

The co-benefits of climate change mitigation

Key points

- Climate change mitigation brings additional benefits, including improved health and reduced resources use
- These co-benefits, which can be locally captured, should be taken into account when assessing the impact of initiatives
- Co-benefits create a wider space for collaboration and facilitate raising finance
- Including co-benefits of climate mitigation can in many cases offset costs and inspire deeper and faster reductions in emissions

Summary

Climate change mitigation initiatives can also advance other policy goals. The health impact of air pollution is equivalent to more than 10% of GDP in almost half of the countries in the United Nations Economic Commission for Europe (UNECE) region. Short-lived climate pollutants (SLCPs), notably black carbon, have strong warming effects but they are also a major component of air pollution. Initiatives that reduce both SLCPs and CO₂, such as vehicle emissions controls, are particularly attractive. Halving greenhouse gases (GHG) emissions by 2050 in relation to 2005 would reduce premature deaths caused by air pollution by 20–40%, depending on the countries. The cost of climate change mitigation is lowered by the benefits obtained by reducing air pollution. Besides health, there are other co-benefits that need to be taken into account in an integrated approach to climate change action that looks at different synergies and trade-offs. The existence of co-benefits with a local impact within shorter time horizons facilitates cooperation and encourages action on climate change mitigation.

Multiple benefits

Human activity affects climate change through emissions of GHG that cannot be absorbed by natural systems. As a result, the stock of GHG increases over time leading to rising temperatures. The shift towards a low carbon economy is an inescapable necessity. Radical changes are required in the way in which economic activity takes place, in particular regarding energy systems, cities and transport. However, this transition is complex and costly. Existing infrastructure and equipment are long lived, which creates barriers to change.

But many initiatives that reduce GHG emissions have benefits that go beyond contributing to climate change mitigation. Reducing air pollution



from emissions of fossil fuels and the accompanying health and environmental impacts is the most obvious co-benefit, but there are many other areas, including resource efficiency, economic security, sustainability of ecosystems or increased economic dynamism where positive impacts can be expected.

Some of these co-benefits have a direct financial translation (e.g. savings from reduced fuel use) while others (like health or the preservation of biodiversity) do not have a direct monetary value and therefore need to be estimated. There are also second-order impacts, including those resulting from freeing public resources for alternative uses. In addition, there are macro effects associated with increased climate-related investments on growth and employment. But there are also distributional aspects (winners and losers) resulting from the shifts in the pattern of economic activity that need to be considered.

However, despite the synergies between climate change mitigation and policy initiatives in other areas, like pollution reduction, there is no perfect alignment. Climate change mitigation does not provide an answer to all pollution problems, which still require specific attention. Moreover, there are instances where the efforts to mitigate climate

change may lead to pollution problems, such as the inappropriate use of biofuels. Diesel cars can be more energy efficient but can also result in increased pollution. The existence of synergies, trade-offs and incomplete alignment of objectives strengthens the rationale for an integrated consideration of these questions, across sectors and policy areas.

It is not only about climate

The assessment of climate change mitigation initiatives changes, once the existence of these multiple benefits is taken into account. The shift towards a low carbon economy is no longer seen as a necessary but costly transition but also as a source of opportunities to advance other policy objectives simultaneously. Climate mitigation policy can be considered as part of larger strategies for low-carbon development, where co-benefits play an important role in the motivation for actionⁱ. In fact, in some cases, policies may seek the co-benefits as the primary target (for example, reducing pollution or tapping into new forms of energy) while climate change mitigation becomes a collateral effect.

However, co-benefits are not always well documented in GHG emission reduction initiatives, which underestimates their positive impact. The outcome of economic assessments can differ significantly once these co-benefits are factored in. The payoffs of particular projects change once these co-benefits are taken into account, which

raises new financing possibilities. Choosing between different mitigation strategies needs to consider not only the economic costs of implementation and the impact on GHG emissions reduction but also the value of these co-benefits.

Health matters

Health co-benefits have attracted much attention, as they are obvious and significant. The overall costs of air pollution, which can largely be attributed to the use of fossil fuels, is huge. In the WHO Europe region, the burden, including premature deaths and morbidity, is estimated to be equivalent to around \$1.6 trillion in 2010. In almost half of the countries covered, this represents 10% or more of GDPⁱⁱ.

OECD work shows that the economic cost of deaths from air pollution in the United States can be estimated at 3.3% of GDP and in Canada is equivalent to 1.7% of GDPⁱⁱⁱ.

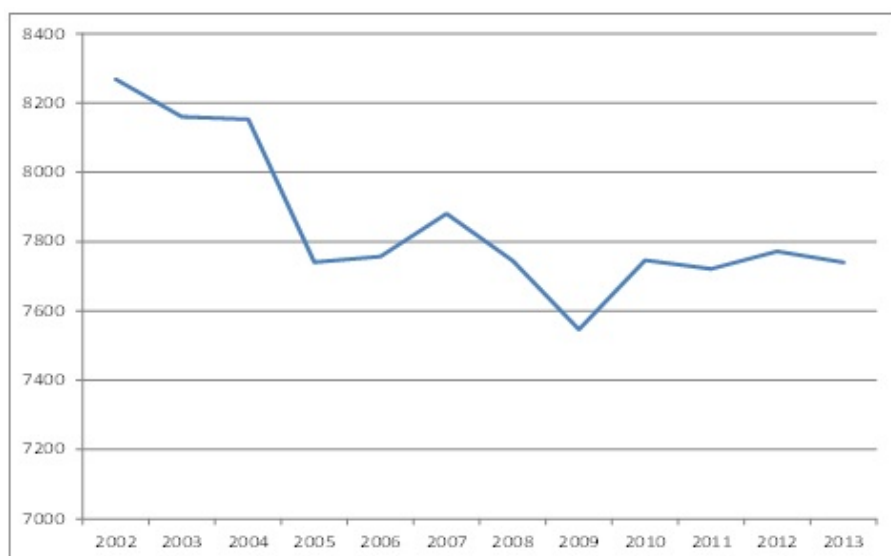
Many initiatives to reduce GHG emissions in household energy, transport, agriculture and electricity generation can help to address existing global health priorities, such as child mortality and non-communicable diseases^{iv}.

However, estimates of these co-benefits vary widely depending on differences in how exposure to pollution influences health risks and in the relation between the willingness to pay to reduce mortality risk and income levels, which is used to assign an economic value to life. Different scenarios can be developed regarding the relation between pollution and health the valuation of health risks.

One study estimated global average health co-benefits at \$58–380 per ton of CO₂ reduced, with benefits higher in developing than developed countries^v. In East Asia co-benefits are estimated to be 10–70 times the marginal abatement cost in 2030. According to other studies, the health co-benefits of limiting warming to 2 degrees by 2100 in the EU27 is estimated at \$200 per tonne of CO₂ reduced^{vi}. Other authors estimate health co-benefits in developed countries at \$100 per tonne of CO₂, while the modal shift to public transport results in a combined benefit of \$60 per tonne of CO₂^{vii}.

Short-lived climate pollutants (SLCPs) have strong warming effects but they are also a major component of air pollution. Fine particulate matter (PM 2.5) (Figure 1) is the leading environmental cause of poor health and premature death. Addressing this source of pollution contributes to both climate change mitigation and improved health outcomes. A recent report^{viii} by the World Health Organisation and the Climate and Clean Air Coalition (of which UNECE is a partner) estimates

Figure 1. Emissions on PM 2.5 as used in EMEP models, thousand tons



Note: Countries covered by the European Monitoring and Evaluation Programme (EMEP) for monitoring and evaluation of the long-range transmissions of air pollutants. The programme provides scientific support to the UNECE Convention on Long-range Transboundary Air Pollution
Source: WebDab – EMEP database http://www.ceip.at/ms/ceip_home1/ceip_home/webdab_emepdatabase/

The work of UNECE

UNECE activities contribute to climate action with significant co-benefits, including:

- The [Convention on Long-Range Transboundary Air Pollution](#), with its [Gothenburg Protocol](#), the first legally binding agreement to reduce short-lived climate pollutants.
- [Vehicle regulations](#) to reduce emissions and improve efficiency
- [Best practices for methane management](#)
- Cleaner [energy production from wood](#)
- [The Transport, Health and Environment Pan-European Programme \(the PEP\)](#)

that outdoor exposure to PM 2.5, of which black carbon makes up a major part, is the cause of around 3.7 million premature deaths annually. Including the impact of indoor pollution, resulting from households' combustion of solid fuel, the total estimated number of premature deaths is 7 million annually worldwide. Residential burning of biomass in the UNECE region has been identified as a problem under the Convention on Long-range Transboundary Air Pollution.

The Climate and Clean Air Coalition estimates that large scale mitigation of short-lived climate pollutants by 2030 would have not only positive climate-related effects (reducing the rate of sea-level rise by 20% by 2050) but would also avoid 2.4 million deaths annually from outdoor air pollution^{ix}.

Actions that reduce both SCLPs and long-lived GHG while generating significant health benefits are particularly attractive policies to support the goal to keep temperature increases within 2 degrees. Stricter vehicle emissions and efficiency standards are good examples of this type of initiative. This is an area where the UNECE plays a key role through the World Forum for Harmonization of Vehicle Regulations.

The shift towards the use of gas, a cleaner fossil fuel, has a larger impact on health outcomes than on cutting GHG but can nevertheless contribute to both targets (climate change mitigation and reduced pollution). A number of case studies presented in a recent report^x by the International Gas Union showed how initiatives to reduce the use of fuel oil with cleaner alternatives have resulted in cleaner air while reducing GHG emissions in a number of cities.

Air pollution co-benefits offset the cost of climate change mitigation. OECD estimates for both OECD and non-OECD countries show that these benefits can cover a significant part of the cost of mitigation of initiatives^{xi}. However, if the primary objective remains reducing air pollution, there are other mechanisms that are cheaper than mitigation initiatives. Halving GHG emissions by 2050 in relation to 2005 would reduce premature deaths caused by air pollution by 20-40%, depending on the region.

The health implications depend on the sectors where the cuts take place. This, in turn, depends on the time horizon, as actions are expected to take place initially in sectors with lower abatement costs, such as the electricity sector. However, this is a relatively less polluting sector and therefore the health impact is less significant. As cuts shift to the transport and household energy consumption sectors, the health benefits become larger.

Putting it all together

While ideally the full range of cost and benefits of any climate mitigation initiative should be taken into account, in practice, the focus is on a rather narrow range of direct consequences, including the more mainstream benefits of reducing air pollution and related health impacts. However, there are other positive implications that should not be neglected.

A review^{xii} of a number of case studies assessing the importance of co-benefits, which were defined in this context as going beyond the primary focus of the project (energy saving, electricity generation or others), found that these can be very substantial. For example, in a number of forest projects, non-climate co-benefits represented between 53-92% of total benefits. Co-benefits can represent between 50-350% of direct benefits from investment in energy efficiency and renewable energy sources, with health factors dominating. The estimation of these co-benefits largely depends on the context in which the project takes place and the modalities of implementation, which prevents deriving generally applicable rules on the size of these ancillary benefits. But the general implication is that these co-benefits can be substantial.

Reducing dependence on fossil fuels also brings other positive consequences by decreasing the danger of disruptions in energy supply from importing countries or the potential for economic losses due to price volatility. Estimates for these benefits are available mainly for the US market, where they are equivalent to \$5 per tonne of CO₂^{xiii}.

There are not only benefits but also indirect costs or trade-offs associated to some climate mitigation initiatives. For example, increased use of energy from commercial biomass may contribute to reducing GHG emissions but can also have a negative impact on biodiversity. On the other hand, a shift towards non-commercial fuels from biomass by households, as a result of the increased cost of other fuels due to mitigation policies, may have detrimental health effects. These have been highlighted in a report of the Task Force on Health Aspects of Air Pollution, a joint body of the WHO European Centre for Environment and Health and the UNECE Air Convention^{xiv}. UNECE is also working to promote cleaner energy from wood.

These examples show the need for coordination of initiatives that takes into account different interactions. The Intergovernmental Panel on Climate Change^{xv} acknowledges that mitigation measures can also have an impact on other policy goals, creating the possibility of co-benefits or adverse side effects. These linkages, if appropriately

managed, provide a stronger foundation for climate action. An integrated approach that looks at complementarities and trade-offs across multiple objectives in energy systems, transport, urban planning and land use can better take advantage of potential synergies.

A wider scope for cooperation

The existence of significant co-benefits radically changes the incentives for both individual (national) and collective (international) action. Addressing climate change through collective action suffers from a typical market failure – the tragedy of the commons – as the benefits of climate change action are not appropriable. But the presence of co-benefits opens new possibilities. Climate change mitigation actions can be in the countries' own national interests, leaving aside the global climate benefits. Even in the absence of an international global regime to enforce climate change mitigation actions, countries have incentives to undertake initiatives to reap these co-benefits, for example, to reduce pollution^{xvi}.

According to the Global Commission on the Economy and the Climate, more than 50% (or up to 90%) of the reductions in GHG emissions required to prevent temperatures raising above 2 degrees could be achieved through measures that are in the direct interest of countries undertaking them, once benefits other than mitigation are taken into account^{xvii}.

An IMF study^{xviii} estimates that the notional carbon price that takes into account only national benefits would be, on average, for the top twenty emitting countries, \$57.5 per ton of CO₂, raising around 2% of GDP in revenues. If these revenues are recycled to cut income taxes, co-benefits would exceed the costs of carbon pricing. These benefits accrue mainly as a result of the health impact of reduced air pollution at coal plants and lower automobile externalities. There is a significant variation of co-benefits across countries, which basically depends on the exposure of the population to air pollution and the presence of other instruments correcting for negative externalities.

If the costs of climate change mitigation actions can be offset, at least partially, by co-benefits, this would facilitate making more ambitious efforts, including by reducing the political resistance to change. The support of a wider range of groups, representing different interests, could be mobilised for climate change action.

Co-benefits (for example, the reduction of air pollution) are available within much shorter time horizons than the direct effects of climate change

mitigation.^{xix} This has both economic and political implications. If a rate of discount is used to compare future benefits against immediate costs, co-benefits that take place earlier would receive a higher weight^{xx}. Politically, it is easier to gather support to finance initiatives that are yielding a return in a more immediate future. The benefits of addressing climate change are mostly enjoyed by future generations while co-benefits accrue to current generations (i.e. the electorates that support incumbent policymakers). Climate change actions can be justified in terms of current benefits, such as reducing air pollution or creating new job opportunities, rather than as answers to the need to avoid more distant threats.

The existence of these co-benefits has also a positive impact on international cooperation, as the focus shifts from an exclusive emphasis on how to share the costs of reducing GHG emissions. This broader focus provides a stronger rationale for coordination, sharing lessons among countries and supporting each other in the path towards low carbon economies^{xxi}.

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