



Background

The Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (AR6) Synthesis Report repeatedly acknowledges that climate action can also provide co-benefits, or win-wins. For example, many mitigation actions have benefits for health through lower air pollution, active mobility (e.g., walking, cycling), and shifts to sustainable healthy diets. Climate change adaptation can also improve agricultural productivity, innovation, health and wellbeing, food security, livelihood, and biodiversity conservation.

In this webinar, the Met Office and partners discussed some of the co-benefits of climate action such as those on health and wellbeing. In addition to science and policy perspectives, we also heard about how co-benefits are already being realised in some communities.

We were joined by speakers from the University of Leeds, Ricardo Energy & Environment/the UK Department for Energy Security and Net Zero, and Belfast City Council.

Key webinar talking points

IPCC AR6 Synthesis Report and Sustainable Development Goals

The recent IPCC AR6 Synthesis Report emphasised the need for fast and accelerated action and indicates high confidence in the co-benefits of many climate actions such as transitioning to clean energy. The report also noted the synergies of mitigation and adaptation actions with the Sustainable Development Goals (SDGs). For example, shifting to more renewable energy sources and reducing our fossil fuel emissions to help combat climate change also relate to SDG7 which aims to ensure access to affordable, reliable, sustainable and modern energy for all.

Co-benefits

Action to limit future climate change can have a much wider impact on the economy and environment than the direct intended benefits. These provide additional incentives or win-wins to consider when considering climate action. Examples include:

- Electrification of transport reduces greenhouse gas emissions as well as noise from vehicles with benefits to urban living for people's health and air quality.
- Planting trees in urban areas and installing green roofs not only take in carbon dioxide but are also beneficial for improved air quality, mental and physical wellbeing.
- Flood protection measures help avoid risks of injuries and deaths.
- Reductions in pollutants and particulate matter which act as near-term climate forcers also improve air quality and health.
- Agricultural climate mitigation and adaptation can have benefits for food security and ecosystem protection.



It has also been emphasised in some recent reports that taking climate action quickly now will reduce mid- to long-term mitigation costs as well as the costs associated with greater impacts.

Some climate action can, conversely, also have negative consequences or trade-offs, and these need to be considered as part of climate action planning. For example, hard coastal grey infrastructure is an adaptation option that can conflict at times with mitigation goals and may also lead to negative ecological impacts that can undermine ecosystem health.

[Adaptation mitigation nexus](#)

The term ‘adaptation mitigation nexus’ is used to describe all the interactions between adaptation and mitigation, including their synergies, co-benefits and trade-offs. By thinking about climate action in terms of this nexus, we can ensure that mitigation actions are resilient to direct and indirect climate hazards. We also need to ensure that mitigation actions do not lead to wider maladaptation by increasing climate vulnerabilities and risks, and that adaptation actions minimise greenhouse gas emissions without compromising potential reductions in climate vulnerabilities and risks.

The Climate services for a Net Zero world (CS-NOW) programme is identifying a range of no-regret climate actions that have very high benefits and few or no trade-offs including actions such as passive cooling measures - ventilation and urban greening can help reduce the impact of overheating in buildings while also reducing power usage and supporting mitigation goals and energy efficiency measures in buildings.

Active habitat management can increase the resilience of our native ecosystems to a change in climate while at the same time preserving these ecosystems, helping support their carbon

sequestration and storage functions. Practices such as soil conservation, including soil friendly farming practices, or nutrient and water management that can all help support, for example, the agricultural sector. Measures such as peatland restoration again support carbon stores while also providing flood management and biodiversity protection that can be important in a changing climate.

It's important to plan how actions are implemented as this can change the type and magnitude of the effect it has on adaptation and mitigation outcomes. While we often think of them as a mitigation action, efforts to reduce stress on the power system and to increase the use of renewable energy also need to consider adaptation to make sure that that infrastructure is designed and located in ways that reduce risks and exposure to climate hazards.

Co-benefits in practice - a Belfast case study

In Belfast, a Resilience Strategy was launched in 2020 following a process of identifying short-term shocks and longer-term underpinning stresses which include big infrastructure issues, climate change etc. A large piece of analysis on the emissions in the city - the Belfast Net Zero Carbon Roadmap - was also commissioned. That identified where to address resources to reduce emissions, particularly around buildings and transport. There are a lot of co-benefits from dealing with those areas which improve health benefits for people in the city and improve air quality.

Belfast City Council has worked with the Met Office, utilising their City Pack service. Some of the climate information from that has been used in the analysis for developing city climate plans and programmes. The biggest risks that have been identified are around flooding and heat risk, and a piece of work was also undertaken with the Met Office to develop a Heat Pack and a vulnerability index. This helped categorise some of the locations that are more vulnerable to heat impacts, which has been important for the evidence base when planning initiatives to target neighbourhoods which are more at risk.

There is a limited amount of green space in Belfast city centre, which is being addressed through various schemes such as tree planting and green infrastructure development, recognising the benefits of green infrastructure in terms of reducing water runoff and flooding, and also to reduce the impact of the urban heat island effect.

Over-congestion is a big issue for the city, and there are strategies in place to try to reduce car use and increase pedestrianisation and active travel. Information on air pollution is also overlaid to help identify hotspots and focus areas.

Research has been undertaken on the benefits of trees and the 'Belfast 1,000,000 trees' tree planting initiative is underway. Benefits include carbon sequestration and storage, flood alleviation, filtration of air pollutants, urban cooling and improvements to physical and mental health. A Belfast-specific report focused on the benefits around air pollution highlighted the removal of 211 tonnes of air pollution per year and carbon sequestration in the existing tree cover taking up more than 8890 tonnes of carbon each year and storing ~319,000 tonnes of carbon.

One of Belfast City Council's parks, Botanic Gardens, is also a pilot area for a Horizon 2020-funded project, Upsurge, which is focused on nature-based solutions. This is being used as a demonstrator and a test bed for nature-based solutions to improve soil quality, improve carbon absorption, look at water runoff, but also, importantly, to use it as an opportunity to engage local communities in a co-design process. The project is involving people and examining what benefits there are to communities such as building in activities that they would have been involved in like dog walking and walking exercise.

The Belfast retrofit delivery hub was set up in September last year to help develop a programme across the city. This is an interesting example of a scheme aiming to reduce emissions by retrofitting the buildings with the highest level of emissions in the city, but in doing so, is also targeting areas of high deprivation and low health outcomes. The improvements therefore don't only have an impact on the emissions in the city, helping achieve Net Zero targets, but also help improve public health and wellbeing of people in the city and address fuel poverty.

Measurement and evaluation

There is no consensus in terms of an approach for quantifying or more broadly assessing co-benefits and trade-offs. In order to identify co-benefits and trade-offs and to ensure that co-benefits are enhanced and trade-offs are minimised or eliminating, however, it is important to understand the current situation and establish a baseline.



For example, a greenhouse gas inventory to understand where our emissions are coming from now and in the future, and, from an adaptation perspective, understanding local climate vulnerabilities and risks through a vulnerability and risk assessment, as these can vary across geographies. It is also important to facilitate coordination and knowledge sharing between mitigation and adaptation stakeholders rather than operating in silos.

The CS-NOW programme is assessing UK climate action against key climate risks identified in the UK's third Climate Change Risk Assessment (CCRA3). Risk assessments are also relevant at a city level or even at an organisational level.

Different actions can also be implemented in a range of ways that can then change the magnitude of the effect. This also makes it difficult to make a quantified assessment and there's a need for further research to try to quantify those benefits, both for mitigation and adaptation.

Some areas can be more straightforward than others to quantify, for example health and air quality benefits. Measures that reduce human exposure to pollutants will improve the health of the population and mean less people are affected by some of the respiratory and cardiovascular diseases that are associated with exposure to air pollutants.

Barriers to action

Barriers to taking climate action are varied, including political, funding and evidence barriers, and can be different depending on location. In some places there will be competing demands and priorities.

For example, in a city, issues with violence and security have been cited as concerns in relation to urban greening as increased shade and darkness can provide more space for people to hide increasing potential risks to personal security. In some countries and cities that might consider passive cooling measures such as opening windows for ventilation, this may not be possible in areas where there's an issue around crime.

At a macro level, political instability can also cause a distraction in terms of adaptation and mitigation goals.

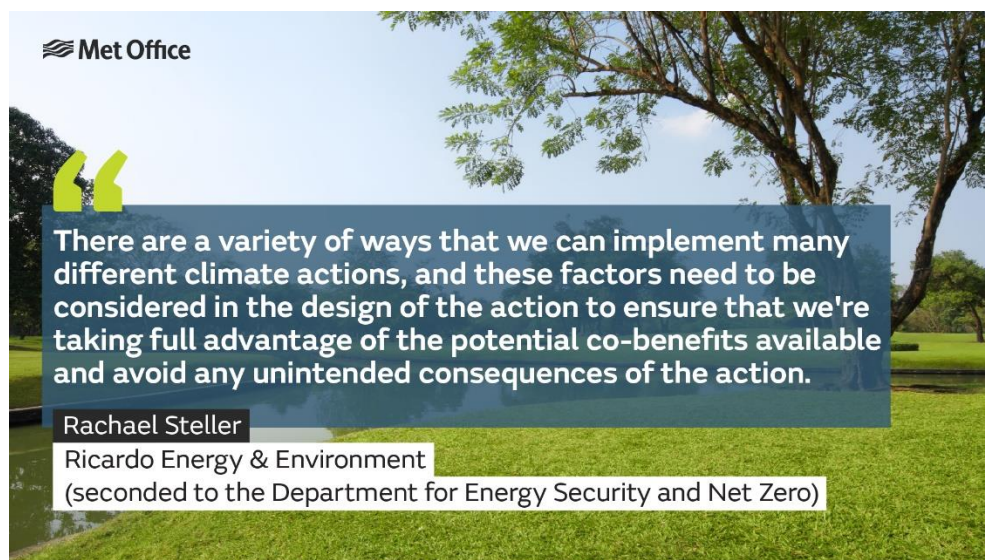
Challenges are very context dependent, but highlighting co-benefits can help support efforts to enhance action.

Final summary

Indirect benefits of avoiding climate impacts can be far-reaching and diverse. These range from improvements in health outcomes to ecosystem benefits, improvements in energy security or reduction in poverty. Some climate actions can generate multiple co-benefits across mitigation, adaptation and Sustainable Development Goals.

For example, nature-based solutions can contribute to both adaptation and mitigation goals as well as water and food security, biodiversity, physical and mental health outcomes, and livelihood and income diversification opportunities.

There's also clear and emerging evidence that climate actions can have the potential to result in trade-offs. For example, hard coastal grey infrastructure is an adaptation option that can conflict at times with mitigation goals and may also lead to negative ecological impacts that can undermine ecosystem health.



Under continued global warming, our range of adaptation and mitigation options is going to become more limited and highlights the urgency in using evidence to inform decisions to take effective and equitable actions and avoid trade-offs. There are a variety of ways that many climate actions can be implemented, and these factors need to be considered in the design of the action to ensure that they take full advantage of the potential co-benefits available and avoid any unintended consequences.

The University of Leeds, in collaboration with the Met Office, has developed an online communication and decision support tool called a Co-benefits Portal which assesses the confidence of the available evidence for co-benefits and trade-offs across a variety of mitigation and adaptation options. No-one can be an expert in all the different actions and potential range of different effects that they can have on adaptation goals, mitigation goals and other societal goals, so the more different perspectives from different sectors and viewpoints that are involved in planning and conversations, the stronger action will be and will help avoid the risk of trade-offs that are unforeseen due to lack of engagement with a broad range of different stakeholders.