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Contact:
michela.maione@uniurb.it

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1. IPCC (2014) Fifth Assessment Report: Summary for Policymakers http://www.ipcc.ch/pdf/assessment-report/ar5/syr/AR5_SYR_FINAL_SPM.pdf

2. This study was based on the activities carried out under 'ACCENT-Plus' (Atmospheric Composition Change: The European Network-Policy Support and Science), funded by the European Commission under its Seventh Framework Programme. See: http://cordis.europa.eu/project/rcn/96700_en.html

European Commission

Science for Environment Policy

Coordinated policies can benefit both air quality and climate change

Pollutants emitted by human activities have caused declines in air quality and drastic changes to climate. Despite being inextricably linked, these two major environmental issues tend to be viewed separately by policy. However, in certain instances, considering these issues together could lead to strategies that benefit both, according to a newly published review.

Climate change and air pollution are two of the biggest environmental issues facing humanity. Air pollution is a major cause of disease, responsible for over 3 million premature deaths globally (almost half a million of which are in Europe), and recent changes to the climate are unprecedented for millions of years — causing widespread and severe impacts on human and natural systems[1].

These challenges are connected in many ways, and it is impossible to separate emissions into clear groups of air-borne pollutants (which have effects on human health and ecosystems) and climate forcers (which change climate), as most emissions have effects on both.

In the EU, air quality and climate change are dealt with by separate policy frameworks in different Directorates General (DG): DG Environment (air quality) and DG Climate Action (climate change). Air quality has been dealt with at EU-level, for example, by the National Emission Ceilings Directive, the Directive on Sulphur Content of Fuels, and the Directive on ambient air quality and cleaner air, as well as at a wider international level, by the UNECE LRTAP Convention for example. Climate change is dealt with by international agreements, such as the UN Framework Convention on Climate Change, and also by the EU's own climate and energy package, adopted under the 20-20-20 targets.

As many of the emissions that lead to degraded air quality also contribute to climate change, and many potential measures to mitigate climate change also affect emissions of air pollutants, regulations on emissions are needed in both policy departments.

However, these must be carefully balanced, as it can be the case that policy actions designed to mitigate air pollution could accelerate climate changes. Conversely, some mitigation options could benefit both areas. Therefore, according to the researchers, coordinated actions taking into account the air quality–climate links are required. They say these actions need to be based on strong scientific grounds, as recognised by the European Commission, which has recently promoted consultation processes among the scientific community, policymakers and relevant stakeholders.

In this study, EU-funded[2] researchers examined how such coordinated actions could be achieved by policy. After assessing the policy frameworks, the researchers looked at the pollutants they regulate. According to the researchers, particulate matter (PM) is the atmospheric component that best illustrates the air quality–climate change connection. It can induce adverse health effects even at low concentrations but can also influence the climate by scattering and absorbing radiation.

Aerosols (tiny particles within PM) can be associated with cooling effects, which means emission control policies to improve air quality, by reducing PM_{10} for example, could reduce the number of premature deaths due to air pollution but also increase future climate warming[3]. This is an example of a mitigation option that benefits one side (air pollution) but may worsen the situation in another (climate).

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Coordinated policies can benefit both air quality and climate change *(continued)*

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However, there are mitigation options related to PM that could improve both. For example, absorbing aerosols such as black carbon (an important fraction of PM) have a significant warming effect as well as an air quality impact. A black carbon control measure would therefore have multiple benefits. This illustrates the importance of considering the interplay between air pollution and climate change when designing policy. EU policy acknowledges that PM can have a cooling effect on the climate, and in a recent Directive states that when reducing PM emissions priority should be given to black carbon in order to simultaneously tackle air quality and climate change.

Although traditionally dealt with by separate policy departments, efforts are being made to consider the issues jointly. Integrated Assessment Modelling (IAM) techniques, for example, are used to identify the co-benefits (as well as potential unintended consequences) of combined air pollution and climate change mitigation strategies. These techniques can help to avoid trade-offs, for example where increased use of biomass for residential heating reduces carbon footprint but contributes to PM emissions. Similarly, the promotion of diesel cars through tax subsidies may reduce CO_2 emissions but increase emissions of NO_2 and PM. It is important that future policies avoid these adverse effects and maximise the co-benefits.

The researchers discuss several hurdles to achieving this, such as organisational arrangements. They cite the report *Integrated Assessment of Black Carbon and Tropospheric Ozone*[4] as a pioneering work aimed at proposing integrated measures to mitigate both air quality and climate warming. This effort led to the initiative Climate and Clean Air Coalition (CCAC), aimed at facilitating faster and more efficient progress toward protecting human health and ecosystems while mitigating near-term climate change.

Pursuing optimal policies will require careful management and political co-operation. The researchers give the example of the European Directive implementing Euro 5 & 6 light-duty vehicle emissions standards, which required the use of diesel particulate filters. Although this led to a small increase in fuel consumption (and therefore CO_2 emissions) and was understandably met with some concern by the climate community, a path forward was agreed. Similar negotiations will become increasingly important in the future.

3. Arneth, A., Unger, N., Kulmala, M., Andreae, M.O., 2009. Clean the air, heat the planet? *Science*: 326, 672–673.

4. Shindell *et al* (2012). *Integrated Assessment of Black Carbon and Tropospheric Ozone.* The United Nations Environment Programme and World Meteorological Organization.