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Evaluation of co-benefits from combined climate change and air pollution reduction strategies

Joana Leitao (1), Rita Van Dingenen (1), Frank Dentener (1), and Shilpa Rao (2)

(1) Joint Research Centre, European Commission, Ispra (VA), Italy (joana.leitao@jrc.ec.europa.eu), (2) International Institute for Applied Systems Analysis, Laxenburg Austria (rao@iiasa.ac.at)

The connection of climate change and air pollution is becoming more relevant in the process of policy making and implementation of emission control strategies because of resulting co-benefits and trade-offs. Some sectors, such as fossil fuel combustion, are sources of both pollutants (NO_x and PM) as well as greenhouse gas (CO_2). Additionally, the use of wood burning as biofuel to reduce climate impact may in fact deteriorate air quality. Furthermore, several air pollutants are important radiative forcers and regulating their emissions impacts on climate. It is evident that both problems need to be undertaken with a common strategy and the existence of cross-policy with co-benefits may encourage their implementation.

The LIMITS FP7 project (http://www.feem-project.net/limits/index.html) was designed with the main goal of assessing strategies for reduction of GHG emissions so that the 2°C target can be achieved. The work developed focus on the evaluation of the implementation of strategies analysing several aspects of different scenarios, namely: the feasibility of low carbon scenarios in terms of available technologies and infrastructure, the required financial mechanisms, and also the co-benefits regarding energy security, economic development and air pollution. For the latter, five integrated assessment models (IAMs) provided greenhouse gases and pollutant emission values for several scenarios. These were based on air pollution scenarios defined according to stringency and implementation of future global legislation. They which were also combined with 2 climate policy scenarios (no climate policy and 2.8 W/m2 target). The former are mostly focused on non-climate policies and technical control measures for emissions of air pollutants, such as PM2.5, NO_x and SO_2, with their emission factors harmonized between the IAMs. With the global air quality source-receptor model TM5-FASST the impact of the resulting emissions was analysed and the co-benefits of combined climate and air pollution strategies assessed. The TM5-FASST tool allows for a fast screening of emission scenario variants and the resulting impacts can be investigated by source country, source sector level or by precursor. Developed at JRC, this model is a linearized version derived from the full chemical transport model TM5-CTM, taking as input pollutants emissions from 56 source regions with global coverage. The resulting pollutant concentrations are determined and their associated effect on human health (from PM2.5 and O_3), the yield loss of damaged crops (from O_3), and CO_2eq of short lived climate forcers are quantified.

The analysis of the LIMITS scenarios allows for impact assessment of alternate air pollution control assumptions on pollutant emission trajectories out to 2030 and 2050. The results show that stringent climate policies provide a significant air quality benefit compared to current legislation air quality policy. The identified benefits and trade-offs provide a strong incentive for the implementation of combined national policy focusing both on climate change and air pollution.