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Provisional agenda item 4) Policy Response to the 2016 Scientific Assessment of the Convention

Convention on Long Range Transboundary Air Pollution, CLRTAP
Note by the Ad Hoc Policy Review Group of Experts

Supplementary information to the official document "Policy response to the 2016 scientific assessment of the Convention" (ECE/EB.AIR/2017/3)

I. Introduction

1. At its thirty-fifth session, the Executive Body for the Convention on Long-range Transboundary Air Pollution established an ad hoc policy review group of experts on the 2016 scientific assessment of the Convention (see ECE/EB.AIR/135, annex II). It requested the ad hoc policy review group of experts on the 2016 scientific assessment of the Convention (policy review group or PRG) to present its findings, conclusions and recommendations to the Working Group on Strategies and Review at its fifty-fifth session, which will then submit its recommendations to the Executive Body for consideration at its thirty-seventh session (Geneva, 11-14 December 2017).

2. The PRG's response to the 2016 scientific assessment is in its report to the Working Group on Strategies and Review (ECE/EB.AIR/WG.5/2017/3) (PRG report). The PRG's report focuses on the group's findings, conclusions and recommendations. In addition, with regard to the review of the priorities of work, the group has identified specific tasks that could be included in the 2018-2019 workplan. As agreed at the thirty-sixth session of the Executive Body, highlights of the proposed updates and revisions to the long-term strategy (LTS) will be addressed in the group's report to the thirty-seventh session of the Executive Body.

3. This informal document provides additional background information written and collected by PRG for its discussions and rationale for the recommendations presented in the PRG's report to the Working Group on Strategies and Review. It is mainly organized by the same four sections that are in the PRG's report. In some cases, the recommendations may not be identical to the text in the group's final report. Therefore, when citing or reviewing the recommendations, the PRG's report, official document ECE.EB.AIR/WG.5/2017/3, should be used. A list of recommendations extracted from the PRG's report is included in informal document 2 "Table of recommendations by the Policy Review Group". Throughout this informal document, the recommendation numbers as included in informal document 2, and the corresponding paragraph numbers from the PRG's report are highlighted in bold and italic text.

II. Background Information

A. Enabling sound policy decisions

1. Human health effects

Scientific assessment report

Despite emission reductions of the major pollutants achieved in the past levels of concentration of ozone and particulate matter (PM), and other pollutants such as heavy metals and persistent organic pollutants (POPs) are still threats to public health and ecosystems. Even at relatively low concentrations air pollution poses a risk to health and due to the large number of people exposed it causes significant morbidity and mortality in all countries. And this cause of death is avoidable.

WHO has provided scientifically-based air quality guidelines values that can be used by countries as long-term targets on a voluntary basis. These air quality standards are reviewed on a regular basis.

Discussion/Rationale

The WHO Health risks of air pollution in Europe (HRAPIE) project recommends using dose/concentration-response function for key pollutants for risks quantification and formulation of scientifically-based air quality guidelines. Those values are a reference for pollution abatement policies objectives and main parameters in cost-benefit analyses.

New WHO studies have provided evidence of health effects of key pollutants at lower levels than previously reported (in particular for PM, ozone and nitrogen dioxide (NO_2)) that justify future updates of the WHO Global Air Quality Guidelines.

The Task Force on Health should further review and harmonize methodologies for health impact assessments and, as appropriate, contribute to updating the WHO Air Quality Guidelines (in priority PM (including black carbon (BC)), ozone, NO_2, sulphur dioxide (SO_2), carbon monoxide (CO)) focusing on pollutant-specific risk assessment for mortality and other identified health endpoints. Furthermore, considering that they are a main driving force for present air pollution abatement policies, it is recommended that health effects of PM be further investigated with due consideration of its components (e.g., secondary inorganic aerosols, organic and elemental carbon). ***(Recommendations (Recs) 1 and 2 in informal document 2; paragraph 11 (a and b) in the PRG report)***

In the context of projected future scenarios of emission reduction, the Joint Task Force on Health aspects of Air Pollution and other appropriate Task Forces such as the Task Force on Integrated Assessment Modelling should also further work on dose/concentration response function to improve health impact analysis and modelling exercises. These analyses should take into consideration some specific factors, such as aging of societies in the UNECE region or its subregions, which might counteract the benefits of emission reductions.
(Rec. 3 in informal document 2; paragraph 11 (c) in the PRG report)

Despite major emission reductions achieved in the past, pollution levels of heavy metals and POPs are also still a concern, in particular mercury (critical loads are still exceeded in several countries), Polycyclic Aromatic Hydrocarbons (PAH) and dioxins/furans (PCDD/Fs) (some growth at present after fast decline in the period 1990-2000), because of their toxicity and adverse effects for human health and the environment.

The exposure occurs through different pathways – anthropogenic atmospheric emissions, including long-range transport, secondary sources, and food chains. The Scientific Assessment Report (SAR) considers that *"science-based policies aimed at reducing exposure need to consider all relevant exposure pathways. Given the increasing epidemiological evidence of low-dose effects, the present concepts of thresholds or safe exposure levels are not sufficient."* This justifies further scientific work on airborne effects on health of HMs and POPs, taking into consideration the work already performed under the UNEP Stockholm Convention on POPs. ***(Rec. 4 in informal document 2; paragraph 11 (d) in the PRG report)***

2. Integrated environmental policy

The importance of taking an integrated approach towards addressing multiple environmental effects is highlighted in the SAR. Three strongly interrelated policy fields that should form the basis for integrated environmental policy development under the Convention have been identified:

(a) Ozone-nitrogen-climate-biodiversity interactions;
(b) Nitrogen management;
(c) Integrated approach for the development of air pollution and climate change policies and measures.

(a) Ozone – nitrogen – climate – biodiversity interactions

Scientific assessment report

According to the SAR, *"...air pollution has a net cooling effect on climate change, and air pollution controls will alter the net balance. To limit the rate of temperature increase in the coming decades, air pollution policies could focus more on the abatement of air pollutants that have both a warming effect and impose risks to human health and ecosystems."*

Discussion/Rationale

Effects of ozone and nitrogen on, and interaction with, biogeochemistry, biodiversity and other ecosystem processes are very complex. There is already a lack of basic knowledge on the effects of single pollutants/processes; this applies even more to combination effects.

Interactions between ozone, nitrogen, climate change and ecosystems are an important science-policy item for this Convention and its outreach since air pollution is the central link for these interactions. Due to the complexity of these interactions, this is not only a scientific issue but also a communication issue.

For instance, while links between climate change, carbon and nitrogen biogeochemistry and POPs / heavy metals (HM) biogeochemistry are being addressed in the present work plan (e.g. items 1.1.1.10, .11, .13, .14, .23 and .24) as well as in the WGE Trends Report, more policy relevant clarification is needed on the interaction of these processes. One example might be the mobilization of mercury (Hg) by climate change and change in acidification. It remains to be seen whether work plan item 1.1.1.1 will fulfil this complex, important task. ***(Rec. 7 in informal document 2; paragraph 14 (c) in the PRG report)***

PRG recommendations 5, 6 and 13 (see informal document 2) and paras 14 (a) and (b) and 22 (a) of the PRG report exemplify further specific research priorities in this area.

Nitrogen and carbon cycles are closely linked at regional and global levels. Both cycles affect air pollution and climate change in complex ways.

Different forms of nitrogen compounds are interlinked. Nitrogen plays a key role in air pollution (via nitrogen oxides (NOx) and ammonia (NH_3) emissions, and indirectly on ozone (O_3)) and also in climate change (directly through N_2O emissions and aerosols, and indirectly through its effect on CO_2, CH_4, and O_3 emissions). Nitrogen also plays key roles in food production (crops growth, nutrient imbalance, nitrate leaching), species level impacts and biodiversity loss (exceeding critical loads for eutrophication and acidification, alteration of sinks), and human health (O_3 and PM through NH_3 and NO_x).

A warmer climate influences also VOC and NH_3 emissions as these are strongly temperature-dependent. This may result in further increases of tropospheric ozone levels with feedbacks to climate.

An integrated policy would allow tackling PM exposure, ground-level ozone, biodiversity loss and other nitrogen effects while contributing to reduce effects on climate.

(b) Nitrogen management

Scientific Assessment Report

Agriculture is highlighted in the SAR as a major source of air (NH_3) and climate pollutants (CH_4 and N_2O) causing damages to health and ecosystems.

Ammonia related problems such as human exposure to secondary particles and biodiversity loss (the risk of eutrophication is persistent) are still major problems and current commitments are insufficient even if they have already contributed to the reduction of nitrogen emissions and depositions.

As ammonia emissions are not linked to the use of fossil fuels, the emissions will not decrease due to climate policy and remain the responsibility of air quality managers. In this regard, the SAR (p 23) considers that "*.... a multi-effect perspective that addresses health impacts in conjunction with, e.g., biodiversity concerns, offers a robust risk management approach that hedges against the uncertainty of the health impacts of secondary inorganic aerosols. If these aerosols would not be linked to negative health effects, NH_3 reductions will be still warranted for the protection of biodiversity*".

Discussion/Rationale

The CLRTAP addresses NO_x (combustion) and NH_3 (agriculture) considering direct effects of these pollutants to air, in a cost-benefit analysis of air pollution abatement. But additional effects of these pollutants, including those on climate change have to be considered as well.

Effectively the nitrogen cycle is related to the climate cycle through the "nitrogen cascade", meaning that 1 atom of nitrogen compounds contributes to different effects including:

- N_2O formation with fertilizers use;
- O_3 formation which is a strong GHG;
- aerosol formation which has a cooling effect;
- alteration of CO_2 sinks due to increased supply of nitrogen compounds;
- alteration in the productivity of ecosystems and carbon sequestration;
- increase of CH_4 emissions from wetlands by excess of nitrogen depositions, CH_4 from digestion of ruminants, loss of crops productivity (and the less uptake of CO_2).

The PRG considers that the full cascade of effects of nitrogen compounds, impacting human health, biodiversity, climate and others, are additional reasons to expand the scope of action of the Gothenburg Protocol to encourage a more efficient nitrogen use, especially in agriculture, in a coherent framework.
(Rec. 11 in informal document 2; paragraph 18 (d) in the PRG report)

Ammonia measures appear to be the most cost-effective measures to further reduce PM-exposure (NH_3 is a crucial contributor to the formation of ammonium nitrate and sulfate, most common secondary particles) and improve ecosystem protection. The best cost-effective measures must be identified and promoted for all types of farms while addressing specifically the large farms where a huge potential for emissions reduction lies. The Gothenburg Protocol should also be updated with strengthened ammonia reduction commitments. ***(Rec. 8 and 12 in informal document 2; paragraph 17 (a) and 18 (e))***

An identified barrier to ammonia mitigation is the lack of knowledge of farmers and the general public on the fact that emissions from agriculture are a problem, on the efficiency of abatement measures and on the economic benefits of some measures.

The UNECE Framework Code for Good Agriculture Practice for Reducing Ammonia Emissions (ECE/EB.AIR/129) provides useful information for farmers and a wide range of measures to allow Parties to define the best strategy adapted to its local situations and circumstances (e.g., big/small farms, type of culture, intensive/extensive livestock farming). Parties should be reminded to use this Framework Code as a tool when establishing their national advisory codes and to apply it, as required by annex IX of the Gothenburg Protocol. ***(Rec. 9 in informal document 2; paragraph 17 (b) in the PRG report)***

The Task Force on Reactive Nitrogen (TFRN) should also continue to work on the collection and dissemination of information such as best practices, economic assessment of the measures, cost-effective measures applicable to small farms and/or to large farms, information on products such as pesticides and fertilizers. Antagonistic effects of abatement measures or practices with regard to methane, NH_3 and N_2O should also be taken into consideration. ***(Rec. 10 in informal document 2; paragraph 17 (c) in the PRG report)***

Notwithstanding the requirement to translate the UNECE Framework Code into a national code, the Parties should improve communication towards farmers on the necessity, and co-benefits, to abate pollutants emissions from agriculture, in particular NH_3. ***(Rec. 9 and 10 in informal document 2; paragraph 17 (b) and (c) in the PRG report)***

At the 2014 workshop on the UNECE Framework Code of Good Agricultural Practices, poor data availability was noted, especially (but not only) in Eastern European countries, as well as a lack of resources to improve the availability of data. As emission inventories and estimates do not necessarily reflect exact reality, monitoring of atmospheric concentrations is also necessary to verify expected trends. ***(Recommendations 57 and 73 in informal document 2; paragraph 49 (b) and 59 in the PRG report)***

(c) Integrated Approach for the development of air pollution and climate change policies and measures

<u>Scientific Assessment Report</u>

The importance of taking an integrated approach in terms of pollutants and effects is highlighted in the SAR. In terms of addressing air pollution and climate change, the SAR points out that *"Many of the air pollution controls have clear co-benefits on GHG emissions and climate change" "On the other hand, climate policy will automatically influence emissions of air pollutants related to the use of fossil fuel" – "Interactions occur along multiple pathways and act in both directions*" (chap 9, p 30).

From a pollutant perspective, the main linkage between air quality and climate can be viewed through the lens of short-lived climate pollutants (SLCPs): BC, O_3, CH_4, and some hydrofluorocarbons (HFCs).

According to the SAR, *"...air pollution has a net cooling effect on climate change, and air pollution controls will alter the net balance. To limit the rate of temperature increase in the coming decades, air pollution policies could focus more on the abatement of air pollutants that have both a warming effect and impose risks to human health and ecosystems."* Understanding the potential for climate change and air quality benefits of mitigation options, while avoiding unintended consequences, requires some understanding of the underlying physical and chemical properties of the pollutants, their sources, and their fate and behaviour in the atmosphere.

Discussion/Rationale

The Gothenburg Protocol is one of the first international treaties to adopt a multi-effect, multi-pollutant approach, and has been acknowledged in international fora as a best practice model for addressing issues in an integrated manner. The Long-Term Strategy for the Convention (2010) states that there is a continuous need to improve and revise the Protocol and that stepwise improvements *"…will reduce the gap between the impacts on the environment and on human health and critical loads, critical levels, and health-orientated air quality targets. Such revisions will take account of new and emerging findings of relevance to [the Gothenburg] Protocol, including intercontinental transport of air pollution, reactive nitrogen and the interlinkages between air pollution and climate change."*

When looking at the linkages between air quality and climate change, one can view these through the lenses of their multiple combined effects on the environment, or from the pollutant, or source mitigation perspectives. Taking these different lenses can help to provide an integrated view of the different options available to curb negative effects, and develop win-win scenarios.

Multiple-effects perspective

The importance of this perspective becomes increasingly clear when considering the potential for detrimental, and sometimes unintended, consequences when designing a policy for one effect, and not considering the repercussions on other effects. For instance, encouraging diesel car usage to achieve CO_2 reductions (climate benefit), results in higher NO_x, PM (including BC) emissions (air quality and climate detriment).

The scope of the Gothenburg Protocol includes consideration of climate change as an additional effect while making recommendations to address its three main effects (acidification, eutrophication, and ground-level ozone). Climate change is beginning to be addressed within the Protocol through the lens of short-lived climate pollutants (SLCPs), which BC, O_3, CH_4 and some hydrofluorocarbons. In addition to having a warming impact on the climate, three of the SLCPs (BC, O_3 and CH_4) are also air pollutants, or contribute indirectly to air pollution.

Addressing these types of pollutants in a multi-effect framework can help contribute to multiple goals within the Protocol. The Gothenburg Protocol currently works to achieve O_3 reductions by targeting key precursors. BC has been listed as a priority pollutant in the protocol, and though CH_4 is not currently directly addressed by the Gothenburg Protocol, it is also a precursor to O_3. The SAR makes specific mention that CH_4 requires policy consideration. Gothenburg is still the first international treaty to provide some international governance on addressing SLCPs.

Another important consideration when taking a multi-effects perspective, particularly in the air quality/climate change discussion, is in considering multi-effect interactions. The most discussed interaction lies in how air pollutants influence climate change (i.e., black carbon and ozone are both air pollutants, and also have a warming impact on the climate).

Another interaction which is less discussed is how climate change impacts air quality. Higher global temperatures are speeding up the rates at which air pollutants are being emitted and formed in the atmosphere. For instance, it is projected to lead to increased levels of ground level O_3, despite ongoing efforts to reduce precursors, as the rate of O_3 formation is expected to increase along with increased precursor concentrations (e.g., CH_4 released from thawing permafrost). It is also projected to lead to increased ammonia levels, from increased evaporation from soils, and thus higher levels of secondary PM.

Multi-Pollutant Perspective

Black carbon is both an air pollutant, and a climate forcer, as it can act as a carrier of potentially toxic metals and has a potent warming effect on the climate. Ozone also has effects on both air quality and climate, as it also has a warming effect on the climate, and contributes to human morbidity and mortality. Methane is somewhat different than the others: while it has potent warming effects on the climate, it contributes to diminished air quality indirectly as it is a precursor to ozone formation. Methane reduction measures and the related cooperation with other organizations are further discussed in Section D.4 at the end of this document.

Both ozone and methane emissions are projected to rise due to increasing global temperatures. As each of these SLCPs has either a direct or indirect impacts on both air quality and climate change, developing mitigation options to curb their emissions is best approached by considering these effects in combination. Focusing efforts on addressing the multiple effects of climate change and air quality through only the SLCP lens may be a limiting approach. The strength of taking a multi-pollutant, multi-effects approach lies in not taking a limiting view of the potential implications of a mitigation strategy, and to consider all of the possible consequences of a mitigation action.

Air pollutants, other than SLCPs contribute to both climate change and air quality, for example NH_3. Ammonia contributes to the formation of secondary particulate matter by reacting with NO_x and SO_2. It also contributes indirectly to climate change: NH_3 in soil (e.g., from fertilizer), is transformed through various processes into N_2O, a long-lived and potent GHG, and part of the Kyoto basket of GHGs. The SAR calls for reduced NH_3 emissions to address acidification and PM levels, and discusses the potential for climate co-benefits from achieving such reductions. Though NH_3 is not often discussed in integrated climate change and air quality discussions, the SAR has highlighted the benefit of taking an integrated, multi-effect approach by considering these two effects for this particular pollutant.

Source Mitigation Perspective

Targeting common source or sector emitters is often a useful strategy for reducing emissions that influence both air quality and climate change. Energy is often thought of as a main link between air and climate, given that many of the pollutants that contribute to both of these effects are emitted from the energy sector. Gains can be made in both areas via an increase in energy efficiency, and subsequent reduction in the consumption of fossil fuels. Reductions in emissions from major energy producing sources would lead to reductions in in CO_2 emissions and certain air pollutants (e.g., SO_2, NO_x, VOCs, PM, heavy metals, and POPs).

The transportation sector is another area which has overlap between pollutants for air quality and climate change. As mentioned previously, some mitigation options have trade-offs which need to be considered in decision-making (e.g., diesel fuelled cars reduce CO_2, but lead to increases in BC and O_3). Instead, mitigation policies would do best to aim for win-win scenarios considering all of the potential consequences (e.g., NH_3 emissions reductions from large area sources such as fertilized soils and livestock management, through enhanced nitrogen management, would contribute to reduced $PM_{2.5}$ and N_2O). Regardless,

acknowledgement of the trade-offs in the design of mitigation policies is required when taking an integrated approach.

Integrated Assessments

Work on integrated approaches to addressing air quality and climate change has expanded in recent years, though integrated approaches to air quality and climate change mitigation are still emerging in policy spheres. Though there is still a shortage of information related to interactions of certain feedback cycles and pollutant emissions and interactions, there is currently sufficient information to enact mitigation policies that take an integrated approach, while avoiding negative consequences and aiming for win-win scenarios. Depending on the context, some jurisdictions will adopt the lens of one effect to develop its mitigation policies, and discuss other effects through the lens of co-benefits. This approach does lead to some integration in policy design, but still risks the possibility of unintended consequences if a full analysis is not undertaken on the full breadth of all possible effects. Thus, taking an integrated approach towards addressing air quality and climate change means considering these issues on equal footing, to ensure full consideration of all possible scenarios.

CLRTAP has been playing a leadership role on the issue of integration of effects and pollutants internationally, having developed some analytical tools to consider these effects in an integrated manner. The integration of issues is institutionalized in the LRTAP organization through its multi-effects Protocol (Gothenburg), and Task Forces (e.g., Task Force on Integrated Assessment Modelling – or TFIAM). The TFIAM has been evaluating cost-effective strategies to concurrently address climate change and air quality through its GAINS model, which evaluates both the air quality and climate change impacts from various mitigation scenarios. The Convention could consider sharing results of integrated assessments and best practices learned from integrated approaches to addressing climate change and air quality, with key partner states and institutions. Enhanced information related to air quality or climate change co-benefits could help to reduce the political threshold for taking action on some key issues.

Extending the Multi-Pollutant, Multi-Effect Framework to Other Organizations

To expand the scope of the multi-pollutant, multi-effect integrated framework that the Gothenburg Protocol embodies, it will be important for the Convention to work with outside organizations to share models and best practices. While CLRTAP has made some progress towards reducing some SLCPs to address both climate change and air quality, the United Nations Framework Convention on Climate Change (UNFCCC) remains the main international body to address climate change. It will be important for CLRTAP to work with other international organizations such as the UNFCCC to ensure that an integrated approach is taken towards air quality and climate change mitigation. One option could be to propose the creation of an ad-hoc working group within the UNFCCC to address SLCPs. CLRTAP can also partner with the CCAC and the Arctic Council, which are concurrently taking an integrated approach, similar to LRTAP, through the lens of SLCPs. Creating such a space within the UNFCCC organizational structure could also present an opportunity for regional organizations, such as Asia Pacific Clean Air Partnership, who are also focusing on air pollution and climate change mitigation issues to engage in dialogue.
(Informal Document 2: Recs 13, 14, 15, 17 and paras 22 (a), (b) (ii), 23 (b) in the PRG report)

Scientific Assessment Report

The SAR points to residential solid fuel combustion as a major source of $PM_{2.5}$ and PAHs in the UNECE region. In some of the EU Member States the use of biomass in households contributes to more than 50 % of their national emissions of PM and also PAHs. Residential wood-burning is also the second largest source of black carbon emissions.

Discussion/Rationale

Due to low combustion temperature, most small combustion plants burning solid fuels (biomass and coal) emit products of incomplete combustion such as $PM_{2.5}$, BC, CO, PAH and even PCDD/Fs. If coal is used, those little devices emit also sulphur and other toxic pollutants (according to the composition of coal) which cannot be destroyed, even with a good combustion.

Unfortunately, in the UNECE region (including Canada and the United States of America) the number of households heating with wood is strongly increasing. The use of biomass as a substitute for fossil fuels is promoted in the framework of climate and renewable energy policies and even subsidised in several countries (United Kingdom, Germany, Sweden). Coal is still used in several countries but forbidden for domestic use in others.

According to the report by the Joint Task Force on Health Aspects of Air Pollution (ECE/EB.AIR/2014/6), residential heating with wood is a sector in which $PM_{2.5}$ and BC emissions can potentially be reduced with greater cost-effectiveness than other emissions reduction options.

Such reduction could be achieved in any future revision of the Gothenburg Protocol by inter alia implementing emission standards based on BAT and energy –efficiency requirements for new domestic stoves and installations for solid-fuel burning and by developing a code of good practice for such installations that would also raise consumer awareness on health risks of PM, BC, PAHs and other potential pollutants emitted by wood-stove and inefficient small combustion plant.
(Rec. 19 and 20 in informal document 2; paragraph 25 (a and b) in the PRG report)

Additional measures could be considered by the Task Force on Techno-Economic Issues (TFTEI) for analyse on their relevance, efficiency and impact, such as:

- ban the marketing, sale and distribution of coal (specifically bituminous coals) as domestic fuel (cf. WHO air quality guidelines);
- encourage (e.g. provide financial incentive) the substitution of old and inefficient wood-stoves by modern and efficient residential wood-heating devices using best technologies; the purchase of a house or when the house is refurbished could be the appropriate moment;
- ban the marketing and sale of inefficient devices;
- defining eco-labelling of stoves and other small combustion plants based on the best performances levels in emissions of $PM_{2.5}$, BC, NOx, SOx, PAHs or on energy efficiency;
- ban subsidies for the use of biomass;
- ban the use of wood-stoves when the meteorological conditions are bad and/or when pollutants concentrations are over limit values for health, and that another heating system is available;
- promote district heating (medium or large combustion plants) using BAT and/or less polluting sources such as excess energy from power production or from industries, heat pumps;
- ban the burning of yard wastes and wastes of forest and agricultural origin.
  (Rec. 20 in informal document 2; paragraph 25 (b) in the PRG report)

3. Cost-effective measures

Scientific Assessment Report

The Scientific Assessment Report highlights in its key findings that *"Air pollution control costs are generally significantly lower than the costs of damage to health and the environment"*.

Discussion/Rationale

Analyses of the economic costs of the impact of air pollution and particularly the costs-effectiveness of control policies are essential tools and arguments to design achievable control strategies, to give decision support to policymakers and motivate them to ratify and implement the Protocols and to facilitate the communication and awareness on air pollution.

The GAINS model provides cost-benefit assessments of emission control measures and cost-effectiveness analysis to identify least-costs scenarios that could achieve policy target related to air pollution control. Concerning the availability of data, it contains a large set of data on the costs of technologies available to control emissions.

It usually considers conservative cost data or options (e.g. regarding energy efficiency improvements) and even excludes some options from the model (e.g. economies of scale, changes in infrastructure planning) to avoid producing too ambitious control measures or scenarios. In that sense the model is not intended to replicate the reality or to give the most cost-effective control measures but to give decision support to policymakers by producing a cost-effective ordering of known and established technologies that, with high certainty, are the most expensive options to reduce emissions to meet ceilings.

The model needs permanent improvements and updates to improve its results and to stay a reliable tool.
The appropriate Task Forces under the Convention should undertake the review of the control costs currently used by the GAINS model in the framework of the Convention to improve the costs-effectiveness analysis produced by the model. ***(Rec. 21 in informal document 2; paragraph 27 (a) in the PRG report)***

The review should, inter alia, provide good assessments of the national costs of air pollution abatement measures and compare costs collected by different sources (TFTEI (ERICCA) and national models, including the US EPA BENMAP model) with the costs used in the GAINS model. Priority should be given to the costs of BAT. Harmonisation of the cost calculation methodologies and parameters of these models should precede the review and GAINS cost calculations should be complemented with macro-economic calculations (see SAR p 21).

Furthermore, to complement the update and review of the GAINS model, the following tasks should be taken into consideration:

- pursuing the collaboration with WHO to monetize health impacts from air pollution so that cost-benefit analysis can include as much information as possible;
- analysing the monetized impact of air pollution on ecosystems (as identify in the EU ECLAIRE program) and regularly reviewing it;
- conducting additional research on prices distortions acting in favour of diesel or encouraging the use of more solid-fuel domestic energy, as these are the two main sources for health impacts and costs in the WHO region according to a WHO/OECD study;
- analysing whether additional local measures would be more or less cost-effective than additional European wide measures, or measures in Asia, to reduce life years lost, considering the relative importance of sources like agriculture, domestic sectors, transport depending on local conditions or local financial support; ***(Rec. 23 in informal document 2; paragraph 27 (c) (i) in the PRG report)*** and
- analysing whether a Northern Hemispheric approach to reduce ozone precursors is more or less cost-effective than a European approach alone to reduce ozone damage to health and crops in Europe, as transcontinental fluxes, including methane, influence background ozone trends in Europe and North America (see SAR p 12: peak concentrations of ozone have begun to decline in several areas but average annual ozone concentrations do not show a clear decline because inter-alia increased precursor emissions in South-East Asia and less ozone is taken away by NOx

emissions close to the source regions). ***(Rec.24 in informal document 2; paragraph 27 (c) (ii) in the PRG report)***

The necessity to improve emission inventories which appears as a main recommendation in the report of the PRG is also an essential prerequisite to provide reliable tools for the model, including baseline of current emissions with a good estimate of the measures that are already in place. In order to determine the emissions impact, and therefore benefits of a policy, analysis need to be able to compare the baseline that includes estimates of old equipment that will be phased out and the efficiency and emission factors of new equipment that will be installed. A better understanding of real-life emission factors (for cars, domestic wood burning, agriculture, etc.), is also needed to improve the effectiveness estimates of measures.

That is especially true for countries in Eastern Europe, the Caucasus and Central Asia (EECCA) which need to improve emission inventories and assessments of abatement potentials to get more confidence in the feasibility of reaching the national emissions obligations and engage in the ratification process.

Concerning communication at the national level on the costs of the control strategies, it seems particularly difficult to compare or synthesize studies on the economic costs of the impacts of air pollution because of the differences in their complex methodologies, the scopes, pollutants, parameters taken into consideration and the geographical coverage.

Besides, the SAR points out (p 20-21) that by meeting commitments through ratification and implementation of CLRTAP Protocols, many Parties would see more cost-effective reductions in health and environmental impacts than could be achieved by unilateral action alone. The more Parties ratify the Protocols, the larger the scale of the market for cleaner technologies, and the lower their costs.

It would be useful that TFTEI and the Task Force on Integrated Assessment Modelling (TFIAM) produce a report for policymakers that clearly sets out the costs of controls versus the costs of inaction in clear form to encourage ratification and implementation of the Protocols. ***(Rec. 22 in informal document 2; paragraph 27 (b) in the PRG report)***

The communication towards policymakers or towards the public would also be facilitated by using "positive words" such as "benefits of emission reduction" instead of using the terms 'costs of air pollution" or "damages due to air pollution".

It is however highly likely that carrying out this update will require additional funds.

B. Maximizing the impact of the Convention and its protocols

1. Ratification and Implementation

The PRG discussed how to motivate countries to ratify the Protocols and what strategies could be used to address the main ratification impediments to the Gothenburg, POPs and Heavy Metals Protocols. In addition, the Group discussed the implementation of the 2012 amendments to the Gothenburg Protocol, and the amendments to the two other Protocols on POPs and on heavy metals as well as for implementation of the other 5 protocols.

Scientific Assessment Report

The SAR discusses the need for further reductions in SO_2, NO_x and PM in the EECCA region while acknowledging the difficulty of implementing additional policy measures in light of the higher costs of controls in Eastern Europe (0.2% of GDP as compared to 0.05% of GDP in the EU). Without financial and technical support, this difference could be a reason for the EECCA region to need more time to implement measures to meet protocol obligations. The SAR also highlights that the technical annexes to CLRTAP Protocols provide clear guidance to EECCA countries in the process to ratify and are seen as helpful in the design of national plans. It also states that the national emission ceilings (or national emissions reduction obligations) that are part of the 2012 Gothenburg Protocol amendments can be an obstacle to ratification in EECCA countries due to substantial uncertainties in their emission inventories and projections.

Discussion/Rationale

A needs assessment of the UNECE member States that have not ratified the Convention was included as annex II to the Report of the Ad Hoc Group of Experts on the Action Plan for the Implementation of the Long-Term Strategy for the Convention (ECE/EB.AIR/2012/15). This document lays out similar issues. While some progress has been made on building technical capacity, more needs to be done as the problems still exist. Many parties to the Convention believe that this is the highest priority facing the Convention now and if progress cannot be made relatively soon, the near-term successes of the Convention should be called into question.

While countries know there are air pollution problems, complexity of protocol provisions is a major impediment for understanding national obligations. In some cases, there is a lack of knowledge in the countries on how to assess air pollution at the national level. The Convention should help direct countries in the EECCA region on various aspects of technical assessments to quantify the national level of air pollution and identify and implement appropriate abatement strategies. While capacity-building activities in EECCA countries (including those focused on improving emission inventories and assessment of abatement options) seem appropriate, countries have limited expert capacity and lack of sufficient resources in the government agencies to continue progress started so these activities may have limited effect. Capacity-building could improve the general understanding of technical and scientific topics, as well as the development of skills of national experts and thus the technical capacity of the relevant institutions, but the agencies need the technical and financial means to take the next steps. The lack of financial resources also derives from the low political priority given to air pollution abatement.

The flexibility provisions in the 2012 amendments are extremely useful for countries in the EECCA region. In the EECCA region, there is a significant difference in the approach for regulations and compliance for existing sources and countries in that region believe that focusing on new installations/sources would be a better use of resources. It is far more complex, very costly and from a practical perspective, infeasible, especially for small countries in the region, to retrofit existing sources to

meet limit values. This is the main reason why progress toward ratification of the latest three protocols is slow. In addition, an objective assessment of the costs and benefits of ratification would be helpful as we work together on further cooperation on implementing the Convention's protocols.

(Informal document 2 recs 25-33 and para 33 (a) – (i) in the PRG report)

2. Enforcement of Protocol obligations and related support to countries

The PRG discussed how the Convention could better ensure enforcement of the current protocol obligations and related support to countries to implement their substantive and emissions reporting obligations.

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The SAR only briefly touches on compliance on page 34: *"Capacity-building activities implemented by UNECE with the support of several parties to CLRTAP are aimed at improved ratification, and implementation of and subsequent compliance with key protocols to the Convention.…The infrastructure not only ensures compliance with protocols under CLRTAP, but also provides a valuable knowledge base….."* Given that compliance with Protocols is key for further progress and the success of the Convention, and that the LTS gives a high priority to the work of the IC, the PRG provides the following information.

Discussion/Rationale

Paragraph 16(b) of the Long –term Strategy for the Convention (LTS) adopted in 2010 (Annex to Executive Body (EB) Decision 2010/18) stresses that, *"full compliance by all Parties with their obligations under the Protocols is a very high priority. The work of the Implementation Committee will be given a very high priority and the compliance mechanism will be improved."* The Action Plan for the Implementation of the LTS (EB Decision 2011/14) assigned to the Implementation Committee (IC) the task "*identify and evaluate systemic and other barriers to achieving compliance and identify options for improvements."*

After the adoption of the long-term strategy in 2010 and the action plan in 2011, the IC worked to revise its mandate and improve its functioning. These improvements and terms of reference were adopted in EB decision 2012/25, "On improving the functioning of the Implementation Committee."

In addition, the IC in its report to the EB in December 2012 (ECE/EB.AIR/2012/16) identified *"a difference between 'barriers' to achieving compliance – which it determined to be largely outwith the control of a Party and potentially affecting more than one Party – and 'reasons' for non-compliance – which it determined to be within the control of a Party. A case of non-compliance could be caused either by a barrier to compliance, or there could be a specific reason for the non-compliance. In addition, a case could include elements that are both within and outwith a Party's control."* (para 114, ECE/EB/AIR/2012/16).

Furthermore, the IC identified the following systemic barriers to achieving compliance:

(a) inaccurate obligations in the Protocols / obligations for which there are no measures that can be taken or no cost-effective measures that can be taken;
(b) linkage of obligations to old base years that can no longer be calculated;
(c) insufficiency of the reporting guidance; and
(d) outdated /obsolete emissions factors where there is no or insufficient information to improve estimates or make them more reliable.

Currently, the IC is functioning well and has made many improvements in the last several years to respond to the LTS, including concentrating on longer-lasting non-compliance cases and successfully addressing cases of repeated non-compliance by a Party. The current procedures for notifying Parties of their potential non-compliance are effective as well as the subsequent steps taken by the Committee to address a Party's non-compliance, engage in dialogue with the Party concerned and make recommendations to the Executive Body, as appropriate, for its decisions.

Funding and resources to ensure Parties have the capacity to improve and report their emissions data should be a high priority in the Convention as this is the basis for all of its work. Capacity building and assistance to countries in Eastern and South-Eastern Europe, the Caucasus and Central Asia is crucial in this regard. Assistance efforts have over the last years concentrated to a significant degree on supporting countries in developing and improving their emission inventories, as a foundation for preparing the ground towards the development of action plans, policies and measures for air pollution abatement and the ratification of the Protocols. Further to support in emission reporting, there was assistance provided to a number of countries in analyzing their national legislative framework with a view to identify the gaps with the protocols' requirements to be closed and the steps towards ratification.

As per its terms of reference, the Committee *"may consider any other relevant information available under the Convention and from technical or other bodies under the Convention."*

It is desirable that the IC and technical subsidiary bodies work in partnership to support countries in the achievement of emission reductions required by the protocols. This link will help keep a focus on addressing some of the systemic barriers that have been identified by the IC. In addition, it may be helpful during the 5-year in-depth emission inventory reviews, for the Centre on Emission Inventories and Projections (CEIP) and TFEIP to collaborate with the IC as they discover information that may help the IC in its compliance reviews. At the same time, the IC may flag to the technical bodies (CEIP) and the EMEP Steering Body Parties which issues would be important to be addressed in the next round of annual in-depth inventory reviews.

The secretariat could play a prominent role in this as they are responsible for bringing matters of potential non-compliance to the attention of the Committee, in particular upon reviewing the reports submitted in accordance with a protocol's reporting requirements or on receipt of information from a technical body or centre under the Convention.

Previously, the Implementation Committee has also reviewed Parties' compliance with their obligations to report on strategies and policies, for which a questionnaire was sent to Parties on a biennial basis until 2010. Following Executive Body decision 2013/2, the sessions of the Working Group on Strategies and Review are now being considered the format for reporting on strategies, policies and measures and have thus replaced the questionnaire. Annually in advance of the WGSR sessions, Parties are invited to report at the session on strategies, policies and measures employed to implement obligations under any of the Protocols to the Convention. The introduction of specific segments on "information sharing by Parties on the implementation of the Convention" has led to an enhanced sharing of sharing of experiences and good practices across countries and regions, conducive to support the implementation of the Convention and the Protocols. The Executive Body at its thirty-sixth session (15-16 December 2016) reviewed the effectiveness of decision 2013/2, considering an overview of the reporting prepared by the secretariat and decided to retain the format of the WGSR for information sharing on strategies, policies and measures to abate air pollution. ***(Recs 34-38 of informal document 2, para 35 (a)-(e) in the PRG report and annex 1 for more information on the IC)***

3. Updating the amended Protocols

(a) Possible update to the Gothenburg Protocol

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The SAR has highlighted continued gaps with respect to the Gothenburg Protocol meeting its objectives. The issues at hand require enhanced action to reduce emissions of key pollutants – some of which are currently covered by the Gothenburg Protocol, and others which are not, but contribute to the issues which the protocol is intended to address. This policy response addresses potential recommendations for an update to the 2012 Gothenburg Protocol, and the potential timing for such an update.

The key conclusions that emerge from the SAR as related to the Gothenburg Protocol include strong evidence for the need for further reductions for $PM_{2.5}$, ammonia (NH_3), as well as the need to reduce background ozone (O_3) levels, particularly through methane (CH_4) reductions.

In terms of $PM_{2.5}$, the report states that though levels have declined in European EMEP sites, and in North America, that 87% of the EU population is still exposed to $PM_{2.5}$ levels exceeding the WHO air quality guideline. The SAR also concludes that NH_3 continues to exceed critical loads in some regions in Europe. In particular, it states that there has been no evidence of ecosystem recovery from reduced emissions to date, and that it is unclear as to how long it will take for ecosystems to respond to the reduced nitrogen deposition. In summary, substantial reductions of NH_3 are lacking, and enhanced action to reduce NH_3 emissions, beyond what is included in the 2012 Gothenburg Protocol, is required.

Climate change is already beginning to be addressed within the Protocol through the lens of SLCPs, which include BC, CH_4, ground-level ozone and some hydrofluorocarbons. In addition to having a warming impact on the climate, three of the SLCPs (BC, O_3 and CH_4) are also air pollutants, or contribute indirectly to air pollution. Thus, addressing these types of pollutants in a multi-effect framework can help contribute to multiple goals within the Protocol. The Gothenburg Protocol currently works to achieve O_3 reductions by targeting key precursors. BC has been listed as a priority pollutant in the protocol, and though CH_4 is not currently addressed by Gothenburg it is also a precursor to O_3. The SAR makes specific mention that CH_4 requires policy consideration. Gothenburg is still the first international treaty to provide some international governance on addressing SLCPs.

With regards to O_3, the SAR concludes that while there has been progress on reducing peak levels of O_3, background levels of O_3 have continued to rise. Peak O_3 levels have been decreasing due to significant steps forward in achieving reductions of NO_x and non-methane VOCs. These precursors generally have short lifetimes, and thus have the greatest effect on peak levels of O_3. However, methane (CH_4), another key O_3 precursor, has a much longer atmospheric lifetime, can be transported greater distances, and has a greater bearing on background O_3 levels.

Methane levels have been seen to either increase or decrease over time, depending on the region. Within Europe, methane levels have generally been declining (though rising slightly again in recent years), while in Asia and North America, levels have been rising. The report states that rising methane levels on a global scale have been contributing to the increased background levels of O_3 within the UNECE. Given that there is no stated safe level of O_3, the report states that there is a continued need to target further reductions of key O_3 precursors.

The report suggests that technical measures are available (e.g., for combustion facilities, vehicles, ships and farms) to meet the WHO guideline levels for $PM_{2.5}$ and O_3 in most places in Europe, and for avoiding excess nitrogen in most European nature areas. It also suggests that behavioral changes in energy use, transport and diet could also play an important role. The SAR concludes that meaningful reductions in background O_3 levels may only be achieved through CH_4 reductions at the northern hemispheric level, at

the very least. The greatest potential for methane reductions may be seen in the waste and oil and gas production sectors, while emissions from the agricultural sector would be more difficult to reduce.

Discussion/Rationale

Although black carbon has been added to the Gothenburg Protocol as a priority pollutant for consideration when meeting $PM_{2.5}$ commitments, this was always understood to be a first step. Commitments on black carbon could be considered, as could mandatory reporting of emissions inventories.

The LTS does not specifically name methane as a pollutant to address under CLRTAP, but it highlights areas of work where additional action or commitments on methane under CLRTAP would be appropriate. In addition, methane is clearly recognized as a precursor to ozone in the Gothenburg Protocol.

A possible option could be to amend the Gothenburg Protocol to include methane emissions reduction commitments and/or control measures and/or specific targets. This would be an additional signal to other international bodies that political will exists to take action to reduce methane. This option would limit methane commitments to the members of the UNECE (unless Gothenburg is opened for global accession). Another possibility for inclusion of methane in the Protocol is simply as a priority pollutant for enhanced action, similar to the approach already taken for black carbon. This option would still allow the Gothenburg Protocol to play a leading role in terms of reducing emissions of SLCPs, but would provide more flexibility for Parties, and allow the current momentum on methane to play out somewhat.

A number of options were discussed for consideration during the Gothenburg Protocol review to prepare for updating the Gothenburg Protocol. These include ***(Recommendations 34-38 of informal document 2, para. 35 (a) – (e) of the PRG report)***:

a. Include CH_4 as a priority pollutant of concern
   i. Consider the possibility of including CH_4 in the Protocol as a priority pollutant for enhanced action, similar to the approach already taken for BC. This option would still allow the protocol to play a leading role in terms of reducing emissions of SLCPs, but would provide more flexibility for Parties. This option may be more feasible in several years once the Protocol has entered into force, as the global methane context may have shifted by then.

b. Include emissions reductions commitments for black carbon
   i. Though there are no explicit emissions reductions commitments in the Gothenburg Protocol in its current form, it does provide direction to Parties to reduce BC emissions by prioritizing $PM_{2.5}$ sources based on the highest total estimated BC emissions. Specific emissions reductions commitments were not considered in the 2012 amendment due to issues in preparing complete, accurate emissions inventories, consistent across all UNECE member States.
   ii. Since the 2012 amendment, some progress has been made in developing emissions inventories, mainly through the development of UNECE technical guidance materials.
   iii. A possibility exists for including specific emissions reductions commitments for black carbon within the Gothenburg Protocol. This would be complementary to the work being performed under the Framework for Enhanced Action on Black Carbon and Methane within the Arctic Council to develop a collective global goal on black carbon. This option would require considerable discussion among Parties, and may not be appropriate until the quality of emissions inventories across UNECE countries improves to an acceptable level. Still, as this process could take several years, it may be advisable to begin discussions on this possibility in the near term.

c. Include further emissions requirements for NH_3
   i. As the effects of NH_3 accumulation in the environment continue to escalate, addressing NH_3 levels in the near-term is becoming increasingly urgent. Achieving further NH_3 emissions

reductions could help curb some potentially irreversible effects (e.g., acidification), and would also have both positive impacts in addressing climate change and air quality. NH_3 emissions have both warming and cooling implications for the global radiative balance. On one hand, NH_3 reacts in the atmosphere to form light scattering aerosols (ammonium sulphate and ammonium nitrate), which contribute to poor air quality and rising $PM_{2.5}$ levels, and also have a cooling effect on the climate. Conversely, NH_3 can also be transformed through biological processes in soil into N_2O, a potent greenhouse gas. Considering both the cooling and warming effects of NH_3, it has been found to have an overall cooling effect on the climate, at least in the U.S. (Pinder et al., 2012).

ii. If more stringent reductions are sought for NH_3 for UNECE countries with current commitments, emissions reductions commitments for countries that have not committed to reductions of NH_3 as of yet, could be sought (e.g., Canada and the US).

d. Include further emissions requirements for O_3 precursors covered by the Protocol

i. The SAR concludes that while peak O_3 levels have decreased, background levels continue to be an issue for countries within the UNECE.

e. Include further emissions requirements for PM

i. The SAR concludes that PM levels within the UNECE region are still high, and thus require continued action to reduce.

f. *Include further emissions requirements for acid rain precursor pollutants*

i. The SAR concludes that there are still critical load exceedances in many parts of North America and Europe in terms of total nitrogen and sulphur deposition.

<u>Appropriate timing for updating the Gothenburg Protocol</u>

Though the 1999 version of the Gothenburg Protocol has entered into force for those Parties that have ratified, the most recent 2012 amended version of the Gothenburg Protocol currently has only two ratifications - Sweden and the U.S. For the important updates of the 2012 Protocol to begin to have impact within the UNECE region (including North America), it is important that the work of the Convention focus on achieving sufficient ratifications for it to enter into force (17 ratifications are required).

Thus any updates to the Gothenburg Protocol should only take place following entry into force, and following a full review of the Protocol. Article 10 of the amended Protocol sets out that the first review shall commence no later than one year after the entry into force of the amended Protocol, and that procedures, methods and timing of the review shall be specified by Parties at sessions of the Executive Body. It does not stipulate that a review should not commence prior to that time.

Thus work in the near-term should focus on increasing ratifications, and on gathering information and preparing for the review of the Protocol. As per indications by Parties in December 2016 (see EB session report ECE/EB.AIR/137), it is currently expected that entry into force (90 days after sufficient ratifications are received) will occur in 2018. So preparations should begin soon.

Ensuring the Protocol is in force before amending it again, is particularly important in the context of EECCA countries, as allowing the 2012 amendments to enter into force before beginning would allow for Parties to begin complying with their 2020 obligations ahead of once again amending the Protocol. Otherwise there is a risk of EECCA countries falling further behind other UNECE countries in terms of meeting obligations, thereby furthering the gap that the flexibility mechanisms in the 2012 amendments were designed to help close.

(Recs 39-45 of informal document 2; paras 37 (a)-(c) and para 38 (a)-(i) in the PRG report)

(b) Possible updates to the Protocol on Persistent Organic Pollutants

Scientific Assessment Report

According to the SAR, POPs emissions have rapidly decreased since early 1990's with differences among the EMEP countries. But pollution levels of unintentionally released POPs (UPOPs) are still a concern, especially in, but not limited to, EECCA countries.

Rationale

Levels of POPs are influenced by primary anthropogenic emissions, secondary sources (re-emissions from previously-contaminated reservoirs)[1] in the EMEP region, and intercontinental transport. According to the SAR, model estimates indicate that intercontinental transport of PCDD/Fs, HCB, and polychlorinated biphenyl (PCBs) can make a substantial contribution to air pollution levels in EMEP countries. As recommended in the SAR, reducing background levels and exposure to these pollutants will require measures beyond implementation of the Protocols, including broader coordination beyond the European or North American scale, as well as coordination with other international fora.

The UNEP Stockholm Convention on POPs (Stockholm Convention) was adopted in 2001. Building on the 1998 Protocol on Persistent Organic Pollutants (POPs Protocol) under the CLRTAP, the Stockholm Convention raised the profile of POPs to the global level. At present, there are 152 signatories and 180 countries are Party to the Stockholm Convention. The Stockholm Convention includes more substances than the POPs Protocol.

Activities under the CLRTAP POPs Protocol have phased down in recognition of global efforts under the Stockholm Convention. In December 2013, the Executive Body adopted a principled approach to future listings, whereby proposals for new listings would first be referred to the Stockholm Convention for consideration; additional action under the POPs Protocol considered only if stricter measures in the UNECE region are warranted or if the substance is not ultimately listed under the Stockholm Convention.

The Stockholm Convention and the POPs Protocol have considerable overlap in their respective provisions. Both include a defined process for evaluating candidate chemicals for inclusion, and largely cover the same substances with similar control measures. However, there are some key differences between the two treaties regarding covered pollutants.

First, the POPs Protocol addresses PAHs, short-chained chlorinated paraffins (SCCPs), polychlorinated napthalenes (PCNs) and hexachlorobutadiene (HCBD), while the Stockholm Convention does not, and only the Stockholm Convention addresses endosulfan.

Second, the POPs Protocol includes emission reduction commitments for unintentional releases of POPs (UPOPs, or PAHs, PCDD/F, HCB and PCBs) and emission limit values for PCDD/F, while the Stockholm Convention uses the best available techniques and best environmental practices approach to limit emissions.

The two treaties cover the same UPOPs, including those mentioned in the SAR (PCDD/Fs, HCB, and PCBs) – with one exception: only the POPs protocol covers PAHs. The POPs Protocol also includes requirements to reduce atmospheric emissions of PCDD/Fs, HCB, and PCBs and to apply emission limit values for PCDD/F for certain stationary sources.

[1] For example, secondary sources of polychlorinated biphenyl (PCBs) occur when building materials, furniture, and other indoor constituents (such as settled dust) act as sinks for airborne PCBs. Sink materials absorb PCBs from air in the presence of a primary source, and the sink becomes a re-emitting source only after the primary source is removed.

Both the POPs Protocol and the Stockholm Convention include best available techniques for controlling sources of UPOPs. The existence of best available techniques under two agreements implies the possibility of duplicative work. However the added benefit of UPOPs best available techniques guidance in the POPs Protocol may be of continued value if more UPOPs are addressed in the Protocol on POPs than the Stockholm Convention, and the level of best available techniques in the Protocol on POPs is more ambitious than what can be agreed to under the Stockholm Convention. Focusing efforts on UPOPs aligns with the LTS and is complementary to the Stockholm Convention.

The SAR does not specifically argue for the need to add additional POPs to the POPs Protocol. Based on the principled approach agreed upon the Parties have agreed in the LTS to increase the focus of future policy work for the Protocol on POPs towards UPOPs. Future action under the Protocol should focus on full implementation, continued emissions reporting and monitoring and further ratifications. Further measures under the Protocol should focus on areas and substances where the implantation of stricter measures in the UNECE region is still recommended.

However, the SAR does note that many POPs and POPs like substances are not monitored regularly, and it is expected that the overall emissions of persistent chemicals are likely to be increasing or remain unchanged. Further scientific and technical work should continue to determine whether additional UPOPs should be added to the POPs Protocol.
(Rec. 46 to 49 of informal document 2; para 41 (a to d) in the PRG report)

(c) Possible updates to the Protocol on Heavy Metals

Scientific Assessment Report

Despite significant reductions, high levels of ozone, heavy metals and persistent organic pollutants (POPs) continue to persist in UNECE countries. Levels of heavy metals and POPs are influenced by primary anthropogenic emissions, secondary sources[2] in the European Monitoring and Evaluation Programme (EMEP) region, and intercontinental transport. According to the SAR, model estimates indicate that intercontinental transport of Hg (mercury) as well as of dioxins and furans (PCDD/Fs), hexachlorobenzene (HCB), and polychlorinated biphenyl (PCBs) "can make a substantial contribution to air pollution levels in EMEP countries".

As noted in the SAR, reducing background levels and exposure to these pollutants will require measures beyond implementation of the CLRTAP protocols, including broader coordination beyond the European or North American scale, as well as coordination with other international fora. Also, the SAR argues that "better emission data, knowledge about remaining abatement options, improved monitoring and scientific understanding, and modelling of the fate of pollutants and their effects on the environment would be useful for future agreements."

One concern raised in the SAR relates to the transport of mercury air emissions to the UNECE from other regions, particularly from East Asia. Since the release of the SAR, the Government of the People's Republic of China deposited its Minamata ratification instrument which could signal potential future positive outcomes for mercury pollution in the UNECE region (i.e., reduction in mercury air emissions).

The SAR notes that *"critical loads of Pb (lead) and Hg (mercury) are still exceeded in several countries. High Cd (cadmium) deposition still occurs in a number of 'hotspots' close to industrial regions"*.

[2] Secondary sources of polychlorinated biphenyl (PCBs) occur when building materials, furniture, and other indoor constituents (such as settled dust) act as sinks for airborne PCBs. Sink materials absorb PCBs from air in the presence of a primary source, and the sink can become a re-emitting source after the primary source is removed.

Discussion/Rationale

Mercury

In 2013, the Minamata Convention on Mercury (Minamata Convention) was adopted, a global treaty negotiated under the auspices of the United Nations Environment Programme. Unlike the CLRTAP's Protocol on Heavy Metals, which obligates Parties to reduce emissions of mercury, lead, and cadmium, the scope of the Minamata Convention is limited to mercury. However, the Minamata Convention is a multilateral instrument that goes beyond the requirements on mercury under the Heavy Metals Protocol.

In 2013, the LRTAP Executive Body adopted a principled approach whereby future action under the Protocol will focus on full implementation and further ratifications, and before proposing any new measures, parties would first consider the potential benefits within the UNECE region beyond those provided by the Minamata Convention.

The Minamata Convention contains provisions that relate to the entire life cycle of mercury, including controls and reductions across a range of products, processes and industries where mercury is used, released or emitted. It also addresses the direct mining of mercury, its export and import, its safe storage and its disposal once as waste. The Convention has been signed by 128 countries and there are 32 ratifications to date. Once there are 50 ratifications, the Convention will enter into force. This is expected in early 2017.

While it is logical to focus efforts to collaborate globally, including with Asian countries, to promote mitigation of mercury pollution, the EB should also consider that, according to the SAR, half of mercury deposition in the UNECE region is attributed to EMEP countries. Therefore, it is worthwhile to pursue mitigation activities within the UNECE region, and to continue to focus on implementing current obligations under the Heavy Metals Protocol, especially in EECCA countries.

Cadmium and Lead

Under the Protocol on Heavy Metals, Parties are obliged to reduce cadmium and lead — below their levels in 1990 or an alternative year, at the choice of each Party, between 1985 and 1995. The amended Heavy Metals Protocol contains considerable flexibilities to enable the accession of the countries in Eastern Europe, the Caucasus and Central Asia in the coming years, and, thus will take into account the economic difficulties and obstacles faced by countries in this region. The inclusion of lead and cadmium in the heavy metals protocols addresses a policy issue that has yet to be addressed at the global level.

Ratification of the three active protocols is a high priority. At present, the Protocol on Heavy Metals only has six Parties. Therefore, there may be work that can be done to address cadmium and lead emissions within the UNECE region to implement the Heavy Metals Protocol. It could be recommended that CLRTAP promote other cooperative efforts, at the regional/local level, with a particular emphasis on the EECCA countries that may need to focus on reducing levels of cadmium and lead.

There is an appetite for lead and cadmium-related emission reduction policies at the international level. The UNEP Chemicals and Waste Branch, for example, has compiled information on the techniques for emissions abatement and on the possibility of replacing lead and cadmium with less hazardous substances or better management techniques. UNEP and the World Health Organization (WHO) have established the joint initiative Global Alliance to Eliminate Lead Paint to prevent children's exposure to lead from paints containing lead and to minimize occupational exposures to lead paint. UNEP also plans to continue work on lead and cadmium abatement options. This presents an opportunity where CLRTAP's expert technical knowledge on lead and cadmium could be shared with UNEP. In terms of addressing gaps in cadmium and lead policy beyond the UNECE region in the near future, CLRTAP could position itself as a centre of expertise on cadmium and lead emissions reductions, with work under the Protocol on Heavy Metals focused on lead and cadmium, rather than mercury. Collaborating and connecting with relevant

organizations such as the UNEP Chemicals and Waste Branch, could promote awareness and possible opportunities to reduce emissions among developing countries or countries with economies in transition.

Conclusion

Despite the significant advances on POPs and mercury through the relevant global treaties (Stockholm Convention and Minamata Convention), the POPs and Heavy Metals Protocols still make important contributions to international air pollution abatement policy (i.e., PAHs, lead and cadmium). Understanding that the CLRTAP EB has adopted a principled approach, whereby future action under the Protocol will focus on full implementation and further ratifications before proposing new measures, parties are then compelled to first consider the potential benefits within the UNECE region beyond those provided by the global agreements, continued monitoring, ratification, and dialogue with relevant organizations on pollutants not covered by the global treaties should be prioritized.

(Recs 50-54 of informal document 2, para 43 (a)-(e) in the PRG report)

(d) Broadening the geographical scope of the Convention and/or its protocols

Scientific Assessment Report

The SAR clearly points out that air pollution is a global problem. Reducing global background levels of O_3 is the remaining key challenge highlighted in the SAR (p. viii). The need for action is ever more prevalent as background concentrations of O_3 and O_3 precursor pollutants (NO_x, VOC and carbon monoxide (CO)) in North America and Asia show a rising trend (p. 25, Section 8.1). In addition, global anthropogenic CH_4 emissions increased in the 2000s (p. 25, Section 8.2). North America and Europe continue to receive transport of particles and gases from other continents. A northern hemisphere abatement strategy is required to tackle damage from long-term O_3 exposure to public health, crops and forest growth.

The SAR concludes that *"since a significant proportion of the deposition in many regions has a hemispheric or global origin, effective policies would need to take these geographic scales into account"* (p. 19, Section 5.5.). It also highlights that the concentrations of fine particles and ozone - which a significant proportion of the urban population in Europe and North America is exposed to at near or above the WHO guideline level - are of hemispheric origin, being strongly influenced by transboundary (even transcontinental) sources. Air pollution is increasingly becoming a global problem.

Discussion/Rationale

Against this backdrop, the policy response to the SAR needs to consider how to respond to air pollution as a global problem, including consideration of the questions of the Convention's regional coverage vs. global coverage, along with its outreach to and cooperation with other regions. This section addresses broadening the geographical scope of addressing air pollution, by expanding the regional scope of CLRTAP and/or the Gothenburg Protocol.

A decade following its previous considerations[3] and in the light of the findings from the SAR and recent policy developments, it appears timely for the Executive Body to reconsider the question of a possible global opening of the Convention.

A formal opening of the Convention and/or some of its Protocols would provide other countries beyond the region, and potentially also other regional economic integration organizations, with the opportunity to join the Convention formally, become part of its networks, and experience exchanges at the scientific and

[3] To read documents referring to these discussions, please see ECE/EB.AIR/89, paras 60-62 and ECE/EB.AIR/2006/8.

policy levels. The experience of other UNECE MEAs demonstrates that formal accession takes many years to achieve. It has also shown that countries from outside the region have taken an interest in the respective activities and participated in meetings following the adoption of amendments to open them.

CLRTAP is unique as a general framework agreement with the Gothenburg Protocol's multi-pollutant, multi-effects approach also being unique in addressing SO_2, NOx, NH_3 and VOCs. Due to the UNECE's historical competencies and expertise in developing norms, standards and legal instruments, several Conventions have been developed under its umbrella (and not initially under the auspices of any of the other UN regional economic commissions). This is not to say that other UN Economic Commissions could not develop their own regional approaches to air quality management, but such an approach would not result in all countries that receive transboundary air pollution from one another being Party to the same instrument.

Opening the protocols could concern mainly the Gothenburg Protocol, which is covering the main pollutants ammonia, sulphur, nitrogen oxides (NO_x), volatile organic compounds (VOC) and fine particulate matter, including black carbon.[4] The EMEP Protocol could also be opened up in order to enlarge the base of the countries not only benefiting from but also contributing to the scientific work underlying the Convention. States beyond the UNECE region could also participate on a voluntary basis in the EMEP programme. There has been a request in this regard by the Republic of Korea. Related financial and budgetary implications would need to be thoroughly considered.[5]

Global accession could act as a means for raising the Convention's visibility and recognition as an important "player" and UNECE as the key organization, alongside UNEP and WHO, in the field of addressing air pollution. It may also provide the Convention with the means to attract funding from other sources, including global programmes such as the Global Environment Facility (GEF) not accessible to it as a regional instrument. The experience in particular of the Water Convention has shown that new funding sources have been attracted to activities related to the opening, but also benefiting other areas of work.

Legal and procedural considerations

The UNECE Geneva Convention is open to accession by the UNECE member States and economic integration organizations as well as States having consultative status[6] with UNECE, according to the Article 14 of the Convention. The 8 additional Protocols contain similar provisions. Opening the Convention for accession to United Nations member States and economic integration organizations beyond the UNECE region would require an amendment of the Convention, to be adopted by consensus by the representatives of the Parties to the Convention and to enter into force for the Parties having

[4] There would thus be no need to open up any of the previous protocols covering emission reductions of sulphur (first and second sulphur protocol), NOx and VOC as these pollutants are also covered by the Gothenburg Protocol. When the amended Gothenburg Protocol comes into force, the original Gothenburg protocol ceases to exist for Parties who have ratified or acceded to its amended version.

[5] Such action would reflect the decision of the Parties during the Committee of Environment Policy in 2014 where "Parties agreed to continue efforts to attract participation from non-ECE delegations and experts at meetings in its framework, especially on issues such as hemispheric transport of air pollution. Parties also agreed to extend outreach activities to regions developing their own agreements on air pollution, including consideration of the possibilities for interregional collaboration, through for example, memorandums of understanding or special events/seminars for non-ECE countries." ECE/CEP/2014/6

[6] In accordance with Resolution 36 (IV) adopted by the Economic and Social Council in 1947, "The members of the Commission are the European Members of the United Nations and the United States of America" (para 7). Canada became a member of UNECE in 1973. In accordance with para 8 of Resolution 36 (IV), "the Commission may admit in a consultative capacity European nations not Members of the United Nations, and shall determine the conditions in which they may participate in its work." Article 8 still appears in the current version of the UNECE Terms of Reference (see http://www.unece.org/fileadmin/DAM/oes/mandate/Commission_Rev5_English.pdf). The UNECE sessional reports to ECOSOC include information regarding countries which were granted during the session a consultative status on the basis of article 8, e.g. the Holy See.

accepted it on the ninetieth day after the date on which two thirds of the Parties have deposited their instruments of acceptance. Such an amendment could also be introduced in the various protocols in case of a desire to open them for accession by United Nations member States beyond the region.

Discussions on amending the Convention and the Protocols, both with regard to substantive and legal considerations, could be pursued through the existing intergovernmental framework i.e., the WGSR as the principal negotiating body for the Convention and its Protocols. Possible legal options could be considered in the light of the experience of other UNECE multilateral environmental agreements (MEAs), which have negotiated amendments for a global opening.

Experience by other UNECE MEAs

There are various examples of opening of UNECE legal instruments for global accession. The governing bodies of the Convention on Environmental Impact Assessments in a Transboundary Context (Espoo Convention) and the Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water Conventions) have adopted amendments opening them for global accession or ratification in 2001 and 2003, respectively (ECE/MP.EIA/4, Decision II/14 and ECE/MP.WAT/14). In addition, several other Conventions are also taking steps to achieve global accession.

Further to previous considerations by the Executive Body of the Air Convention, the governing body of the Protocol on Water and Health to the Water Convention decided not to open for global accession at this stage in time, in order to focus on enhancing its ratification (currently only 29 Parties) first and foremost in the UNECE region.

To date, no Member State of the United Nations not member of ECE has acceded to an ECE MEA, though several have declared their interest, formally or informally, in the instruments being open. Accession by countries to the Water Convention is most advanced, several countries having initiated related processes.[7] Several non-ECE Member States have joined transport-related ECE treaties.

Different considerations prevailed in the discussions of the governing bodies to open the UNECE legal instruments for global accessions. These have ranged from the desire to promote transboundary cooperation, peace and solidarity worldwide, to enriching the pool of good practice - to the desire to support countries beyond the region in improving their protection of human health and the environment, enhancing their administrative, institutional and legal frameworks, and fostering the implementation of the 2030 sustainable development agenda. Some of the UNECE treaties which have been open for global accession since their adoption have supported interested States through respective awareness-raising or capacity building activities, or have supported other regions in their considerations of negotiating similar legal instruments.
(Rec 55 of informal document 2 and para 47 in the PRG report)

[7] Iraq, Jordan, Lebanon and Tunisia have declared their interest in accession to the Water Convention, Mongolia in accession to the Aarhus Convention and, on an informal basis, the Republic of Korea, with regard to the Espoo Convention.

C. Improving the technical and scientific basis

1. Emission data

The completeness and accuracy of emission inventories and projections needs to be improved, especially in EECCA and South-Eastern European (SEE) countries. Concrete actions and next steps as listed in the 2016-2017 work plan 1.1.2. should be further pursued and developed. ***(Rec. 56 of informal document; para. 49 (a) in the PRG report)***

Emission inventories need to be verified through emission measurements. This applies to many sources, including shipping. ***(Rec. 57; para. 49 (b))***

There are regionally varying gaps and priorities on pollutants and issues. For instance,

1. High-resolution regional data below the current EMEP scale are needed especially for high-emission and high-impact areas (e.g., urban scale); the implementation of the EMEP Strategy in this regard is part of the present work plan but may compete with other items. ***(Rec. 58; para. 49 (c))***
2. Temporal variation of VOC and ammonia emissions over the year are needed especially where emissions are high.***(Rec. 59; para. 49 (d))***
3. "Real-world emissions" e.g. of NO_x are relevant especially where diesel cars dominate. The same applies to PM emissions from small wood combustion installations. ***(Rec. 60; para. 49 (e))***
4. Emissions from shipping are relevant locally, regionally and globally.
   Shipping emissions occur primarily near the coast. ***(Rec. 61; para. 49 (f))***
   Data on shipping emissions seem to be inconsistent / uncertain and are not in all cases publicly available. ***(Rec. 62; para. 49 (g))***

Emission inventories and projections for the pollutants covered by the Gothenburg Protocol may have higher political priority since Parties can only ratify if they agree to national emission reduction commitments (NERCs), which necessarily requires a minimum reliability of their emission inventories and projections.

In the Protocols on Heavy Metal and POPs, the emphasis is on technical emission standards. However, also for heavy metals and POPs reliable inventories are needed to assess effects, source apportionment and reduction strategies. ***(Rec. 63; para. 51)***

Further improvements on emission inventories for black carbon / particulate matter (including selected POPs such as BaP), especially from small-scale combustion and agricultural waste burning, are needed. ***(Rec. 64; para. 52)***

In particular,

1. While a general definition of "condensables" is accepted, only a few Parties have included them (as SVOCs, IVOCs) into inventories, which leads to differences between various national emission inventories as well as in obligations (limit values and NERCs).

   The work of TFEIP and others at aiming on harmonizing the emissions inventories and projections and with respect to the treatment of 'condensables' is very important. ***(Rec. 65; para. 52 (a))***
2. The definition of black carbon as an air pollutant is still unsatisfactory. The PRG recommends that the Convention work on (an) appropriate and useful definition(s) for emissions and for ambient air and effects monitoring purposes.

   Once an acceptable definition is agreed, the PRG recommends that reporting of national black carbon emissions inventories should be mandatory. ***(Rec. 66; para. 52 (b))***

The emission inventory review process should be improved:

1. Expert reviewers are doing a good job but more investments are needed by Parties; ***(Rec. 67; para. 53 (a))***
2. Review results are public but a stricter/better follow-up is needed. ***(Rec. 68; para. 53 (b))***

As emissions outside UNECE are increasingly important, so is the quality of non-UNECE inventories and projections.

For classical air pollutants, EDGAR data (plus Japanese emission inventories for East Asia) are used in the Task Force on Hemispheric Transport of Air Pollution (TFHTAP).

MSC-East uses two global inventories for Hg (UNEP/AMAP and EDGAR-Hg), a gridded global inventory for PCBs, and a non-gridded global inventory for PCDD/Fs; some limited non-UNECE region data also exist for HCB. ***(Rec. 69; para. 54)***

2. Dispersion modelling

Atmospheric processes and effects are scale dependent. The new EMEP grid and modelling/monitoring combinations may improve data reliability, but there are many remaining issues.

One practical example is the spatial distribution of ammonium nitrate concentration and nitrogen deposition which is strongly dependent on a correct, complete and scale-specific parametrization of relevant processes (e.g. multiphase physico-chemistry). This challenge should be more explicitly mentioned in the EMEP Strategy and the Long-term Strategy. ***(Rec. 70, 71; para. 55)***

Heavy metals and POPs atmospheric chemistry affects the character of their dispersion and exposure pathways. They accumulate in all environmental media and are re-emitted to the atmosphere. Their multiphase chemistry is important on all scales (global; regional including Arctic, marginal seas; local including hot spots and large cities). The effects of Hg and POP depend not only on air pollution but also bioaccumulation / biomagnification processes in environmental media.

There are major knowledge gaps related to heavy metals and POPs pollution on all of these aspects. ***(Rec. 72; para. 58)***

3. Scope of monitoring and challenges to the existing monitoring systems

Monitoring is aimed at determining progress in improving air quality, human health and ecosystem effects.

More precisely, monitoring is needed to

1. verify that models are able to describe the dynamics of atmospheric and ecosystem processes;
2. detect recovery from past impacts or detect new impacts;
3. assess efficiency and sufficiency of further abatement. In other words, monitoring is the only way to find out whether the huge investments into emission abatement have been successful or not; there are good economic reasons to keep up an informative monitoring system.

Challenges to the existing monitoring system

The full implementation of the EMEP and WGE monitoring strategies already poses a major challenge. However, even some of the present monitoring networks have been curtailed to such an extent that further reductions might jeopardize their meaningful existence. It is uncertain whether using satellite-based measurements could possibly fill in the gaps in the future.

This general finding has to be differentiated with respect to region (EECCA > SEE > Western Europe and North America), pollutants and parameters:

1. Air quality measurements are performed by EMEP (coordinated by the Chemical Coordinating Centre (CCC)), on national levels fulfilling obligations of the EU Ambient Air Quality Directives and North American agreements, complemented by other national plus local air quality monitoring. The main issues are 1) the already insufficient but still decreasing number of

background stations, 2) insufficient quality assessment / control systems, and 3) the partial incompatibility of various networks.

2. Wet deposition is monitored under EMEP (coordinated by CCC) and various national and local networks. Issues are similar to air quality monitoring.
3. Dry deposition is not regularly monitored due to its complexity; this may be an issue for reliability of models.
4. Health effects are monitored by various networks, mostly coordinated by WHO.
5. Ecosystem effects are monitored by the International Cooperative Programmes (ICPs). There is no comparable system outside the Convention: E.g. the EU biodiversity monitoring (Natura2000) largely ignores air pollution as a relevant driver. There are limited national/regional networks.

The explicit mentioning of air pollution effects monitoring in the EU Directive on National Emission Reduction Commitments (NERC Directive) might improve the visibility and perceived relevance of effects monitoring in EU countries and beyond. ***(Rec. 73 - 75; para.s 59 - 61)*** However, there was no consensus on mandatory networks or even parameters to be measured as originally proposed. In addition, the Directive does not recommend standards on collection, compilation, presentation and quality assurance / control but refers to other EU directives and CLRTAP programmes. Therefore the NERC Directive will probably not or not directly improve harmonization beyond what has already been achieved via cooperation within and between ICPs, largely performed by the ICP Centers with insufficient budgets.

Work plan element 1.1.1.1 foresees a WGE document to the Executive Body in 2016 which sets priorities for monitoring and other collection of data on effects by Parties and for ICPs in view of policy needs and given financial constraints.

Geographical scope

A priority of Convention monitoring are the background stations (atmospheric as well as effects) since its focus is on long-range transboundary air pollution.

In order to better monitor health effects, a more explicit modelling and monitoring for urban and suburban areas is needed. Overstretching the available capacities and capabilities at the expense of background / transboundary monitoring should be avoided.

If the Convention further extends the geographical scope of its monitoring and modelling from circumpolar (as already implemented via cooperation with the Arctic Monitoring and Assessment Programme (AMAP)) to hemispheric (as already partially implemented via TFHTAP, cooperation with the Acid Deposition Monitoring Network in East Asia (EANET) etc.), or even global, challenges to effects as well as atmospheric monitoring will be very different. Implementing this work might compete for available resources with the need to move to the city scale.

One possible alternative might be an intensified cooperation with specific non-UNECE regions or countries (e.g. East Asia) on monitoring, including on effects.

One practical aspect of global monitoring would be the availability of Global Environment Facility (GEF) funding.

Any strategic decision on extending the geographical scope to high-resolution (e.g. cities) and hemispheric / global work, including the strategic decisions on outreach, has to keep the consequences for monitoring mentioned in the background document in mind. ***(Rec. 76; para. 62)***

4. Improving the functioning of WGE and EMEP and their subsidiary bodies

The following text aims to deal with all science-related subsidiary bodies. Regarding ICPs, it is based on the 2013 ICP Review (for effects monitoring) and the work plan items 1.4.1 – 1.4.3 that resulted from that review. There may be additional issues especially for non-ICP programs that had not been reviewed.

The 2012 Action Plan as well as the 2013 ICP Review recommended various developments and changes related to their structure, operations and communication.

Specifically for the effects-related work, the following activities were recommended and listed in the work plan 2016/17 (1.4.1 – 1.4.3):

1. Develop common standards for all ICPs and a web portal approach to enable access to data/information.
   Specifically, EMEP and WGE, including ICPs and other subsidiary bodies were tasked to:
   1. improve the data access via the web;
   2. develop a common web-based portal; and
   3. develop a formal set of agreed common standards.

   Up to now, there seem to be limited efforts regarding 1. and 2. ***(Rec. 77, para. 63 (a))***

   The adoption and implementation of the "Guidance Document on health and environmental improvements using new knowledge, methods and data" has been a major step forward in harmonizing and prioritizing indicators and parameters to be monitored. Still, the harmonization of technical standards (e.g. on field measurements, laboratory analyses, data management etc.) between different programs merits further work. ***(Rec. 78; para. 63 (b))***

2. Organize the work carried out by the ICPs more effectively. Specifically, WGE and ICPs were asked to:
   1. explore ways to combine/ merge the activities of some ICPs (e.g., Integrated Monitoring, Forests, Waters).
   2. organize joint meetings; and
   3. improve integrated working and reporting.

   Activities of individual ICPs are generally still performed in the present organizational framework. Some thematic and/or joint ICP meetings have been organized (e.g. between ICP Waters and ICP Integrated Monitoring), but they are rather an exception than the rule.

   Integrated working and reporting has been intensified, e.g. via more focused reporting to WGE and EMEP and the production of thematic reports such as the WGE Trends Report. ***(Rec. 79; para. 63 (c))***

3. Explore a more stable long-term financial mechanism for effects-related activities.
   The Executive Body Bureau and main subsidiary bodies were asked to recommend a new financial mechanism to the Executive Body.

   There have been various consultations and discussions on this important item, inter alia via dedicated meetings of Parties leading programs and hosting centers not funded by the EMEP Protocol. The announced reduction in funding of the Coordination Center for Effects has instigated discussions in WGE and EB meetings. While interim solutions may alleviate some problems, the long-term issue of insufficient and unreliable funding of activities not covered by the EMEP Protocol (which include effects related activities) has not been solved. ***(Rec. 80; para. 64)***

5. Linked, multipurpose CLRTAP monitoring

Atmospheric monitoring should be more closely linked to effects monitoring. While this recommendation from WGE, EMEP and Convention Strategies has been partially implemented, there seems further room for intensification.

Work plan element 1.1.1.7 calls for an EMEP/WGE contact group to compare WGE exposure measurements with exposures modelled and monitored by EMEP. This would be most useful. ***(Rec. 81; para. 65 (a))***

Cooperation between CLRTAP monitoring and external research should be pursued more systematically to use synergies and communicate competences the Convention has to offer (see e.g. Saltsjöbaden V recommendation re. POP monitoring). ***(Rec. 82; para. 65 (b))***

The Convention should take every opportunity to make monitoring networks serve multiple clients (national and international) and other problems (e.g. effects of climate change and even for land use and biodiversity management). ***(Rec. 83; para. 65 (c))***

The increasing complexity of scientific findings feeds a general tendency in CLRTAP: national inputs may be perceived to become less relevant, and policy relevant scientific information is produced by international institutions which are capable of the complex tasks. This may further hinder the countries´ readiness to invest in national science (and even more so: monitoring) which in turn decreases the view that they ”own“ the knowledge and the data.

At the same time, this means that the Convention is able to tackle scientific issues which are too complex to be dealt with by individual countries alone. As consequence, engagement is needed both from the countries and from the Centres / Programmes and from the countries´ delegates to all Convention bodies.

This conclusion also applies to science / policy issues beyond monitoring; it has implications for multi-level governance as well. ***(Rec. 84; para. 65 (d))***

6. Hemispheric air pollution

The PRG discussed the information that would be helpful for policymakers to discuss and begin to take steps to address hemispheric air pollution in a meaningful way.

Scientific Assessment Report

The SAR focuses on the hemispheric scale of ozone pollution and mercury. Specific scientific and technical gaps as it relates to hemispheric transport are not fully identified in the report. However, the case has been made that the Convention should continue to play a vital role in assessing and addressing hemispheric transport of air pollution in the northern hemisphere. For example, background concentrations of ozone in major regions (e.g., Asia and the west coast of North America) show a rising trend. As recommended in the SAR, reducing background levels and exposure will require measures beyond implementation of the Convention’s Protocols, including broader coordination beyond the European or North American scale, as well as coordination with other international fora. The long-term strategy (para. 14(b)) highlights ozone and PM as the important pollutants for hemispheric transport. Therefore, the work under the Convention in the TFHAP has focused on ozone and PM. For ozone precursors, the SAR includes the most details regarding methane and NO_x. For heavy metals and POPs, the SAR states that the knowledge from the Convention on this topic is being shared with the Global Conventions on mercury and POPs (The Minamata and Stockholm Conventions). Most of the work on POPs and heavy metals is conducted within MSC-E.

Discussion/Rationale

The PRG believes that the current knowledge is enough to begin policy conversations within the Convention on the hemispheric transport of ozone and PM and recommends that these begin in the 2017-2018 timeframe. There is scientific and technical information, including modeling results, that needs to be presented to WGSR as a first step. The ad hoc group of experts on the action plan for the long-term strategy of the Convention already recommended (ECE/EB.AIR/2012/15, para 20) that the work of TFHTAP may have policy implications in the longer term and the Task Force should communicate with the WGSR appropriately. While there needs to be further work within TFHTAP, the time has come to begin these conversations.

The WGSR needs information on the amount of hemispheric pollution coming into the UNECE region that cannot be addressed within the region and where contributions are greatest from non-UNECE region countries. The updated long-term strategy and the PRG's recommendations could address whether there are other policy mechanisms beside protocols that could help address pollution from the non-UNECE countries. ***(Recs 85-94 of informal document 2 and paras. 67 (a)-(d), 68 (a)-(d) and 69 in the PRG report)***

D. Improving communication, outreach and cooperation

The SAR finds that ozone, heavy metals and POPs continue to pose long-term risks in many UNECE countries. In addition to implementing the Convention's protocols, reducing background levels and exposure will require broader coordination beyond the European and North American scales.

TFHTAP has shown that further protection of health and ecosystems would require emission reduction of all ozone precursors, including and specifically methane. As limiting methane emissions is of major importance for controlling ozone concentrations over the coming decades, a coordinated approach that goes beyond the current domain of the Convention and includes major emitters in Asia is needed. Similarly, intercontinental transport of mercury and some persistent organic pollutants becomes an increasingly important issue. Air pollution thus becomes a problem that has to be tackled not only at local, national and regional scales, but also at the global level.

Clearly, further international policy collaboration and coordination of air pollution science is needed to harmonize methods for estimating emissions, monitoring air quality and impacts. Exploring synergies between air pollution policies at different levels as well as between air pollution and energy, transport and agricultural policies could help identify additional cost-effective measures.

Disclaimer: Any additional activities, in particular those that involve new cooperation or outreach projects, would require additional funding for centers and the secretariat.

Note that this section does not follow the same structure as the final report as the information from the background documents prepared by the PRG were re-organized for the final report.

(a) Communication to policy makers

In general, air pollution policy makers have been well-informed and well-briefed of ongoing work under the Convention through the intergovernmental meetings and the annual sessions of the Executive Body, which have regularly featured reporting (both oral and in writing) on the implementation of the workplan items "communication and outreach."[8]

EECCA countries frequently mention that awareness of higher-level policy-makers (politicians, parliamentarians etc., not only from the environmental policy domain) needs to be further raised in order to convince them of the implementation of abatement measures, their cost-effectiveness (BAT etc.). This issue has been addressed through the organization of high-level roundtables in the forum of capacity-building events (e.g. as for example in Kyrgyzstan and Uzbekistan), with the participation of high-level decision-makers. Other forums such as the United Nations Environment Assembly (UNEA) and the World Health Assembly (WHA) with their resolution on air pollution, as well as the International Commission on Sustainable Development have also been used as a means to raise awareness.

In this context, the Batumi Environment for Europe Ministerial Conference in 2016 has provided an excellent means to raise awareness of the Environment Ministries at the higher level. There continues, however, to be a need to further engage higher-level decision-makers from other Ministries responsible for

[8] This item was introduced to the workplan of 2014-2015 for the first time.

the respective sectors required to bring about necessary emission reductions (energy, agriculture, housing, chemicals management, etc.).

(b) Awareness-raising of health and environmental effects

To build on the visibility raised at the Batumi Conference and to further raise awareness on the health and environmental effects of air pollution, one possibility would be to address these issues in the general experience sharing sessions under WGSR, or possibly the special sessions which could be organized on some of these topics (e.g. featuring the linkages between air pollution and agriculture, (renewable) energy, climate change, health of humans and ecosystems).

This would also constitute a contribution to the implementation of the Sustainable Development Goals (SDGs; see also in annex 2 some more information extracted from the informal document submitted by the UNECE secretariat to the Committee on Environmental Policy (CEP) session in 2015 with relavance to CLTRAP activities). With regard to the SDGs, it is recommended that the Convention raise visibility of its contribution to support their implementation, e.g. during dedicated information sharing with policy makers.

(Recs 95-107of informal document 2 and paras 71 - 74 in the PRG report)

2. Outreach activities and working with other international bodies

The Convention has already developed a number of tools and mechanisms for raising awareness of its work, such as, among others, intergovernmental meetings, expert workshops, guidance documents, and communications and promotion materials. To further enhance this toolbox, several options could be envisaged, some of which have already been described in detail e.g. joint events/ joint sessions with UNEP/ WHO in the framework of Executive Body sessions or the governing bodies of these organizations; dedicated workshops; information/promotion kits for national focal points; opening up experience sharing sessions under the WGSR.

In addition, some of the following ideas could be further discussed:

- Developing online training courses or linking to online training courses that already exist in some countries. Collaboration with CCAC and/or WHO could be beneficial to help countries assess the benefits to health from reducing air pollution (e.g. country tools like BenMAP in U.S.). The CCAC integrated benefits calculator could be beneficial to Eastern Europe/Baltic nations if not equipped to use something like BenMAP.
- Increase the awareness on the possible contribution of the UNECE Geneva Convention on Air Pollution in favor of the SDG's implementation (see Annex 2).
- As it seems that the most appropriate body under the Convention to explore opportunities for cooperation with International Maritime Organization (IMO) would be the Task Force on Emission Inventories and Projections, the PRG recommends to the Executive Body to encourage the co-Chairs of that Task Force to explore the possible restriction on emissions of black carbon.
- The PRG recommends to the Executive Body to encourage the UNECE secretariat to renew the MoU with the Convention on Biological Diversity (CBD), the co-Chairs of the Task Force on Reactive Nitrogen and the co-Chairs of the ICP Vegetation to continue and possibly extend the cooperation with the CBD.

3. Response to global policy processes: broadening the geographical scope when addressing air pollution

<u>Scientific Assessment Report</u>

This section addresses broadening the geographical scope of addressing air pollution. Consideration should be given to how to respond to air pollution as a global problem, e.g., by expanding the regional

scope of CLRTAP and/or the Gothenburg Protocol), addressing it under a global legally binding instrument, or other cooperative options. This section focuses on options other than formally expanding the scope of CLRTAP and/or the Gothenburg Protocol, dealt with in section B. 3 (d) of the official document (and addressed earlier in this document).

The SAR clearly points out that air pollution is a global problem. Reducing global background levels of O_3 is the remaining key challenge highlighted in the SAR (p. viii). The need for action is ever more prevalent as background concentrations of O_3 and O_3 precursor pollutants (NO_x, VOC and carbon monoxide (CO)) in North America and Asia show a rising trend (p. 25, Section 8.1). In addition, global anthropogenic CH_4 emissions increased in the 2000s (p. 25, Section 8.2). North America and Europe continue to receive transport of particles and gases from other continents. A northern hemisphere abatement strategy is required to tackle damage from long-term O_3 exposure to public health, crops and forest growth.

Against this backdrop, the policy response to the SAR needs to consider the questions of the Convention's regional vs. global coverage, along with its outreach to and cooperation with other regions.

Discussion/Rationale

Global instruments under the umbrella of the United Nations exist for regulating POPs - the Stockholm Convention on POPs, and mercury - the Minamata Convention on Mercury, although the latter is not yet in force[9]. There is no comparable global instrument to address other pollutants such as PM, O_3 and their precursor emissions which are covered under the Air Convention and its Protocols – mainly the Gothenburg Protocol.

At the scientific level, collaboration on long-range transport in the Northern hemisphere is being mainly pursued through the Task Force on Hemispheric Transport of Air Pollution (HTAP). At the policy level, recent years have seen the adoption of global resolutions in other international forums such as the World Health Assembly (WHA) (resolution 68/8 adopted in 2015 on Health and the environment: addressing the health impact of air pollution) and by the United Nations Environment Assembly (UNEA) (resolution 1/7 adopted in 2014 on strengthening the role of the United Nations Environment Program in promoting air quality).

These resolutions raised the visibility of WHO and UNEP as organizations providing fora for addressing air pollution. While CLRTAP is mentioned in UNEA resolution 1/7, calling for increased action by United Nations member States to ratify relevant legal agreements, the resolution encourages Governments that have not yet done so to consider becoming parties to the relevant global agreements addressing air pollution. It also requests UNEP to explore opportunities for strengthened cooperation on air pollution within the UN system and with other organizations.

Option 1: Continued collaboration without a formal opening of the Convention

There are many opportunities to cooperate effectively. LRTAP could continue its scientific work on a broader international basis by inviting relevant partner bodies to discussions. At the Gothenburg workshop in 2006, this was identified as a more efficient option than an opening of the Convention. Representatives from other regions (representing Asia and South America) then voiced their interest in establishing a tailor-made agreement targeted specifically at the needs of their regions and adjusted to the respective economic and environmental situation.

[9] There are 31 ratifications as of September 2016; 50 are required for the entry into force, in accordance with article 31 of the Minamata Convention on Mercury.

Some efforts were already deployed in cooperation e.g. with the Acid Deposition Monitoring Network in East Asia (EANET), the Malé Declaration on Control and Prevention of Air Pollution and its Likely Transboundary Effects for South Asia (Malé Declaration); and the North-East Asian Subregional Programme for Environment (NEASPEC). This cooperation could be strengthened, including through respective capacity support. Further synergies could be explored between UNECE and the neighbouring UNESCAP, keeping in mind also its overlapping membership.[10]

In fact, recent NEASPEC projects related to air pollution take inspiration from the institutional and technical frameworks of the UNECE Air Convention and aim at establishing similar comprehensive umbrella mechanisms in North-East Asia building on existing structures like EANET. The secretariat had previously been invited by UNESCAP and by NEASPEC member States, such as the Republic of Korea, to provide technical and policy advice.[11]

The Asia Pacific Clean Air Partnership, launched by the UNEP Regional Office for Asia and the Pacific, could potentially serve as a key forum to engage Asian countries on air pollution issues. NEASPEC promotes environmental cooperation in the field of air quality among its member States. The NEASPEC secretariat is provided by the sub-regional office for East and North-East Asia of the United Nations Economic Commission for Asia and the Pacific (UNESCAP).

Cooperation could also be strengthened with UNEP, WHO, WMO, CCAC and other global organizations and networks, as encouraged by UNEA resolution 1/7 (para. 5 c). WHA resolution 68/8 also requests WHO to work with relevant United Nations partners, programmes and agencies (para. 2 (4)). The resolution also urges member States to develop policy dialogue, collaboration and information sharing between different sectors (para 1 (9)). Both resolutions are encouraging countries to work together and to develop national strategies and actions to improve the air quality according to the local situation. Further work at this level may be – from a political and a substantive perspective in terms of air pollution abatement – more effective than a globalization of CLRTAP, at present only applicable to UNECE members. The extent to which following resolutions adopted under other frameworks and contributing to their implementation can lead to the same abatement measures and the same level of visibility as a possible opening of CLRTAP needs to be carefully considered.

(Recs 108-138 of informal document 2 and paras 75-88 in the PRG report)

For many years, the regional approach adopted under CLRTAP was effective as demonstrated by the success achieved during the last decennials - the SAR shows examples of the achievements within the UNECE region, highlighting the significant emissions reductions achieved for some key pollutants. At the same time, it highlights the need for urgent action to address some pollutants which require action on the global level (e.g., background O_3) and further develop a northern hemisphere abatement strategy which takes intercontinental transport into account.

[10] There are numerous UNECE member States Parties to CLRTAP which are also member States of UNESCAP: Armenia, Azerbaijan, France, Georgia, Kazakhstan, Kyrgyzstan, Netherlands, Russian Federation, United Kingdom of Great Britain and Northern Ireland. Uzbekistan, a non-Party to the Convention, while participating in the capacity building programme, is also both a member of UNECE and UNESCAP.

[11] See paragraph 29 of the report on outreach activities presented to the Executive Body at its 33rd session (ECE.EB.AIR/127), addressing possible cooperation between NEASPEC and CLRTAP, and paras 73-75 of the report on outreach activities presented to the EB at its 35th session (ECE.EB.AIR/145). Information on cooperation with North-East Asia has also been presented to the EMEP Steering Body and its Bureau.

The extent to which voluntary efforts can lead to results – insofar as far the political will is present - is shown by existing initiatives such as the CCAC. This voluntary approach could possibly be reproduced under other auspices and focused on the improvement of air quality.

Option 2: Pursue cooperation outside UNECE and negotiate an amendment to Convention/Protocols

This option would provide a more direct access to policy-makers from other regions and a more sustainable means to reach out to pursue cooperation with countries from beyond the region, further to existing cooperation frameworks. In pursuing such cooperation, a specific focus could be on countries in the Northern hemisphere, in the pursuit of developing a coherent abatement strategy for key pollutants. At the same time, it would enhance CLRTAP's visibility by policy-makers from both within and outside the region, and with other international organizations. With regard to cooperation with other organizations addressing air pollution both at the global and regional levels, it would be important for such cooperation to be pursued also at the intergovernmental level, further to the ongoing secretariat efforts.

Approaches across the UNECE MEAs with regard to the opening have differed; from gradual approaches, focusing first on the establishment of contacts with other regions and the respective networks before pursing capacity building – in case funds are available – to more active approaches, with the presence in the countries through capacity building activities and their involvement in intergovernmental meetings. Countries from other regions having expressed an interest in UNECE MEAs have done so following their introduction to the legal instruments through their involvement in intergovernmental or expert meetings.

Before pursuing the option to open the Air Convention for broader accession, it is vital to understand whether countries from outside the region have an interest in joining. To assess whether such interest exists, it is important to ensure that there is awareness about the Convention in other regions, e.g., through cooperative projects, capacity-building activities or the involvement of countries from outside the region in the Convention's various activities. The six countries in North-East Asia participating in the NEASPEC framework have become somewhat familiar with CLRTAP and its legal framework through the ongoing information exchange and regular participation of the secretariat in its meetings. Some of the NEASPEC member States, in particular the Republic of Korea, have – at the level of the Ministries of Environment and Foreign Affairs - indicated their interest in the Convention and in regional cooperation.

Option 3: Consider the best approach to address air pollution globally [12]

In lieu of broadening the geographic scope of CLRTAP, could be to work concertedly with UNEP to galvanize global support to achieve air pollution reductions at the global scale. Over the past few years, UNEP has been vocal about the need to fill the policy gaps on global air pollution policy.

As noted, UNEA adopted a global resolution on strengthening the role of UNEP in promoting air quality. Through the resolution, UNEP is tasked with the following task: *"to undertake global, regional and subregional, as appropriate, assessments by 2016, if possible, focused on identifying gaps in capacity to address air quality issues, including monitoring and control opportunities for cooperation, and air pollution mitigation opportunities, building upon existing global, regional and subregional cooperative efforts on air pollution, such as the Stockholm Convention on Persistent Organic Pollutants, the*

[12] While this option may not speak to the specific question of whether or not Gothenburg or the Convention can be opened to accession, when considering the options, it may be useful to ask the larger policy question – what is the best approach to address air pollution globally? Asking serves two purposes. First, it assures alignment on this issue. Second, elimination of one option offers an opportunity to determine a clear path forward. This offers the opportunity to discuss the variety of paths and options. Another reason to consider this question (even if only for the purposes of a thorough conversation) is that historical evidence presented in earlier in this discussion paper shows that UNECE conventions can be open to global accession and that UNECE conventions can also be a foundational tool upon which UNEP builds on for a global scale.

Minamata Convention on Mercury and the UNECE Convention on Long-range Transboundary Air Pollution and its eight protocols, and information provided by States members of the UNEP."

Through the Montevideo Programme, UNEP has discussed the possibility of taking further action at the global level on air pollution, with the possibility of either opening up CLRTAP and its protocols for accession by UN member States from outside the UNECE region, or by establishing an umbrella organization under which CLRTAP could fall, which would oversee the development of regional air pollution treaties.[13]

As a response to the UNEA resolution, which calls on governments to *"formulate action plans and establish and implement nationally-determined ambient air quality standards"* and *"to establish emissions standards for their significant sources of air pollution,"* UNEP launched the Asia Pacific Clean Air Partnership (APCAP) with the support of the Government of Japan in July 2014. APCAP aims to bring together existing initiatives in Asia and the Pacific to promote scaled up action to combat air pollution. APCAP consists of three main pillars: a Joint Forum on atmospheric environmental issues, a Science Panel comprising eminent scientists and a Regional Assessment report. The first meeting of the Joint Forum was held November 2015, where the CLRTAP Secretariat made a presentation on the purpose and practices of the Convention and the preliminary conclusions of the SAR. UNEP plans to conduct an assessment of air pollution issues with an aim of translating science to policy and the assessment is expected to be completed in 2016. At the sub-regional level, UNEP will support the operation of sub-regional air pollution networks such as EANET. At the national level, UNEP will provide technical and policy support for control and prevention of air pollution through training and knowledge sharing partnerships. It would be important to ensure cooperation with existing structures such as NEASPEC serviced by UNESCAP and other regional initiatives.

These policy declarations and the subsequent actions suggest that UNEP has been considering options to achieve action on air pollution at the global level, and taking a lead role in coordinating these efforts. At the same time, it is important to note the legal, normative and policy efforts undertaken by the United Nations secretariat and its regional commissions – by CLRTAP in the pan-European region and North-America and under the umbrella of UNESCAP in North-East Asia through NEASPEC, in close cooperation with CLRTAP. Addressing air pollution at the global – and the regional - levels in a holistic and coordinated approach, it is important to build on existing structures and mechanisms while avoiding any duplication of efforts.

UNEP has also noted that the UN International Law Commission is developing guidelines for the protection of global atmosphere. However, the work being undertaken by the Law Commission will not address specific air pollutants nor will it interfere with the political processes of treaty regimes.[14] The Montevideo Programme also notes the necessity to coordinate regulation of SLCPs and interlink climate change and ozone treaties.

These policy recommendations align with LRTAP's long-term strategy.[15] The UNECE Air Convention secretariat had been in dialogue with UNEP regarding the sub-item of the Montevideo Programme for

[13] See the Report of the Montevideo Programme Environmental Law Seminar: Law to regulate air pollution and protect Earth's atmosphere Osaka, Japan, 23 and 24 June 2015 http://www.unep.org/delc/Portals/119/documents/montevideo/osaka-montevideo-law-seminar-report.pdf
[14] Ibid, 15.c
[15] Ibid, 14.b

Development and Periodic Review of Environmental Law on "Law to regulate air pollution and protect Earth's atmosphere".[16]

(Recs 112-138 of informal document 2 and Section D 4 (a) in the PRG report)

4. Working to reduce methane, including cooperatively with other organizations

Methane, an important greenhouse gas, is included in the Kyoto Protocol basket of greenhouse gases and is one of the gases meant to be reduced as part of countries' commitments under UNFCCC. Not only is controlling this particular gas important for the climate, but also for air pollution. As a precursor to ozone, methane impacts health and vegetation, and thus needs consideration in its own right.

The PRG saw value in surveying the different organizations that discuss methane mitigation in order to determine which would be optimal partners for strategic discussions about methane mitigation.

Scientific Assessment Report

The SAR notes that simulations of the Task Force on Hemispheric Transport of Air Pollution (HTAP) indicate that, after an initial decrease in region-wide annual average ozone concentrations in North American and Europe, ozone may start increasing after 2020-2030, progressively driven by methane (SAR p.27). This is mainly attributed to an increase of methane emissions in other regions of the world.

Discussion/Rationale

The LTS does not specifically name methane as a pollutant to address under CLRTAP, but it highlights areas of work where additional action or commitments on methane under LRTAP would be appropriate. For example, in paragraph 16(c), the LTS states that the Executive Body of the Convention and its subsidiary bodies should *"focus on PM, tropospheric ozone, eutrophying pollution, and the Convention will address other pollutants if the scientific evidence is sufficiently strong and Parties agree they are appropriate."* Further in paragraph 16 (d), the LTS states that *"stepwise improvements and revisions of the multi-pollutant/multi-effects Protocol will reduce the gap between the impacts on the environment and on human health and critical loads, critical levels and health-oriented air quality targets."*

Short-lived climate pollutants, which include black carbon, methane, ground-level ozone, and certain hydrofluorocarbons (HFCs), are both potent greenhouse gases and air pollutants. Methane, a contributor to the formation of ground-level ozone, is estimated to be 84 times more potent a warming agent than CO_2 over a 20-year period, and 34 times more potent than CO_2 over a 100-year period.

Scientific evidence shows that an integrated approach to the development of air pollution and climate change policies would best work towards achieving sustainable development goals, and promote the transition to a low carbon economy. The LTS noted that the important links between climate change and air pollution have received little attention in international climate discussions. It also goes further to argue that the existing gap in international governance on the topic of SLCPs highlights opportunities to enhance the Gothenburg Protocol.

A number of forums encourage countries and/or the private sector to develop methane emission reduction strategies. All are based on voluntary participation and compliance. The institutions described below have

[16] As stated in the report on outreach activities presented to the EB's 35th session (2-4 May 2016): *"Exchanges have taken place with UNEP regarding UNEA resolution 1/7, the 6th GEO and the sub-item of the Montevideo Programme for Development and Periodic Review of Environmental Law on "Law to regulate air pollution and protect Earth's atmosphere." (*ECE/EB.AIR/135)

not identified targets or emission caps, nor have they announced intentions to encourage such policies. The G20 Energy Ministerial has perhaps been the forum which has most advanced international discussions on specific methane emission reductions from the oil and gas sector. However, the outcomes of these discussions have not since been disclosed publically, as the G20 has not traditionally been considered to be a forum for such policies.

Existing forums aimed at addressing methane

The United Nations Framework Convention on Climate Change

The UNFCCC entered into force on 21 March 1994. The UNFCCC objective is to *"stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system"*. In 2015, all (then) 196 then Parties to the Convention adopted by consensus the Paris Agreement, aimed at limiting global warming to less than two degrees Celsius, and committing to pursuing efforts to limit the rise to 1.5 degrees Celsius. On October 5, 2016, the threshold for entry into force of the Paris Agreement was met, with the result that the Agreement will enter into force November 4, 2016.

Unlike the Kyoto Protocol to the UNFCCC, which created the 6-gas basket of greenhouse gases (now 7), the Paris Agreement makes no mention of a specific basket of gases that must be reduced. Notwithstanding that there is no requirement per se to reduce any particular gas under the Paris Agreement or the UNFCCC, there has been growing interest and urgency in addressing methane. Methane is considered to be the second largest contributor to current warming after CO2, and reductions of methane at the moment are considered quite cost effective. Moreover, given its relatively short life in the atmosphere reductions of methane can help reduce near-term warming. Therefore to meet climate goals, momentum to reduce methane emissions has increased. A large number of countries listed methane among the gases they intend to address in their Intended Nationally Determined Contributions (INDCs) under the UNFCCC.

Aside from the UNFCCC, a number of complementary fora exist aimed at reducing methane emissions. The co-existence of these fora indicates that there is no compelling reason not to consider methane outside of the UNFCCC, and indeed that there are benefits from considering it from more than one angle.

The Global Methane Initiative

The Global Methane Initiative (GMI) includes countries with large sources of methane and/or special expertise and interest in developing methane projects. There are currently 41 GMI Partner Countries, which account for approximately 70 percent of global methane emissions from targeted sources. GMI encourages partners to develop action planning documents to articulate the overall vision for a Partner's participation in GMI, outline key country activities and priorities, and provide a mechanism to advance cooperation among partners by identifying needs and opportunities. This sharing of information and best practices enables bilateral or multi-lateral partnerships to flourish when multiple GMI Partners express interest in working in particular countries or regions. Private sector entities, financial institutions, and other non-governmental organizations are eligible to become partners. To build capacity, improve technology transfer, and promote private direct investment, GMI encourages public-private participation in the forum.

GMI works towards methane emissions reductions by facilitating public and private sector investment in methane abatement, recovery, and use projects. Partners identify barriers to project development and support activities designed to help overcome these barriers, such as capacity building, meetings and

workshops, technology transfer and other training events, feasibility studies, and technical assistance. Partners also identify and assess potential project sites, and clarify regulatory and legal issues.

GMI is a complementary initiative to a country's commitments under the UNFCCC. GMI helps countries build capacity and provides technical support to advance methane mitigation projects so countries can use this Initiative to help support and advance their efforts under the UNFCCC.

The Climate and Clean Air Coalition

Established in 2012, the Climate and Clean Air Coalition (CCAC) is an international, voluntary initiative aimed at advancing collective efforts to reduce SLCPs. In its first four years, the CCAC launched seven sector-specific and four cross–cutting initiatives, established a Science Advisory Panel, and grew its membership from 6 to 100 Partners, with many additional organizers, countries and sub-national entities also participating in the initiatives. The private sector also participates in the CCAC and engages with these initiatives and other voluntary actions.

The CCAC aims to catalyze action and mobilize support to deliver substantial SLCP reductions in the near-to medium term. As appropriate, these policies include voluntary and/or regulatory mechanisms to deliver reductions at scale by engaging both the public sector and the private sector. Through its activities, such as facilitating peer-to-peer engagement and providing support to develop, enhance and implement SLCP national policies and action plans, the CCAC hopes to achieve change in technology and practices, influenced laws/regulations, policies and plans and strengthened institutions.

In November 2016, Ministers representing the CCAC's state partners, in cooperation with non-state partners, released the Marrakech Communiqué encouraging countries to take actions that reduce black carbon, methane and HFCs. The Communiqué urged countries to report emissions of methane and HCFs according to the UNFCCC and International Panel on Climate Change guidelines. Although the statement stops short of recommending specific methane reduction commitments, it does support mitigation efforts, including national methane reduction strategies, regulations, policies or enhanced actions including those which encourage energy efficiency and fuel shits from activities related to oil and natural gas extraction, transportation and processing.

Existing Collaboration between GMI, CCAC, and UNECE

The GMI has a history of collaborating with the CCAC on projects in the oil and gas, waste and agriculture sectors, and with the UNECE through the Group of Experts on Coal Mine Methane and the Group on Natural Gas. In 2014, the GMI initiated a review process and mandated a Task Force to look at the renewal of its charter and consider options for the future. The GMI Task Force recommended better alignment with other relevant organizations. As a result, the GMI, the CCAC and the UNECE announced an official alliance during the Global Methane Forum in March 2016. These groups intend to work more closely in the near term, building on best practices and lessons learned in areas of common interest and leveraging respective networks.

A partnership between the GMI and the CCAC is a logical development as the two organizations have complementary mandates and good track records. GMI and CCAC have already engaged in joint projects in the oil and gas, waste and agriculture sectors. For example, two of the CCAC initiatives with a strong focus on methane, municipal solid waste and oil and natural gas production, were conceived, designed, and led by GMI partner countries. The initiatives were intended to build upon GMI accomplishments and leverage the high-level political will created by the CCAC. These initiatives were more broadly focused than regular GMI activities (e.g. include black carbon as well as methane). Of note, the CCAC has launched the Oil and Gas Methane Partnership in 2014, of which GMI is a partner. The objective of the

CCAC Oil & Gas Methane Partnership is to help oil and gas companies find and minimize methane emissions in their operations and create a new global standard in methane emissions control.

The UNECE offers an intergovernmental platform where member states come together to develop standards, guidelines, norms, and best practices on technical issues. From the UNECE's viewpoint, as expressed at the Global Methane Forum earlier this year, cooperation on technical issues is a way to advance integration and policy development. From this perspective, UNECE believes it is advantageous for the three organizations to work together to explore methane management methods and technologies along the whole value change, in all relevant extractive industries, and among stakeholders.

The Arctic Council

The Arctic Council, an intergovernmental forum that addresses issues faced by Arctic States and Indigenous people of the Arctic, was the first forum to recognize the importance of taking action to address SLCPs. Its early work focused on scientific contributions, confirming the substantially disproportionate impact that SLCPs have on the Arctic and concluding that reductions would lead to near-term climate, health and economic benefits in the Arctic, while also contributing to the global effort to limit the increase in the global average temperature.

To date, the Arctic Council has hosted two task forces dedicated to the issue of SLCP mitigation. The Task Force on Short-Lived Climate Forcers was established by the Arctic Council in 2009. In 2011, the Task Force delivered its first report, focused primarily on black carbon. In 2013, it was asked to continue its work by focusing on methane and tropospheric ozone, as well as further black carbon work. The second task force, the Arctic Council's Task Force on Black Carbon and Methane, was established in 2013 with the objective of creating the a collective agreement on black carbon and methane. The Arctic Council's Framework for Enhanced Action on Black Carbon and Methane, adopted by Arctic Ministers in 2015, commits Arctic States and participating Observer States to enhanced, ambitious national (and collective) action plans or mitigation strategies, as well as to improve science and emissions inventories, and includes the biennial submission of national reports on emissions and action and the submission of black carbon inventories to CLRTAP. An Expert Group was created under the Framework to review and synthesize national reports, and deliver a summary of progress and recommendations to Arctic Council Ministers.

Prior to COP 21, the Arctic Council affirmed its commitment to work alongside other countries under the UNFCCC to reach an ambitious, inclusive, durable and flexible protocol, other legal instrument or an agreed outcome with legal force under the Convention, applicable to all Parties by 2015 which will meet the long term goal aimed at reducing greenhouse gas emissions so as to hold the increase in global average temperature below 2 °C above pre-industrial levels.

The G-20

Canada and the U.S. have committed to national methane targets bilaterally in the Joint statement on Climate, Energy and Arctic Leadership, and trilaterally with Mexico under the North American Climate, Clean Energy, and Environment Partnership. Canada and the U.S. have committed to reduce methane emissions from oil and gas operations by 40-45% below 2012 levels by 2025. Mexico has also committed to reduce it emissions of methane from oil and gas by 40-45% by 2025.

These three countries have also committed to encourage other G-20 countries to take on commitments to reduce their emissions of methane from oil and gas. This type of advocacy can be very helpful to broaden the number of countries who are committed to reducing methane emissions.

While these commitments are politically binding as opposed to legally binding, both Canada and the U.S. have committed to bring forward regulations expeditiously and as soon as possible. Canada will publish proposed regulations in early 2017.

G-20 Energy Ministerial

The G-20 Energy Ministerial is also a forum that has held discussions on methane reduction targets. The G-20 Energy Sustainability Working Group was considered to be well-placed to effectively address methane emissions given the global leadership role that G-20 countries have and given that G-20 countries are responsible for a large share of oil and gas methane emissions. Discussions at the working level have been ongoing under the G-20 Energy Sustainability Working Group regarding a proposed oil and gas methane emissions reduction target since May 2015.

Last year, the U.S. used the meeting in Istanbul as an opportunity to negotiate methane reduction targets from the oil and gas sector. Since these discussions took place, Canada and the U.S. announced their commitment to reduce oil and gas sector methane emissions by 40-45% from 2012 levels by 2025. Recently, the G20 Energy Ministers met in Beijing, People's Republic of China in June 2016 where they recognized the importance of "Transforming our world: the 2030 Agenda for Sustainable Development" by UNGA and the Paris Agreement under the UNFCCC, reaffirmed the importance of energy collaboration within and beyond G20 countries for tackling common energy challenges and shaping a sustainable low GHG emission energy future, while utilizing energy sources and technologies.

Discussion/Rationale

The PRG discussed that the EB consider adding methane in some way to the Gothenburg Protocol when it next considers amendments to it, and also recommends that the following additional options be considered:

Option 1: Work with the UNFCCC to catalyze action on methane

- CRTAP could participate in meetings of the Ad Hoc Working Group on the Paris Agreement, to ensure that methane and other SLCPs play an important part in the Paris Agreement implementation.
- As per the recommendation on ensuring an integrated approach to addressing air pollution and climate change, a first step could be to bring all relevant actors (Arctic Council, UNEP, UNECE, GMI and the CCAC) together in a workshop to discuss how best to collaborate on achieving global methane reductions.

Option 2: Strengthen existing partnerships with like-minded organizations

- Allows for countries to further develop and bring forward their national methane strategies and targets and advocate for more countries to take action
- Continues the bottom-up policy-making approach
- Continue the partnership with GMI and CCAC and explore opportunities to cooperate on technical issues.
- GMI, CCAC, and UNECE may wish to focus on technical issues (i.e. leaks, emissions, venting, incomplete combustion) as opposed to overarching emissions reductions target. This work would likely be seen as apolitical, and thus avoid being a contentious issue debated in political arenas.
- Methane emissions would continue to be seen under the rubric of climate change, not through the integrated policy lens of climate change and air pollution, which is the best path forward according to the SAR.

Option 3: Continue methane emission reduction target discussions in the G-20 forum

- The G20 forum would provide an established structure of working groups and secretariat support
- Could possibly exclude smaller countries, who are disproportionately affected by climate change and air pollution, from participating in negotiations
- Overarching emission reduction targets formed in this environment tend to be political. Countries may not wish to make such commitments at this time.

(Rec 16 of informal document 2 and Section A 2 (c) in the PRG report)

Annex 1 Additional Background on the Implementation Committee

The Implementation Committee (IC) was established by the Executive Body in 1997 (EB Decision 1997/2) to review compliance by Parties with their obligations under the protocols to the Convention. The Committee's work focuses on three main areas:

(i) considering cases of possible non-compliance by an individual Party with any of its emission reduction obligations under a given protocol;
(ii) reviewing compliance by Parties with their reporting obligations; and,
(iii) carrying out in-depth reviews of specified obligations in an individual protocol at the request of the Executive Body.

The Executive Body revised 1997/1 with Decision 2006/2: "Implementation Committee, its structure and functions and procedures for review." EB Decision 2012/25 updated its mandate and EB Decision 2006/2.

In its report to the EB meeting in December 2013 (ECE/EB.AIR/2013/3), the IC informed the EB that it had developed an information paper on compliance to inform technical bodies under the Convention about the importance of compliance/implementation to the good functioning of the Convention, in accordance with the Long-term Strategy and that the paper was circulated to the chairs of the TFEIP, WGSR and WGE and the EMEP Steering Body.

Annex 2

Mapping of the Environment sub-program processes and activities that support countries in achieving the Sustainable Development Goals

ECE/BATUMI.CONF/2016/INF/1 *(PDF)*

Available on http://www.unece.org/environmental-policy/environment-for-europe/efe-conferences/batumi-conference/documents-and-materials

The present information document was prepared by the secretariat at the request of the Committee on Environmental Policy at its special session in February 2016 (ECE/CEP/2016/2, forthcoming), which was held to prepare the Eighth Environment for Europe Ministerial Conference.

The document responds to the call in General Assembly resolution 70/1 for an "adequately resourced, relevant, coherent, efficient and effective United Nations system in supporting the achievement of the Sustainable Development Goals. It also emphasized "the importance of system-wide strategic planning, implementation and reporting in order to ensure coherent and integrated support to implementation of the new Agenda by the United Nations development system" (paras. 46 and 88, respectively).

Selection of individual paragraphs related to air pollution in the chapter II. Goal by goal

§ 12. This chapter presents, for each SDG, subprogramme processes, including specific, concrete activities that will support countries in achieving the SDG. References to specific targets are indicated in parentheses after the titles.

Goal 2 End hunger, achieve food security and improved nutrition and promote sustainable agriculture (targets 2.2, 2.4)

§ 16. The Convention on Long-range Transboundary Air Pollution (Air Convention) sets targets for ammonia and nitrogen oxides and thus assists countries in abating nitrogen emissions and managing nitrogen more sustainably. This has direct impact on soil quality and will help in promoting sustainable agriculture.

§ 17. A task force under the Air Convention will continue to develop technical and scientific information and encourage coordination of air pollution policies on nitrogen in the context of the nitrogen cycle. The work of the task force will also help countries in fulfilling their obligations to reduce nitrogen oxides and ammonia emissions under the Convention's Protocol to Abate Acidification, Eutrophication and Ground-level Ozone (Gothenburg Protocol) and the Protocol concerning the Control of Emissions of Nitrogen Oxides or their Transboundary Fluxes.

Goal 3 Ensure healthy lives and promote well-being for all at all ages (targets 3.2–3.4, 3.9, 3.d)

§ 22. By reducing air pollution, the Air Convention is tackling the world's largest environmental health risk for non-communicable diseases. A joint task force, established by the Executive Body for the Convention and the WHO European Centre for Environment and Health, will continue to assess the health effects of long-range transboundary air pollution and provide supporting documentation. These assessments make it possible to quantify the contribution of transboundary air pollution to human health risks and to define priorities to guide future monitoring and abatement strategies. This will help countries in reducing morbidity and premature mortality related to air pollution.

Goal 7 Ensure access to affordable, reliable, sustainable and modern energy for all (targets 7.2, 7.a)

§ 47. The Air Convention sets emission limit values for air pollutants and these have proven to be an effective tool in stimulating investment in clean technologies, including in the energy sector. A task force was under the Convention is developing a techno-economic database of information on control technologies for air pollution abatement and their costs. The information will be used both to update the

technical annexes to the Convention's protocols as well as for input data to integrated assessment modelling. It will also assist countries in identifying technologies including in the energy sector that will reduce air pollution.

Goal 9 Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation (targets 9.1, 9.4, 9.a)

§ 56. As noted under Goal 7, the Air Convention stimulates investment in clean technologies. This helps countries in promoting sustainable industrialization. The information on control technologies for air pollution abatement, mentioned under SDG 7, will also assist countries in identifying technologies that will help reduce air pollution.

Goal 11 Make cities and human settlements inclusive, safe, resilient and sustainable (targets 11.1–11.7, 11.a, 11.b)

§ 65. Reductions in air pollution at the national level achieved under the Air Convention also mean an improvement in air quality at the city level. In turn, this protects historical buildings and monuments, as air pollution is a key factor in the degradation of building materials. The Convention's International Cooperative Programme on Effects of Air Pollution on Materials, including Historic and Cultural Monuments performs quantitative evaluations of the effect of major pollutants on the atmospheric corrosion of important materials and assesses the trends of corrosion and pollution. The information assists countries in protecting their cultural heritage. The quantification of the effects of air pollution at the city level under the Convention's Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP) will assist countries in tracing progress towards improving urban air quality.

Goal 12 Ensure sustainable consumption and production patterns (targets 12.1, 12.2, 12.4–12. 8)

§ 75. By setting emission targets for various air pollutants, the Air Convention assists countries in sustainably managing and improving air quality and in reducing releases of chemicals to air. In doing so, the effects of air pollution on other natural resources, such as water, will also be reduced. EMEP will provide sound scientific support, playing a major role in informing policy developments and helping countries in monitoring progress in reducing air pollution. The Convention's International Cooperative Programme on Assessment and Monitoring of Acidification of Rivers and Lakes (ICP Waters) assesses, on a regional basis, the degree and geographical extent of the acidification of surface waters. The three latest protocols to the Convention further help countries in ensuring the environmentally sound management of chemicals throughout their life cycle and to reduce their release to air.

Goal 13 Take urgent action to combat climate change and its impacts (targets 13.1–13.3)

§ 81. The Air Convention's Gothenburg Protocol is the first legally binding agreement containing obligations to reduce the broader spectrum of short-lived climate pollutants, including ground-level ozone precursors and black carbon. Implementation of the Protocol's obligations also has climate co-benefits. In addition, Convention task forces are working to better understand the intercontinental transport of air pollution across the Northern Hemisphere, including estimates of specific air pollutants, as well as the interactions between greenhouse gases and air pollution. Convention bodies will furthermore cooperate with the Arctic Monitoring and Assessment Programme on modelling of air pollutants, including black carbon.

Goal 14 Conserve and sustainably use the oceans, seas and marine resources for sustainable development (target 14.1)

§ 86. The Air Convention sets targets for various air pollutants, including ammonia and nitrogen oxides, and thus assists countries in reducing marine pollution from land-based activities, particularly nutrient pollution. Under the Convention, ICP Waters assesses the degree and geographical extent of the acidification of surface waters in the region, with follow-on effects for oceans, seas and marine resources.

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 (targets 15.1, 15.3–15.6)

§ 88. The Air Convention sets targets for emissions of various air pollutants, and thus assists countries in mitigating pollution effects on ecosystems and biodiversity. The Convention's International Cooperative Programme on Assessment and Monitoring of Air Pollution Effects on Forests provides a periodic overview of the condition of forest ecosystems in terms of health, productivity, diversity and nutrition. ICP Waters assesses the degree and geographical extent of acidification of surface waters. This, too, will assist countries in mitigating pollution effects on ecosystems and biodiversity.

Goal 17 Strengthen the means of implementation and revitalize the global partnership for sustainable development (targets 17.6, 17.9, 17.13, 17.16, 17.17, 17.19)

§ 99. The Air Convention provides a regional platform for sharing knowledge and expertise to support the achievement of a number of SDGs in countries of the region. The knowledge gathered is freely available and can also be used by countries beyond the ECE region. Exchange of data is also being fostered between the Air Convention, the Stockholm Convention on Persistent Organic Pollutants, the Minamata Convention on Mercury and the Arctic Council.