# Guideline for Policy Makers Toward the Reduction of Radiative Forcing of Methane and Tropospheric Ozone as SLCP

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Although the importance of the reduction of SLCPs in the atmosphere for the mitigation of mid-term as well as long-term climate change is, in principle, well known, their reduction target has not been clearly proposed. Also, discussions of which species should be controlled including the recent finding of ineffectiveness of BC for global warming mitigation, and of possible adverse effect of $NO_x$ control for $O_3$ reduction on the reduction of $CH_4$ reduction give an impression of ambiguity to policy makers, and have discouraged their motivation for SLCP co-control. In order to promote the policy of SLCP co-control, we need to give more straightforward message to policy makers regarding the target and effectiveness of SLCP co-control.

In the present study, instead of employing detailed chemical-climate model simulation, an “empirical approach” based on historical concentrations of $CH_4$, and trop. $O_3$ are taken to discuss the targeted reductions of anthropogenic emissions of each SLCP and precursors ($NO_x$ and NMVOC). Due to the long atmospheric lifetime, global mean concentration of $CO_2$ will increase to ca. 450 ppbv in 2040, regardless of the IPCC scenario, RCP3PD, RCP4.5 and RCP6, which would lead to inevitable further increase of radiative forcing ($DRF_{CO2}$) of ca. 0.8 W $m^{-2}$ taking 2010 as a base year. Meanwhile, analysis of historical increasing trend of RF shows that $DRF_{CH4}$ is ca. 0.14 and 0.21 W $cm^{-2}$, and $DRF_{O3}$ is ca. 0.17 and 0.21 W $cm^{-2}$ lower in 1970 and 1960, respectively, with reference to 2010. This would mean that $DRF_{CH4}$ + $DRF_{O3}$ is -0.31 and -0.42 W $cm^{-2}$ in 1970 and 1960 as compared to 2010, which corresponds to the compensation of 38% and 53% of 0.8 W $m^{-2}$ increase due to $CO_2$, respectively.

Base on the above discussion, the necessary reductions of anthropogenic emissions of $CH_4$, $NO_x$ and NMVOC in Asia in 2040 will be discussed and compared with the proposed emission reduction in the Solution Report prepared under UN Environment Asia Pacific Office in 2018.

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