

## Vienna Convention for the Protection of the Ozone Layer and its Montreal Protocol on Substances that Deplete the Ozone Layer’s contribution towards the 2030 Agenda for Sustainable Development and the Sustainable Development Goals

### Introduction

The President of the Conference of the Parties to the Vienna Convention for the Protection of the Ozone Layer (Vienna Convention) and the President of the Twenty-Ninth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer (Montreal Protocol) are jointly submitting this report to the 2018 High Level Political Forum on Sustainable Development (HLPF), in response to the invitation from the President of the United Nations Economic and Social Council, H.E. Ms. Marie Chatardová.

The report is structured around the template provided in the letter of invitation and deals with the theme of the 2018 HLPF: *Transformation towards sustainable and resilient societies*. It describes the contribution of the Vienna Convention and its Montreal Protocol (the ozone treaties) towards those Sustainable Development Goals under review in 2018 which are most relevant to the work of the two treaties.

In the 2018 HLPF, all sustainable development goals are to be examined from the perspective of the given theme, with particular emphasis on SDGs 6, 7, 11, 12 and 15 in addition to SDG 17. Goals 4, 5, 6, and 16 are not of direct relevance to the work of the ozone treaties and so will not be mentioned in this report. Given the overlap in goals between those reviewed this year and those reviewed in 2017, this report (in particular the descriptions of activities under goals 1, 2, 3, 7, 9, 10, 14 and 17) builds on and may repeat some information provided in previous submissions.

### 1. An assessment of the situation regarding the principle of “ensuring that no one is left behind” at the global level

Table 1: schematic overview of the goals to which the ozone treaties contribute

MONTREAL PROTOCOL CONTRIBUTIONS TO THE GOALS	SUSTAINABLE DEVELOPMENT GOALS													
	1	2	3	7	8	9	10	11	12	13	14	15	17	
Universal ratification of the ozone treaties							√						√	
Engagement with all stakeholders													√	
Allocation of funds to developing countries	√				√	√	√		√	√			√	
Technology transfer	√				√	√	√		√	√			√	
Institutional strengthening and capacity building	√					√	√		√				√	
Promote food security and greener economy		√						√	√			√		
Avoid damage to crops, fisheries and materials		√						√	√		√	√		
Possible energy efficiency enhancements				√				√	√					
Protection from UV radiation			√					√			√	√		
Climate change mitigation								√	√	√				
Avoided skin cancers			√											
Avoided eye cataracts			√											
Increased investment in green alternatives						√			√					
Promote the use of greener, safer chemicals						√			√					

Goal 1: End poverty in all its forms everywhere; Goal 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture; Goal 3: Ensure healthy lives and promote well-being for all at all ages; Goal 7: Ensure access to affordable, reliable, sustainable and modern energy for all; Goal 8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all; Goal 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation; Goal 10: Reduce inequality within and among countries; Goal 11: Make cities and human settlements inclusive, safe, resilient and sustainable; Goal 12: Ensure sustainable consumption and production patterns; Goal 13: Take urgent action to combat climate change and its impacts; Goal 14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development; Goal 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss; Goal 17: Strengthen the means of implementation and revitalize the global partnership for sustainable development.



Scientific studies have shown that without the Montreal Protocol, the world would have experienced massive losses of ozone in all areas. Scientists, assuming a 3% annual increase in CFCs, have projected that two thirds of the ozone layer would have been destroyed during the period 1974 to 2065. The resultant extreme increases in the damaging UV radiation (300% or more) would have led to a number of adverse consequences for humans and ecosystems, including large increases in incidence of skin cancer, eye cataracts, immune system suppression and crop damage.<sup>1,2</sup> Recent study gives credence to the theory that the mass extinction of species that scientists say occurred around 252 million years ago may have been attributable to the destruction of the ozone layer following a long period of volcanic eruptions.<sup>3</sup> These findings provide some indications of what life would have been like without the ozone treaties, and underline the importance of maintaining and building upon the progress that has been achieved to date in the protection of the ozone layer.

The Vienna Convention, adopted in 1985, and its Montreal Protocol, adopted in 1987, have ensured that to date more than 99% of the historic peak levels of consumption and production of harmful ozone depleting substances (ODSs) has been phased out. As a result, the ozone layer is healing and is expected to be restored by around the middle of the century.

The concept of ‘ensuring that no one is left behind’ applies at different levels within the context of ozone protection, ranging from the level of international diplomacy, through the national or community level to the individual. All of these are interconnected.

At the level of international diplomacy, both ozone treaties are universally ratified, by 197 parties. Four of the five Amendments to the Montreal Protocol – the London, Copenhagen, Montreal and Beijing Amendments – have also achieved universal ratification and the recently adopted Kigali Amendment has already surpassed the requisite number of ratifications to ensure its entry into force in January 2019. Universal ratification is a significant achievement among international agreements and ensures that no country is left behind in implementing the specified measures to protect the ozone layer and the climate. In addition, both in the discussions and decision-making at the international level and in the process of phasing out ozone-depleting substances at the national level, the Montreal Protocol has set a unique example of engagement with all stakeholders including governments, scientists, industry and civil society. This underpins the Protocol’s global implementation and the achievement of its objectives and, through them, contributes to the goals of sustainable development. (*Goal 17: Strengthen the means of implementation and revitalize the global partnership for sustainable development*).

One of the key pillars of the Montreal Protocol’s implementation is the Multilateral Fund for the Implementation of the Montreal Protocol. The Fund, working with its four Implementing Agencies and a number of bilateral agencies, provides financial and technical support to developing countries in complying with their obligations under the Montreal Protocol. Funding decisions are taken by its Executive Committee, whose membership is balanced between developed and developing countries, ensuring that the two groups of countries have equal weight in the decision-making and management of the Fund resources. To date, the Fund has allocated approximately US\$3.6 billion to assist 147 developing countries to meet their Montreal Protocol obligations. The Fund has supported technology transfer projects that have replaced ozone-depleting substances with ozone-friendly substitutes and technologies in developing countries. As a result, the potentially negative impacts of the transition, both in the enterprises concerned and on their workers, have been mitigated and the

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<sup>1</sup> <https://www.atmos-chem-phys.net/9/2113/2009/acp-9-2113-2009.html>

<sup>2</sup> [https://www.researchgate.net/profile/Richard\\_McKenzie/publication/50940711\\_UV\\_impacts\\_avoided\\_by\\_he\\_Montreal\\_Protocol/links/0046351fe283f2e8fa000000/UV-impacts-avoided-by-he-Montreal-Protocol.pdf](https://www.researchgate.net/profile/Richard_McKenzie/publication/50940711_UV_impacts_avoided_by_he_Montreal_Protocol/links/0046351fe283f2e8fa000000/UV-impacts-avoided-by-he-Montreal-Protocol.pdf)

<sup>3</sup> As reported in Newsweek.com <http://www.newsweek.com/demolished-ozone-layer-252-million-years-ago-left-trees-sterile-uv-radiation-801100>



relevant industries are more competitive, leading to economic benefits. Institutional strengthening and capacity building are also priorities of the Fund and have ensured sustained, dedicated and effective implementation of activities. (**Goal 1: End poverty in all its forms everywhere; Goal 8: Promote sustained, inclusive and sustainable economic growth full and productive employment and decent work for all; Goal 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation; Goal 10: Reduce inequality within and among countries; Goal 12: Ensure sustainable consumption and production patterns**).

The Montreal Protocol has made significant contributions to food security and a greener economy, sustainability of human settlements, and combatting climate change. The phase-out of ozone-depleting substances has contributed an estimated US\$460 billion in global benefits between 1987 and 2060 due to avoided damages to agriculture, fisheries and materials such as plastic and wood that would have been caused by the depletion of the ozone layer.<sup>4</sup> Ozone-depleting substances have been used in many sectors and products that permeate our daily lives. Their phase-out has resulted in changes to production and consumption patterns and stimulated more efficient production processes, as well as the innovative redesign of products and equipment to use greener chemicals. In addition, the poisonous and ozone-depleting fumigant gas methyl bromide, which had been widely used in agriculture, buildings and commodities, has been largely phased out (with some applications remaining in quarantine and pre-shipment to control pests and a few critical uses), prompting the development of more effective and safer alternatives. The parties' recent agreement to phase down global-warming hydrofluorocarbons (HFCs) under the Kigali Amendment is accompanied by increased attention to the related opportunities to enhance energy efficiency in the refrigeration, air-conditioning and heat pump sectors. Energy efficiency enhancements resulting from cooling technology and system changes will also have important implications for the energy sector and power grid expansion plans in developing countries as needs, demand and access to cooling increase with rising standards of living and climate change. At the same time, the transition from HFCs to climate-friendly alternatives has prompted discussions with international safety standards organisations with a view to updating existing standards or developing new standards to ensure the safe and effective handling of the alternative substances. (**Goal 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture; Goal 7: Ensure access to affordable, reliable, sustainable and modern energy for all; Goal 11: Make cities and human settlements inclusive, safe, resilient and sustainable; Goal 12: Ensure sustainable consumption and production patterns**).

The impacts of UV-radiation on terrestrial ecosystems, crops and forests are wide-ranging. Long-term exposure to increased UV-B radiation negatively affects many plants, including crops, and trees. By protecting the ozone layer, disruption of plant species' growth and damage to ecosystems and agriculture have been mitigated. The oceans, lakes and rivers, including their UV-sensitive aquatic species, are being protected from the adverse effects of UV radiation. Many aquatic organisms, especially phytoplankton, fish larvae and small fish, suffer damage from increases in UV radiation and biological systems are experiencing increasing ecological stress from additional, compounded effects of climate change and pollution. Protection from UV radiation helps to protect aquatic resources, which in turn protects the economies of countries and sectors that rely on those resources. (**Goal 14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development; Goal 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss**).

Since many ozone-depleting substances also have global-warming potential, the Montreal Protocol has already mitigated an estimated 135 billion tonnes of CO<sub>2</sub> equivalent emissions between 1990 and 2010, rendering it one of the most effective tools to date in climate change mitigation. Building on this success, implementation of the

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<sup>4</sup> Markandya, A. and Dale, N. (2012): "The Montreal Protocol and the Green Economy: Assessing the Contributions and Co-Benefits of a Multilateral Environmental Agreement," Contribution to the Green Economy Initiative, United Nations Environment Programme, OzonAction Branch and Economics and Trade Branch, accessible at <http://www.unep.org/ozonaction/Portals/105/documents/publications/green-economy-report.pdf>, Pages 45 & 50



Kigali Amendment, which provides for phasing down harmful greenhouse gases (primarily used in air conditioning, refrigeration and foam insulation), is expected to avoid up to 0.5°C of global warming by the end of this century, while continuing to protect the ozone layer. This represents a significant step towards meeting the commitment under the Paris Agreement to keep global warming below 2°C. Add to this end the opportunities for improvements in energy efficiency that may be associated with a shift to substances with lower global-warming-potential, and the Montreal Protocol is well-placed to continue to be a highly effective tool in the fight against climate change and its impacts. (*Goal 13: Take urgent action to combat climate change and its impacts*).

In addition to the general societal benefits described above, at the level of human health the ozone treaties have had far-reaching effects. By protecting the ozone layer which prevents the harmful UV-B radiation from reaching the surface of the earth, it has been estimated that by 2030, up to 2 million cases of skin cancer may be prevented globally each year along with millions of incidences of eye cataracts, a leading cause of blindness.<sup>5 6 7</sup> The sustainability of the shift away from ozone depleting substances towards climate-friendly and safer alternatives is assured not only by the obligations of parties under the Protocol but also by increased investment in green alternatives, which drives down the costs of alternatives and makes them more accessible to the common person. (*Goal 3: Ensure healthy lives and promote well-being for all at all ages; Goal 12: Ensure sustainable consumption and production patterns*).

## 2. The identification of gaps, areas requiring urgent attention, risks and challenges

The Montreal Protocol's architecture is designed to monitor progress in terms of science, technology and the environment and to be responsive to new and relevant developments. Its three Assessment Panels are tasked with identifying emerging issues and regularly provide parties with up-to-date, independent information on scientific, technical, economic and environmental issues, enabling parties to take informed and timely decisions. As a result, the Protocol has been amended five times to refine its infrastructure, tighten its controls and include controlled substances and other measures under its remit. In addition, the Montreal Protocol has a built-in mechanism to adjust the existing control measures agreed upon by the parties in a quick and efficient manner, based on new scientific or technical information. Using this fast-track mechanism, the Protocol has been adjusted six times.

An issue that has recently been identified includes the impact of very short-lived substances (VSLs), which are not controlled under the Montreal Protocol owing to their relatively short atmospheric lifetime (i.e. less than 6 months)<sup>8</sup> but which may negatively impact the recovery of stratospheric ozone achieved under the Montreal Protocol. Other issues that require further investigation include the impacts of some ozone depleting substances with relatively low ozone-depleting potential that are not currently controlled under the Montreal Protocol, the interaction between climate change and ozone layer depletion, the potential impact of atmospheric

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<sup>5</sup> The Montreal Protocol's Environmental Effects Assessment Panel reported to the 29<sup>th</sup> Meeting of the Parties in November 2017 that estimates are that by the end of the century, in the USA alone, between 275 million and 300 million cases of skin cancer would be prevented for people born between 1980 and 2100.

<sup>6</sup> van Dijk, A., Slaper, H., den Outer, P.N., Morgenstern, O., Braesicke, P., Pyle, J.A., Garny, H., Stenke, A., Dameris, M., Kazantzidis, A., Tourpali, K., and Bais, A.F. (2013): Skin Cancer Risks Avoided by the Montreal Protocol—Worldwide Modeling Integrating Coupled Climate-Chemistry Models with a Risk Model for UV: <https://www.ncbi.nlm.nih.gov/pubmed/22924540>.

<sup>7</sup> US EPA report (27 Feb 2015): Updating ozone calculations and emissions profiles for use in the atmospheric and health effects framework model: [https://www.epa.gov/sites/production/files/2015-11/documents/ahf\\_2015\\_update\\_report\\_final\\_508.pdf](https://www.epa.gov/sites/production/files/2015-11/documents/ahf_2015_update_report_final_508.pdf).

<sup>8</sup> Oram, D. E., Ashfold, M. J., Laube, J. C., Gooch, L. J., Humphrey, S., Sturges, W. T., Leedham-Elvidge, E., Forster, G. L., Harris, N. R. P., Mead, M. I., Samah, A. A., Phang, S. M., Ou-Yang, C.-F., Lin, N.-H., Wang, J.-L., Baker, A. K., Brenninkmeijer, C. A. M., and Sherry, D.: A growing threat to the ozone layer from short-lived anthropogenic chlorocarbons, *Atmos. Chem. Phys.*, 17, 11929-11941, <https://doi.org/10.5194/acp-17-11929-2017>, 2017.



geoengineering as well as the expected changes in solar activities on the recovery of the ozone layer<sup>9</sup>. These and other potential emerging issues are being assessed by the Protocol's Assessment Panels. The next quadrennial assessment by the Panels is expected to be issued at the end of 2018 and its major outcomes will be presented as part of the contribution to the 2019 round of the High Level Political Forum.

In addition, in terms of ozone-depleting potential, there are still 1% of controlled ozone-depleting substances remaining to be phased out. This includes mainly hydrochlorofluorocarbons (HCFCs) and small amounts of other substances exempted from the control measures for critical or essential uses, including laboratory and analytical uses, and for process agent applications. For HCFCs, the remaining quantities in terms of metric tons are still considerable and their phase-out is a challenge, especially in light of the fact that some of the most common alternatives to HCFCs are HFCs, which are now subject to control under the Montreal Protocol since the adoption of the Kigali Amendment in 2016. Furthermore, phasing down HFCs with high global-warming potential, by transitioning to substances that are both climate-friendly as well as ozone-friendly, will also be challenging. A further complicating factor is the illegal trade in controlled substances, given the continuing demand for a decreasing supply.

As noted in earlier submissions, some uses of ozone depleting substances are not controlled under the Montreal Protocol; however they are monitored through the Protocol's data reporting requirements. These include feedstock uses, as well as quarantine and pre-shipment uses of methyl bromide. Ozone depleting substances in banks (e.g. equipment, insulation foams, chemical stockpiles) are also not controlled under the Montreal Protocol, although various decisions call on parties to manage and dispose of such banks in an environmentally sound manner. The emissions of those substances could cause ozone layer depletion and contribute to climate change, although they are unlikely to reverse the ongoing recovery of the ozone layer.

The entry into force of the Kigali Amendment is now assured, with ratification by more than the requisite number of parties. However the widest possible ratification and implementation is needed if the Amendment is to achieve its estimated effect of avoiding up to 0.5°C of global warming by the end of the century. The HLPF can be instrumental in encouraging the remaining parties to ratify the Kigali Amendment.

Assuming the Kigali Amendment is widely ratified, the period 2020-2030 will be particularly challenging as developing countries will need to start phasing down HFCs at the same time as finalizing the phase-out of HCFCs, which will require continued support from the Multilateral Fund.

### **3. Valuable lessons learned on transformation towards sustainable and resilient societies**

The 2017 submission to the HLPF highlighted the key aspects of the Montreal Protocol's framework and implementation that have underpinned its success. These can be briefly summarised as follows:

Engagement with all stakeholders including industry: This is one of the main strengths of the Montreal Protocol. Industry, science, civil societies, government, and intergovernmental organizations are all valuable partners in achieving the goals of the Protocol. The media have also assisted in raising awareness on ozone-related issues.

Technology transfer and industrial conversion: Funding and technology transfer continue to remove barriers to adopting greener substitutes and alternative technologies and to facilitate the efforts of developing countries in

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<sup>9</sup> Arsenovic, P., Rozanov, E., Anet, J., Stenke, A., Schmutz, W., and Peter, T.: Implications of potential future grand solar minimum for ozone layer and climate, *Atmos. Chem. Phys.*, 18, 3469-3483, <https://doi.org/10.5194/acp-18-3469-2018>, 2018.



building capacity, raising awareness and introducing regulatory and compliance measures to meet their targets under the Protocol.

Non-compliance regime: The parties monitor compliance with the targets through a procedure that facilitates compliance rather than punishing non-compliance.

Assessment Panels: The three Assessment Panels provide regular and updated information on scientific, technical, economic and environmental issues, enabling the parties to take informed and timely decisions on complex matters and ensuring that policies and actions are based on sound science.

Flexibility in implementation: The parties have provided for various exemption mechanisms to address the lack of suitable alternatives to ODSs. These mechanisms provide a balance between the imperative to phase out controlled substances and the need to ensure that society is not disrupted.

Non-party trade provisions: The provision banning trade in controlled substances with non-parties creates an incentive for countries to ratify, while building in flexibility in certain circumstances.

#### **4. Emerging issues likely to affect building sustainable and resilient societies**

A key area to be considered under this section is the interplay between ozone depletion and climate change, both in policy and in science. As mentioned above, the Montreal Protocol has already contributed significantly to mitigating climate change, and the Kigali Amendment is building upon this legacy.

As the planet warms, humanity is increasingly seeking ways to keep cool, and developments in the refrigeration, air-conditioning and heat pump sectors are intrinsically implicated. The Montreal Protocol promotes a transition to environmentally superior alternatives that still meet the day to day needs of humans in a manner that safeguards health and safety.

At the same time, the parties to the Protocol are aware that the movement away from HFCs presents opportunities to catalyse and secure improvements in the energy efficiency of appliances, equipment and systems, which could deliver a variety of co-benefits for sustainable development including for energy security, public health and climate mitigation<sup>10</sup>. To this end, energy efficiency discussions are ongoing among the parties.

There is also ongoing scientific research on the interactions between climate warming and ozone layer depletion as both environmental issues impact the atmosphere.

#### **5. Areas where political guidance by the high-level political forum is required**

With the entry into force of the Kigali Amendment on 1 January 2019 now assured, the focus must turn to increasing the number of ratifications and eventually achieving the widest possible ratification and implementation so as to reap the maximum benefits from the phasedown of HFCs in terms of the climate, the environment, the economy, and society as a whole. The encouragement, guidance and engagement of the HLPF could contribute significantly to this goal.

#### **6. Policy recommendations on ways to accelerate progress in establishing sustainable and resilient societies**

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<sup>10</sup> Decision XXVIII/3 of the Meeting of the Parties to the Montreal Protocol



The Montreal Protocol presents a useful case study in international cooperation to address new global challenges for maximum engagement and impact, with possible implications for future concerted action. Some of these lessons are highlighted here.

First, societies are, inherently, creatures of cooperation and agreement. Engagement and participation of all components of a society – all stakeholders – are essential to its success and indeed its continued existence. The Montreal Protocol’s approach to stakeholder engagement has achieved comprehensive engagement and ensures equity between the responsibilities of the developed and the developing world.

Secondly, clear identification of a problem in concrete terms is the first step to addressing it. Feasible and effective solutions to common problems of society, comprising clear steps and responsibilities, must be based on accurate and up to date information and expertise. Policy, and environmental policy, must be grounded in sound science and revisited over time to take account of new developments.

The feasibility of implementing an agreed policy is often a factor of capacity and resources. Parties to the Protocol in November 2017 reinforced their longstanding commitment to supporting developing countries in meeting their commitments under the Protocol by agreeing to replenish the Multilateral Fund, in the amount of USD540 million for the triennium 2018-2020.

Progress in achieving the established targets and goals, at a global and individual country level, requires regular monitoring. In the ozone treaties this occurs through two mechanisms. At the global level, it takes the form of ongoing research and systematic observation of the ozone layer itself, under various international monitoring programmes involving scientists from the developed and developing world, mandated by the Vienna Convention. At the individual country level, regular reports by parties of their consumption and production of substances controlled under the Montreal Protocol are reviewed by a committee, again composed of both developed and developing countries, which is empowered to make recommendations for further action.

Finally, regular oversight by a decision-making body such as the Meeting of the Parties ensures that implementation is on track, ensures that parties are in compliance with their obligations, deals with issues arising and charts the way forward to maintain momentum needed to achieve the goals.

The sustainable development goals are, as described by the General Assembly itself<sup>11</sup>, integrated, indivisible and interlinked in nature. The Montreal Protocol’s experience demonstrates this essential interconnectedness, with aspects of the Protocol’s implementation impacting, either directly or peripherally, multiple goals.

Similarly, at the level of international cooperation, different entities are working separately or together towards achieving the same goals. Existing cooperation fora, such as the United Nations Environment Management Group which recently undertook an exercise of mapping the overlaps and potential synergies of the activities, provide useful insights into potential areas of cooperation. The role of the United Nations Environmental Assembly in strengthening and bringing together the messages from the various multilateral environmental agreements could also provide a useful tool towards enhancing the environmental parameter in financial, social and developmental considerations covered by other UN partners as envisaged by its resolution 2/5 “Delivering on the 2030 Agenda for Sustainable Development”, adopted by the second session of the UN Environment Assembly on 27 May 2016. The global overview provided by the HLPF presents an important opportunity to identify not only duplication of efforts and areas where synergies may be enhanced, but also gaps needing to be filled to ensure a comprehensive and cohesive approach to implementing the 2030 agenda.

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<sup>11</sup> GA resolution 70/299 - Follow-up and review of the 2030 Agenda for Sustainable Development at the global level paragraph 2