

Summary of the Forty-first Meeting of the Open-ended Working Group of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer: 1–5 July 2019

The forty-first meeting of the Open-ended Working Group of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer (OEWG 41) was faced with a lengthy agenda as it laid the groundwork for decisions to be taken at the thirty-first Meeting of the Parties (MOP 31) to be held in November 2019 in Rome, Italy.

Agenda items that were discussed and kept open for MOP 31's further consideration include, among others:

- unexpected emissions of trichlorofluoromethane (CFC-11);
- terms of reference (ToR) for the study on the 2021-2023 replenishment of the Multilateral Fund for the Implementation of the Montreal Protocol;
- review of the ToR, composition, balance, fields of expertise and workload of the Technology and Economic Assessment Panel; and
- ToR for the 2022 Quadrennial Assessment.

Agenda items whose discussions were concluded at OEWG 41 and noted in the meeting report include:

- risk of non-compliance with hydrochlorofluorocarbon (HCFC) production and consumption reduction targets by the Democratic People's Republic of Korea; and
- safety standards.

Over 450 participants from governments, UN agencies, intergovernmental and non-governmental organizations, academia, and industry attended OEWG 41, which convened in Bangkok, Thailand from 1-5 July 2019.

A Brief History of the Montreal Protocol

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 (UV) 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.

Key Turning Points

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.

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

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 Multilateral Fund (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 HCFCs. MOP 4 also agreed to enact non-compliance procedures. It established an Implementation Committee (ImpCom) 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 hydrofluorocarbons (HFCs) as part of its ambit and to set phase-down schedules for HFCs. HFCs are produced as replacements for CFCs and thus a result of ODS phase-out. HFCs are not a threat to the ozone layer but have a high global warming potential. To date, 73 parties to the Montreal Protocol have ratified the Kigali Amendment, which entered into force on 1 January 2019.

COP 11/MOP 29: The eleventh meeting of the Conference of the Parties to the Vienna Convention for the Protection of the Ozone Layer (COP 11) and MOP 29 met from 20-24 November 2017, in Montreal, Canada. COP 11/MOP 29 adopted decisions including: essential-use exemptions and critical-use exemptions; future availability of halons; and energy efficiency. They also adopted a decision agreeing on a USD 540 million replenishment of the MLF for the triennium 2018-2020.

MOP 30: Convened from 5-9 November 2018 in Quito, Ecuador, MOP 30 adopted decisions on, *inter alia*: issues important to the January 2019 entry into force of the Kigali Amendment; approved destruction technologies to be used for HFCs; the MLF Executive Committee's (ExCom) progress in developing guidelines for the financing of the HFC phase-down; Article 5 parties' access to energy-efficient technologies in the

refrigeration, air conditioning and heat pump sectors; a proposal to permit essential use exemptions for HCFCs for specific uses by certain parties; and unexpected increases in CFC-11 emissions.

OEWG 41 Summary

On Monday morning, 1 July, OEWG 41 Co-Chair Laura-Juliana Arciniegas (Colombia) opened the meeting. Apichin Jotikasthira, Deputy Permanent Secretary, Ministry of Industry, Thailand, said his country is working hard to ratify the Kigali Amendment. Noting the Amendment is critical to combating climate change and that the first commitment for Article 5 parties is only four years away, he urged all countries to ratify the Amendment as soon as possible.

Noting that space cooling is a huge energy consumer in the Asia-Pacific region, Dechen Tsering, Director, UNEP Regional Office for Asia and the Pacific, said this underscores the need to ensure the Amendment implementation incorporates energy efficiency improvements in the refrigeration and air conditioning (RAC) sector. She expressed UNEP's readiness to assist countries in ratifying the Amendment and further strengthen monitoring, reporting, and verification (MRV) under the Protocol.

Tina Birmipili, Executive Secretary, Ozone Secretariat, noted the assessment panels' 2018 quadrennial reports show progress towards ozone layer recovery, but stressed that the work is far from over. She said the CFC-11 case demonstrates the need for continued national vigilance and enforcement and for improving global monitoring, and noted the Secretariat has identified policy issues for OEWG consideration regarding strengthening existing MRV obligations.

Co-Chair Arciniegas introduced the agenda (UNEP/OzL.Pro.WG.1/41/1/Rev.1) and the Secretariat's overview of the issues on the agenda (UNEP/OzL.Pro.WG.1/41/2). The European Union (EU) indicated that it will raise the issue of short-lived substances and banks of ODS under Agenda Item 5 (Quadrennial assessment of the Montreal Protocol for 2018 and potential areas of focus for the 2022 assessment), and Italy will introduce a proposal for a "Rome Declaration" for the High-level Segment at MOP 31.

Delegates adopted the agenda with these amendments.

Delegates agreed to the organization of work, as proposed by Co-Chair Alain Wilmart (Belgium).

Unexpected Emissions of Trichlorofluoromethane (CFC-11) (Decision XXX/3)

Co-Chair Arciniegas introduced this agenda item (UNEP/OzL.Pro.WG.1/41/2, UNEP/OzL.Pro.WG.1/41/2/Add.1, UNEP/OzL.Pro.WG.1/41/3, UNEP/OzL.Pro.WG.1/41/3/Add.1, and UNEP/OzL.Pro.WG.1/41/INF/7). Paul Newman, Co-Chair, Scientific Assessment Panel (SAP), presented the SAP's interim report resulting from Decision XXX/3 (Unexpected Emissions of CFC-11) on recent observations of CFC-11. He outlined the observation and monitoring stations' locations globally and underscored that many source regions remain unmonitored—namely large parts of South America, Africa, and Asia. He highlighted the CFC-11 Symposium held in Vienna, Austria in March 2019, where scientists gathered to analyze data and methods used to report on the recent detections of CFC-11 in the atmosphere. Noting the SAP has confirmed that 40-60% of the CFC-11 emissions' source is Eastern Asia, Newman added that the current emissions would not have a substantial impact on ozone layer recovery; however, if these levels are sustained, this will no longer be the case.

Helen Tope and Helen Walter-Terrinoni, TEAP presented on behalf of the TEAP Task Force on CFC-11. Tope and Walter-

Terroni presented the preliminary report on potential sources of emissions of CFC-11. They stated production pathways go from CTC to CFC-11 in micro-scale plants, and from CTC to CFC-11/12 on a large scale in existing liquid-phase plants. They said CFC-11 and CFC-12 production is possible in existing HCFC-22 plants, outlining spare capacity in a number of countries. They detailed several production options for CTC, which is a feedstock for CFC-11, stating there is no evidence of illicit international trade in significant quantities of CFC-11 or CTC post-phase-out—although there is evidence of the marketing of CFC-11 for use in foams. They outlined the different uses for CFC-11 in the aerosols, solvents, RAC, and foam sectors. Providing more information on CFC-11 use in the foams sector, Tope said the Task Force found that a potential source of the increased CFC-11 emissions is the production of closed-cell foam products using the banned substance, as it is technically and economically feasible, underscoring further analysis shows it remains the only plausible scenario.

Responding to delegates' questions, the SAP explained without more regional monitoring stations it is difficult to identify other CFC-11 sources aside from those in China. They stated that natural sources of CFC-11 are unlikely. The SAP further declared that it has not seen increasing CFC-12 emissions, or a global increase in CTC emissions. They expressed the hope that they would be able to elaborate on "fingerprinting" emission sources, the technique of fingerprinting a plume by identifying its various gases, in its report to MOP 31. The SAP underscored that finding emissions requires a few years of data collection to identify trends and time to vet the data and analysis techniques.

Responding to delegates' questions, the TEAP said they had reported all possible scenarios to raise parties' awareness so they can check possible sources in their own countries. They also commented that:

- CFC-11 has not been used as a feedstock in the past, and there are no commercial reasons for doing so now, swing plants can indeed be shifted easily from permitted HCFC-22 production into banned CFC-11 production;
- TEAP has no evidence that CFC-11 is being produced in response to a lack of supply of HCFC-141b, due to phasing-out production of the latter; and
- it is unlikely that CFC-11 emissions are from landfills or stockpiles.

China reported data on their domestic foam sector, CTC feedstocks, and HCFC-22 production, consumption, and use. She maintained that CFC-11 is not being used as a blowing agent nor are HCFC-22 plants being switched to CFC-11 production in her country. She invited TEAP and SAP experts to visit the Chinese plants.

In the afternoon, Co-Chair Arciniegas provided an overview of the report by the Secretariat on unexpected emissions of CFC-11, which outlines the procedures under the Montreal Protocol and the MLF by which the parties review and ensure continuing compliance with Protocol obligations and with the terms of agreement under the MLF. She then opened the floor for discussion.

China outlined action her country has taken to address "weak links" in compliance, including through capacity building and establishing "hotlines" to report illegal activities. Canada stated more needs to be done to address the issue, including through taking stock of capacity gaps and strengthening MRV.

Japan warned that if the source of the unexpected CFC-11 emissions cannot be fully identified and addressed, its contributions to the MLF might be at stake. He called for comprehensive and effective measures, such as preventing

leakage during equipment disposal. Norway called for the Vienna Convention's Trust Fund for Research and Systematic Observation to investigate enhancing atmospheric monitoring of ODS, and, with Australia, for the parties to examine ways to improve reporting of illegal trade. Senegal suggested more atmospheric monitoring stations be established and for CFC bank inventories to be conducted. Australia supported Canada's suggestion to request the Vienna Convention's Ozone Research Managers for advice on improving monitoring. He also said parties should consider the enforcement suggestions forwarded by the ExCom, but cautioned against possibly "globalizing the enforcement issue of one or two countries."

The US reiterated its concern over the unexpected rise in CFC-11 emissions and suggested it is necessary for national bodies and institutions to take stock of their own effectiveness. With Canada, he suggested establishing a contact group on this issue and, echoing Bahrain's comments, said the mandate of a contact group should be clear and limited to address the issue at hand.

Kuwait cautioned against holding all Article 5 parties collectively responsible for the transgressions of a few. He further maintained that the question of where the CFC-11 demand is originating has not been addressed. He queried if production is based on local or overseas demand, saying if so, both parties should be held responsible. Niger also posited that consumers of the illegal CFC-11 production need to be identified.

Argentina added measures taken against Article 5 parties should be proportionate to the funds available for these parties to meet certain compliance demands.

The EU, commending China for their actions thus far, added it is time to reassess and address short-, medium- and long-term actions needed for the Protocol to continue effectively. He called for more ground-based monitoring to verify satellites' detection of banned substances.

Delegates agreed to create a contact group to focus on two aspects: identifying technical and scientific issues, including information needs; and institutional matters under the Vienna Convention and the Montreal Protocol.

The contact group was facilitated by Annie Gabriel (Australia) and Osvaldo Álvarez-Pérez (Chile) and met from Tuesday through Friday. Initial discussions within the contact group focused on identifying technical and scientific issues. This provided parties with the opportunity to hear further clarification from the SAP.

Discussions initially addressed existing gaps in monitoring stations and how the existing stations calculate global averages of CFC-11 emissions. The SAP explained the panel does not base assessments on monthly data but instead looks at data over several years to ensure robustness in data reporting.

Parties also wished to understand the rate of CFC-11 emissions coming from China, but the SAP responded that while new research provides an estimate on emissions broken down annually, the variability is hard to trace unless there is a notable drop or rise in emissions.

The SAP explained the location of CTC plants does not necessarily trace the source of CFC-11 emissions. It also clarified that while the CFC-11 emissions site has been identified, it is yet to be determined where the CFC-11 is being produced, and this can be thousands of miles away from the source of the emissions.

The contact group also discussed other useful instruments such as "Medusa" that tracks gas usage. The SAP provided parties with more information on this equipment, noting that this specific instrument measures a large number of chemicals so it can be applicable to the majority of ODS controlled by the Montreal Protocol.

Parties asked the TEAP if it would be able to identify if there are particular economic drivers to rationalize the uptake of CFC-11. They posed the possibility that the weak integrity of supply chain checks and monitoring have enabled the ease of movement of CFC-11 and if stronger controls can now be justified.

Another point of discussion focused on the geographical distribution of patents for CFC-11: it was noted by the TEAP that one was taken out for South Korea and the remaining were for China; however, the location of patents does not indicate that they have been commercialized or confirm the country in which they were filed. The TEAP said that it has not followed up on this issue.

The contact group then discussed a number of other issues related to the foams in which CFC-11 are used and other technical questions to better understand the demand for this chemical. The TEAP also reviewed the areas requested by parties for further assessment in its final report to be completed by September 2019. They requested parties to provide any related information by the end of July for inclusion in its report and analysis.

Towards the end of the week, discussions turned towards the second part of the mandate, which focused on institutional matters. Points raised included the need for:

- a better understanding of past CFC-11 emissions and what the implications are;
- more information on existing CFC-11 stocks;
- monitoring capacities that could be potentially examined at the 11th meeting of the Vienna Convention's Ozone Research Managers, to be held in April 2020, including satellite and ground-based monitoring and related gaps;
- strengthening MRV; and
- capacity building to enable monitoring of CFC-11 in blends.

Parties emphasized the need to adopt a more holistic approach to address the institutional structure and requirements of the Montreal Protocol in order to more effectively monitor potential illegal trade of substances such as CFC-11. One party conceded that the current reporting requirements for the Montreal Protocol are weak, attributing this as a potential reason for the recent CFC-11 emissions. Parties urged improving the requirements while another party suggested stronger domestic controls and knowledge on industries using ODS to better track illegal trading and unreported emissions.

Parties discussed licensing systems and how they can be improved to achieve compliance. An Article 5 party noted that it is important to differentiate between licensing systems for production and importing countries, and added that the CFC-11 issue in addition to monitoring issues should not focus solely on Article 5 parties. It was further emphasized that while Article 5 parties clearly disclose data on their chemical stocks, little is known about non-Article 5 parties' existing stocks of certain substances.

Parties also discussed how to improve existing reporting mechanisms under the Vienna Convention and Montreal Protocol and noted that monitoring systems under these bodies should not replace national-level obligations.

Reporting back to plenary, the Contact Group Co-Facilitators acknowledged there were a number of issues discussed during the four contact groups but given the complexities of the topic, no draft decision or substantive conclusions were drawn at this meeting. The Co-Facilitators instead asked country parties who provided substantive suggestions during the discussions to provide a concrete plan of action for MOP 31.

Terms of Reference for the 2021-2023 MLF Replenishment Study

Co-Chair Wilmart introduced this item (UNEP/OzL.Pro.WG.1/41/2) on Monday afternoon. Parties mostly agreed that the TEAP should conduct the study. Nigeria said the ToR should consider the HFC phase-down holistically, including energy efficiency elements and the challenges in ensuring compliance. Australia and the EU suggested the ToR of the prior replenishment study could serve as a starting point. Australia also urged considering the costs of Article 5 party compliance with core obligations. The EU said the study should include indicative figures for subsequent replenishments. Argentina called for including financing of national HCFC Phase-out Management Plans (HPMPs), and cautioned against including energy efficiency until the MOP could provide clearer guidance on what is needed. The US urged focusing on the needs of the 2021-2023 triennium.

A contact group, co-facilitated by Ralph Brieskorn (Netherlands) and Agustin Sánchez Guevara (Mexico), was established. The contact group met from Monday through Friday.

Initial discussions focused on collecting proposals from delegates for the ToR, using the 2017-2019 Replenishment Study ToR as a template. Among the proposals offered were those regarding:

- potential costs of control measures pertaining to the special needs of low-volume consuming countries;
- the need to allocate resources to ensure enhanced and improved vigilance through the strengthening of existing MRV systems, and to maintain and/or enhance energy efficiency of low- or zero-Global-Warming-Potential (GWP) technologies and equipment while phasing down HFCs; and
- bearing in mind ExCom rules and guidelines regarding the eligibility for funding of projects on institutional strengthening and sectoral and national phase-down plans.

On Thursday, parties were able to complete the first reading of the ToR (UNEP/OzL.Pro.WG.1/41/CRP.8), completing its review on Friday. Discussions focused on how best to reference the special needs of low-volume and very-low-volume consuming countries and those of small- and medium-sized enterprises (SMEs), and a provision regarding allocating resources to enable all Article 5 parties to achieve and/or maintain compliance with Protocol Articles 2A-2J (covering all controlled substances), while taking into account decision XIX/6 (Accelerated phase-out of HCFCs) and the extended commitments made by Article 5 parties under approved HPMPs.

Areas of disagreement included references to the special needs of low-volume and very-low-volume consuming countries, and to the needs of SMEs. Regarding the elements for the TEAP to take into account, disagreement remained regarding references to the resources needed for, *inter alia*:

- enhanced and improved vigilance through the strengthening of existing MRV systems;
- the preparation of HFC phase-down plans;
- maintaining and/or enhancing energy efficiency of low-GWP or zero-GWP technologies and equipment while phasing down HFCs; and
- the introduction of zero- or low-GWP alternatives to HFCs and maintaining energy efficiency in the servicing/end user sector.

Also bracketed were calls for the TEAP to provide estimates of the resources needed to phase down HFCs in accordance with the Kigali Amendment, as well as indicative figures of the estimated funding required for phasing out HCFCs that could be associated with enabling Article 5 parties to encourage the use of low-GWP or zero-GWP alternatives.

Delegates forwarded the amended CRP to MOP 31 for further consideration.

Quadrennial Assessment of the Montreal Protocol for 2018 and Potential Areas of Focus for the 2022 Assessment

On Monday afternoon, Co-Chair Wilmart invited the SAP and the Economic Effects Assessment Panel (EEAP) to present their reports (UNEP/OzL.Pro.WG.1/41/2 and UNEP/OzL.Pro.WG.1/41/2/Add.1) on the 2018 Quadrennial Assessment and suggested areas of focus for the 2022 Assessment.

The SAP stated that the report demonstrated, *inter alia*, how actions taken under the Montreal Protocol have led to decreases in the atmospheric abundance of controlled ODS and the start of the recovery of the stratospheric ozone layer. He also reminded parties that there are few remaining options to hasten the recovery of the ozone layer, mostly due to the fact that actions that could have significant effects have already been taken; any remaining options would, individually, lead to small-to-modest ozone benefits.

The EEAP reported its findings, including that, among others:

- it is challenging to quantify the full range of potential effects of UV radiation, and changes in ozone depletion and climate on human health and the environment;
- more information on UV radiation's effects is needed, including on reactivating latent viral infections and reduced vaccine effectiveness; and
- further scientific knowledge is needed to understand and quantify the synergistic effect on materials of UV radiation, rising temperatures, moisture, extreme weather events, and air pollutants.

On Tuesday morning, the TEAP presented overarching messages from the 2018 Quadrennial Report, including: the Protocol's success hinges on continued vigilance and "continuing the lessons of collaboration, leadership, innovation and shared investment in our global environment"; and the near elimination of ODS with technically and economically feasible alternatives has made a vital and effective contribution to sustainable development.

The TEAP's Technical Options Committees (TOCs) then provided their specific findings and key messages. The Foams TOC reported that, *inter alia*, Article 5 parties face the combined challenge of phasing out HCFCs and phasing down high-GWP HFC blowing agents, also adding that SME and spray foam companies trying to maintain current manufacturing costs may have limited options.

The Halons TOC stated HFC recovery in fire protection equipment is meeting up to 75% of servicing requirements for existing fire protection equipment; and encouraged parties to implement awareness campaigns, insist upon accurate national halon inventories, and establish national halon, HCFC, and HFC banking schemes to ensure critical needs are met.

The Methyl Bromide TOC expressed concern about the unreported use of methyl bromide for controlled purposes and a lack of implementation of emission reduction technologies in quarantine and pre-shipment (QPS) uses, suggesting parties may wish to step up efforts to reduce and replace QPS uses of methyl bromide.

The Medical and Chemical TOC noted, *inter alia*:

- the complete phase-out of HCFCs in sterilization is achievable;
- production and atmospheric concentrations of dichloromethane, not a controlled substance, is unlikely to increase significantly; and

- predictions are that atmospheric concentration of dichloroethane, not a controlled substance, could double by 2030.

The Refrigeration TOC noted that localized transition to lower-GWP refrigerants has occurred, but is not yet globally widespread. He also reported research done in high ambient temperature (HAT) conditions revealed low- and medium-GWP alternatives can be effectively used.

In the ensuing debate, parties requested clarification on reported continued use by Pakistan, Jordan, US, Ecuador, and Barbados of methyl bromide for QPS and queried the reported increases. The Methyl Bromide TOC maintained that the increases, for both Article 5 and non-Article 5 parties, is likely due to harsher bilateral trading environments between countries, resulting in stricter regulations on the importing country by the exporting country.

Other questions centered on providing better understanding on ozone layer recovery and any remaining gaps in monitoring emissions. The SAP maintained there has been scientific consensus that the upper stratosphere is recovering following data collected over a number of years. He added that recovery is projected to return to 1980 levels by approximately 2060, barring any unforeseen rise in emissions.

With regard to gaps in monitoring, the SAP stated that satellite observations remain in reasonable form to provide daily monitoring data, however, ground systems are declining with time.

Australia requested further understanding on why charcoal rot in strawberry plants, in Australia specifically, is on an upward trend. The Methyl Bromide TOC confirmed it is increasing in specific regions as well as a number of other countries, and this is partly explained by fewer resistant varieties and alternatives not performing very well.

The SAP further clarified that dichloromethane is not quantified in a single number but rather depends on where the compound is emitted. He added that the scientific community is not "up to speed" on how to address this and accordingly it will be a focus of future activities, requesting its inclusion in the 2022 Quadrennial Assessment.

Ongoing reported emissions of CTC: Co-Chair Wilmart introduced this agenda item on Tuesday morning (UNEP/OzL.Pro.WG.1/41/2). He said the SAP underscored that the CTC budget is better understood and the gap between top-down and bottom-up estimates has been substantially reduced.

Switzerland acknowledged his country remains concerned with the ongoing reported emissions, hence its request to discuss the issue at OEWG 41. He said concerns include that it is an ODS, a potent greenhouse gas, and is linked to CFC-11. He requested parties consider how to address this issue, including through conducting real time monitoring on production facilities, positing a workshop on this as the most effective way forward. With the EU, he proposed a group be formed, stating a conference room paper (CRP) has already been developed.

The EU also expressed concern about the issue, but said that the reduction in the CTC budget gap is encouraging. Canada suggested that the TEAP and SAP reports may provide a good starting point for further consideration of this matter.

On Thursday, Switzerland introduced its proposal (UNEP/OzL.Pro.WG.1/41/CRP.5), saying it requests:

- the SAP and the TEAP to form a joint task force to update information and make recommendations to OEWG 42;
- parties to provide further information;

- the Vienna Convention's Trust Fund for Research and Systematic Observation to support extension of the network of atmospheric monitoring stations; and
- the Ozone Secretariat to organize a workshop back-to-back with OEWG 42.

Australia, supported by the US, said the proposal was too broad and should be streamlined. She expressed concern about the practicality of the proposed SAP/TEAP task force, and suggested the Trust Fund request was inappropriate and the workshop unnecessary. China, supported by the US, Norway, and Canada, said it wanted to hear from the TEAP and the SAP on whether the joint task force can fulfill the tasks envisaged. China expressed concern about the amount of data generation needed. The US suggested the different components in the CRP could be phased in over time. The EU, Canada, and Mexico supported establishing a contact group to discuss the CRP.

A contact group, co-facilitated by Leslie Smith (Grenada) and Patrick McInerney (Australia), was established to address this issue. On Friday morning, the contact group held an initial discussion of the draft proposal. Parties posed questions to, and sought clarifications from, Switzerland, in the process raising several important issues for consideration in any redrafting of the proposal. Among the issues raised were:

- identifying current knowledge gaps that the TEAP and the SAP could focus on;
- the need for clear instructions for any requests for the Assessment Panels and any information from parties;
- possible overlap with the ToR for the next Quadrennial Assessment;
- the need to consider the Assessment Panels' workload; and
- keeping any work done on CTC within the mandate of and the control obligations under the Montreal Protocol.

Following the report to plenary, delegates agreed to forward the CRP to MOP 31 for further consideration.

Relationship between stratospheric ozone and proposed solar radiation management strategies: On Tuesday morning Co-Chair Arciniegas introduced this item (UNEP/OzL.Pro.WG.1/41/2), stating that this issue had been considered at MOP 30 in 2018, but parties had agreed to defer discussion to OEWG 41. The Federated States of Micronesia (FSM), Switzerland, the EU, the US, Canada, New Zealand, Australia, Brazil, and Burkina Faso supported the SAP providing further assessment of solar radiation management in its next quadrennial report.

Noting that broader work on this subject is underway in the Intergovernmental Panel on Climate Change (IPCC), the US, Canada, Norway, and Colombia cautioned that the SAP's work should stay focused on implications for the stratospheric ozone layer. The SAP proposed a further assessment of solar radiation management in its next quadrennial assessment.

Delegates agreed to consider this issue further under the ToR for the 2022 SAP Quadrennial Assessment.

Any other issues arising from the reports of the Assessment Panels: Chair Arciniegas introduced this item on Tuesday morning. The EU proposed the Assessment Panels suggest best techniques for effective bank management and destruction. FSM, supporting provision of more information on banks, suggested particular emphasis on technical and policy options in their future studies.

The EU asked the SAP to further investigate very short-lived substances and provide a more complete assessment in the next Quadrennial Assessment. Canada suggested the TEAP provide periodic updates on technical aspects of these substances, including alternatives.

Australia suggested the SAP's list of potential subjects for its next Quadrennial Assessment could serve as a good basis for starting discussions on the ToR for that report.

Co-Chair Arciniegas said the plenary would return to this agenda item once a specific proposal has been offered.

An informal group met on Thursday and Friday to discuss a CRP drafted by the EU for a decision outlining the ToR for the 2022 Quadrennial Assessment. The EU explained it sought an initial exchange of ideas and feedback on the draft CRP, which it said was based on the ToR for the 2018 Quadrennial Assessment and the topics flagged in those reports. The EU outlined the key elements, answered questions about the rationale and phrasing of certain provisions, and sought feedback from delegates and the assessment panels. Participants discussed whether a more streamlined ToR might be useful.

During Friday's plenary, the EU reported a draft decision (UNEP/OzL.Pro.WG.1/41/CRP.7) was available, and asked that it be forwarded to MOP 31 for further consideration. The US, supported by Australia, expressed reservations on the way the proposal had been discussed and said many of their comments and ideas were not reflected in the draft. They said they would engage on the issue at MOP 31, either on the basis of the EU's CRP or another proposal that may be put forward.

Delegates agreed to forward the draft decision to MOP 31 on the understanding that its consideration would be subject to a more formal, structured discussion.

TEAP 2019 Report

Co-Chair Arciniegas introduced this item on Tuesday afternoon. The TEAP presented its 2019 progress report (UNEP/OzL.Pro.WG.1/41/2, UNEP/OzL.Pro.WG.1/41/2/Add.1), highlighting that the workload of the TEAP and its TOCs has grown substantially and requesting parties consider the TEAP's overall workload when making requests. She also underscored the difficulty in identifying suitable candidates to join the TEAP, saying they must have adequate history and experience, and the technical expertise and time to meet the demands of the Panel.

The Halons TOC, recalling decision XXX/7 (Future availability of halons and their alternatives), said that an internal working group has been developed. He stated that the amount of halons recovered from shipbreaking is almost exhausted and that the previous estimates were incorrect. On civil aviation, he said that the International Civil Aviation Organization's (ICAO) procedural changes meant halons will not be considered by the ICAO General Assembly until 2022.

The Refrigeration TOC reported that the International Electrotechnical Commission (IEC) had finalized and published the safety standards, "Household and similar electrical appliances – Safety – Part 2-89," noting compliance with this standard is voluntary.

The Medical and Chemicals TOC recalled decision XXIX/7 (Use of controlled substances as process agents) and provided an update on alternative technologies that had eliminated the use of controlled substances as process agents. She said the production of ODS for lab and analytical uses has continually declined in non-Article 5 parties and slightly increased in Article 5 parties.

The Methyl Bromide TOC stated that six critical use nominations had been submitted in 2019, adding that phasing out is proving difficult as alternatives either have a high-GWP or are under strict scrutiny by local authorities. He lamented that methyl bromide stocks reporting is incomplete. He also outlined Israel's emergency use of methyl bromide to fumigate a library, stating there is research showing an alternative could have possibly been used but use in a library may make application difficult.

Responding to various questions, the TEAP members responded that, *inter alia*:

- the Refrigeration TOC has recently added more female members and members from HAT locations, and although it has created a larger than average committee size, the Refrigeration TOC prefers maintaining this composition for the time being;
- the change under international technical standards regarding the refrigerant charge for flammable refrigerants in commercial appliances has extensive implications for such refrigerants' uptake;
- existing information on halon banks is limited, but may improve as the Halons TOC increases its interaction with regional networks of ozone officers;
- the TEAP recognizes the low number of African experts on the Panel, and wants to find solutions for the situation;
- economic expertise will be needed by the TEAP in preparing the study for the next MLF replenishment; and
- the Methyl Bromide TOC's reference to a party that had not reported methyl bromide use for years but then announced a ban in 2019 was intended as an example of the need for greater reporting on methyl bromide use.

The US cautioned that the Methyl Bromide TOC should approve its critical use recommendations based on the facts of the nomination submitted and not anticipated regulatory changes.

Nominations for methyl bromide critical-use exemptions for 2020 and 2021: On Tuesday, OEWG 41 Co-Chair Wilmart noted the Methyl Bromide TOC recommendations on the nominations for critical-use exemptions (CUEs), contained in UNEP/OzL.Pro.WG.1/41/2 and UNEP/OzL.Pro.WG.1/41/2/Add.1, and opened the floor for comments. Canada and Australia disputed some of the TOC's statements regarding the basis for recommending substantially decreased volumes in their nominations for use on strawberry runners. Argentina agreed with the TOC's recommendations on strawberries and tomatoes, underscoring the additional effort this will pose under current macroeconomic conditions in her country. Co-Chair Wilmart urged parties proposing CUEs to discuss these issues bilaterally with the Methyl Bromide TOC during the remainder of the OEWG.

Stocks of methyl bromide: Co-Chair Arciniegas introduced this item on Tuesday afternoon (UNEP/OzL.Pro.WG.1/41/2, UNEP/OzL.Pro.WG.1/41/2/Add.1). The EU informed parties it is working on a CRP that would comprise two parts: an invitation to parties to provide more information on existing methyl bromide stocks, and a request that the Methyl Bromide TOC provide more practical examples of methyl bromide's uses.

The US, supported by Australia, queried the CRP's purpose, maintaining that the use of methyl bromide for QPS is important for global commerce and prevents the introduction of non-native pests. Australia added any forthcoming CRP should be commensurate with the problem and benefits.

Norway, supporting the EU, said there are alternatives available for methyl bromide for about 40% of QPS uses, which is worthy of exploration.

On Thursday morning, the EU introduced the proposal on QPS applications and stocks of methyl bromide, co-sponsored with Norway (UNEP/OzL.Pro.WG.1/41/CRP.4), explaining the proposal has two operative paragraphs, one requesting the TEAP provide further definition on what applications are considered to be covered by the global QPS exemption, and another inviting parties to voluntarily provide information on all methyl bromide stocks by 1 July 2020.

Australia, with New Zealand, supported the CRP in principle, but requested a contact group to discuss it. The US questioned the purpose of the CRP, noting under the Protocol, the definition of QPS uses was up to parties, the Methyl Bromide TOC does not require the data to work on CUEs, and most governments cannot track stocks in the hands of the private sector. Norway observed that the Methyl Bromide TOC had expressed concern about the lack of information on methyl bromide stocks and uses for many years and has noted viable alternatives exist for many uses. Canada, Mexico, Chile, Switzerland, and Colombia supported detailed discussion of the CRP.

Co-Chair Wilmart said an informal group would be formed to discuss the proposal.

On Friday afternoon, the informal group, co-facilitated by Shontelle Wellington (Barbados) and Jessica Esscaip (New Zealand), did an initial review of the CRP. Several delegates expressed confusion on the intent of the proposal. A few questioned whether it was needed. A debate ensued on how to differentiate between various types of methyl bromide stocks treated differently under the Protocol. Several delegates also inquired as to the intended use of any information generated should the decision be approved. Two parties opposed any proposal addressing QPS uses of methyl bromide.

The group agreed that the current CRP would not be forwarded to MOP 31, but that the issue would be placed on the MOP 31 agenda and a new CRP could be introduced there.

Development and availability of laboratory and analytical procedures that can be performed without using controlled substances under the protocol: Co-Chair Wilmart introduced this item on Tuesday afternoon (UNEP/OzL.Pro.WG.1/41/2 and UNEP/OzL.Pro.WG.1/41/2/Add.1). Canada, supported by the US, Australia, and the EU, urged a simplified approach for allowing ODS use in laboratory and analytical processes. Canada offered to develop a CRP on this, but not for presentation in the near future given the 2021 global exemption deadline. Parties agreed to hold discussions informally and intersessionally and revisit this agenda item at MOP 31.

Process agents: On Tuesday afternoon, Co-Chair Wilmart introduced this item (UNEP/OzL.Pro.WG.1/41/2 and UNEP/OzL.Pro.WG.1/41/2/Add.1), noting that the TEAP had recommended three changes at MOP 30 to the list of controlled substances used as process agents:

- to move the use of CFC-113 in the preparation of perfluoropolyether diols from the allowed list;
- to remove the EU from under the application "recovery of chlorine by tail gas absorption from chlor-alkali production"; and
- to change certain quantities.

Discussion of these recommendations had been deferred to OEWG 41. The EU said it needed more time to reflect on proposed recommendations. Noting that after 2021 the list of process agents will not be reviewed again for another four years, Canada urged a comprehensive consideration of the issue now. The US wondered whether the changes in the list were needed. Co-Chair Wilmart proposed interested delegations work informally to develop specific proposals.

Any other issues: On Tuesday, Co-Chair Arciniegas noted traditionally this was the agenda item under which the TEAP nominations were discussed. She pointed out two such nominations have been made, and outlined the rules and procedures for the TEAP nominations. Australia, supported by Canada and the EU, recalled that the TEAP had raised a number of issues to bear in mind regarding its membership, including

specific expertise needed and other skills required. Canada also underscored that the TEAP Co-Chairs should be consulted about nominations. Co-Chair Arciniegas proposed that interested parties intending to make nominations consult informally with others and with the Panel between now and MOP 31.

Article 5 Parties' Access to Energy-efficient Technologies in the RAC and Heat-pump Sectors

Co-Chair Wilmart introduced this agenda item on Wednesday morning (UNEP/OzL.Pro.WG.1/41/2, UNEP/OzL.Pro.WG.1/41/2/Add.1). The TEAP presented its report saying that the report stemmed from decision XXX/5 on the subject requesting the TEAP prepare a report on the cost and availability of low-GWP technologies and equipment that maintain or enhance energy efficiency. Findings include, *inter alia*:

- medium- and low-GWP refrigerants for energy efficiency appliances are widely available;
- components for improved energy efficiency of RAC are available;
- research and development (R&D) is not focused on HCFCs;
- HAT conditions are less relevant with closed refrigeration appliances placed indoors;
- HFC costs will rise as phase-down progresses, making low-GWP refrigerants increasingly cost-competitive;
- fans improve energy efficiency at significant cost;
- manufacturers respond to policies that promote energy efficiency and refrigeration transition by investing in related R&D; and
- transition toward lower-GWP and higher-energy efficient air conditioning equipment can happen simultaneously at lower overall cost through bulk manufacture.

In the discussions that followed, several Article 5 parties posed questions on the applicability of new energy efficient technologies in HAT countries. Cuba, Côte d'Ivoire, Jordan, and the Gambia inquired how accessible these technologies are, while Iraq suggested the Ozone Secretariat encourage research to identify technologies that are cost-competitive in addition to being energy efficient.

India asked for clarity from the TEAP on the interplay between policies and market availability, and the costs of the technologies presented. The TEAP said a forthcoming paper would provide different metrics for approximately six economies on pricing and regulations.

Kuwait noted the minor temperature variation between day and night in HAT countries, saying it is necessary to determine if the studied inverters would be able to function in these conditions. The TEAP affirmed that while the savings incurred will be small due to the slight seasonal variability in HAT countries, they can, nonetheless, function efficiently in these conditions.

Other questions from the US, Saudi Arabia, and Burkina Faso related to increased data availability and information on low-GWP energy efficient technologies, as well as global best practices for adopting energy efficient technology across different conditions.

The TEAP also noted:

- increased efficiency in technologies plus new standards permitting higher charges for flammable or low-flammability refrigerants is allowing use of such refrigerants in higher capacity units;
- while the cost of safety measures for energy-efficient low-GWP RAC production lines in the report appears big, on a per unit basis over several years the cost is actually small;
- discussion of issues on on-site testing of appliances was not mandated for this report; and

- some success stories about transitioning to energy-efficient low-GWP alternatives, and about the use of minimum energy performance standards (MEPS), are provided in the report.

During the general debate, Mozambique noted that cost estimates for low-consumption parties based on data from China would likely not be valid for countries with substantially smaller gross domestic products (GDPs). India requested a survey on in-license patented technologies, as well as a tabular comparison between countries on MEPS and the highest energy efficient product available in the country. FSM suggested an analysis of MEPS that addresses what the options are, and how countries are setting and enforcing them. The EU asked the TEAP to more clearly define what they consider to be low-GWP technology, and expressed interest in more discussion on the importance of improved servicing and leak testing. Kuwait asked the TEAP to discuss how to design MEPS appropriate for HAT countries. Colombia asked the TEAP to identify which sectors could toughen energy efficiency standards fastest. Grenada, supported by FSM, highlighted difficulties low-volume countries have in accessing low- and zero-GWP technologies and in adopting the needed energy efficiency standards.

FSM underscored that costs to access technology become prohibitively high due to, among other things, transport costs. Oman called for more detailed TEAP discussion of the challenges of air conditioning in HAT countries. Norway asked the TEAP to incorporate information on technologies that do not primarily use mechanical vapor compression technology to produce air conditioning or refrigeration, referred to as "not in kind technologies." Mexico suggested that capacity building needs to be addressed from a different stance, saying that new technologies will require new capacities, not just related to flammability issues, but also techniques and characteristics. Syria requested results on the safety of air conditioning alternatives. Nigeria supported market transformation MEPS and labeling, which will benefit most Article 5 countries.

Co-Chair Wilmart suggested the TEAP take note of the comments made and update its report accordingly for presentation at MOP 31, to which delegates agreed.

Linkages between HCFCs and HFCs in Transitioning to Low-GWP Alternatives

Co-Chair Wilmart introduced this item on Wednesday (UNEP/OzL.Pro.WG.1/41/2, UNEP/OzL.Pro.WG.1/40/7, UNEP/OzL.Conv.11/7, UNEP/OzL.Pro.29/8, UNEP/OzL.Conv.11/7/Corr.1, UNEP/OzL.Pro.29/8/Corr.1, and UNEP/OzL.Pro.30/11). Kuwait noted that this agenda item had been proposed by Saudi Arabia due to a concern that there would be a negative impact due to a "clash" in the timetable in phasing-out HCFCs and phasing-down HFCs. Saudi Arabia maintained that its efforts in this area remain very active and will share developments with parties in the near future.

Cuba noted the high costs related to transitioning to low-GWP technologies and requested the consideration of funding support for low-volume consuming countries to meet such requirements.

With the support of Bahrain, Kuwait, Oman, Iraq, and Saudi Arabia, Kuwait requested discussions be deferred to the next OEWG to allow for countries to receive and review data on low-GWP potential technologies. Delegates agreed.

Safety Standards

On Wednesday afternoon, Co-Chair Wilmart introduced this agenda item (UNEP/OzL.Pro.WG.1/41/2 and UNEP/OzL.Pro.WG.1/41/INF/3/Rev.1), noting the Secretariat has developed

a tabular overview of safety standards for refrigeration, air conditioning and heat pump systems and appliances, and a corresponding online tool. The EU, Canada, Colombia, Kuwait, and Burkina Faso praised the tool and urged the Secretariat to update it regularly, stating this issue should remain on the agenda for future OEWGs and MOPs. China expressed satisfaction with the adoption of an IEC standard on commercial equipment allowing higher charges of flammable refrigerants, and hoped for a similar revision regarding household appliances. Kuwait and Argentina emphasized the need to monitor how international standards are taken up by parties.

Co-Chair Wilmart closed the agenda item, saying the discussion will be noted in the meeting report.

Review of the ToR, Composition, Balance, Fields of Expertise and Workload of the TEAP

Co-Chair Wilmart introduced this item on Wednesday afternoon (UNEP/OzL.Pro.WG.1/41/2, UNEP/OzL.Pro.WG.1/41/4, and UNEP/OzL.Pro.WG.1/41/INF/6), recalling Decision XXX/15 on this subject.

Saudi Arabia called for ensuring TEAP composition is equitable and in line with the TEAP's ToR. He suggested conducting a regular review process, with questions such as who should conduct such a review to be worked out by the MOP. He said currently trying to assist the TEAP in nominating experts that match its expertise needs is difficult because the TEAP is not clear on what expertise needs are already met by existing members and where expertise gaps exist. He provided examples of how to update existing tables in TEAP's matrix of expertise. He called for setting clear and transparent criteria for nominations. He also underscored the importance of having applicants with HAT country expertise, while stating that this does not necessarily require the expert to be from a HAT country.

China said that clearer criteria would help parties to select appropriate expertise. She said the report notes that on the whole 65% of experts are from non-Article 5 countries, and expressed the hope that in the future there would be more representatives from Article 5 countries. She also encouraged greater gender balance on the TEAP.

India noted that the MOP had developed comprehensive ToR and said this is an opportune time to establish a process or mechanism to ensure the ToR are adhered to. He also urged full consultation with national focal points.

Bahrain stated new approaches to selecting members of the panel may benefit all parties. Kuwait called for limiting reappointments, cautioning against inadvertently creating "lifetime" positions for some and not for others.

Jordan said selection must be based mainly on expertise and the specific specialization of the candidate and equitable geographic representation.

Saudi Arabia requested a contact group on the issue. Co-Chair Wilmart said an informal group would be formed, with the understanding that there was general agreement that the TEAP's ToR should not be re-opened.

An informal group, co-facilitated by Lara Haidar (Lebanon) and Philippe Chemouny (Canada), met on Thursday and Friday to discuss the draft decision (UNEP/OzL.Pro.WG.1/41/CRP.6). Proponents explained their rationale for the proposal, and why it differed in some respects from Saudi Arabia's intervention in plenary. The TEAP explained current procedures for TEAP nominations and the matrix of expertise. Several parties suggested improving the matrix, raising its profile, and clarifying where expertise gaps currently exist. A few parties requested greater future transparency regarding the reasons some nominations

are rejected. Parties also spent time ensuring that wording is consistent with the current TEAP ToR and previous applicable decisions.

The OEWG agreed to forward a revised draft decision to MOP 31 for its consideration.

Membership of the MLF ExCom

Co-Chair Wilmart introduced the agenda item (UNEP/OzL.Pro.WG.1/41/2) on Wednesday afternoon. Bosnia and Herzegovina presented the proposal by the Eastern Europe and Central Asia region (UNEP/OzL.Pro.WG.1/41/CRP.2) to amend the ExCom ToR to raise the number of Article 5 and non-Article 5 parties on the MLF ExCom to eight apiece, and reserve one of the Article 5 seats for Eastern Europe and Central Asia.

Grenada, Burkina Faso, Jordan, Kuwait, and Bahrain expressed empathy for the principle of equal representation and supported further discussion of the CRP. Mexico observed that the solution for Central Europe arrived in 2004 under decision XVI/38, which created the current arrangement and was adequate at that time, but circumstances have changed so the CRP should be discussed.

The US cautioned that the current composition of ExCom is a careful balance of a wide variety of interests. Australia expressed concern that any change to that balance might destabilize ExCom work. He also suggested that Eastern Europe and Central Asia is not an official UN grouping. Bosnia and Herzegovina responded Eastern Europe is an official grouping, but some Central Asian countries associate with it in the Montreal Protocol context.

The EU expressed confusion about whether the CRP requests an ExCom seat for just the Article 5 parties in the group or all of them. Armenia said the proposal was all about equal representation, since other groups of Article 5 parties have a permanent seat while her group's Article 5 parties only have representation once every four years. Canada said while the current ExCom distribution is not perfect, perfect balance would be impossible. He suggested considering alternative options for representation of the region.

Co-Chair Wilmart suggested discussions should continue in an informal group, co-facilitated by Laura Beron (Argentina) and Elisabeth Munzert (Germany). The group met on Thursday to share views and work on the text of the draft decision.

Reporting to plenary, Co-Facilitator Beron said that a number of different solutions had been put forward but further consideration of the issue was needed. The draft decision was forwarded to MOP 31 for further discussion.

Request by Azerbaijan to be included among the Parties to which the Phase-down Schedule for HFCs, as set out in Paragraphs 2 and 4 of Article 2J of the Montreal Protocol, Applies

Co-Chair Arciniegas introduced this item on Wednesday afternoon (UNEP/OzL.Pro.WG.1/41/2). Azerbaijan introduced its proposal (UNEP/OzL.Pro.WG.1/41/CRP.3), explaining it is in the process of ratifying the Kigali Amendment, but under the current agreement it will not be able to meet its HFC phase-down obligations. As a result of this, she said Azerbaijan wishes to be included in the special group of non-Article 5 parties with a different baseline and a delayed phase-down.

Belarus said Azerbaijan was not present at MOP 28 when the Amendment was adopted, so was not included in the special group when they should have been. Bosnia and Herzegovina said the region had met and supported the request.

Canada and the EU expressed caution as the draft decision did not fully set out the rationale for the request, and asked for more

time to consider the draft decision. They also expressed hesitancy since they did not want to set a precedent that would lead to other aspects of Decision XXVIII/2 (Decision related to the amendment phasing down hydrofluorocarbons) to be amended further down the line. Australia, the Russian Federation, Bahrain, Kuwait, Jordan, Saudi Arabia, and the US supported the proposal.

Co-Chair Arciniegas suggested parties discuss this matter informally and report to plenary.

Azerbaijan reported on Thursday that following consultation they will submit a revised text to MOP 31, to which delegates agreed.

Risk of Non-compliance with HCFC Production and Consumption Reduction Targets by the Democratic People's Republic of Korea

Co-Chair Arciniegas introduced this item on Thursday morning (UNEP/OzL.Pro.WG.1/41/2/Add.1 and UNEP/OzL.Pro.WG.1/41/INF/8). The Democratic People's Republic of Korea (DPRK) stated that it will face difficulties in meeting HCFC phase-out targets as a result of not being able to receive funds allocated by the MLF due the imposition of UN Security Council sanctions.

ImpCom President Patrick McNerney (Australia) said the issue has been referred to the ImpCom as a matter of potential non-compliance. As the ImpCom is unable to contravene Security Council sanctions, it will only discuss the matter further if and when the DPRK is actually in a state of non-compliance.

The US, with Japan, the EU, Canada, and Australia, said he could not support the draft decision. The DPRK further stated that HCFC allowances have been increased since there are no other options available until the MLF funding is disbursed.

Co-Chair Arciniegas closed the agenda item saying the discussion will be recorded in the meeting report.

Other Matters

On Thursday morning, Co-Chair Wilmart noted that Italy wanted to present a draft of the Rome Declaration under this agenda item.

Italy said it wishes to highlight food loss and waste at MOP 31 and believes that the Protocol has an important role to play in the food cold chain. He said they intend to host a roundtable during the High-level Segment on this issue. He stated a first draft of the proposed Declaration would be posted and requested time to engage informally with parties on the issue. Co-Chair Wilmart said time would be made available.

On Thursday afternoon, an informal group met to discuss Italy's proposal. Italy answered questions about the plans, saying governments can consult on the first draft of the Rome Declaration prior to MOP 31. Most participants praised the idea of the roundtable and expressed interest in a Declaration if concise and avoiding controversial topics. After the informal group meeting, the draft Declaration was posted on the meeting portal for countries to discuss during the intersessional period. The short draft calls for exchanging knowledge and promoting the innovation of energy efficient solutions and technologies that reduce the use of substances controlled by the Montreal Protocol in the development of the cold chain, thereby contributing to the reduction of food loss and waste.

Closure of the Meeting

Plenary reconvened on late Friday afternoon for the adoption of the report and closure of the meeting. Co-Chair Wilmart introduced the draft report (UNEP/OzL.Pro.WG.1/41/L.1 and

UNEP/OzL.Pro.WG.1/41/L.1/Add.1). Delegates adopted the report with minor amendments.

Co-Chair Arciniegas, closing the meeting, thanked delegates for their participation during the OEWG, acknowledging a better understanding had been reached on items that are crucial to the progress of the Protocol. Thanking the Government of Thailand for its hospitality, she closed OEWG 41 at 5:54 pm.

A Brief Analysis of OEWG 41

A new era for the Montreal Protocol began on 1 January 2019 with the entry into force of the Kigali Amendment and with it the phase-down of hydrofluorocarbons (HFCs). Thus, as the 41st meeting of the Montreal Protocol's Open-ended Working Group (OEWG 41) convened in Bangkok, delegates were pleased with the fruit of their years-long labor, but were also reminded that new challenges have already arisen.

The OEWG faced an agenda replete with such challenges including ongoing reported emissions of carbon tetrachloride (CTC); terms of reference (ToR) for the 2021-2023 study of the Multilateral Fund replenishment; and ToR for the 2022 Quadrennial Assessment. Perhaps the most critical issue parties had to address, however, was a holdover from MOP 30, that of unexpected emissions of trichlorofluoromethane (CFC-11).

The admission of new challenges, emerging gaps, and incremental scientific evidence regarding unexpected emissions of CFC-11 arguably does not sit comfortably with the otherwise robust image of the Montreal Protocol; ongoing reported emissions of CTC has also raised similar concerns with a number of parties. CFC-11 was one of the substances written into the original Montreal Protocol text in 1987. Similarly, CTC was listed as a controlled substance at the second Meeting of the Parties (MOP) to the Montreal Protocol in London in June 1990. Both substances were supposed to be phased-out by 2010.

However, just as former UK Prime Minister Margaret Thatcher noted in her speech to MOP 2, "New fields of knowledge and discovery should not be disparaged." In fact many of Prime Minister Thatcher's comments nearly 30 years ago serve as a reminder that each challenge represents an opportunity for the Protocol not to rest on its laurels but to redefine its strengths and showcase its ability to overcome obstacles.

This brief analysis looks at how the Montreal Protocol's more than 30-year history of surmounting challenges, including on an "old" or "settled" subject such as CFC-11, by channeling the very guiding principles and practices of the Montreal Protocol: trust in science, trust among parties, and trust in the Protocol itself.

The Science Moves On

"Science has advanced because the scientists were not satisfied with conventional answers." ~ Margaret Thatcher, Speech to Montreal Protocol MOP 2, 1990

While science has undeniably advanced over the Montreal Protocol's lifespan, the basic science of the impacts of CFCs remains unchallenged. This firm grounding in the science led to the sounding of alarms in 2018 about the unexpected emissions of CFC-11 and the need to address how and why this happened and to ensure it never happens again.

So, like OEWG 40 and MOP 30 before it, OEWG 41 participants tried to identify the appropriate actions that need to be taken to address these CFC emissions. While OEWG 40 and MOP 30 dealt with confirming the emissions and possible source(s), OEWG 41 focused on how to stop any illegal trading

of banned substances. Nevertheless, this is not the first time the Protocol has had to address illegal trade in ODS; this has been a recurring issue since the 1990s.

During the weeklong OEWG, the Scientific Advisory Panel (SAP) provided updates on what has been discovered about the CFC-11 emissions and what the potential consequences are. The SAP gathered the existing scientific studies, developed its own analysis, and laid the ground for action by parties.

On the margins of the meeting halls, one party observed that not enough attention has been given by parties to the very fact that it was not mechanisms under the Protocol that uncovered the CFC-11 emissions, but rather the US National Oceanic and Atmospheric Administration (NOAA), followed by an in-depth investigation by the Environmental Investigation Agency (EIA), a non-governmental organization (NGO). He reasoned that in light of the SAP's confirmation that 40-60% of the source of CFC-11 emissions remains undetermined, the startling fact that there are currently no monitoring satellites in much of Asia, Africa, and Latin America, and only one new monitoring station is currently being planned—a monitoring station is being erected in Africa—parties should work more closely with NGOs and other non-governmental stakeholder groups to strengthen, among others, on-the-ground monitoring ability to detect unreported emissions. As he pointed out, “We don't always have the ability to connect all the dots.”

The Power of Popular Choice

“The Montreal Protocol was a historic achievement. It provided the first real evidence that the world had the will to cooperate, in order to tackle the major environmental issues. And that was a great international step forward.” ~ Margaret Thatcher, Speech to Montreal Protocol MOP 2, 1990

When the Montreal Protocol entered into force, people used their purchasing power to opt for “ozone friendly” technologies despite its higher costs. However, the Technology and Economic Assessment Panel noted that one of the reasons for the recent re-usage of CFC-11 could be because of its lower costs in comparison to the alternatives. One delegate questioned, “Why have we regressed 30 years later in our commitment to avoid ODS? Where did the public buy-in for ozone layer protection go if users are knowingly purchasing and using a banned substance?” This thought prompted the notion that perhaps trust amongst the parties can be extended to trust between parties and the public so that the power of popular choice is once again harnessed.

These observations inevitably led to wider discussions on the gaps in information and perhaps “weak” reporting requirements of the Protocol. Toward the end of the week, parties began to recognize that the focus should not be on apportioning blame but rather working together to find a way forward. They were asked by the contact group co-facilitators to work on suggestions for how to achieve this and report to MOP 31.

Similarly, the ongoing reported emissions of CTC—an issue of concern since MOP 28 in 2016—was raised by parties as an issue to further study, gather information on, and understand. Parties differed on this. As one observer said, gathering further information may identify loopholes and gaps currently being used, but posited that some parties are weary of this straying outside the Protocol's current mandate. Discussions on a draft decision to investigate the CTC matter further were unable to make progress at OEWG 41. Parties, however, could agree that the matter needs further consideration and will continue discussions at MOP 31.

Sink or Swim Together

“We are all affected by the damage that CFCs do, both to the ozone layer and as greenhouse gases. And it is only when all of us come together to take action that we can get on top of the problem.” ~ Margaret Thatcher, Speech to Montreal Protocol MOP 2, 1990

There were times when discussions in plenary, as well as on the sidelines, oscillated between the responsibilities of Article 5 parties versus non-Article 5 parties, but as one party interjected on the last day of the meeting with his final reflection, “It's not about non-Article 5 parties and it's not about Article 5 parties. We are all in this together.”

And with that, parties were quickly reminded of the wide gulf that existed between parties leading up to Kigali, but how the enormous amount of effort and time dedicated to making the Kigali Amendment come into force allowed Article 5 parties to bolster unity to work alongside non-Article 5 parties to find solutions that are amenable to all.

This meant that parties endeavored to meet each other's demands for the greater purpose of moving forward and resolving complex issues surrounding the Protocol. So while certain non-Article 5 parties stressed the need to streamline more effective licensing systems to achieve compliance, Article 5 parties maintained this could be done so as long as non-Article 5 parties begin to enhance their reporting on banned substances in the same detailed way Article 5 parties are expected to do.

It also ignited a productive discussion on how monitoring systems are not meant to be a substitute for national-level obligations and countries should exercise their own vigilance in assuring that illegal chemical usage is not taking place. These points on the responsibility and subsequent treatment of countries where the unreported emissions are coming from were not resolved at OEWG 41. Instead, parties were asked to provide a substantive plan for addressing this issue to be presented at MOP 31.

Where We Go From Here

Many observed that OEWG 41 ran remarkably smoothly with little delays or prolonged disagreements. It was either a display of general consensus on most matters or a daunting forewarning that MOP 31 will have to tackle the tougher issues overshadowing this process; namely, how to propose firm solutions to the illegal usage of banned substances under the Protocol.

A number of parties lamented that an inordinate amount of time has been occupied at OEWG 41 and will be required at MOP 31 to continue to address the illegal usage of CFC-11. They further stated that if parties reported on the mere suspicion of the illegal usage of CFC-11 sooner, many of the complexities being faced now could have been avoided. One delegate countered that when a family member has committed a transgression, the temptation is to cover it up from the outside world. He went on to say, “What we needs to shift now is the thinking that other parties are not part of the family. We will support each other through the mistakes and triumphs of this Protocol.”

This commitment to support other parties exemplifies the trust that parties have historically had in each other and the continued desire to preserve this trust. Moreover, the intended steps to formulate a concrete plan for MOP 31 on how to address the illegal usage may not be a sign that trust is wavering in the robustness of the Protocol, but rather an acknowledgment that this multilateral environmental agreement cannot rest on its laurels; it must continue to evolve and grow for the trust to be maintained

and demonstrably evident for governments, industry, and the public at large. This is further underscored by parties agreeing to discuss CTC issues further, even though they differ on how or why it needs to be addressed.

As has often been repeated over the past 30 years, the Protocol must continue to use what the science is telling us about the ozone layer as the foundation for action. Science provided irrefutable evidence of the hole in the ozone layer prompting the first agreement in the history of the United Nations to be ratified by 197 countries. And it was scientific recommendations that enabled parties to take action to eradicate almost 99% of the gases responsible for the depletion of the ozone layer. Indeed, this trust in science has been the bedrock of the Montreal Protocol and should continue to carry this Protocol forward.

Upcoming Meetings

HLPF 2019: Convening under the auspices of the UN Economic and Social Council, this year's High-Level Political Forum (HLPF) will address the theme "Empowering People and Ensuring Inclusiveness and Equality." It will conduct an in-depth review of Sustainable Development Goal (SDG) 4 (quality education), SDG 8 (decent work and economic growth), SDG 10 (reduced inequalities), SDG 13 (climate action), and SDG 16 (peace, justice and strong institutions), in addition to SDG 17 (partnerships for the Goals), which is reviewed each year. Among other items, the Forum will consider the Global Sustainable Development Report, which is issued every four years. **dates:** 9-19 July 2019 **location:** UN Headquarters, New York **www:** <https://sustainabledevelopment.un.org/hlpf/2019>

25th International Congress of Refrigeration (ICR): The ICR 2019 Congress will be held under the theme of "Refrigeration for Human Health and Future Prosperity," and will focus on issues including: energy saving and energy efficiency, food supply, health, reduction of global warming, and the protection of the ozone layer. **dates:** 24-30 August 2019 **location:** Montreal, Canada **www:** <https://icr2019.org/icr2019>

International Day for the Preservation of the Ozone Layer: The theme for World Ozone Day 2019 is "32 Years and Healing," celebrating over three decades of successful international cooperation that has led to the phase-out of 99% of ozone-depleting chemicals in refrigerators, air conditioners, and many other products. **date:** 16 September 2019 **location:** worldwide **www:** <https://ozone.unep.org/ozone-day/32-years-and-healing>

UN 2019 Climate Summit: UN Secretary-General António Guterres will convene the UN Climate Summit under the theme "A Race We Can Win. A Race We Must Win," to mobilize political and economic energy at the highest levels to advance climate action that will enable implementation of many of Sustainable Development Goals. Its aim is to challenge states, regions, cities, companies, investors and citizens to step up action in nine areas: mitigation; social and political drivers; youth and public mobilization; energy transition; climate finance and carbon pricing; industry transition; nature-based solutions; infrastructure, cities and local action; and resilience and adaptation. **date:** 23 September 2019 **location:** UN Headquarters, New York **www:** <http://www.un.org/climatechange/>

SDG Summit: The HLPF, under the auspices of the UN General Assembly, will assess progress achieved so far since the adoption of the 2030 Agenda in September 2015 and provide leadership and guidance on the way forward that will help accelerate implementation of the 2030 Agenda and SDGs. **dates:** 24-25 September 2019 **location:** UN Headquarters, New York **www:** <https://sustainabledevelopment.un.org/sdgsummit>

ATMOsphere Asia 2019: ATMOsphere Asia provides an opportunity for stakeholders to learn more about natural refrigerant-based technologies and systems in the South East Asian region. **date:** 24 September 2019 **location:** Bangkok, Thailand **www:** <http://www.atmo.org/events.details.php?eventid=80>

ATMOsphere Europe 2019: ATMOsphere Europe provides an opportunity for stakeholders to learn more about natural refrigerant-based technologies and systems in the European region, including on issues such as global and regional policy, regulations and standards, and technology trends and innovation. **dates:** 16-17 October 2019 **location:** Warsaw, Poland **www:** <http://www.atmo.org/events.details.php?eventid=81>

31st Meeting of the Parties to the Montreal Protocol (MOP 31): MOP 31 will consider issues, including unexpected emissions of CFC-11, HFC management, implementation, the Multilateral Fund, among other matters. **dates:** 4-8 November 2019 **location:** Rome, Italy **www:** <http://conf.montreal-protocol.org/meeting/mop/mop-31>

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

Glossary

CFCs	Chlorofluorocarbons
CRP	Conference room paper
CTC	Carbon tetrachloride
CUE	Critical use exemption
ExCom	Executive Committee
FSM	Federated States of Micronesia
GWP	Global warming potential
HAT	High ambient temperature
HCFCs	Hydrochlorofluorocarbons
HFCs	Hydrofluorocarbons
IEC	International Electrotechnical Commission
ImpCom	Implementation Committee
MLF	Multilateral Fund
MOP	Meeting of the Parties
MRV	Monitoring, reporting and verification
ODS	Ozone depleting substance
OEWG	Open-ended Working Group
QPS	Quarantine and pre-shipment
RAC	Refrigeration and air conditioning
SAP	Scientific Assessment Panel
TEAP	Technical and Economic Assessment Panel
TOC	Technical Option Committee
ToR	Terms of reference
UNEP	UN Environment Programme
UV	Ultraviolet