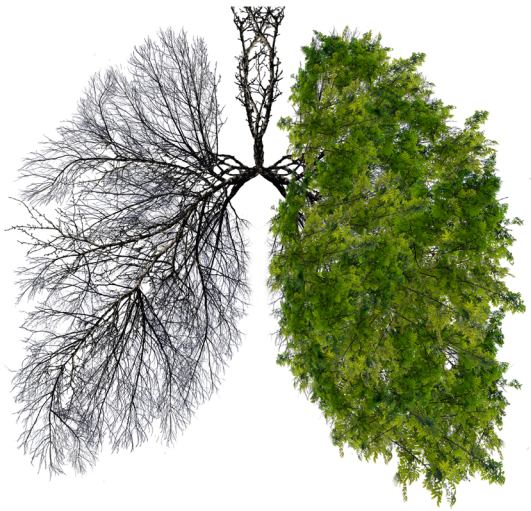
POLICY BRIEF
February 2023

FEPS
FOUNDATION FOR EUROPEAN PROGRESSIVE STUDIES

CLIMATE MAINSTREAMING: CLIMATE AND HEALTH POLICY



SUMMARY

The climate crisis constitutes the largest threat to public health in the 21st century, from which several climate-sensitive direct or indirect health risks emerge. It is noteworthy that the health impact of the climate crisis disproportionately falls on groups with lower socio-economic status, which generally have lower adaptation capacities. There is, however, a huge potential for health policy to contribute to climate change mitigation and for climate policy to reduce disease burden. Policymakers are becoming increasingly aware of the link between health and climate. This nexus is further correlated with inequality, the latter here understood as the unequal distribution of social, political, economic and environmental resources, and health inequity. At the EU level, commitments to reducing net GHG emissions by at least 55% compared to 1990, by the year 2030 and to reach net-zero emissions by 2050 have been formulated within the framework of the European Green Deal and the Fit-for-55 package. Yet, neither does the European Green Deal consider health explicitly, nor does the EU4Health Programme include climate change mitigation or adaptation among its key objectives. Against this background, this policy brief explores risks associated with acting in silos and thus neglecting the interactions between climate, health and inequality, and looks for potential synergies when establishing a sound climate-health-inequality nexus. It further addresses the question as to where the barriers lie for successfully exploiting these synergies between health and climate policy fields. This research showcases potential pitfalls when climate policy does not consider health, and when health policy does not take into account interactions with climate change. It also demonstrates that the interdependencies of climate and health create various opportunities. This policy brief is concluded with recommendations for policymakers with a view to addressing health, climate and inequality in an integrated manner. These recommendations seek to strengthen the climate-health-equality-nexus in the EU.

AUTHORS

DR WILLI HAAS
University of Natural Resources and Life Sciences, Department for Economics and Social Sciences, Institute of Social Ecology

CHRISTINA LAMPL
DR ERNEST AIGNER
DR ANDREA E. SCHMIDT
Austrian National Public Health Institute, Competence Centre Climate and Health

IN PARTNERSHIP WITH

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FEPS
FOUNDATION FOR EUROPEAN PROGRESSIVE STUDIES

THE FOUNDATION FOR EUROPEAN PROGRESSIVE STUDIES (FEPS)

European Political Foundation - Nº 4 BE 896.230.213
Avenue des Arts 46 1000 Brussels (Belgium)
www.feps-europe.eu
@FEPS_Europe

FRIEDRICH EBERT STIFTUNG

FRIEDRICH-EBERT-STIFTUNG

EU-Office Brussels
Rue du Taciturne 38
BE-1000 Brussels (Belgium)
https://brussels.fes.de
@fes_brussels

This Policy Brief was produced with the financial support of the European Parliament. It does not represent the view of the European Parliament.

Introduction

Many studies have shown the potential of health policy in driving climate change mitigation, and of climate policy in reducing disease burden. Yet, in practice, this link has been largely overlooked by the European Union (EU) and its member states. It seems, however, that policymakers are becoming increasingly aware of the link between health and climate as well as the interlinkages of this nexus with inequality[1] aspects.[2] This policy brief highlights the potential that lies in creating climate-health synergies at a policy level, and discusses the barriers that exist in practice and may have impeded exploiting these synergies in the past. This analysis also showcases potential pitfalls when climate policy does not consider health, and vice versa when health policy does not take into account interactions with climate change. It is concluded with recommendations and key principles for policy-makers moving forward towards addressing health, climate and inequality from a holistic perspective.[3]

One of the main difficulties underlying the health-climate-inequality nexus is the fact that the climate crisis remains the largest threat to public health in the 21st century.[4] The challenges posed by climate change for human health and healthcare systems are therefore numerous. Socio-economic vulnerabilities compound direct and indirect health risks emerging due to climate change, and in turn increase health inequity, including due to injury and mortality from extreme weather events, heat-related illnesses, respiratory illnesses, water-borne diseases or water-related health impacts, zoonoses, vector-borne diseases, malnutrition and food-borne diseases, and negative consequences for mental and psychosocial health.[5] In turn, unhealthy lifestyles associated with non-communicable diseases (NCDs) are often not climate-friendly and claim a lot of resources, given that health care also contributes significantly to greenhouse gas (GHG) emissions in developed countries, even though this is often overlooked.

Current policy developments at the EU level support the need for a focus on the climate-health-inequality nexus. This perspective is driven primarily by the need to tackle the climate crisis, and only marginally by the inequality and/or health perspectives. The EU, currently one of the largest emitters of global GHG emissions, has committed to reducing net GHG emissions by at least 55% compared to 1990 by the year 2030, and to reach net-zero emissions by 2050, under its European Green Deal and Fit-for-55 package.[6] Prior to that, the EU committed to climate neutrality before the end of the century by signing the Paris Agreement in 2015. Analogously, the Agenda for Sustainable Development, adopted by all United Nations Member States in 2015 calls for actions to eradicate poverty, and strategies to improve health and reduce inequality while tackling climate change and working to preserve oceans and forests.[7]

The new EU4Health programme, introduced as a consequence of the COVID-19 pandemic in 2021, aims to increase preparedness to cope with future health crises: Health promotion and prevention are among the programme's core themes. Yet, tackling the climate crisis is not among its key objectives despite the positive benefits of reducing GHG emissions on health. For instance, decreasing motorized individual modes of transport can improve air quality which simultaneously co-benefits health objectives through active mobility.[8] These actions further support synergies with many of the United Nations' Sustainable Development Goals (SDGs), resulting in a healthier and more equitable society.[9] Climate change impacts on health constitute a threat with burdens being unequally distributed. Accordingly, the EU has a responsibility to act for protecting health, re-

ducing inequality and mitigating climate change as well as planning adaptation measures adequately. Therefore, not only the contribution of climate and health policies is required, but also of social policy.

Figure 1 highlights the importance of moving from silo-thinking with some intentions to cooperation between health policy, climate policy and social policy (little overlapping areas) to interlinked solutions, while increasing the total benefit arising from such an integrated approach, showing via the bigger overlapping area in the figure.

The next section outlines the conceptual background for EU policy-making, while section 3 sets the climate and health policy context identifying the main barriers and the linkages between these two policy fields. Section 4 applies the conclusions from both the conceptual discussion and the problem analysis to showcase high-level principles, and positive examples for creating sustainable, healthy and equitable outcomes, as well as shortcomings of EU policies, including the Green Deal.

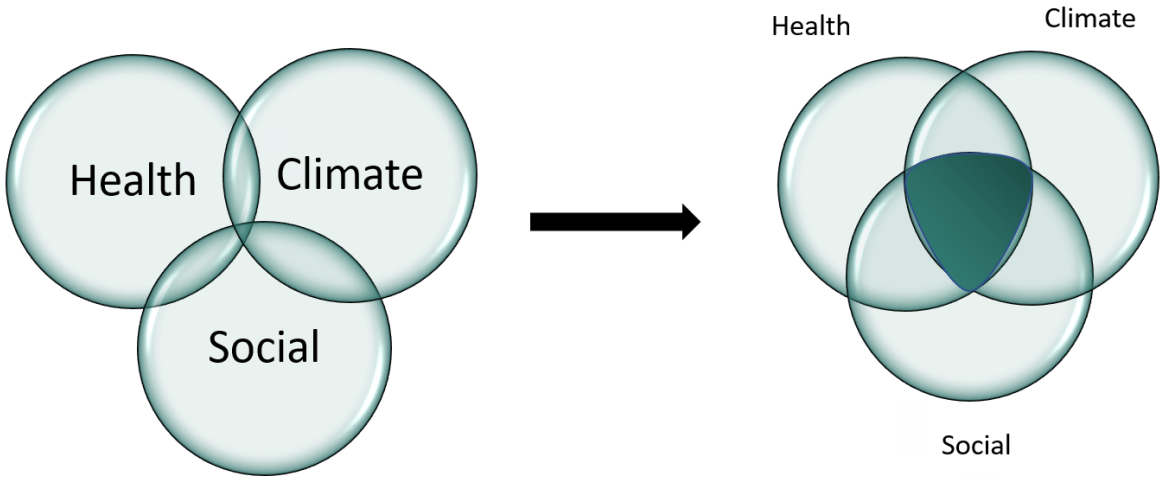

Figure 1: Policy spheres required to tackle the climate-health-inequality nexus

The Interlinkage between health, climate, and social policies in the EU

This chapter focuses on how the interlinkages described in the first section may be conceptualised from a policy perspective. It highlights the importance of considering equality and justice in the analysis of health and climate policy synergies. The section also emphasizes the potential of health policies to achieve climate change mitigation.

This is first because the health sector itself is a significant yet often overlooked contributor to GHG emissions in developed countries, in particular in secondary care settings like intensive care units and hospitals. The national health sectors in European countries contribute between 4% (Greece) and 8% (The Netherlands) to the carbon footprint of their respective countries.

Second, there is a large scope for improvement regarding the prevention of illness and health promotion in most European countries, in particular among vulnerable population groups. The health sector thus plays a crucial role both in promoting equitable health outcomes while also reducing carbon-intensive treatments in the health sector. Reducing health inequity, defined as unfair differences in achieving one's full health potential because of social position or other socially determined circumstances, would have a positive effect on climate mitigation.[10]

In turn, climate justice emphasizes that climate change affects populations differently, having potentially more severe social, economic, public health, and other adverse impacts on underprivileged populations. The objectives of both climate-relevant sectors and health sectors are therefore similar, aiming to improve quality of life and the reduction of GHG emissions as well as co-pollutants. The potential for policies and governance structures in these sectors to tackle health inequity and climate change simultaneously will be highlighted subsequently.

Health for All Policies and Co-Benefits: core concepts towards a sustainable transformation

Equality is a key concern both in climate policy and health policy, with silo thinking in both health and climate policy frequently worsening equity concerns. For example, climate change disproportionately impacts those populations that are often already affected by multiple health problems.[11] Furthermore, health policies failing to take intersectoral action in public health contribute to the climate crisis, in particular for the most vulnerable. These basic considerations on the interplay of climate and health policy spheres are described below.

> *Health and climate have many interrelations and tend to be non-conflicting, yet conflicts and trade-offs are possible in practice.*

Health for all Policies (HfAP) – a step forward for Health in All Policies (HiAP)

While *Health-in-all-Policies* (HiAP) was first introduced in 2006, its promise was attractive and straightforward, based on the idea that all sectors (for example, energy, urban planning, transport, industry, and health) must work together to improve population health. The *Health for All*

Policies paradigm stresses the role of other sectors to improve health as a precondition for the functioning of our societies. This puts emphasis on a bidirectional rather than a unidirectional relationship between health and other sectors. As demonstrated during the early phases of the COVID-19 pandemic, multi-sectoral cooperation allows for the development of large-scale intersectoral responses and co-benefits, and supports shared goals.[12]

Defining the concept of co-benefits of climate mitigation

Health promotion, prevention and curative care are included in this analysis of health policies[13] Further, following the World Health Organisation (WHO), health is defined as a state in which physical, psychological and social dimensions of a person's well-being are taken into account, instead of the simple absence of disease or physical integrity.[14] This broader definition is key to avoiding risks and utilizing benefits in the interlinking domains of health, climate, and social policy. Against this background, co-benefits are defined as the positive effects that a policy or measure aimed at one objective might have on other objectives, thereby increasing the total benefits for society and the environment.[15]

First, active mobility i.e. facilitating walking and cycling improves health through increased physical activity, resulting in reductions in respiratory diseases, cardiovascular diseases, cancer, diabetes and obesity.[16] Furthermore, where car trips are replaced by cycling or walking, there is also a significant reduction in GHG, air and noise pollution.[17]

Secondly, a shift to a more nutritious plant-based diet in line with WHO dietary recommendations could reduce global emissions significantly, ensuring a more resilient food system and avoiding up to 5.1 million diet-related deaths a year by 2050.[18] Current eating patterns contribute up to one-third of the EU's GHG emissions,[19] with the production and consumption of meat and dairy products having the largest environmental impact, and food waste worsening the current state.

Thirdly, urban green space might facilitate climate mitigation and adaptation while offering health co-benefits, such as reduced exposure to air pollution, local cooling effects, stress relief and increased recreational space for social interaction and physical activity.[20] The implications of a HiAP approach for health equity are shown by Hall and Jacobson, highlighting potential mutually positive effects.[21]

The next section highlights, how the HfAP approach, a step towards HiAP, further develops these ideas.

Conceptualizing the climate-health-equality nexus

The policies meant to implement transformation towards better health and tackling the climate crisis are still narrow and in silos,[22] while future risks call for both broadening the understanding of health and developing a strong link between sectors. Taking the public health system rather than the health care system as the point of reference widens the perspective on co-benefits potentially accrued from the interplay of climate mitigation and health promotion. The interlinkage of different policy dimensions relating to climate change and public health calls for a holistic scope of action across sectors (see Fig. 2)

Beyond social policy (Fig. 1), other policy areas also need to be involved in tackling the climate-health-inequality nexus, as highlighted in Fig. 2.

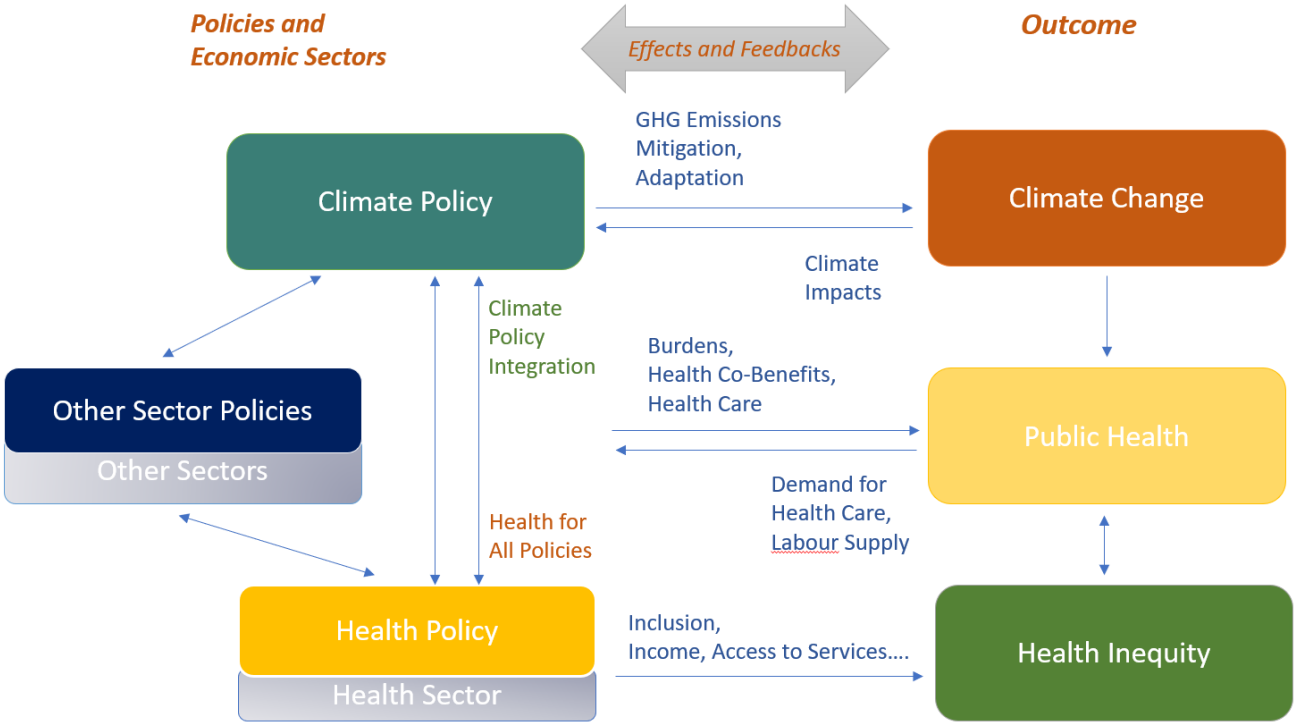

Figure 2: Interplay between climate change, public health, health inequity and other policy sectors.[79]

Policies and economic activities impact climate change, public health and health inequity. In turn, their outcomes trigger several feedback loops. In addition, climate impacts require restoration activities after damages, and precautionary adaptation needs more economic activities resulting in more GHG emissions. Significant health inequities, on the one hand, are amplified among vulnerable population groups due to pre-existing conditions. On the other hand, health inequities can also be increased by climate change itself. This is due to the fact that poorer and less educated population groups have neither the competence nor the means to take adequate preventive measures. At the same time, climate change can lead to budgetary pressures on the public and private sectors. This in turn can lead to lower wages and poorer education and health services for groups that are already vulnerable.

The chart (Figure 2) also shows that there are great opportunities through preventive policies based on holistic approaches. Good coordination of climate policy with health policy and all other economic sectors that affect climate and health can reduce GHG emissions and health burdens while reducing inequalities. Examples include transport policy, diet and agriculture policy, spatial planning, and appropriate tax and subsidy policies. Health for all policies combined with climate policy integration can therefore become a lever to make use of the various feedback in order to achieve improved outcomes.

Holistic approaches allow for addressing dif-

ferent population groups and political actors. Health is a fundamental topic that can gain the attention of a vast majority of people regardless of their political engagement. Social aspects are often overlooked when dealing with climate action, but this can also be an opportunity to tackle long-standing social challenges. For instance, when publicly funded retrofitting programs make buildings for disadvantaged groups more liveable during extreme weather periods, it can save operating costs for cooling or heating; or if public transport is improved, it can increase mobility for commuting at affordable prices for all.

Thereupon, the scheme presented in this research can be used both for analysing current developments and for optimising policies to generate benefits in all three important and interlinked outcome dimensions : public health, health equity and climate change.

> *Not addressing the interlinkages between climate and health will likely result in unjust, unhealthy and climate-unfriendly outcomes.*

Current developments combined with the willingness to address the interlinkages between climate and health are a major concern. These developments are likely to lead to several unjust, unhealthy, and climate-unfriendly outcomes unless countermeasures are taken. The following list describes current developments with existing measures. The chapter ends with scenarios that go beyond existing measures towards creating co-benefits across multiple dimensions.

The following developments might be expected with both current measures or the absence of measures:

- **If no intervention takes place,** neither in climate mitigation nor climate adaptation, negative health impacts of the climate crisis (conflicting with health goals) are likely to occur, in particular for vulnerable groups (conflicting with equity goals). In addition, the continuation of unhealthy lifestyles increases health risks and requires more carbon-intensive health treatments, which further amplifies climate impacts, especially for vulnerable groups.

- **If (mal-)adaptation** of the health sector to the climate crisis takes place, GHG will increase (contradicting climate goals), and ultimately impact vulnerable groups particularly (contradicting with equity goals). Combined with the continuation of unhealthy lifestyles and carbon-intensive treatments in health care, the situation for vulnerable groups worsens. For example, polypharmacy may have a potentially negative effect on health, particularly in underprivileged groups, as well as on climate (due to the high emission intensity of pharmaceuticals), or greening hospitals with plants of high allergenic potential, or creating health facilities with glass facades which need to be cooled with air conditioning systems.

- **If mitigation policies that do not take health into account are implemented**, opportunities to promote health could be missed and existing health problems would prevail. Also, equitable access to health services may decrease particularly for vulnerable groups (conflicting with equity goals) due to increased costs of transport (to reach a

medical treatment) for example. Another illustration of this type of maladaptation is wood heating which increases particulate matter emissions.

At the same time, the interdependencies of climate and health also create various opportunities. Relying on the full range of available options, considering health and climate issues jointly, one might create co-benefits across multiple dimensions:

- Well-designed policies for **adaptation** to climate change contribute to better health (health co-benefit) while potentially decreasing GHG emissions (climate co-benefit) and reducing health inequalities (equity co-benefit).
- Climate **mitigation** policies can foster the adoption of healthy practices to increase healthy life years (health co-benefits) and enhance health equality (equity co-benefit).
- Interventions supporting health promotion, disease prevention and health care policies for climate and equality create multiple co-benefits.

Shortcomings in previous EU policy-making

Based on the conceptual understanding provided in section 2, this part provides some examples of barriers to the effective implementation of more equitable health and climate policies in EU countries. The persistence of social determinants of health, as a social gradient, and of inequalities in access to services may negatively impact other policy fields. Given the high carbon intensity of the health sector, a higher burden of disease also implies higher GHG emissions. Besides, climate-unjust policies further increase health inequities. This section analyses problems emerging from the lack of concerted action in the climate and health spheres.

Correlation between health inequities and effects of climate change

Health inequities are a matter of concern across the industrialised world. Climate change thus impacts population health that is a priori not distributed equally across socio-economic groups, as well as across gender and race. Health follows a social gradient: the higher the social position, the better the health.[23] Also in high-income economies, most diseases affect people with a lower socioeconomic status more than those with a higher one. In this section socio-economic status is not only defined by income but also by, employment rank.[24]

Across all OECD (Organisation for Economic Co-operation and Development) countries, four out of ten (43%) people in the lowest income quintile report a longstanding illness or health problem as opposed to less than three out of ten (26%) people in the highest income quintile. In addition, life expectancy also varies by education level and gender. In some countries, like Slovakia, men with higher education outlive men with lower education on average by almost 15 years.[25] As famously put by Michael Marmot and Richard Wilkinson, "[the social gradient of health] runs from top to bottom of society, with less good standards of health at every step down the social hierarchy. […] To understand the causes of this gradient, we have to examine the circumstances in which people live and work – the social determinants of health."[26]

High levels of social inequalities can also have severe social and political repercussions and undermine the well-being of everyone in society

by generating a perception of injustice, reducing trust and social cohesion, which can lead to intolerance and discrimination.[27]

A health impact assessment from Mueller and colleagues has shown that nearly 20% of mortality could be prevented annually if international recommendations for performance of a physical activity, exposure to air pollution, noise, and heat and access to green space had been followed, with a disproportionately positive impact on lower socio-economic groups. Estimates show that the greatest portion of preventable deaths was attributable to increases in physical activity, followed by reductions in exposure to air pollution, traffic noise, and heat. This upholds the need for climate policies that acknowledge the existence of health inequities and social, economic, political and environmental inequalities.[28]

The health impacts of climate change affect older people, children, and those with pre-existing health problems the most, while the array of adaptation options is unequally distributed across populations. The European population is especially vulnerable to heat due to ageing populations, urbanisation, and the high prevalence of chronic health diseases. Heat-related health risks are expected to increase especially in the Mediterranean area and Eastern Europe.[29]

Other impacts of the climate crisis on health and inequality, apart from the heat, are also becoming more and more visible. Increased frequency and intensity of extreme weather-related events associated with climate change threaten the health and well-being of the population in Europe (for example, northern coastal Europe's greater risk of flooding, or southern Europe's increasing risk of droughts and wildfires).[30] Shifts in allergenic pollen concentrations and longer pollen seasons in Europe lead to more frequent allergic sensitizations and symptoms. With respiratory allergies being a major health burden in Europe, increased pollen concentrations and longer pollen seasons in European settlement areas are particularly concerning. Climate change also affects health through increased risks of infectious disease outbreaks, which emerge due to more suitable climate conditions and increased travel and transport (e.g. via zoonoses or vector-borne diseases).

Adaptation strategies to deal with the health impact of climate change, are also dependent on one's social position. For instance, opening a window during a warm summer night may not be possible in areas with higher crime rates or noisy areas. Also, for people with pre-existing health problems, cooling down outdoors is easier if adequate infrastructures (such as green spaces) are available near one's home, the latter being again associated with higher social status.[31]

Co-pollutants of GHG emissions lead to inequitable health impacts in Europe

Air pollution and noise, to a large extent caused by motorized individual traffic, also continue to contribute to serious illnesses and premature deaths, especially in urban areas. In 2019, air pollution continued to drive a significant burden of premature death and disease in the 27 EU Member States: 307,000 premature deaths were attributed to chronic exposure to fine particulate matter; 40,400 premature deaths were attributed to nitrogen dioxide exposure; 16,800 premature deaths were attributed to acute ozone exposure.[32]

Motorized individual traffic powered by internal combustion engines emits GHG emissions and co-pollutants like NOx and PM2.5/10 that are directly related to health problems. It needs to be stressed that PM2.5/10 is emitted from the exhausts of combustion engines and a not-too-

small share stems from the abrasion of tyres and brakes. Consequently, replacing combustion engines with e-motion or other alternative fuels might address GHG emission problems, but has weak health benefits. As a matter of fact, it does not equate to a complete elimination of emissions.

Additionally, lack of exercise which is another serious health problem linked to motorized individual traffic persists. The same applies to noise pollution, as rolling noise already drowns out engine noise from a speed of 30-40 km/h, even with combustion engines. Further, bad environmental quality (air, noise, and little urban green) along traffic routes leads to low housing costs attracting people with low income. These areas display high surface sealing and thus overheat more rapidly. Overnight ventilation is often difficult, thus putting multiple burdens on people with lower incomes.

Adverse climate effects of healthcare practices

The health sector itself is a major source of CO2 emissions in the EU, amounting to between 4% and 8% of total emissions.[33] Health systems that do not prioritize prevention and health promotion, ultimately have to treat increasing numbers of patients in cost- and carbon-intensive settings like hospitals, which further contribute to rising GHG emissions.

Due to the occurrence of premature deaths that would be either preventable or treatable, and to the lack of public health interventions addressing behavioural risk factors, the existence of unjust practices thus affects climate policy goals. Given that health care costs are highest at the end of life, the persistence of these inequities creates negative outcomes both for the health system and for patients.[34]

Two examples highlight this inter-relationship:

- The first example refers to avoidable hospitalisations and premature deaths. Not being treated at the right point of service at the right time contributes to increasing GHG emissions and is often grounded in socio-economic inequalities in access to health care. Occurrences of avoidable hospitalisations have been shown to correlate with lower socio-economic status (income, education, employment status) and low health literacy.[35] In 2019, across OECD countries, more than 3 million premature deaths among people under 75 years could have been avoided through better prevention and healthcare interventions, equivalent to over one-quarter of all deaths. Of these, approximately 1.9 million would have been preventable through effective primary prevention and other public health measures, and over 1 million were considered treatable through more effective and timely healthcare interventions.[36] Many of these premature deaths are caused by modifiable behavioural risk factors, such as unhealthy diet, lack of physical activity, tobacco use, and the harmful use of alcohol. Occurrence of these risk factors is again strongly associated with lower social position, often due to difficult life circumstances throughout the life course or unfortunate living environments (for example the lack of access to a healthy diet or car-centred built infrastructure).[37] Obesity and worsening health often also result from these behavioural risk factors, again affecting people in lower social positions more frequently than others.

- The second example in health settings refers to polypharmacy and overmedication. Patients in lower socio-economic positions are affected disproportionately. In terms of climate, the GHG emission from pharmaceu-

ticals contribute roughly 20% of the overall health carbon footprint in developed countries creating climate-related concerns.[38]

The adverse effects of siloed climate policies

The factors described in the previous sections pose a dual challenge to the health system. Due to the loss of stable and healthy ecosystems as a result of the climate crisis, the demand for health services is expected to increase. Meanwhile, the health sector accelerates the climate crisis due to high emissions. In addition, groups with pre-existing comorbidities and in lower social positions are disproportionately affected by the health impact of climate change.

A report from the European Environment Agency (EEA) draws attention to the close links between social and environmental challenges across Europe.[39] The report shows that vulnerable groups remain disproportionately affected by environmental health hazards, such as air and noise pollution and extreme temperatures, especially in Europe's eastern and southern regions. Road traffic management, promoting walking and cycling, healthy and sustainable nutrition, tree planting and good-quality housing are crucial levers to reduce inequality, improve health and lower GHG emissions.

The report also makes a case for enhancing the coherence between different EU policy areas (health, poverty, climate change and air pollution), and – at the local level – a multi-pronged approach, from welfare to urban design.[40] In sum, no one is safe from risks resulting from climate change. Yet, those contributing least to its causes tend to be those least able to protect themselves and their families – like people in low-income and disadvantaged countries and communities while being harmed disproportionally.[41] In the short- to medium-term, the health impacts of climate change will be determined mainly by the vulnerability of populations, their resilience to the current rate of climate change and the extent and pace of adaptation.[42] In the longer term, the effects will increasingly depend on transformational actions taken now to reduce emissions.[43]

High-income population groups can afford healthy living conditions and access to healthcare, but their lifestyles are associated with high GHG emissions. While being less vulnerable to the climate crisis, they also have the means to adopt low-emission lifestyles. High-income population groups also tend to have the power to promote conditions and shape structures for climate-friendly living for all at a political level more easily than others. High-income population groups also tend to have the power to promote conditions and shape structures for climate-friendly living for all at a political level more easily than others. For instance, in 28 European countries, the top 10 % income group causes 6.2 tons of CO2e/adult equivalent due to mobility, compared to the bottom 10% income group whose emissions are 0.6 tons of CO_2e.[44] This points to a greater GHG saving potential for high-income households by switching to more active mobility like walking and cycling. In other fields, such as food and heating, low-income households are frequently known to be locked in climate-harmful modes of living by not being able to afford climate-friendly and healthy food or heating systems. The consequences of this are particularly dire in face of the energy crisis that is currently unfolding.

While high-income households can shift to a climate-friendly low-cost heating system because of the high share of residential ownership, low-income households are often dependent on their landlords to shift to climate-friendly low-cost heating systems. Similarly, while food prices for industrial energy-intensive foods are increasing,

ecologically climate-friendly food prices remain stable. This shifts the costs of political failure to climate-friendly and healthy food systems for all low-income households. Hence, climate-friendly options are available to high-income households, while low-income households cannot easily shift to climate-friendly options and are locked into climate-harmful expensive systems.

The missed opportunities in policy-making

In practice, several barriers remain to an integrated implementation of climate and health policies for all.

Overstretched public budgets favour a narrow focus on core tasks

There is a constant competition for public funding. The COVID-19 pandemic and Russia's invasion of Ukraine including the energy supply problems, inflation and further economic knock-on effects on GDP require additional public funding. In addition, health expenditure has been continuously rising in all developed countries independently of climate change,[45] which led to actions limiting further expenditure growth to avoid higher burdens for public budgets in some countries.

At a global level, the EU has played an important role in compensating the Global South: Representing 16% of the world's GDP the EU is the third largest economy and together with its member states, the world's biggest provider of finance for climate adaptation and mitigation action in the Global South. It further strengthened this position at the COP27 in 2022 even though It will further burden the EU's and its member states' public budgets.

However, no action is likely to have high costs too, not only on the environment but also on society and the economy. In 2018, the monetised value of European heat-related mortality was equal to 1-2% of regional gross national income.[46] Likewise, PM2.5 exposure driven primarily by fossil fuel combustion led to years of life loss, with an economic value of 129 billion Euros per year. Moreover, European climate change-related labour productivity losses, mostly caused by heat stress, could be up to 1,15 of GDP or 563 billion Euros in the worst-case scenario.[47]

“No action is likely to have high costs too, not only on the environment, but also on society and economy.”

In total, climate change will be detrimental to European economies, with potential losses amounting to 8% of its gross domestic product (GDP) by 2050 under a severe scenario of an average global temperature increase of 2.6°C over the next 30 years.[48] If the 2°C degree objective is missed, inequalities globally and in the EU will increase, as well as substantial economic damages.[49]

Despite the high demand for public budgets, the European Commission proposed to assign at least 30% of total expenditure in the 2021-27 budget (including the Next Generation EU programme) to meet its climate change mitigation targets.

A study by Darvas and Wolff shows that the need for public investment to meet the European Union's climate goals is between 0.5 per cent and 1 per cent of GDP annually during this decade.[50]

And they state that increasing green public investment while consolidating deficits will be a major challenge. Simultaneously, they point to the experience of consolidation episodes which resulted in major public investment cuts. Thus, consolidating deficits when the economic outlook is moderate or even bleak could result in such cuts again in the future. These might lead to a narrower focus on the climate and digitalisation policy domains with regards to their joint core task to reduce GHG emissions and to boost digitalization for economic growth instead of complicating the already tremendous challenge by widening the scope to include health.

Decoupling health and climate policies, areas that used to belong together historically

In terms of the development of climate change mitigation policies in the EU, health co-benefits are part of the policies, but due to the separation of responsibilities for GHG and non-GHG emissions across Directorate Generals (DGs), climate change and air pollution mitigation policies are decoupled at EU level. While health co-benefits are the primary lever for EU air pollution mitigation policies, health does not play the same integral role in the development of climate change policies.

The following barriers are examples of why health co-benefits are not addressed and partially inhibited in the development process of climate-mitigation policies:

- Dominance of economic growth and monetary evaluations of social, health and environmental outcomes
- Challenges with the attribution of (longer-term) health outcomes, amongst others due to health impacts of climate change
- Limited funding dedicated to climate change and health research.[51]

In addition, resistance and interests from powerful vested interests (e.g. car and pharmaceutical industries) limit cross-sectoral collaboration between the health sector and climate change decision-makers and prevent a joint response.[52] For instance, to ensure future revenue streams, pharmaceutical corporations lobby for the sale of medication in contrast to prevention-focused public health policies, while the automobile industries lobby for market-driven technological fixes to reduce GHG emissions of cars, instead of a shift towards climate-friendly forms of active mobility. The respective approaches to public health and climate mitigation focus on each of the sectors, neglecting the potential of policy interventions at the intersection of the two fields (e.g. active mobility that prevents ills and does not depend on cars). The latter, however, could increase societal welfare and ensure substantial savings in public budgets but stands in contrast to the profit motive which mobilizes vast lobbying budgets of automobile and pharmaceutical industries.

Finally, a recent analysis of climate discourses revealed a variety of "discourses of climate delay",[53] that accept the climate crisis (in difference to discourses of climate denial) but justify inaction in certain societal domains or across society as a whole. Such narratives in the health domain might argue falsely that climate policies are only needed in terms of adaptation in the health sector; that climate policies necessarily affecting low-income groups lead to social stratification and should thus be avoided; that non-systemic solutions (e.g. a shift towards electric vehicles in the health sector) are sufficient; or that climate-policies lead to welfare losses. These types of discourses could result in a division between those who promote climate policies and those who promote public health policies. This would only serve vested

interests aiming to avoid GHG-emission reductions or public health policies.

Another barrier is the lack of a compelling, harmonized evidence base because current evidence consists primarily of heterogeneously modelled HEM (Health Effects of mitigation) estimates. Although there is a broad agreement about the general approach to modelling HEM, the broad array of mitigation actions and a wide variety of specific modelling approaches taken have precluded meta-analysis.[54] Previous studies have shown that the public health benefits from ambitious mitigation efforts would far outweigh their cost,[55] yet challenges remain for comprehensively including health in the cost assessment of climate policies.

Separation of disciplines at universities and in research

There is a striking expression which states that universities have departments (disciplines), and the world has problems.[56] In fact, a rich stock of literature states that due to the disciplinary separation in universities and research funding, collective research approaches are structurally disadvantaged. Strengthening interdisciplinary research facilitates moving from silo thinking to a more problem-oriented approach in terms of recent societal challenges. Regarding university programmes/curricula, a more interdisciplinary focus on different subjects is still missing (for example, there is a need for programmes for climate students addressing health- and equity-related subjects.

Added to disciplinary skills, students urgently need to develop skills as to how to include other scientific perspectives into their own research domain.[57] Further, while critical research strands criticize the welfare state's dependency on GDP (Gross domestic product) growth, and c onsider it an obstacle to transformation, other research fields like mainstream economy promote a continuation of growth in the context of a "green economy". However, critical research shows that it is necessary to achieve human well-being other than through economic growth if planetary boundaries are to be respected.[58] Societal challenges, therefore, call for overcoming the separation into isolated disciplines.

Lack of strategic intersectoral planning beyond innovative projects

Analysing a health-promoting initiative called Healthy Cities shows the path for a shift from a linear disease-driven approach to an open system that recognises the complexity and holistic approaches. The Healthy Cities initiative started 30 years ago, sought to translate the rhetoric of Health for All and the Ottawa Charter for Health Promotion (an international agreement signed at the First International Conference on Health Promotion) into tangible actions. The aim was to realize the vision of a healthy city through a process of political commitment, visibility for health, institutional change, and innovative action for health. It seemed that by the end of the 20th century, Healthy Cities were able to become a major global movement for public health, realized by the expansion of Healthy Cities in the 1990s around high-income countries.[59]

Reflecting on the experience of Healthy Cities, it is apparent that the initiative has been influential in putting health and sustainability onto the agenda of towns and cities. However, in the UK and many other countries, these frameworks have rarely become integral to municipalities' strategic planning processes. Instead, they have tended to remain marginalized, regarded by many as distinct 'projects' or 'initiatives'. At the same time, the radical nature of Healthy Cities and Local Agenda 21 is proposed to be retained and affirmed rather than 'slimmed down'. It seems challenging to move the interlinked

topics from the margins to the centre stages by demonstrating the increasing relevance and practicality of its principles and their congruence with effective modes of governance, positioning health promotion as a key element of good governance. Furthermore, it is often still perceived as something additional to mainstream activity, largely running projects and encouraging communication. The window of opportunity for any real change in the political agenda to occur has yet to be opened.[60]

Coordination and durability – a political science perspective

Turning to political science and public administration, two main problems for intersectoral programmes seem relevant: coordination and durability. When it comes to coordination, the first problem is rooted in the bureaucracy's mission and its "culture", narrowly focusing on task accomplishment and guiding everyday tasks in terms of their priorities and ambitions. Goals outside of the scope of this mission are likely to be interpreted as irrelevant commitments. Additionally, the interaction of of experts and policy-makers from different disciplines and spheres could lead to obstacles for communication due to differing intentions and understanding of notions/concepts. A second problem is the lack of continuity in intersectoral governance for health, due to the lack of dedicated budgets for maintaining specialist staff. Besides, management reforms may redirect attention to narrower goals and new challenges may attract attention.[61]

Additional obstacles to policy development and the incorporation of different policies are the limited expected political returns of intersectoral policies. The subsystem structure of policy systems seems to be an additional barrier to joint efforts towards a common goal.

Overall, the challenge is to move health, sustainable development and quality of life into the centre of the political agenda of policymakers and the wider political discourse so that they become core strategic driving forces. More recently the development of more equity-oriented approaches as well as a shift in the evaluation of programmes have been put forward to ensure a reduction of inequalities more systematically than in the past.[62]

Guidelines for policy-makers

Following the conceptual analysis in section 2 and the problem analysis in section 3, this section highlights new governance principles based on concrete policy examples addressing practices at different governance levels and develops recommendations based on an examination of the European Green Deal.

Presenting principles for a just climate-health governance

Acknowledging the challenges for a just transition to an integrated healthy low-carbon society calls for new governance principles.

> *Three government principles are proposed:*
>
> - *Developing evidence*
> - *Integrated assessments*
> - *Setting-based or place-shaping approach*

The conceptual framework in Figure 2 emphasises the interplay between climate change and public health and rests on a deep-rooted concerted action between health, climate and other sector policies. It can be described as a 'multi-solving' approach, "using one investment of time or effort to solve several problems at once in a way that also improves equity".[63]

To overcome the separation of responsibilities between policy domains, we propose the following three governance principles:

The first governance principle is **developing a consistent and compelling body of evidence and green data space, supervised and commissioned by a cross-sectoral policy committee combined with a coalition or network approach to advocacy**. This is showcased for example by good practice from experience with other population health challenges such as air quality and tobacco abuse.[64] This approach also means being prepared to take advantage of windows of opportunity while taking into account ideological framings of policy proposals to decision-makers.[65] One positive example is the Superblocks initiative in Barcelona, Spain, detailed in the following section.

The second governance principle is to **establish an integrated assessment approach**, to be implemented mutually for measures in health policy (with a 'climate lens') and in climate policy (with a 'health lens') at the same time considering social aspects (with an 'equity lens'). However, this integrated approach should not overlook other policy sectors that could be relevant for climate and health. This requires the acknowledgement that health, climate mitigation and adaptation outcomes are highly determined by other sectors and their relevant policies. A positive case in point is the guideline to implement HiAP developed in South Australia, by following three concrete steps detailed in the next section.

Such an approach needs to avoid a sole focus on economic aspects and needs to integrate insights from both climate and health on equal footing while considering equity concerns. Equity from a socio-economic perspective as well as an intergenerational or gender aspect may be crucial in successfully creating intersectoral commitments that work. For example, the Healthy Start scheme in the UK has integrated gender, and socio-economic equality aspects successfully in an intergenerational approach, even though more detailed evaluations are missing to date. In general, evaluations should be planned in every policy action to monitor outcomes and successes as well as challenges in different fields of action. In the context of climate mitigation, such an approach needs to focus on the huge emissions of high-income and wealthy groups, while improving the living conditions of low-income groups by enabling them to enjoy a climate-friendly and healthy life.

The third governance principle is taking a **setting-based or place-shaping approach in both public health and climate policy**.[66] In general, settings are integrated within other settings of higher scale, such as schools located in specific neighbourhoods, integrated into city-wide infrastructural structures and, at yet a higher geographic level, within a region. Following the concept of place-shaping for example, designing measures that take the areas where people live, work and spend their free time into account, could be an opportunity for public health, as shown by the Healthy Cities agenda. Applying an elaborated settings approach in health is relevant and feasible. The key idea is to systematically create environments and structures that, on the one hand, make healthy and climate-friendly living accessible and, on the other hand, make unhealthy and climate-unfriendly living more difficult.

Policy examples

Three examples of good practice complement our analysis, showcasing how barriers to cross-sectoral collaboration can be overcome and how climate, health and equity benefits can be achieved while avoiding trade-offs. Due to a lack of evaluation in terms of policies, it was hardly possible to find well-documented and successful publications on the evaluation of policies. The three described examples highlight the importance of evaluation through an interdisciplinary approach.

Superblocks in Barcelona

Due to numerous challenges of the urban environment and its effects on health and social behaviour, in 2016 the city government of Barcelona approved a strategy to make the city a more liveable one, by rebuilding parts of the city into so-called Superblocks, by reorganizing parts of the city in terms of traffic reduction and more space for the residents.

A multidisciplinary team of public health professionals was formed and developed the conceptual framework as well as the assessment tool to evaluate the main health and environmental effects of the policy intervention.[67] It has also identified the possible inequitable effects of the intervention on different populations depending on their age, gender, social class and other specificities. The health outcomes which have been measured were: traffic injuries, cardiovascular disease, respiratory disease, depression/anxiety and social well-being.

Evaluation results of one of the four Superblocks showed an improvement in air quality, with harmful emissions reduced by 25% to the initial measurement. Additionally, the traffic reduction was effective in terms of the level of air and noise pollution, stressed out by 50% of the women and men interviewed in one Superblock. The implementation of the superblocks has shown positive effects on health and well-being, creating a sense of tranquillity and increased physical activity. The perceived gain in well-being, tranquillity, quality of sleep, reduction of noise, reduction of pollution and increase in social interaction could be seen.[68]

> *Tranquillity, higher quality of sleep, reduction of noise and air pollution and increased social interaction were the perceived gains in well-being.*

Modelling results have shown that the implementation of 500 superblocks in Barcelona could prevent 667 premature deaths annually, increasing the life expectancy for the adult population by almost 200 days on average, resulting in an annual economic impact of 1.7 billion euros.[69]

The example highlights both a setting-based approach, combined with an integrated assessment methodology, as well as a strong network approach for advocacy in achieving positive effects for climate, health and equality.

Healthy Start in England

Healthy Start England is a nutrition programme from the National Health Service (NHS) in the UK. People from low-income population groups received vouchers to buy healthy and climate-friendly food, like fruits, vegetables, milk

and food for new-borns and toddlers up to the age of 4, (in detail 3 £ per week for pregnant women and from age 1 to 3 of the toddler, and 6,2 £ in the first year of life.) The programme is conceptualized for low-income groups and also takes into account sustainable aspects (for example plant-based products).

The evaluation shows, that it supported the families' healthy and sustainable shopping behaviour. Coordinated work amongst health, social care and welfare rights workers across all disciplines were needed for successful and sustainable implementation.[70] The example highlights the successful integration of different equity elements, namely socio-economic aspects, gender aspects and aspects of intergenerational solidarity.

> *Coordinated work between disciplines and professions supported healthy and sustainable shopping behaviour of low-income groups.*

Health in all policies (HiaP) guidelines from South Australia

South Australia has developed guidelines to implement HiAP that include three steps which can be considered as lessons learnt for future policy implementation. They highlight the importance of a network approach as well as an integrated assessment framework.

Firstly, a rapid desktop analysis of key interactions and synergies between health and well-being outcomes was undertaken, resulting in 14 targets that were selected in the South Australian Strategic Plan. They employed a "Health Lens Analysis" that includes five elements to engage with other sectors, gather evidence for identifying solutions, generate policy recommendations, navigate the recommendations through the decision-making process and evaluate the effectiveness. This analysis provided a mechanism for the integration of health considerations across a wide range of policy areas.

Secondly, and as a consequence of the first step, policy-makers and decision-makers outside the health sector recognised the connections between health and the core business of other government agencies, and started to consider the important role that non-health policies have in promoting health.

Thirdly, based on these pre-steps, a HiAP conference was jointly convened and attended by the executive and senior officers from the state government. The key message at the conference was that HiAP is a solution to address a range of complex issues. Helpful tools and instruments reported in the South Australian context were inter-ministerial and inter-departmental committees, cross-sector action teams, integrated budgets and accounting, cross-cutting information and evaluation systems, joined-up workforce development, community consultations and citizens' juries, partnership platforms, development of the Health Lens Analysis (method), and legislative frameworks. The case study shows that it is vital to ensure that the HiAP approach retains its momentum. Mainstreaming HiAP will ensure that the linkages between targets will in turn provide a possibility for the necessary mutual momentum across sectors. Taking into account these recommendations and experiences71 could serve as a blueprint for mainstreaming climate and Health-for-All-Policies.

> *Cross-sector teams, integrated budgets, cross-cutting evaluation, community consultations and partnership platforms were key instruments.*

Policy recommendations

The overall goal of the European Commission's European Green Deal is to put sustainability and the well-being of citizens at the centre of economic policy, and the sustainable development goals at the heart of the EU's policymaking and action. Consequently, the climate-health-equality link is at the core of these goals.

The recommendations of this policy brief focus on two areas of the European Green Deal: the shift towards sustainable and smart mobility and the shift towards a fair, healthy, and environmentally friendly food system. This policy brief analysed the climate-health-inequality links in the two areas of the document and identified missing links to finally formulate recommendations for improvement.

Proposals in terms of policies towards transport in the European Green Deal:

- Active mobility in urban areas like walking and cycling is key to substantially reducing GHG emissions and tackling numerous health issues related to lack of exercise and clean air. Making walking and cycling attractive is an inclusive strategy for all citizens independent of their income. While the Green Deal proposes more stringent air pollutant emissions standards for combustion-engine vehicles and the prohibition of the sale of ICE vehicles by 2035 in the EU, it lacks promotion of active mobility. Examples are urban mobility centred around public transport and active mobility, entailing car-free areas, safe surroundings, strolling zones, cycle routes and urban forests for heat-fit cities of short ways at the costs of surface parking and traffic with motorized individual traffic.[72]

- While the Green Deal states that the price of transport must reflect the impact it has on the environment and health, there is no mention of how vulnerable groups are to be considered and how infrastructure planning needs to be done to ensure inclusive ways of active transport for people with different levels of disability.

- In general, the focus on technology and economic instruments, as presented in the European Green Deal, lacks an adequate consideration of health and well-being, if well-being is understood not only in monetary terms but in the sense of creating sustainable "well-being societies", committed to achieving equitable health now and for future generations without breaching ecological limits.[73]

- Proper care for the well-being of citizens in the shift towards sustainable and smart mobility requires a high-level committee including cross-sectoral policymakers and interdisciplinary expert groups covering expertise for all SGDs. They need to engage in a transparent and accountable process enabling openness and full consultative approaches to encourage stakeholder endorsement and advocacy. First efforts in this direction could be seen at the EU level in the development of the new European Urban Mobility Framework.[74] However, there is a lack of consist-

ent and decisive anchoring from the highest to the lowest levels of governance.

Strengthening the climate-health-inequality-nexus in the Farm to Fork strategy:

- While the strategy strives to stimulate sustainable food consumption and promote affordable healthy food for all, it is not explicit on the health problems. Reversing the obesity epidemic in many countries, as described by The Lancet Commission on healthy diets from sustainable food systems,[75] is not addressed. The same applies to one of the key issues for climate-friendly and healthy diets, the diet gap, which is the high discrepancy between present dietary patterns and healthy dietary recommendations. The biggest gap exists for meat products, especially red meat, which has a high carbon and land footprint and where the Green Deal is called for to address dietary patterns in Europe to enable a just transition globally for feeding the world without overstretching critical ecological limits.[76]

- The Green Deal fails to acknowledge that the price of food does not reflect the impact it has on workers in food production, on the environment and health. While such a reflection is required, the strategy needs to point at measures for vulnerable groups who do not have the financial means to participate in the envisaged shift.

- Achieving affordable, climate-friendly and healthy food requires again a high-level committee including cross-sectoral policymakers and interdisciplinary expert groups covering expertise for dietary patterns, food waste and food production and all SGDs. They need to engage in a transparent and accountable process enabling openness and full consultative approaches to encourage stakeholder endorsement and advocacy. This requires leadership by the European Union for the well-being of all, even if stakeholder groups oppose the shift towards fair, healthy, and environmentally friendly diets from a sustainable food system.

As a minimum requirement for the design of all transformative policies mentioned in the Green Deal, it is proposed to involve health, climate, and equity experts in high-level committees to ensure that well-being is at the heart of EU economic policy, policymaking, and action. It goes without saying that all policies should be evaluated externally, but with a particular focus on whether the climate-health-inequality nexus is being used to generate societal benefits and whether trade-offs are being avoided.

To capture the health gains and equity implications of Europe's low-carbon transition, the following indicators as outlined by the Lancet Countdown in Europe are highly valuable:

- Progress on each mitigation action and health co-benefits (e.g. energy system, sustainably and healthy transport, buildings, food, agriculture and health)

- Improvements in adaptation, planning and resilience for health (e.g. adaptation planning and assessment of reduced overall risks)

- European epidemiological data on climate change impacts, exposures and vulnerabilities

- Adequacy of continuous understanding of the economic dimension of inaction and action as well as appropriate finance for action

- Changes in politics and governance (e.g. political engagement with health and cli-

mate change)[77] especially considering: the impact of policies and their implementation on vulnerable groups, equity issues and how they improve or deteriorate health inequities by using epidemiological data, separate surveys accompanying setting-based and place-shaping approaches for learning on the interplay of climate, health, and equity.

Conclusions and way forward

The European Commission and its Member States are acknowledging their historic responsibility to act as an agenda-setting model in the world. However, this is urgently requested as the EU has overshot its fair share of the safe global carbon budget for the period from 1850 to 2015 by 29%, second only to the US which has overshot it by 40%.[78]

While the EU is gradually taking up the challenge to substantially reduce its GHG emissions, it has been largely silent on the complex interconnection of climate, health and inequality, although the EU has long been considered as a "normative" power in global politics. The Covid-19 pandemic has made clear that it is possible to work against silo thinking towards a more goal-oriented and interdisciplinary approach. Because of this permacrisis, the world is dealing with, health must be at the forefront of policy development. Well-being without leaving anyone behind can be improved by not harming our ecosystems, and by transforming the principles mentioned below in Table 1.

The key driver for transformation is the climate crisis with its pending health threats, especially for vulnerable groups. This low-carbon shift may become too narrow in its scope and thus create new problems for vulnerable groups. This would constitute a missed opportunity to bring about improvements in health and well-being for the whole society.

In contrast, the proposed alternative approach uses the available options to their full extent to foster the health-climate-inequality nexus. Such an approach needs a careful design to step out of old beaten tracks which have failed to deliver the expected results. This alternative approach requires a supportive policy environment in which the European institutions take the lead by:

- setting the direction and the goals and naming concrete challenges without concealing the underlying conflicts,
- ensuring a well-balanced involvement and collaboration of officials from a wide mix of the Commission's policy domains, academics from different fields and stakeholders from different backgrounds,
- establishing a proper policy cycle to allow for evidence-based agenda setting, policy formulation and decision implementation and evaluation.

At the heart of this endeavour lies the necessity to manage the interlinkages between health, climate and inequality, where multiple co-benefits can be achieved and trade-offs avoided.

To monitor the progress, evidence-based indicator tracking is needed to ensure that health and equality considerations are well accounted for when developing and implementing climate policies. Only such monitoring allows for a reflexive, adaptive and transparent approach, which is required in times of dynamic developments globally and in many societal arenas. Adequate indicators could be those published in the Lancet Countdown in Europe, mentioned in section 4, Policy Recommendations.

From	Towards
Egoistic acts	Ecological action
Health repair	Prevention and health promotion
Technological climate fixes	Integrated approaches including sufficiency
Silo thinking	System thinking
Individual lifestyle focus	Healthy and sustainable living environments
Fragmented budgets	Joint budgeting and programming
GDP growth led economy	Economy of wellbeing

Table 1: Transformation principles for a more inclusive wellbeing

Overall, the ingredients to productively harness the climate-health-inequality nexus are well known and some have already been tested. The barriers to such a holistic approach are also known and overcoming them remains the major challenge, but the fact that they promise fewer risks and greater opportunities make the task rewarding.

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Endnotes

1 Inequality is here understood as the unequal distribution of social, political, economic and environmental resources. Health inequities (also sometimes coined health inequality) are defined as systematic, avoidable and unfair differences in health outcomes; See McCartney, G., Popham, F., McMaster, R. et al.(2019) "Defining health and health inequalities." *Public Health*, 172: 22-30.

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About the author(s)

DR WILLI HAAS

Willi Haas works as a Senior Researcher and Lecturer at the University of Natural Resources and Life Sciences for the Department for Economics and Social Sciences, Institute of Social Ecology. His research areas focus on Material flow analysis, Socioecological Transformations, Socioecological Transitions and Labour, Sustainable development, Health and sustainability, Local studies, Environmental policy and Inter- and transdisciplinarity. Willi Haas holds a PhD in Philosophy from Alpen-Adria University.

CHRISTINA LAMPL

Christina Lampl is working as a Junior Health Expert in the Competence Centre Climate and Health. In her work she is focussing on health co-benefits of climate mitigation, on the transition to a healthy, fair and sustainable Food System and on Integrated Assessments.Previously she worked at the Medical University Graz in the research group Aging Medicine and Lifelong Health (2021), as well as dietician in Ecuador and the University of Applied Science JOANNEUM in Graz at the Department of Nutrition and Dietetics (2017 to 2019). Christina Lampl holds a Master of Science in Health Studies from University of Applied Science Burgenland.

Dr Ernest Aigner

Ernest Aigner is a research associate at the Competence Center Climate and Health. He is co-editor of the Austrian Panel for Climate Change (APCC) Special report Structures for Climate Friendly Living and co-editor of the book Climate Social Policy and has published, among others, work and growth in the context of a social-ecological transformation. Ernest Aigner holds a PhD from the Department of Socioeconomics and a Master in Socio-Ecological Economics and Policy at WU Vienna.

DR ANDREA E. SCHMIDT

Andrea Schmidt is the head of the newly established Competence Center Climate and Health since March 2022. Previously, she was deputy head of the Department of Health Economics and Systems Analysis. S he conducted research at the European Centre for Social Welfare Policy and Research in Vienna (2010 to 2016), worked for the European Parliament in Brussels (2007/2008) and volunteered at the United Nations University (UNU-ILI) in Amman, Jordan (2008). Andrea E. Schmidt holds a doctoral degree from the Department of Socioeconomics at WU Vienna and a MSc in Public Policy and Human Development from Maastricht University, Netherlands.

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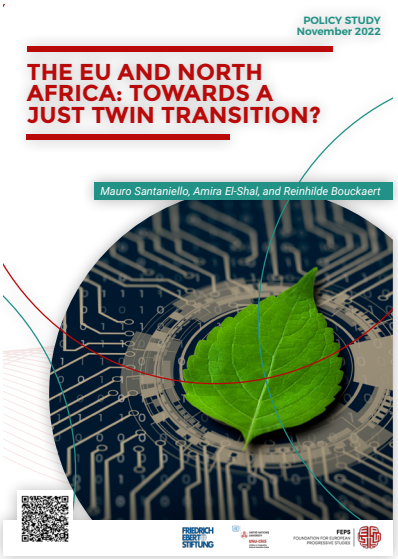

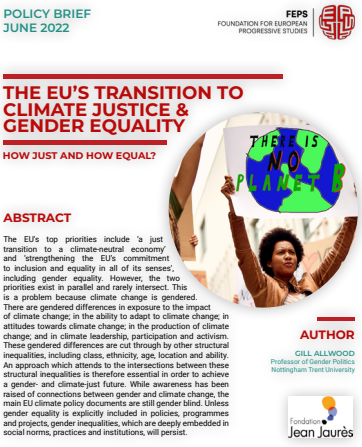

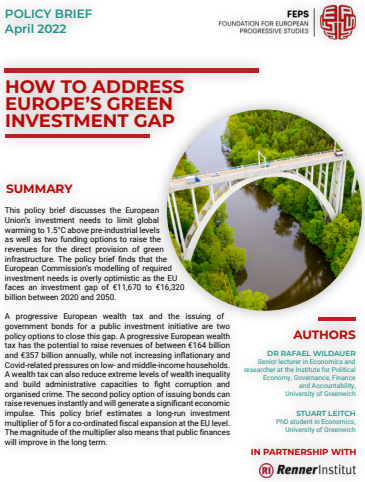

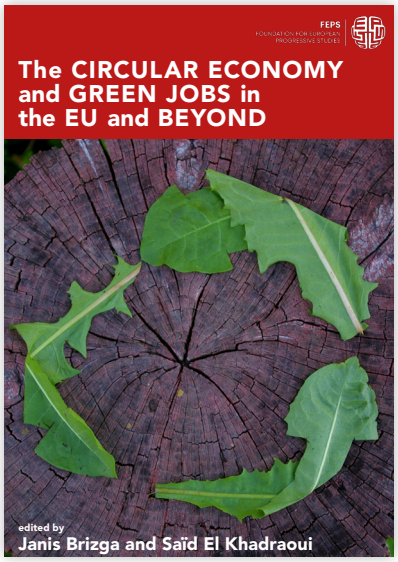

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