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SHORT-LIVED CLIMATE FORCERS

(Prepared by the Co-Chairs of the Bureau of the Task Force on National Greenhouse Gas Inventories)

(Submitted by the Secretary of the IPCC)

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SHORT-LIVED CLIMATE FORCERS

Proposal for an IPCC Expert Meeting on Emission Estimation of Short-Lived Climate Forcers[1]

1. Background

Recognizing the potentially significant influence of aerosols on climate change as identified in the IPCC Third Assessment Report (TAR), the IPCC at its 22nd Session (November 2004) decided to hold an expert meeting on estimation of aerosols emissions. Following this decision, an Expert Meeting on Emission Estimation of Aerosols Relevant to Climate Change was held in May 2005 by the Task Force on National Greenhouse Gas Inventories (TFI) assisted by the Working Group I (WGI). The objectives of this meeting were: (i) to conduct a preliminary assessment of issues related to developing estimates for anthropogenic emissions of aerosols identified in the TAR as having an impact on climate change; and (ii) to discuss the methodological approaches and related issues for estimating emissions of aerosols. While the whole range of aerosols was considered, the primary focus was on carbonaceous aerosols such as black carbon.

This expert meeting concluded, among others, that global inventories of emissions of aerosols relevant to climate change contained significant sources of uncertainty, and that it was not yet possible to reliably produce internationally comparable national emission estimates and estimate real differences in emission characteristics between countries. It was agreed that work was needed to reduce some of the uncertainties, and that further similar meetings participated by WGI, TFI and other aerosol inventory experts should be held.

The conclusions of this expert meeting were reported to the 24th Session of the IPCC (September 2005) for consideration of further work on aerosols. Noting the complexity of the issues involved, the IPCC at the same session agreed not to take any further action on emission estimation of aerosols relevant to climate change before the Fourth Assessment Report (AR4) was completed. It also agreed to revisit the item after completion of the AR4. However, it did not materialize and no follow-up expert meeting has been held by the IPCC so far.

The AR4 concluded that aerosol forcings were better understood than at the time of the TAR due to improved in situ, satellite and ground-based measurements and more comprehensive modelling while the dominant uncertainty in radiative forcing remained, and that aerosols also influence cloud lifetime and precipitation (AR4, WGI SPM). The estimated aerosol direct radiative forcing was –0.5 [–0.9 to –0.1] W m^{-2} and the indirect cloud albedo forcing of –0.7 [–1.8 to –0.3] W m^{-2}. The Fifth Assessment Report (AR5) again concluded that aerosols contributed the largest uncertainty to the total radiative forcing estimate, and revised the estimated direct aerosol effect at –0.27 [–0.77 to +0.23] W m^{-2} and the cloud indirect effect at -0.55 [-1.33 to -0.66] W m^{-2}. The AR5 also revised upwards the total radiative forcing of methane through updating estimate for indirect effects of methane emissions on ozone and stratospheric water vapour, and concluded that emissions of short-lived gases contribute to the total anthropogenic radiative forcing, with a virtually certain positive radiative forcing effect for emissions of CO and a likely net negative effect for emissions of nitrogen oxides.

[1] Short-lived climate forcers (SLCF) are referred to also as short-lived climate pollutants (SLCP). They are referred to as near-term climate forcers (NTCF) in the AR5, which are a set of compounds whose impact on climate occurs primarily within the first decade after their emission. This set of compounds includes methane, which is also a well-mixed greenhouse gas, as well as ozone and aerosols, or their precursors, and some halogenated species that are not well-mixed greenhouse gases. (Annex 3 Glossary, WGI contribution to AR5)

2. Proposed options for an expert meeting on SLCF during the AR6

The potential importance of reducing emissions of short-lived climate forcers (SLCF) such as methane, black carbon, and precursors of tropospheric ozone (including methane, carbon monoxide, non-methane volatile organic compounds and nitrogen oxides) is recognized not only to mitigate climate change but also to improve air quality and therefore bring near-term co-benefits in terms of human health, agricultural yields and ecosystems. In this context, a proposal was made by Mexico and other countries at the 45th Session of the IPCC (March 2017) to the effect that the IPCC should continue the discussion and consideration on issues relevant to short-lived climate forcers. This request will be partly addressed in the Sixth Assessment Report (AR6) as the proposed outline of WGI from the AR6 scoping meeting (May 2017) includes a chapter on Short-Lived Climate Forcers and Air Quality (pending on approval during the 46th Session of the IPCC), and this issue was identified as an important cross-cutting issue across all Working Groups, especially when considering cities. However, issues relating to development of robust inventory methodologies on estimation of SLCF emissions, which were emphasized in the Mexican proposal at the IPCC-45, will require consideration by the TFI and may not be covered in the AR6.

Taking into consideration the abovementioned agreement at IPCC-24, which has not yet materialized as well as the above-mentioned proposal, made at IPCC-45 and the expectations for a stronger focus on SLCF in the AR6, it is timely to consider the organization of an IPCC expert meeting on SLCF.

This consideration shall take into account the range of other proposed expert meetings that are considered relevant within the AR6 cycle.

In addition, in view of the financial difficulties that the IPCC is facing as well as the tight schedule and heavy workload already envisaged during the AR6 cycle, timing and size of this expert meeting need to be carefully determined. Before stating the options, is necessary to remind that in the present budget structure no fund allocation has been considered and therefore all amounts mentioned below require additional contributions to the Trust Fund. The scope of this expert meeting should be carefully considered with various factors taken into account such as the feasibility, the availability of resources, the depth of discussion which can be attained, and the benefit. In this context, three options are proposed for consideration by the Panel:

2.1 Option 1: Discussion on issues on estimation of emissions (TFI)

2.1.1 Objectives of the proposed expert meeting

This expert meeting would have the following aims:

- To review existing methodological work to estimate emissions of SLCF (e.g. studies on measurement methods, methodological guidance developed by other organizations, inventories that were actually produced by some countries) with a view to considering feasibility for the IPCC to develop methodological guidance;
- To consider which species of SLCF should be prioritized in the possible future work to develop inventory methodology, taking account of uncertainties in emission estimates and applicable common metrics as well as the extent to which it will contribute to inform decision making in mitigation policies and measures;
- To consider how the inventory methodology on SLCF would relate to the existing inventory methodology on greenhouse gases (What kind of elements in the existing GHG inventory methodology can or cannot be applied to SLCF?);
- To identify gaps in scientific understanding on estimates of SLCF emissions that need to be filled in by scientific research community.

2.1.2 Participation

This expert meeting would require participation of the following experts in order to achieve the objectives mentioned above. The total number of participants would be 60.

- National greenhouse gas inventory experts who are familiar with TFI work;
- Inventory practitioners who have experiences of developing SLCF emissions inventories;
- Experts representing other relevant organizations/initiatives that are engaged in methodological work on SLCF, e.g. UNECE Task Force on Emission Inventories & Projections (TFEIP), Climate and Clean Air Coalition (CCAC), Arctic Council;
- Experts representing the WGI physical science basis on common metrics such as GWP, GTP provided in AR5

2.1.3 Implications

This expert meeting will focus on issues relating to inventory methodology which will not be covered by the AR6. The limited scope will require less participants (hence less financial resources) than the other options and it will enable focused and in-depth discussion on inventory-related issues, while its outcome will be mostly findings and recommendations relating to TFI work.

Assuming participation of 60 experts, financial support to 30 journeys will be required. Also, other financial support to the local host of this meeting will be required if this meeting will be held in a developing country or a country with economy in transition. In total, CHF 140,400 from IPCC Trust Fund will be required. This expert meeting will be operated by TFI with assistance of WGI.

2.2 Option 2: Discussion on issues on estimation of emissions and estimations of climatic effects (direct and indirect effects on radiative forcing, including implications on clouds) (TFI, WGI)

2.2.1 Objectives of the proposed expert meeting

This expert meeting would have the following aims in addition to those for Option 1 above:

- To review existing methodological work to quantify the global radiative direct and indirect effects of SLCF, with a focus on new developments since the AR5;
- To identify gaps in scientific understanding on estimates of direct and indirect climate effects of SLCF on radiative forcing, including implications on clouds, that need to be filled in by scientific research community.

2.2.2 Participation

This expert meeting would require participation of the following experts, in addition to those for Option 1 above, in order to achieve the objectives mentioned above. The total number of participants would be 80.

- Experts representing the WGI physical science basis on near term climate forcers and their precursors (including the evolution of emissions, concentrations, at sectoral/regional and global scale, direct and indirect effects on radiative forcing).

2.2.3 Implications

This expert meeting will have a wider scope than the Option 1, focusing on both estimation of emissions and estimations of climatic effects (direct and indirect effects on radiative forcing, including implications on clouds). This wider scope will enable a wider range of conclusions that include not only recommendations on future TFI work but also inputs for the assessment of these issues in the chapter on SLCF and air quality in the WGI contribution to the AR6, while it will require more participants (hence more financial resources) than the Option 1.

Assuming participation of 80 experts, financial support to 40 journeys will be required. Also, other financial support to the local host of this meeting will be required if this meeting will be held in a developing country or a country with economy in transition. In total, CHF 187,200 from IPCC Trust Fund will be required. This expert meeting will be operated by TFI and WGI.

2.3 Option 3: Discussion on issues on estimation of emissions and estimations of climatic effects (direct and indirect effects on radiative forcing, including implications on clouds) (TFI and all WGs)

2.3.1 Objectives of the proposed expert meeting

This expert meeting would have the following aims in addition to those for Option 2 above:

- To review the existing scientific knowledge on the relationships between emissions of SLCF and air quality, including implications on human health, crop yields and ecosystems, with a focus on new developments since the AR5, and the possibility to quantify co-benefits associated with the mitigation of these compounds.

2.3.2 Participation

This expert meeting would require participation of the following experts, in addition to those for Option 2 above, in order to achieve the objectives mentioned above. The total number of participants would be 100.

- Experts representing knowledge on air quality and implications (at the interface between WGI-WGII-WGIII: atmospheric chemistry and air quality, human health, natural and managed ecosystems, economics, mitigation pathways).

2.2.3 Implications

This expert meeting will have the widest scope, covering implications on human health, crop yields and ecosystems, as well as co-benefits associated with the mitigation of SLCF, in addition to that covered by the Option 2. This widest scope will enable a wider range of conclusions than the other options, including inputs for the assessment to be made by WGII and WGIII in the AR6, such as how improved air quality resulting from adaptation and mitigation options provides co-benefits for human health, well-being and longevity. However, this option will require more participants (hence more financial resources) than the other options.

Assuming participation of 100 experts, financial support to 50 journeys will be required. Also, other financial support to the local host of this meeting will be required if this meeting will be held in a developing country or a country with economy in transition. In total, CHF 234,000 from IPCC Trust Fund will be required. This expert meeting will be operated by TFI and all WGs.

3. Timing

Taking into consideration the Strategic Planning Schedule for AR6, the following schedule is proposed:

- Jan-Feb 2018: Nomination of participants by IPCC member governments and observer organizations
- mid March 2018: Selection of participants
- late March 2018: Sending invitation letters to the participants
- late May 2018: Expert Meeting

The report of this expert meeting will be submitted to the IPCC Plenary Session in October 2018.