implementing energy efficiency measures and how to do so. Niger suggested a workshop could focus specifically on the RAC sector.

Rwanda said CRP.5 was prompted by a recent statement by the African Ministerial Conference on the Environment to prioritize affordable, safe and energy efficient technologies. The Gambia and Gabon stressed the need for new energy efficient equipment, as well as local capacity building.

Noting the need to increase electrification in Africa, Djibouti called energy efficiency “imperative,” referring to Sustainable Development Goal 7 (affordable and clean energy).

Kenya, supported by Iran, suggested merging CRP.4 and CRP.5. OEWG 39 Co-Chair Sylla asked the proponents of the two CRPs to meet informally and explore whether the CRPs could be merged.

On Friday India introduced a merged proposal (UNEP/OzL.Pro.WG.1/39/CRP.4/Rev.1), noting that a provision was added calling for the TEAP to assess capacity building and servicing sector requirements in the RAC and heat pumps sectors, and that the call for the workshop asks that it be held at the commemoration of the 30th anniversary of the Montreal Protocol at MOP 29, and focus on energy efficiency opportunities with specific reference to HFC phase-down.

Noting that a Secretariat-funded workshop would have to be approved first by the MOP, Kuwait suggested private funding could be found to enable the workshop to be held at MOP 29, rather than wait to have the workshop in 2018. Australia and the US pointed out that if it is not authorized by the MOP, even with alternate funding, the workshop could not be held as an official event associated with the Protocol. Executive Secretary Birmpili said the rules are very clear and not a matter of financing or logistics, but rather one of mandate: if it is to be an official event, the MOP must authorize it first.

Noting the Executive Secretary’s clarification, OEWG 39 Co-Chair Sylla said the revised CRP would be forward to MOP 29 for its consideration.

CONSIDERATION OF HFCS NOT LISTED IN ANNEX F TO THE MONTREAL PROTOCOL

On Wednesday, OEWG 39 Co-Chair Newberg explained this agenda item derived from a CRP submitted by Switzerland and Norway at MOP 28 to consider HFCs not listed in the Protocol’s Annex F, and that parties had agreed to consider the CRP at OEWG 39.

Switzerland introduced the CRP (UNEP/OzL.Pro.WG.1/39/2, Annex), explaining it was motivated by the fact that HFCs still exist in the marketplace that are not covered by the Kigali Amendment. He stressed the intention is to create a voluntary mechanism to create transparency on new HFCs entering the market so that parties are aware of them.

Saudi Arabia, Pakistan, the Russian Federation and Burkina Faso agreed on the need for further clarification and language on this request. The US, supported by Australia and Japan, observed the approach of the CRP conflicted with that of the Kigali Amendment, and suggested that a simpler approach is called for. Canada said it would be happy to assist Switzerland and Norway in clarifying the CRP’s language. The OEWG 39 Co-Chairs asked interested parties to conduct informal discussions.

Reporting to Friday’s plenary on the week’s consultations, Switzerland stated it is important to clarify that the CRP is not trying to propose new substances for Protocol control, and that further informal discussion prior to MOP 29 would seek to develop the language to clearly communicate this intent. He added that the OEWG 39 consultations have decided that TEAP should provide information updates on a regular basis, with specific modalities to be determined, rather than burden parties with reporting on more substances. He said a revised CRP would be offered at MOP 29. The EU, Colombia and Pakistan indicated their interest in working with Norway and Switzerland before the MOP to produce the revised CRP.

CLOSING SESSION

On Friday evening, OEWG 39 Co-Chair Sylla presented the draft OEWG 39 report (UNEP/OzL.Pro.WG.1/39/L.1 and Add.1). Parties requested several clarifications before approving the report. Saudi Arabia requested reference to Article 7 in discussion regarding trade of refrigerants after 2033. India clarified the request to the TEAP to assess technology and funding requirements necessary to maintain and enhance energy efficiency in the RAC and heat pump sector during the HFC phase-down.

Canada, as host of MOP 29, welcomed parties to Montreal, noting that this was the 30th anniversary of the Montreal Protocol, the 375th anniversary of the City of Montreal and Canada’s 150th anniversary.

Thanking participants, Executive Secretary Birmpili reminded them that the Ozone Awards will be delivered at the MOP 29 High Level Segment, pointing out that the deadline for nominations is extended until 27 July.

OEWG 39 Chair Sylla gavelled the meeting to a close at 6:22 pm.

A BRIEF ANALYSIS OF OEWG 39

After years of division and debate on whether or not HFCs should be addressed under the Montreal Protocol on Substances that Deplete the Ozone Layer, delegates arrived in Bangkok buoyed by their success in adopting the Kigali Amendment at MOP 28 in 2016. Delegates spoke of carrying the “spirit of Kigali” of open dialogue and pragmatic compromise to OEWG 39, and forward to MOP 29. Seasoned delegates observed that Kigali renewed the sense of trust and cooperation in “the ozone family,” so cherished in the Protocol’s early years.

Their elation, however, was tempered, remembering the many outstanding issues that will impact the Amendment’s implementation, including urgent “housekeeping” tasks, such as data reporting, and external policy areas, which may influence this implementation, namely standard setting and energy efficiency.

This brief analysis examines progress made at the OEWG on the road toward the MOP, and explores efforts in Bangkok to lay the groundwork for the Kigali Amendment’s implementation, while judging tricky issues such as the next MLF replenishment, the interaction between the Montreal Protocol and other international processes, and follow-up to Kigali decisions on safety standards and energy efficiency.

MATCHING AMBITION WITH COMMITMENT

A key task facing MOP 29 is a series of decisions and commitments that must be in place if the Amendment’s implementation is to proceed as scheduled. These matters include data reporting, setting global warming potential figures for controlled substances so that baselines can be calculated, and approved destruction technologies for HFCs, all of which are items that must be decided so they can be included in national laws or regulations for implementing the Amendment. While positive discussions were held on most items at OEWG 39, few issues were resolved; decisions on most outcomes and action items will need to be further negotiated in Montreal.

As requested by MOP 28, the Technology and Economic Assessment Panel (TEAP) drafted a comprehensive estimate of funding requirements for the 2018-2020 replenishment of the Multilateral Fund, which was presented at OEWG 39. This replenishment, which includes enabling activities and initial

control measures for HFC phase-down, was higher than previous requests. TEAP estimates often serve as the starting point for MOP negotiations on donor replenishment commitments.

Many delegations felt the TEAP estimate needed further refinement and clarification, so a contact group spent three days developing a proposed list of 20 factors for TEAP to take into account in a supplementary report to be submitted to MOP 29. One proposal for the list, energy efficiency requirements to be taken into account in the 2021-2023 and 2024-2026 MLF replenishments, was particularly contentious in the contact group and had to be brought to plenary for resolution. However, before the meeting's close, the Kigali spirit prevailed with delegates reaching a pragmatic compromise: since the item in question concerned indicative figures for a later replenishment, delegates would return to this issue at a later date.

This is perhaps a cautionary sign for the difficult replenishment talks expected at MOP 29. As the Kuwaiti delegate stated in opening plenary, "it's time to see if our ambitions in Kigali will be matched by our commitments." Indeed, several Article 5 delegates present at OEWG 39 cautioned that without the necessary financial and technological resources, their enthusiasm for tackling the challenges the Kigali Amendment presents will wane. In other words, without the funding to support the transition, several Article 5 parties emphasized that they will not have the capacity to implement the required changes.

The elephant in the room, spoken of only privately, was whether the US will provide its full share in the next replenishment. A longtime advocate for regulating HFCs under the Montreal Protocol, the US position is currently unclear given the new Administration's posture on climate change. A member of the US delegation tried to calm woes in the margins of the meeting, asserting "this president is a strong proponent of American business, and American businesses have been advocates for the Protocol for 30 years." Nonetheless, unease remains.

TREADING CAREFULLY INTO NEW TERRITORY

For years, parties have debated whether addressing HFCs under the Protocol ventured too far into the territory of the UN Framework Convention on Climate Change, which governs climate change. With the Kigali Amendment now adopted, this was hardly mentioned at OEWG 39. Still, several delegates publicly and privately declared this to be an exception and not a precedent, urging that the Protocol not muddle into the governing space of other international processes. At OEWG 39, worry about possible overreach largely focused on the relationship between the Montreal Protocol and the independence of standard setting bodies, such as the ISO and IEC, as well as how to explore the relationship between the HFC phase-down and energy efficiency.

Preceding the OEWG, the Secretariat organized a workshop on safety standards for low-GWP alternatives which received praise for its explanation of work on safety standards relevant to the Kigali Amendment. However, it also unearthed apprehensions, primarily about timing and pace. Setting international standards is an independent, sometimes slow process, and one that does not necessarily align with technological advancements in the RAC and heat pump sectors, legislation or building codes, nor the fast-approaching deadlines for adopting safe low-GWP alternatives to HCFCs and HFCs. Several delegates worried aloud about "putting the cart before the horse," rushing the safety standard-setting process just to meet Kigali Amendment deadlines instead of ensuring safety levels comparable to existing systems.

As discussed at previous Montreal Protocol sessions, and reemphasized in the workshop, until now many of the less expensive low-GWP alternatives have been classified as either "moderately" or "highly flammable" and their application might be hampered by safety standards not keeping pace with technology and safety innovations. This long-standing issue remains unresolved and one that will likely continue to resurface at the MOP.

Similarly, some Article 5 parties, especially those with high ambient temperatures or large informal sectors, cautioned against rushing through the standard setting process, especially if safe low-GWP alternatives do not yet exist. Underscoring their allegiance foremost to end users, namely households as well as informal sector mechanics, Article 5 delegates suggested a need for capacity-building workshops or programmes to "train the trainers," conducted by or in partnership with the TEAP, on the safe handling of low-GWP alternatives. These calls were countered by some non-Article 5 countries, querying whether conducting such training does fall within the TEAP's mandate, which serves largely as an advisory body, and if so, what the "price tag" for such workshops might be.

The OEWG also began what promises to be a long debate about follow-up on the Kigali decision on energy efficiency. This decision, built from the assumption that if the Kigali Amendment was adopted for its climate benefits, the adoption of low-GWP alternatives should then emphasize energy efficiency or any climate gains might be negated. The two CRPs proposed on the issue were received with near universal support from Article 5 parties. Conversely, many non-Article 5 parties were at first silent on the suggestion, then some wondering aloud whether energy efficiency, which focuses on climate benefits, falls within the purview of the Montreal Protocol when many other fora already address this issue. While differences remained, both sides expressed "a willingness to consider" the issue, delaying further discussion to the MOP, after the release of an upcoming TEAP report.

CONTINUING TO BUILD UPON THE STRENGTHS OF THE MONTREAL PROTOCOL

Despite hiccups encountered at OEWG 39, there was general consensus that parties know where they want to go; it's just a matter of how to get there.

This consensus should help maintain forward momentum at the upcoming MOP, aided by the foundational strengths of the world's "most successful multilateral environmental agreement," namely its: flexible implementation, allowing for temporary exemptions as parties solve the issues at hand; self-checking mechanisms for making practical adjustments with advice from its scientific and technical bodies; and sense of community, which employs the diplomatic tools of pragmatism and a "willingness to consider" issues that not all parties may initially agree on. Its cornerstone attribute, flexible implementation, offered the diplomatic space to allow parties to progress on key concerns brought up at OEWG 39 on safety standards and energy efficiency discussions as they relate to HFC phase-down, and how they will eventually align within the Amendment's purview.

Building on the momentum from Kigali, combined with the planned return to the city of the Protocol's birth for its thirtieth anniversary, delegates appear confident that this mature agreement will work out the kinks and challenges of the HFC phase-down through the "slow and steady" approach. OEWG 39 achieved greater clarity on how safety standards and energy efficiency

might affect the implementation of the Kigali Amendment, while revealing that it will take time to understand and agree on how these fundamental concerns can be addressed. As one delegate put it, “the best meals are cooked over a slow flame,” alluding to perhaps the greatest strength of the Protocol: its openness to parties challenging each other, combined with time for proper reflection, toward determining the best path forward, together

UPCOMING MEETINGS

Climate Week NYC 2017: The ninth annual Climate Week NYC will take place during the General Debate of the UN General Assembly. Leaders from business and government will gather to demonstrate: how continued investment in innovation, technology and clean energy will drive profitability and lead us towards a net-zero emissions global economy; and how non-state actors are embracing the opportunities of the clean economy, innovating to create jobs and prosperity for businesses and communities alike. **dates:** 18-24 September 2017 **location:** New York City, US **contact:** Nazneen Nawaz, The Climate Group **phone:** +44-20-7960-2715 **email:** media@theclimategroup.org **www:** <https://www.theclimategroup.org/ClimateWeekNYC>

Global Summit on Chemical Safety and Security 2017 (ChemSS2017): Organized by the International Centre for Chemical Safety and Security (ICCSS), and the China Petroleum and Chemical Industry Federation (CPCIF), ChemSS2017 and the accompanying exhibition is a multi-stakeholder event dedicated to addressing chemical safety and security solutions in the supply chain of raw materials, production, infrastructure, transportation and use of chemicals in all areas of chemical activity. **dates:** 19-20 September 2017 **location:** Shanghai, China **contact:** Amb. Krzysztof Paturej, ICCSS President **phone:** +48-22-436-20-44 **email:** k.paturej@iccss.eu **www:** <http://www.chemss2017.org/>

First Meeting of the Conference of the Parties to the Minamata Convention on Mercury: Following the entry into force of the Minamata Convention, COP1 will convene in Geneva, Switzerland, culminating in a High-Level Segment on 28 and 29 September 2017 entitled “Make Mercury History,” to celebrate the commitment of the international community to the Minamata Convention. **dates:** 24-29 September 2017 **location:** Geneva, Switzerland **contact:** Interim Secretariat of the Minamata Convention **fax:** +41-22-797-3460 **email:** mercury.chemicals@unep.org **www:** <http://www.mercuryConvention.org/>

13th Meeting of the Persistent Organic Pollutants Review Committee: The Persistent Organic Pollutants Review Committee (POPRC13) will, among others, review the possible listing of hazardous chemicals under the various annexes of the Stockholm Convention. **dates:** 17-20 October 2017 **location:** Rome, Italy **contact:** BRS Secretariat **phone:** +41-22-917-8729 **fax:** +41-22-917-8098 **email:** ssc@pops.int **www:** <http://www.pops.int>

13th Meeting of the Rotterdam Convention Chemical Review Committee: The Chemical Review Committee (CRC13) will, *inter alia*, review chemicals and pesticide formulations for possible listing under Annex III of the Rotterdam Convention. **dates:** 23-27 October 2017 **location:** Rome, Italy **contact:** BRS Secretariat **phone:** +41-22-917-8296 **fax:** +41-22-917-8082 **email:** pic@pic.int **www:** <http://www.pic.int/>

80th Meeting of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol: The Multilateral Fund (MLF) Executive Committee

will continue to look at reports with specific reporting requirements and status of contributions and disbursements.

dates: 13-17 November 2017 **location:** Montreal, Canada **contact:** MLF Secretariat **phone:** +1-514-282-1122 **fax:** +1-514-282-0068 **email:** secretariat@unmfs.org **www:** <http://www.multilateralfund.org/default.aspx>

59th Meeting of the Implementation Committee Under the Non-Compliance Procedure of the Montreal Protocol: The Committee will look at country programme data and prospects for compliance. **dates:** 18 November 2017 **location:** Montreal, Canada **contact:** Ozone Secretariat **phone:** +254-20-762-3851 **fax:** +254-20-762-0335 **email:** ozone.info@unep.org **www:** <http://ozone.unep.org/en/meetings>

29th Meeting of the Parties to the Montreal Protocol and 11th Meeting of the Conference of the Parties to the Vienna Convention: MOP29 and COP11 are scheduled to be held jointly to consider issues, including HFC management, implementation, and other matters. **dates:** 20-24 November 2017 **location:** Montreal, Canada **contact:** Ozone Secretariat **phone:** +254-20-762-3851 **fax:** +254-20-762-0335 **email:** ozone.info@unep.org **www:** <http://ozone.unep.org/en/meetings>

For additional meetings, see <http://sdg.iisd.org/>

GLOSSARY

ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
CFCs	Chlorofluorocarbons
CTC	Carbon tetrachloride
CRP	Conference room paper
CUEs	Critical use exemptions
EUEs	Essential use exemptions
ExCom	Executive Committee (MLF)
FSM	Federated States of Micronesia
GWP	Global warming potential
HAT	High ambient temperature
HCFCs	Hydrochlorofluorocarbons
HFCs	Hydrofluorocarbons
HPMP	HCFC Phase-out Management Plan
ICAO	International Civil Aviation Organization
IEC	International Electrotechnical Commission
ISO	International Organisation for Standardisation
MBTOC	Methyl Bromide Technical Options Committee
MCTOC	Medical and Chemicals Technical Options Committee
MLF	Multilateral Fund
MOP	Meeting of the Parties
ODS	Ozone-depleting substances
OEWG	Open-ended Working Group
RAC	Refrigeration and air conditioning
SAP	Scientific Assessment Panel
TEAP	Technology and Economic Assessment Panel
TOC	Technical Options Committee
UNEP	UN Environment
UNIDO	UN Industrial Development Organization