

Ozone strategies in the context of other policy objectives

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Ground-level ozone is a very complex issue,
influenced *inter alia* by
emissions, long-range transport, complex
chemistry, climate and local conditions.

Some important uncertainties in the understanding of the ozone problem

- **Health effects:**
 - Impacts of low O₃ concentrations?
 - Chronic effects? In polluted air (cities)? Multi-pollutant mixtures?
 - Personal exposure? Role of indoor exposure?
- **Vegetation:**
 - Interaction between of O₃ and nitrogen deposition/fertilization – net impacts of NO_x reductions?
- **Climate change:**
 - Changes in weather patterns – blocking high pressure systems, etc.
 - Biogenic emissions, ozone deposition during droughts
- **Ozone formation:**
 - How well can current O₃ models explain lower O₃ levels (long-term, nights, winter, etc.)?
 - Linkages across scales (urban/regional/continental/hemispheric)

More research is needed.

In the meantime:

A risk management approach?

1) Despite all the uncertainties, we know that:

- The O₃ problem is linked to NO_x, VOC, CH₄, CO emissions
- Large scale reductions of background ozone (to protect vegetation and perhaps health) require large-scale NO_x and CH₄ mitigation
- VOC cuts reduce local O₃ peaks and urban plumes (if and where they remain a problem – how many people are living in high ozone plumes?)
- The quantification of the benefits of specific measures remains challenging with current tools

2) Strengthen measures targeted at other policy objectives with co-benefits for O₃

Further NO_x reductions are necessary for

- WHO guidelines for PM_{2.5} (~90% of health impacts are related to PM_{2.5}),
- biodiversity protection (excess nitrogen deposition),
- NO₂ limit values.

CH₄ mitigation is essential for

- ambitious long-term climate targets (UNFCCC),
- limiting near-term temperature increase (SLCP/CCAC),
- sustainable economic development (SDG).

Further VOC cuts

- could also reduce SOA and thereby PM_{2.5}
– but uncertainties about role of solvents emissions.

Key points

- Due to gaps in scientific understanding, it is currently difficult to develop robust strategies targeted at ozone.
- But strengthened efforts to achieve the WHO guideline for PM2.5 and to enhance climate policies are likely to deliver co-benefits for health- and vegetation protection against ozone.
- International and even hemispheric coordination is essential.