CO-BENEFITS OF CLIMATE CHANGE MITIGATION AND ADAPTATION ACTIONS

KEY MESSAGES

- **With careful, integrated planning and policies**, climate mitigation and adaptation interventions can have a large number of other positive impacts, providing co-benefits to society. However, this is currently underutilised.
- **The value of co-benefits often equals or outweighs the cost** of climate mitigation and/or adaptation interventions.
- **Considering co-impacts (benefits and negative consequences) in planning and decision-making incentivises stakeholders** to work together in a more integrated way and can garner support for more ambitious policy and actions, as well as help link local, regional and national-level policies and actions.
- **Climate actions with carefully planned co-benefits can trigger additive effects**, leading to further reduction in greenhouse gases.
- **Focusing on co-benefits can help to ensure public support for climate action** and incentivise changes in behaviour amongst citizens, as co-benefits are often more readily recognisable positive impacts of a net-zero transition.
- **There should be a requirement to assess co-impacts** (co-benefits and co-harms) for proposed policy and actions, as our natural capital is finite, and so any action is necessarily a trade-off.
- **There is a strong incentive to encourage systems-thinking in planning and decision-making** during the transition to net-zero, instead of insular and vested interests and silo-working, in order to achieve more effective climate policy, more sustainable and better economies, and provide a safer and higher-quality environment that improves peoples' lives.
- **Considering co-benefits in climate actions should not deter** or dampen the main goal of climate actions, or be used as smoke screen for inaction.
- **Creating appropriate local and global indicators of co-impacts across the system** (e.g., economy, public health, wellbeing, environment) is necessary to allow for monitoring of co-benefits, rebound effects and unintended consequences, and research into co-impacts for an effective and just net-zero transition.

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INTRODUCTION

Drastic actions are needed on a global scale to reduce greenhouse gas (GHG) emissions and meet the Paris Agreement target of avoiding a 1.5°C rise in global temperatures, compared to pre-industrial levels. In addition, climate adaptation measures need to be deployed at scale in order to avoid the worst effects of climate change. This will entail profound changes to societies, economies, institutions and systems around the world.

In many cases, climate change adaptation and mitigation actions will have knock-on impacts to other challenges faced by society (co-impacts) – whether positive co-benefits or negative effects. The Intergovernmental Panel on Climate Change (IPCC) refer to co-benefits as "the positive effects that a policy or measure aimed at one objective might have on other objectives".[1]

Maximising co-benefits and minimising trade-offs is essential to ensure that public support for climate action is maintained and enhanced in the next phase of relatively rapid decarbonisation. Indeed, the UK Climate Assembly report from 2020 suggested that the co-benefits of climate action should be at the heart of the UK government's approach to achieving net-zero.[2]

Governments, cities and institutions face the challenging task of decarbonising while meeting other key objectives such as maintaining or growing a stable economy and the provision of healthcare and public services. The co-benefits of climate action may play an important role in helping these institutions reconcile environmental and development goals.

Conversely, policies and actions with other objectives might contribute toward climate change mitigation goals. For example, many causes of poor health or loss in biodiversity, including overconsumption and exploitation of resources, are also drivers of climate change. The delivery of efficient and equitable climate policies requires identifying and assessing co-benefits and negative effects, and understanding their relationships and co-dependencies.

Some countries, like India, have embraced co-benefits within their national plan on climate change[3], but this is far from common. Despite growing interest, **co-benefits remain overlooked and underutilised in policymaking**.[4,5,6,7] Co-benefits are generally more routinely integrated in local authorities and municipalities, but in a recent survey only 24% of cities, mostly in the global North (5% in Africa), consider co-benefits as part of their climate actions.[8]

BOX I: TERMINOLOGY AND DEFINITIONS

The concept of 'co-benefits' is used in multiple ways across different academic disciplines. For clarity on definitions, we provide below integrated and multidisciplinary definitions of the terms we use in the briefing, supported by a graphical representation of their relationship (Figure 1).

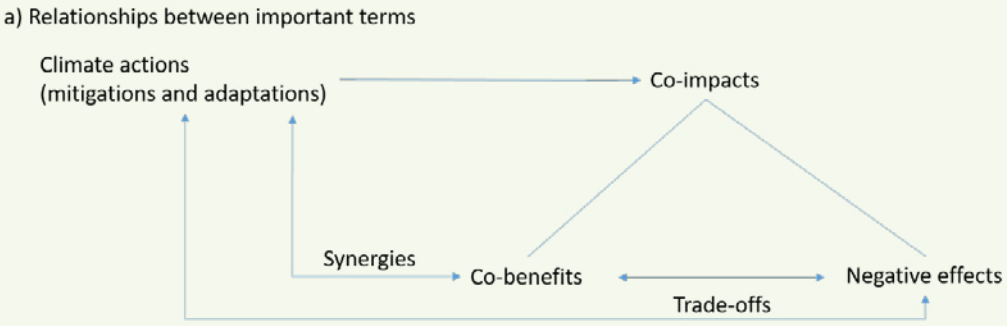

Figure 1: Diagrammatic representation of the relationships between key terminology

Co-impacts:
Any climate mitigation and/or adaption action or policy will have non climate-related impacts on society. Collectively these are termed co-impacts. Co-impacts can be intentional, when a policy or action take them into account, or unintended.

Co-benefits:
The positive effects that a policy or action aimed at climate actions might have on other objectives. Co-impacts of climate actions and policies which have positive effects on non-climate related objectives are termed co-benefits.

BOX I: TERMINOLOGY AND DEFINITIONS (CONTINUED)

The negative effects that a policy or action aimed at climate actions might have on other objectives. Co-impacts of climate actions, and policies which have negative effects on non-climate related objectives, are termed negative effects or adverse effects.

Trade-off:
Compromise between different objectives. For example, some societal negative effects might be traded-off against climate related benefits and some other co-benefits. Similarly, a trade-off might occur between two co-benefits with lower target achieved for one in order to maximise the positive impact of another.

Ripple effect:
Cascade of effects resulting from a climate policy or action, providing one co-benefit which in turn provide another and so on.

Synergistic effect:
Greater effects on objectives achieved by simultaneously targeting different objectives. Synergetic effect can occur through reinforcing feedback loops between climate actions and co-benefits, which in turn increase the effect of the climate action, or by tackling climate and non-climate benefits simultaneously and achieving a greater outcome.

TYPES OF CO-BENEFITS

Evidence shows that **carefully planned and properly coordinated climate action can create powerful synergies that result in multiple positive non-climate benefits**, such as improved biodiversity, job creation, reduced inequality and improved public health, as well as avoid some adverse co-impacts.[9,10,11,12,13,14,15] Some common examples of co-benefits are listed below:

Health

The most documented co-benefits are in terms of improved air quality and the associated positive impact on public health through reduced premature mortality and prevalence of chronic diseases.[16] It is estimated that climate mitigations reducing air pollution could avoid between 0.6 to 6.5 million premature deaths annually, and reduce associated health care costs forecasted to be $176 billion [~£130 billion].[17]

Policies encouraging reduction in car use, active transportation (e.g. walking and cycling) and reduction in travel distance and frequency contribute to the prevention of other non-communicable diseases such as diabetes, dementia, ischaemic heart disease, cerebrovascular disease, and cancer, through increased physical activity. It is estimated that the NHS in the UK could make direct savings estimated at £17 billion via greater adoption of active forms of transport.[18] Shifting toward plant-based diets could also reduce mortality by 6 to 10% at the same time as reducing GHG emissions related to food by 29%-70% by 2050.[19]

Biodiversity and environmental conservation

The impact of climate mitigation and adaptation on biodiversity and the environment is well documented. For example, carbon sequestration schemes based on forest protection, afforestation and sustainable forest management (e.g. REDD+) have been linked to increases in biodiversity, reduced soil erosion, ecosystem-services, air and water quality.[20,21] It is important, however, to develop, agree on and implement improved methodologies for quantifying carbon reductions from avoided deforestation in REDD+ and similar afforestation projects to avoid overestimating their carbon mitigation impacts.

Models predict that a 84%-93% global reduction in species extinction compared to business-as-usual could be achieved with aggressive climate adaptations.[22]

Economies and productivity

Climate adaptation and mitigation can have positive impacts on productivity and economies. There are numerous examples of less carbon-intensive farming practices and carbon sequestration actions leading to substantial improvement in agricultural yields.[23,24] Similarly, there is good evidence that environmental tax revenue can provide double dividends.[25] Energy efficiency can lead to reduced energy imports[26] and increased productivity[27], albeit also to increased energy use as a negative rebound.

Renewable energy growth has been linked to increased productivity in several parts of the world including sub-Saharan Africa because of more stable energy supplies.[28] Climate actions and policies can lead to increased employment.[29,30,31] Macro-economic outcomes are better in the presence of climate policy than in its absence.[32]

INTERACTION BETWEEN CO-IMPACTS: RIPPLE EFFECT AND SYNERGIES

Co-impacts do not emerge in isolation.[33] Co-benefits might occur as ripple effect, synergies or trade-offs between several co-impacts.[1] For example, housing energy efficiency policy could help break the cycle of poverty through cascading impacts on personal finance, improved physical and mental health for individuals, increased attendance and performance in education for children and at work for adults.[29] This would ultimately result in productivity gain for the economy and savings through reduced health costs and benefit payments.

Co-impacts might also contribute to reinforce climate actions, leading to further reduction in GHGs. Analysis of the REDD+ programme showed that more wildlife diversity and carbon stock conservation can be achieved for the same budget if both objectives are pursued together.[34]

Conversely, **achieving benefits in one area might result in adverse effects elsewhere, or necessitate trade-offs**.[35] This is most apparent in the food-energy-water and land nexus and in the relationship between electric vehicles, energy consumption and air quality.[36] There are reports of counter-intuitive impacts, with examples of projects of afforestation or carbon sequestration leading to decreased biodiversity.[37]

In some cases, the adverse effects can manifest themselves more distantly. For example, policy to increase renewable energy in south-Saharan Africa can result in increased energy security with subsequent improvement in productivity[30] as well as job creation[38], but these benefits are not equally distributed[39] or necessarily sustainable.[32] As such, they might increase inequalities and have no impact on poverty and sustainable development or reduction in risk of conflict.[40]

Relationships between co-impacts are complex and act on multiple levels and timescales. The causal pathways and feedback loops between climate mitigations and adaptations and co-impacts are not well understood, integrated and quantified. **Having integrated models, based on systems analysis, to understand these relationships** is crucial to provide decision-makers and policy designers with adequate multi-criteria analysis and decision tools to optimise policies and actions.

THE VALUE OF CO-BENEFITS

Despite the difficulty in monetising co-benefits, evidence from empirical and modelling studies unequivocally shows that **the value of co-benefits often equals or exceeds climate mitigation costs**.[8,10,29] For example, it is estimated that by 2050, climate mitigation actions could result in Euro 250 billion [~£216 billion] per annum in air pollution savings[41] which alone represents between 75% to 85% of mitigation costs to achieve net-zero.[42,43] The benefit-to-cost ratio is estimated to be as high as 11:1 in some empirical studies[44], with favourable return on investment in timescales ranging from 2 to 14 years.[45]

The value of co-benefits varies geographically and by sector. However, on the whole, disregarding their value equates to underestimating the net benefit of climate mitigation actions.[46] It is also likely that the full value of co-impacts (co-benefits and negative/rebound effects) is underestimated.[47] Understanding the combined value, and distribution of, all potential co-benefits and co-impacts is important during planning, evaluation and monitoring of climate and policy actions to ensure fairness and avoid a zero-sum situation. There is a lack of policy evaluation tools enabling this.[48]

The value of co-benefits from a traditional cost-benefit analysis point of view is undeniable, but their value is even greater if considered from a different economic perspective. Greater positive impact and sustainability could be realised from climate actions if they were considered together with their co-impacts throught more realistic economical models based on systems dynamics and physics[49,50] and the fact that our natural capital is finite, such as Doughnut Economics, which integrates social and planetary boundaries.[51] Within this framework, actions and policies should be planned and evaluated using the "safe and just space" framework (Figure 2) to maximise human welfare within planetary boundaries. As such, **there should be a requirement to assess co-benefits and co-harms and identify trades-offs during policy planning and decision making.**[52] The city of Amsterdam is the first to positively adopt this approach, integrating planning and evaluation of climate and social policy and action.[53]

1 See Box 1 for definitions of these terms.

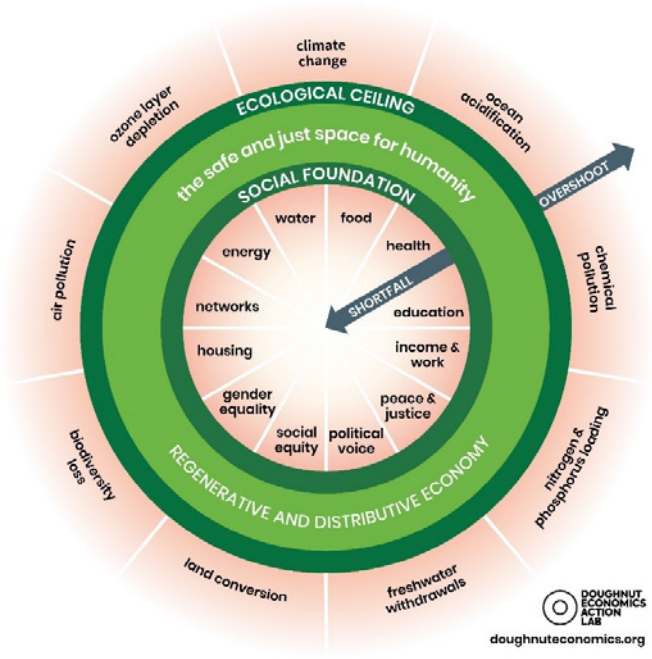

Figure 2: Doughnut Economics. Social and planetary boundaries. From Raworth K. Doughnuts Economics 2018.

ADVANTAGES OF CONSIDERING CO-BENEFITS IN DECISION-MAKING

Highlighting co-benefits might enable stronger resolve and commitment toward achieving the Paris Agreement target, and deliver more effective and wide-reaching policies and actions. The below section explores three approaches to considering co-benefits in decision-making.

Aligning support for climate action

Concerns about climate change and its future impacts have so far not succeeded in galvanising sufficient public and political support and actions to drive the rapid reductions in emissions that are needed. The potential negative impacts of decarbonisation policy on socio-economic outcomes is often mentioned as the main reason for people not engaging in climate mitigation actions.[54] Research shows that policies which favour activities with associated co-benefits are more likely to be attractive to the public and to stakeholders.[55]

Recognising the co-benefits of climate action can motivate stakeholders to adopt stricter GHG control actions and targets[56,57] and increase willingness to pay for climate-related policies.[55,56,58,59]

For the public and the political cycle, the benefits of climate policy can be spatially and temporally distant, with the the cost and effort involved today largely perceived as benefits for others in the future and in other geographical places.[60] Co-benefits, on the other hand, are often more local, easier to measure, and occur more immediately. **As such, they provide a near-term and more localised positive policy framing for climate action,** which might overcome political and economic obstacles more easily.

Co-benefits also enable policymakers to frame the need for urgent climate action in the context of public and political priorities.[61] **However, they can also be used to dress-up inaction on climate**. People tend to prioritise economic growth and improvement in living an health standards over environmental concerns. Focusing on the co-benefits of climate action can help legitimise governmental climate policies to the wider public. Designing policies that tackle both climate change and non-climate priorities at municipal, regional or national level can also increase support from stakeholders and the likelihood that a policy will be approved by decision-makers.[62,63]

A significant challenge across many levels of government is that those who pay for climate mitigation and adaptation actions are often not those who accrue the associated co-benefits. For example, the installation of seperate cycle lanes to encourage active travel is generally paid for by the Department for Transport, but the associated benefits that the intervention has upon reduced rates of obesity and improved air quality will often be accrued in financial savings to the local NHS Trust. This emphasises the need for greater cross-departmental and cross-organisational collaboration to maximise opportunities.

Diversifying arguments for climate action

Related to the above point, a co-benefits approach also diversifies the arguments for climate action, taking them beyond environmental reasons and into the realm of economic, social and political drivers. **This increases the range of policy options and brings more potential actors with complementary expertise into involvement with climate action.**

If such actors see a legitimate reason to get involved with climate policy, it increases the capacity of individuals and institutions to make pro-environmental choices immediately and in the future. The 2020 Carbon Disclosure report, with data from cities around the world, showed that, on average, cities that cited co-benefits reported more than two times as many mitigation actions as cities that did not report co-benefits.[9]

Breaking down silos across institutions and sectors

Institutional and sectoral fragmentation are key barriers to incorporating co-benefits in broader climate planning.[64] Governmental systems, local authorities and industrial sectors tend to operate in silos, and institutions, departments and sectors are often placed in competitive rather than cooperative settings. These structural factors can lead to disconnected, disjointed and sometimes counter-productive actions, resulting in "zero sums" or in rebound, increased net emissions and negative co-impacts.

Conversely, evidence shows that **the communities most advanced in climate change innovation are those with coherent policies based on integrated and cooperative planning processes.**[65] Empirical evidence from New Zealand shows that increased collaboration, awareness and learning between local authorities and departments led to greater emissions reductions.[66] Box 2 and 3 show examples of how a co-benefits approach can bridge organisational and disciplinary divides.

The co-benefits model is an opportunity for integrated research, planning and monitoring of climate actions and co-impacts, providing more agile and adaptive responses. It can also potentially help shield climate action from the nature of the political cycle, where key objectives are traded off against each other, and it may help to strengthen vertical policy integration. Importantly, integrating co-benefits into planning and decision-making can turn targets perceived as conflicting, such as growth and climate action, into synergies.

Such advantages of co-benefits can be fully utilised and realised if policy- and decision-makers focus on the relationship between different co-impacts and have the tools to navigate their complexity in order to optimise policy and action. System thinking and concepts coming from system science could provide the decision-making tools required, as explored in the following section.

SYSTEMS THINKING TO ASSESS CO-BENEFITS AND NEGATIVE EFFECTS

There is a real challenge in structuring co-benefits and co-impacts in a framework, and in finding multi-criteria decision analysis tools that can assist policy and decision-makers in devising optimum policy and actions.[11] Different classification schemes exist in the scientific literature based on traditional sectors e.g. transport, energy or types of co-impacts (economic, environmental, social and political-institutional)[12] or according to the pathway between policy and co-impacts (e.g. air-pollution).[5]

Pragmatic frameworks such as the Urban Action Impacts Framework[11] or the Ashden Co-benefits Toolkit[68] exist to assist decision-makers in regions' and cities' local authorities to identify pathways from policy action to impact. The Decarbonisation Policy Evaluation Tool[50] is useful to evaluate the level of agreement in the scientific literature on whether a specific policy instrument results in positive or negative co-impacts across seven broad categories of outcomes (environmental, technological, cost related, innovation, competitiveness, distributional and other social outcomes).

BOX 2: INTEGRATING THE CO-BENEFITS OF CLIMATE ACTION AND BRIDGING ORGANISATIONAL AND DISCIPLINARY DIVIDES

Seasonal Health Intervention Network (SHINE)

The SHINE project, set up by Islington Council, provides a good example of cross-organisational collaboration that recognises the multiple benefits of climate action. The Housing team of Islington Council formed a partnership with local GPs and health visitors who, with the permission of their patients, refer vulnerable householders experiencing health issues related to the quality of their accommodation (e.g. pneumonia, colds) to the housing team of the council. The SHINE team then provide vulnerable customers with advice on energy efficiency, accessing grants for new boilers, and reducing their fuel bills. The SHINE project helps to tackle the root cause of the householders' illness. rather than dealing with the symptoms.

This type of approach has been replicated in other areas of the UK, including in the 'Boilers on Prescription' project run by Gentoo Group (a housing association) in partnership with Nottingham City Homes and Bangor University. Here, NHS patients living in cold, damp homes were 'prescribed' double glazing, boilers and insulation by their GP in an attempt to reduce their need for readmission. The 'Warm Homes for Health' report, published by Bangor University, analysed the impact of the project and found a 5% improvement in self-rated health status, a 4% reduction in anxiety and a 37% reduction in the number of households in fuel poverty[67]. The average intervention cost for the energy efficiency improvements was £3,725 and 12-months after the intervention, a 16% reduction (–£94.79) in household 6-month health service use was found.

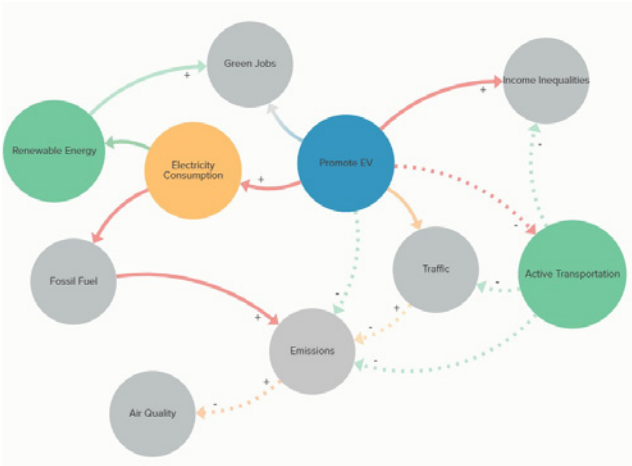

Figure 3: Example of a system model of co-impacts focused on mobility changes. Green arrows are co-benefits, red arrows are negative effects, and orange arrows denote trade-offs.

The above tools are limited in their ability to understand and quantify the interactions between co-impacts and facilitate planning and monitoring. **Tools to evaluate the effectiveness of different policies and actions on multiple outcomes in a systematic way are severely lacking.**

Effective policymaking requires an understanding of the relationships between different co-impacts to maximise synergies and manage potential trades-off. Many adverse side effects and inequality impacts of climate change mitigation policies emerge through complex dynamic relationships and feedback loops between co-impacts, which are not immediately obvious and difficult to predict.[15,69]

For example, achieving positive co-impacts and a reduction in GHG emissions from encouraging electric vehicle (EV) uptake is contingent on increasing renewable energy supply. If these do not occur in tandem, extra demand for electricity might lead to increased use of fossil fuels.[39,70] In addition, EV uptake policies must not displace policies targeted at improving active transportation, which could create new income inequalities (see Figure 3).[70]

A promising approach for integrated planning of climate action to achieve co-benefits is to adopt concepts and science from systems theory and systems thinking.[71,11] The prediction made by Meadows et al.[72] in the 1970s, about the impact of climate change on society using system thinking has, recently been proven to be true[73], showing the potential for this approach.

Systems approaches enable the relationships between policy actions and different co-impacts to be fully mapped, providing a holistic and multidisciplinary view of potentials and disadvantages associated with different plans and actions.

System maps (see Figure 3) enable both qualitative and quantitative explorations (e.g. scenario planning) for planning and monitoring integrated strategies. It enables stakeholders and decision-makers to develop common key performance indicators, identify leverage points, tipping points and barriers, and as such promote joint actions and innovation and avoiding unintended rebound. As an example, this has been successfully deployed in eleven communities in British Columbia, to develop integrated strategies for energy, transportation, land, water, and biodiversity conservation.[36]

BOX 3: CO-BENEFITS OF DECARBONISING PHARMACEUTICALS, HEALTHCARE AND WATER SECTORS

Globally, the pharmaceutical industry's carbon emissions are more than 50% higher than those of the automotive sector.[74] Pollutants from pharmaceuticals also pose a direct danger to our water supply, which is already under threat from climate change. These adversely affect human and animal health, particularly aquatic life, at very low concentrations. These harms connect to wider issues of biodiversity, water and food security, and potential conflict around scarce resources.

Decarbonising the pharmaceutical sector requires changes in practice within the industry toward green pharmaceuticals[75], and a reduction in the consumptions of pharmaceuticals.[76] This is one example of the synergestic relationships between decarbonising the pharmaceutical industry and health. However, the potential for co-benefits is much wider.

Nature-based solutions – The Glasgow smart canal story

The Glasgow Smart Canal provides a good illustration of how climate actions can impact the health and consumption of pharmaceuticals. The Smart Canals was developed as a strategic partnership between local authorities, Scottish Canals, Scottish Environmental Protection Agency, Scottish Water and community organisations to use the canals as a sustainable nature-based drainage solution and to improve water quality. The plan considered co-benefits, aiming to use the project to enable economic development and improve housing.

BOX 3: CO-BENEFITS OF DECARBONISING PHARMACEUTICALS, HEALTHCARE AND WATER SECTORS (CONTINUED)

An 18 year-long study showed that this climate action positively improved health, decreased risks of mortality and non-communicable diseases by 3% year on year[77], and led to an 8% reduction in the consumption of drugs used to treat mental health in the population living near the canal.

These co-benefits were un-intended and unplanned, but show the potential for links between climate policies and positive health outcomes. Work is currently underway to use the developments around the canals to actively consider health co-benefits.

Improving health through prescription of social and physical activities

Social and physical activity, particularly in natural environments, is effective in the prevention and treatment of many physical and mental health issues. The UK is spearheading social prescribing in primary care, which involves health care professionals prescribing social and physical activities to patients instead of drug-treatment. This approach is gathering pace intenationally as it has been shown to be effective, to pay for itself, and to lead to reduced drug usage and subsequent carbon emissions[78] as well as pollutant footprint.

Experiments are underways in Canada, Denmark and Sweden. Urban green and blue spaces which can be used as nature-based solutions for climate mitigation and adaptation, such as by repurposing old infrastructure like disused canals as illustrated above, are also particularly good assets to use for social prescription. Designing urban green-and-blue nature-based solutions, especially large scale projects such as sponge cities, could have a significant impact on the feedback loop between health, drug prescription and their associated carbon emissions.

ADDRESSING RISKS OF THE CO-BENEFITS APPROACH

Removing focus from tackling climate change

A series of risks are also associated with the co-benefits approach. For example, **moving toward a co-benefit model for climate policy and action runs the risk of overshadowing the original aim of addressing climate change, and as such lessening climate mitigation ambitions.**[79] This is a particular risk if one co-benefit is considered in isolation, as trade-offs could then be obscured.[80]

This has been the case in Norway, where the Government used a range of economic incentives to increase uptake of EVs to reduce pollution and GHG emissions. These policies were very effective in increasing uptake, however EVs were mostly purchased as second cars and run on electricity produced by fossil fuels. This led to adverse effects on widening inequalities and reducing tax income, with no net gains in reducing GHG emissions.[70]

In addition, while the co-benefits approach may provide the opportunity to tackle multiple stresses to human welfare simultaneously with climate mitigation and adaptation, **it does not address the key underlying causes of climate change such as unsustainable growth, consumption and development.**[81]

Ethical concerns and just transitions

At face value, emphasising the co-benefits of climate actions conveys a positive message. However, it also poses certain ethical questions.[77] There is evidence that pursuing specific co-benefits without adequately taking into account potential negative effects could exacerbate poverty and vulnerabilities, jeopardizing low-income community livelihoods, housing, environment and access to affordable services.[82,83] As such, it is essential that decision-makers place issues of equity and inclusivity at the centre of climate mitigation policies.[81,84]

In addition, there is a distinct risk that co-benefits might be used to "push" particular policies in an opportunistic way, which could be perceived as a form of environmental imperialism.[85,86,87] This is particularly relevant to the discussions around Article 6 of the Paris Agreement, which will allow countries to coordinate climate change mitigation and adaptation measures internationally, and which has yet to be agreed at the time of writing. The specific design of Article 6 will be discussed at COP26 in Glasgow, and it will likely contain a market which might include monetisation of co-benefits and might further lead to hypothetical, rather than real, benefits.

Finally, there is also the potential that co-benefits are used as smoke screen to rationalise or mask climate inaction.

Steps to avoid risks

To address and avoid the risks of the co-benefits approach outlined above, the following steps will be important:

- **Establish systems-based tools to monitor co-impacts and consider trade-offs and adverse effects of climate action.**
  Since some co-impacts might be positive for one group of stakeholders, but negative for others, decision-making and monitoring systems need to include a wide plurality of views reflective of the communities concerned. Use of participatory stakeholder approaches to explore particular trade-offs around solid emission reduction frameworks between different impacts is crucial.[11] In addition, the complexity of the task needs to be embraced and not undermined. Finally, there must be transparency.
- **Rapidly increase capacity in system science and system thinking, in terms of skills and green digital technologies**.[88] This step will likely be a determining factor in increasing the consideration of co-benefits in policy and decision-making, as climate change is a problem which requires true multidisciplinary working. Some advocate the need for change away from expert leadership toward polymath leadership.[86] It is also likely that not all unintended effects of co-benefits-led policies can be forecasted.
- **Policy needs to consider all co-impacts within a well established and solid emission reduction framework**.

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