Health co-benefits of climate action

The Paris Agreement was a major political step towards reducing the risks of climate change; however, even if the agreed reductions in greenhouse gas emissions are fully implemented, the global average temperature will still have increased by about 3°C above preindustrial levels by the end of the century.[1] Deeper cuts are needed for the achievement of the long-term goal of keeping the increase to well below 2°C. An obvious rationale for action is the imperative to reduce the risks to health from climate change, but in an era when powerful interests seek to cast doubt on climate change science,[2] major ancillary near-term benefits (co-benefits) of climate action provide added justification for policies to cut greenhouse gas emissions. Health co-benefits can arise through several pathways, including through reduced air pollution, increased physical activity, and dietary change.[3]

The International Energy Agency suggested that a 7% increase in investment to achieve a "Clean Air Scenario" could result in saving 3 million premature deaths worldwide in 2040, provide energy access for all, and lead to a peak in carbon dioxide emissions in 2020.[4] The figure shows the sources of major primary air pollutants. In China, under the same scenario, mean life expectancy is increased by 15 months in 2040, relative to today. Although the benefits are larger in more highly polluted countries, they can be substantial even in developed nations. For example, in the USA, clean energy policies consistent with warming of 2°C could prevent 175 000 premature deaths by 2030, and subsequently 22 000 (95% CI 11 000–96 000) annually after 2030, with clean transportation contributing additional benefits.[5]

Global average marginal co-benefits of avoided mortality have been valued between US$50–380 per tonne of carbon dioxide, which exceed marginal abatement costs in 2030 and 2050.[6] Global fossil fuel subsidies are estimated to total around $5·3 trillion annually, largely as a result of a failure to account for the costs of air pollution and climate change.[7] Removing these subsidies and implementing carbon taxes could, if properly designed, improve health, reduce greenhouse gas emissions, redistribute wealth, and stimulate employment.

Policies to reduce short-lived climate pollutants, particularly black carbon, a component of fine particulate air pollution arising from incomplete combustion, could result in 0·7–4·7 million avoided premature deaths annually from reduced ambient air pollution alone.[8] Reductions in methane, another short-lived climate pollutant and a precursor of tropospheric ozone, which damages crop growth, could increase annual crop yields by 30–135 million tonnes due to ozone reductions in 2030 and beyond.[8]

A 2016 systematic review[9] has shown the potential to reduce greenhouse gas emissions, together with land and water use, by shifting present dietary intakes to environmentally more sustainable healthy diets, suggesting that median reductions of 20–30% across these indicators are possible in high-income settings, with modest reductions in all-cause mortality risk. Reductions in environmental footprints were generally proportional to the magnitude of animal-based food restriction. The greatest per-calorie environmental impacts were for ruminant meat, followed by other animal products, and lowest for many plant-based foods. Additional evidence from low-income settings is needed.

Studies of strategies to reduce greenhouse gas emissions and improve health in urban environments have shown the potential to achieve both environmental and health improvements. For example, modelled effects of low emission vehicles and increased

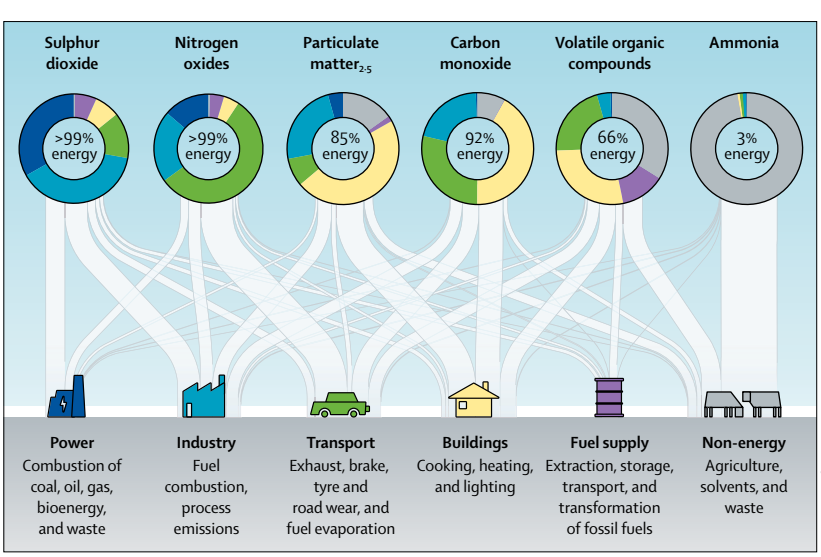

Figure: **Selected primary air pollutants and their sources**
Reproduced from the World Energy Outlook 2016: Special Report Energy and Air Pollution.[4]

walking and cycling in London and Delhi showed major benefits to health outweighing the increased risk of exposure to road injuries. In the case of London, the main benefits were projected from increased active travel, which reduced the risk of diabetes, ischaemic heart disease, stroke, and other health outcomes related to sedentary lifestyle.[10] In cities with high air pollution levels such as Delhi, a substantial proportion of the health benefits are likely to be due to air pollution reduction. If urban populations in England and Wales had similar patterns of walking and cycling to those achieved in Copenhagen, about £17 billion of costs could be averted from the National Health Service over 20 years, increasing further beyond that period.[11]

Assessments of policies to mitigate environmental change should specifically consider the potential unintended adverse consequences (co-harms). Some types of biofuels, such as corn alcohol, compete directly with important food crops. Diesel engines were promoted in some countries because of their reduced greenhouse gas emissions but have higher emissions of fine particulates and nitrogen oxides. Increasing the energy efficiency of houses by use of improved insulation and draught proofing might increase exposure to household air pollution unless accompanied by improved ventilation to prevent the build-up of harmful pollutants.[3]

Future studies of health co-benefits need more consistent methods, counterfactual scenarios, and timescales to compare the relative cost-effectiveness of different strategies.[12] The concept can be extended to policies to reduce other types of environmental change and future research also needs to consider how improved understanding of co-benefits can most effectively help catalyse action by policy makers to support planetary health.

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I am a member of the Scientific Advisory Group of the Climate and Clean Air Coalition hosted by the UN Environment Programme.

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