CLIMATE & CLEAN AIR COALITION
TO REDUCE SHORT-LIVED CLIMATE POLLUTANTS

Guidance Note on Short-Lived Climate Pollutants for Intended Nationally Determined Contributions

Recent scientific assessments coordinated by the UN Environment Program[1] have identified a number of 'win-win' measures for near term climate protection and clean air benefit. Fast uptake of these cost-effective and readily available measures, which target emissions of short-lived climate pollutants (SLCPs) in key sectors, could bring rapid and multiple benefits for human well-being. SLCPs include methane, tropospheric ozone, hydrofluorocarbons (HFCs), and black carbon (BC - the strongest warming component of particulate matter 2.5 [PM2.5] air pollution), they have a warming effect on climate, and most of them are also dangerous air pollutions with detrimental impacts on human health, agriculture, and ecosystems. While fast action to mitigate SLCPs could help slow the rate of climate change and improve the chances of staying below 2°C target in the near term, longer term climate protection will only be possible if deep and persistent cuts in CO_2 emissions are rapidly realised.

A number of CCAC countries such as Mexico, Cote d'Ivoire, and Bangladesh, have expressed their desire to include actions on SLCPs in their INDC submissions to the UNFCCC. This note is intended to provide guidance to countries that would like to do so by helping them identify specific SLCP actions and measures that may be included in their Intended Nationally Determined Contributions (INDCs) and by suggesting additional information that may be provided regarding such actions and measures.

I. SLCP actions and measures to consider including in INDCs

The 2011 Assessments led by UNEP and WMO identified 16 key measures, targeting methane and BC-rich sources, which if deployed globally by 2030 could avoid about 0.5°C of additional warming by 2050, prevent approximately 2.4 million deaths annually to outdoor PM2.5 air pollution, and many more from indoor PM2.5 air pollution, and avoid about 50 million tonnes of lost crop yields by reducing concentrations of ground level ozone. A rapid phase down of high-GWP HFCs, as has been proposed under the Montreal Protocol, could increase the prevented warming by 20% to a total of 0.6°C by 2050. Additional carbon dioxide reductions may also be achieved from improvements in combustion efficiency due to BC and methane measures, and if an HFC phase down leads to significant energy efficiency gains, such as the 30-60% efficiency gains achieved in appliances in past phase outs of fluorinated gases.

The 16 measures are shown in the table below. In addition to these measures, there are a number of measures that will reduce and prevent HFC emissions, such as a gradual phase down of HFCs, as

[1] UNEP/WMO (2011) Integrated Assessment of Black Carbon and Tropospheric Ozone; UNEP (2011) HFCs: A Critical Link in Protecting Climate and the Ozone Layer; UNEP (2011) Near-term Climate Protection and Clean Air Benefits: Actions for Controlling Short-Lived Climate Forcers; WB & ICCI (2013) On Thin ice: How Cutting Pollution Can Slow Warming and Save Lives.

under the European Union's f-gas rule, as well as targeted measures for reducing specific HFCs, as outlined in the recently published report, *Alternatives to Hydrofluorocarbons*.[2]

Table 1 - SLCP Measures identified that improve climate change mitigation and air quality and have a large emission reduction potential (Source: UNEP 2011)

Sector	Measures [3]	Targeted emissions
Transport	Standards for the reduction of pollutants from vehicles (including diesel particulate filters), equivalent to those included in Euro-6/VI standards, for road and off-road vehicles	BC and co-pollutants
	Elimination of high-emitting vehicles in road and off-road transport	BC and co-pollutants
Residential	Replacing lump coal by coal briquettes in cooking and heating stoves	BC and co-pollutants
	Pellet stoves and boilers, using fuel made from recycled wood waste or sawdust, to replace current wood burning technologies in the residential sector in industrialized countries	BC and co-pollutants
	Introduction of clean-burning (fan-assisted) biomass stoves for cooking and heating in developing countries	BC and co-pollutants
	Substitution of traditional biomass cookstoves with stoves using clean-burning fuels (liquefied petroleum gas (LPG) or biogas)	BC and co-pollutants
Industry	Replacing traditional brick kilns with vertical shaft brick kilns	BC and co-pollutants
	Replacing traditional coke ovens with modern recovery ovens	BC and co-pollutants
Agriculture	Ban on open burning of agricultural waste	BC and co-pollutants
	Control of methane emissions from livestock, mainly through farm-scale anaerobic digestion of manure from cattle and pigs	Methane
	Intermittent aeration of continuously flooded rice paddies	Methane
Fossil fuel production and transport	Extended pre-mine degasification and recovery and oxidation of methane from ventilation air from coal mines	Methane
	Extended recovery and utilization, rather than venting, of associated gas and improved control of unintended fugitive emissions from the production of oil and natural gas	Methane
	Reduced gas leakage from long-distance transmissions pipelines	Methane
Waste management	Separation and treatment of biodegradable municipal waste through recycling, composting, and anaerobic digestion as well as landfill gas collection with combustion/utilization	Methane
	Upgrading primary wastewater treatment to secondary/tertiary treatment with gas recovery and overflow control	Methane
	Ban on open burning of municipal waste	BC and co-pollutants

[2] Carvalho, S. *et al.* (2014) ALTERNATIVES TO HIGH-GWP HYDROFLUOROCARBONS.

[3] More details on these measures can be found in the UNEP/WMO (2011) INTEGRATED ASSESSMENT OF BLACK CARBON AND TROPOSPHERIC OZONE. Please note that there are measures other than those identified in the table that could be implemented. For example, electric cars would have a similar impact to diesel particulate filters but these have not yet been widely introduced; forest fire controls could also be important but are not included due to the difficulty in establishing the proportion of fires that are anthropogenic. In addition, there are also intermediate measures that are not listed here, such as improving brick firing practices (e.g. zig-zag firing of BTKs, use of internal fuel mixed with clay, substituting solid fuels like coal and biomass with clean-burning fuels, etc.)

Refrigeration & A/C	Phase-down consumption and use of high-GWP HFCs by replacing them with low-GWP and not-in-kind alternatives	HFCs

Considering the flexibility that the INDC process presents, CCAC partners might decide to include any number of measures (such as those listed in Table 1) that they are pursuing at home. These measures could be included regardless of how the country prefers to frame SLCP reductions in its INDC, e.g., measures taken by pollutant, measures taken to reduce near-term warming, or measures taken to reduce near-term warming and achieve sustainable development co-benefits.

II. Additional SLCP information that countries may wish to include in their INDCs

While no formal consensus has been reached among UNFCCC Parties about what to include in the INDCs and how they might be elaborated, paragraph 14 of the *Lima Call for Climate Action*, agreed by Parties in December 2014 highlights some of the information Parties may wish to include in their INDCs, such as:

1. Quantifiable information on the reference point (including, as appropriate, a base year)
2. Time frames and/or periods for implementation
3. Scope and coverage
4. Planning processes
5. Assumptions and methodological approaches including those for estimating and accounting for anthropogenic greenhouse gas emissions and, as appropriate, removals
6. How the Party considers that its intended nationally determined contribution is fair and ambitious, in light of its national circumstances, and how it contributes towards achieving the objective of the Convention as set out in its Article 2

Countries wishing to include SLCPs in their INDC may therefore do so in a variety of ways. For example, countries might highlight SLCPs within a section on the scope and coverage of their INDCs, such as what sectors or gases are covered in their plans. They might include descriptions of their National Action Plans on SLCPS within a section on Planning Processes. They might share assumptions and methodologies for estimating benefits of SLCPs reduced, whether in terms of CO_2-equivalence,[4] as is UNFCCC practice for methane and HFCs, or in other terms, such as in the particulate matter reductions or health benefits in the sample in section III below. Countries might also emphasize strategic information as well, such as how their actions on SLCPs can help fulfil the objective of the Convention in Article 2, e.g., reducing SLCPs can help trim peak temperatures and slow the rate of climate change, allowing ecosystems and societies to better adapt as called for in Article 2.

C. Sample Format for Including SLCP actions in INDCs

With the purpose of advancing the goals of Article 2 (UNFCCC), noting the importance of 'stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system … within a time frame sufficient to

[4] Within the CCAC, the Scientific Advisory Panel does not recommend using CO_2-e to describe any climate forcers, except when working with other fora, such as the UNFCCC which has a clear methodology for CO_2-e for HFCs and methane. The SAP does not recommend using CO_2-e for black carbon under any circumstances.

allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner' in [country] actions are being taken to implement many of the short-lived climate pollutant (SLCP) measures shown in Table 1. There are already policies in place to reduce emissions from the [sector/activity] which focus on [details]. We expect that this will reduce associated emissions by [X amount]. In addition, [country] will focus on implementing [measures] to reduce emissions from [sector/activity].

It is estimated that the action being taken on SLCPs will considerably reduce the emissions that contribute to near-term warming and thus promote a decrease in the rate of warming we will experience over the next few decades. In addition, the actions will lead to a considerable decrease in $PM_{2.5}$ and precursors of ozone pollution. The action [country] will take on methane will lead to reduced background ozone formation, which will avoid crop production losses and reduce human health impacts. In addition, the implementation of [BC measures] will also reduce NOx, CO and NMVOC emissions, all of which are ozone precursors, and they will also reduce black carbon (BC), organic carbon (OC) and other primary $PM_{2.5}$ particles emitted from incomplete combustion, as well as precursors of inorganic and organic $PM_{2.5}$ particles.

Of the air pollutants, $PM_{2.5}$ is leading preventable cause of premature deaths and ill-health in the world. In in [country], $PM_{2.5}$ pollution is estimated to cause [X- take number from GBD estimates – see www……] thousand deaths, reducing the emissions that lead to $PM_{2.5}$ in [country] will have a considerable positive impact on people's health. [also mention crop benefits].

[*if the country has quantitative data*] In [country] we have undertaken some modelling and estimate that emissions of methane in [20XX] should reduce by [X%] in comparison to the projected baseline emissions in [20XX]. By implementing the measures to prevent incomplete combustion we estimate that emissions of different substances will decrease by the percentages shown in Table 2, relative to the baseline scenario emissions in [20XX]. By implementing measures to replace HFCs with alternative strategies and technologies (e.g. using different refrigerants), we estimate that the emissions of HFCs will reduce by [Z%] in the year [20XX] in comparison to the unabated baseline scenario emissions.

Table 2. Reduction in emissions in [20XX] of SLCPs.

Measure and Substance	**'Current' [20XX] Emission**	**[20XX] Projected baseline scenario emission**	**Emission in [20XX] and [X%] reduction in [20XX] relative to the projected [20XX] baseline emission**	
'BC Measures'	(ktonnes)	(ktonnes)	(ktonnes)	(Per cent)
Black Carbon				
'Methane measures'				
CH_4				
'HFC measures'				

HFCs				

Table 2 bis. Reduction in emissions in [20XX] of criteria pollutants.

Measure and Substance	**'Current' [20XX] Emission**	**[20XX] Projected baseline scenario emission**	**Emission in [20XX] and [X%] reduction in [20XX] relative to the projected [20XX] baseline emission**	
'BC Measures'	(ktonnes)	(ktonnes)	(ktonnes)	(Per cent)
Organic Carbon				
'Other' $PM_{2.5}$				
NOx				
NMVOCs				
CO				
SO_2				
NH_3				

Emission reductions of BC, CH4 and HFCs will lead to a reduction in the contribution of [country] to near-term warming. Modelling has estimated that the warming caused by [country] to the global average temperature increase in 2050 due to all emitted substances will be reduced by [X%]. The modelling also estimates that BC emission decreases will result in [X] fewer premature deaths from outdoor exposure to $PM_{2.5}$ in [20XX] relative to the current number deaths (in 20XX) of [X] thousand and projected deaths in [20XX] of [X] thousand, of which Z% are in [country] and the remainder in other countries. Also the number of deaths from ozone decrease by [Z] relative to the projected [20XX] Number of deaths due to ozone. Only [X%] of these are prevented in [country], as the ozone is a regional and hemispheric pollutant. These results are illustrated in Table 3 and Figures XX and XX.

Table 3. Current and projected number of premature deaths under the baseline and mitigation scenario

Measure and Substance	**Current health impact**	**Projected health impacts using baseline emission in [20XX]**	**Projected health impact of the reduced emissions**	
'BC Measures'			(ktonnes)	(Per cent)
Black Carbon				
Organic Carbon				
'Other' $PM_{2.5}$				
NOx				
NMVOCs				
CO				
CH_4				

SO_2				
'Methane measures'				
CH_4				
'HFC measures'				
HFCs				

Prepared by the Supporting National Planning for Action on SLCPs (SNAP) Initiative Lead Partners in consultation with members of the Scientific Advisory Panel (SAP).

For comments, suggestions or questions, please contact: ccac_secretariat@unep.org