Air Quality - Agricultural Emissions

Max Callaghan

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Agricultural Emissions

Outdoor air pollution contributes to millions of global premature deaths annually, with most health impacts air linked to fine particulate matter ($PM_{2.5}$) (Lelieveld et al., 2015). Nitrogen oxides (NO_x) and Sulphir dioxide (SO_2) are produced in the transport and power sectors and undergo further chemical reactions in the atmosphere to form $PM_{2.5}$. Because these reactions are conditional on concentrations of ammonia (NH_3), which is emitted in the agricultural sector, the optimal air pollution mitigation strategy should take into account all three sources, as well as primary carbonaceous aerosols of organic matter (OM) and black carbon (BC).

Due to atmospheric reactions between alkaline ammonia (NH_3) and acidic nitrogen oxides (NO_x) and sulphur dioxide (SO_2), that contribute to the formation of $PM_{2.5}$, an optimal air pollution mitigation strategy should consider agricultural emissions (which primarily account for ammonia) as well as those from the transport and power sectors (Wang et al., 2015; Lee et al., 2015). Ammonia's contribution to premature mortality varies by region; in parts of Europe and North-Eastern America, reductions in Ammonia emissions may generate the largest reductions in mortality, although these results are sensitive to uncertainties about the relative toxicity of $PM_{2.5}$ particles by source (Lee et al., 2015; Lelieveld et al., 2015). Mitigation options for ammonia emissions are higher than other sectors, but behavioural changes towards reducing meat consumption would be highly effective, and would also generate health benefits for humans, a reduction in GHG emissions, a reduction in biodiversity loss, and the improvement of water quality (Backes et al., 2016; Leip et al., 2015).

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