EEA Report | No 11/2021

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Creating a resilient economy within environmental limits

European Environment Agency

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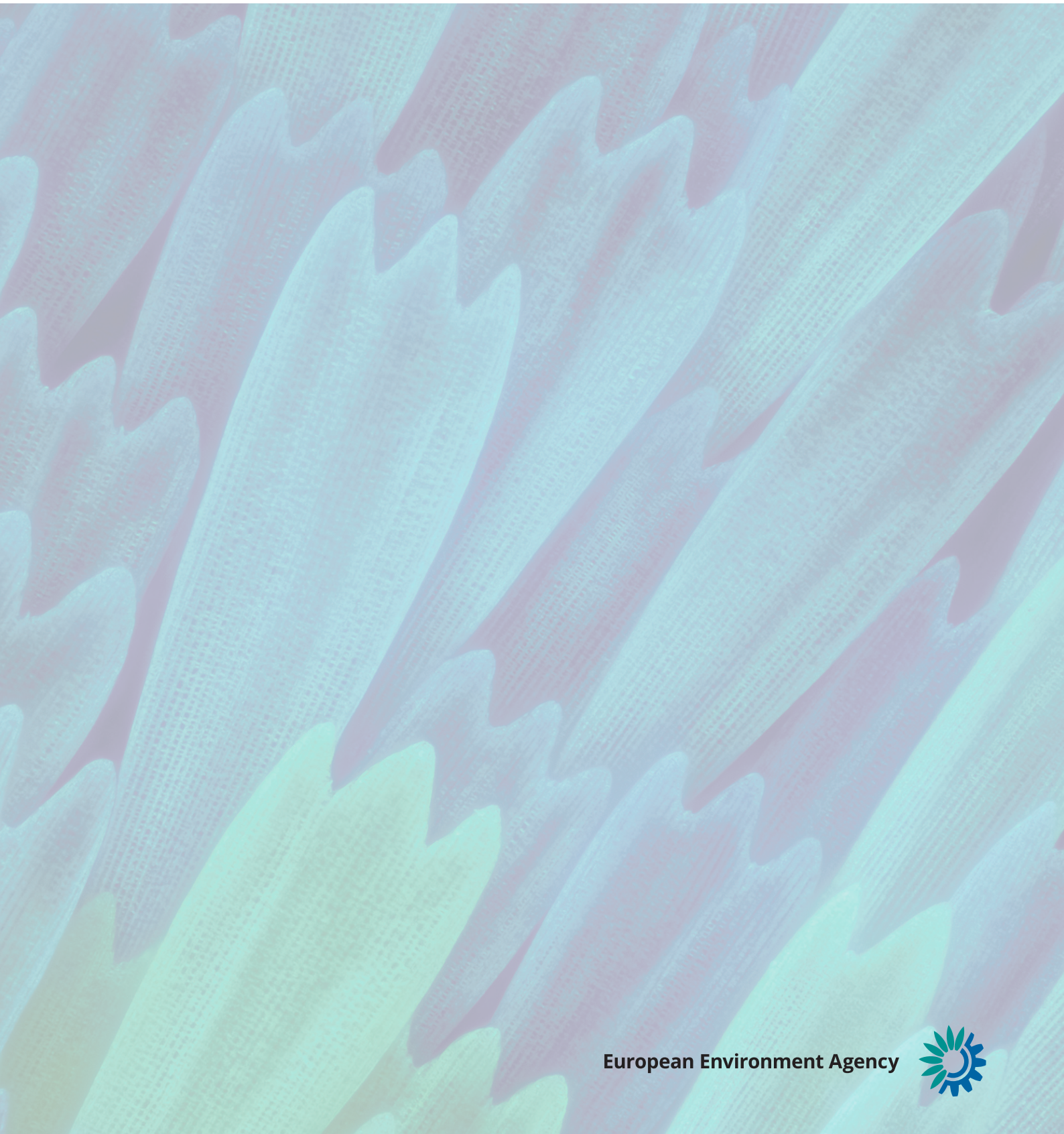

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Executive summary

The idea that European economies and societies need to develop within environmental limits is at the heart of EU policy. The EU's flagship strategic roadmap, the European Green Deal (EGD), aims to create an economy 'where there are no net emissions of greenhouse gases in 2050 and where economic growth is decoupled from resource use', while acting 'to protect, conserve and enhance the EU's natural capital'. The EU's draft 8th Environment Action Programme (8th EAP) likewise envisages that, by 2050, Europe will 'live well, within the planet's ecological limits'.

This awareness of the environmental limits to economic activity is not new. It was an important part of the thinking of the early economists in late 18th century Europe. And it rose to prominence again in the 1960s and 1970s, for example in Boulding's concept of 'spaceship Earth' and the Club of Rome's work on 'limits to growth'. Central to this reasoning is a recognition that economic growth has generated unprecedented wealth in developed regions but has also caused escalating environmental pressures, which undermine the foundations for human prosperity and well-being.

Since the 1970s, governments have increasingly sought to reconcile the tension between economic activity and environmental limits using public policies and institutions, often under the heading of 'sustainable development'. Economics has played an important role in shaping government interventions, although the focus and character of the policy paradigm has shifted over time. In the 1980s, the environmental policy frameworks that began to emerge were largely rooted in microeconomics and sought to shape the behaviour of businesses and consumers by adjusting prices. Since the early 2000s, this approach has increasingly been integrated into a broader perspective addressing the core societal systems driving sustainability challenges. This 'sustainability transitions' perspective is now prominent in EU policy, notably the European Green Deal and its associated strategies addressing transformation of the food, energy, mobility and buildings systems.

While each of these economic perspectives offers valuable insights into how the economic system can be made more sustainable, neither directly tackles the overarching issue of whether unending economic growth can be reconciled with environmental limits. As global environmental pressures grow and increasingly threaten ecological limits, this question grows ever more salient. It is already clear that production and consumption trends cannot continue along the trajectory of the last century, when massive loss of natural capital was partly offset by increases in technologies, infrastructures and the size and skills of the workforce. Sustaining growth of gross domestic product (GDP, i.e. the monetary value of all production in an economy) while operating within environmental limits will require Europe to achieve an unprecedented decoupling of economic activity from environmental and climate pressures. Whether this is feasible is currently uncertain.

In this context, there are growing calls for governments and societies to set aside their focus on economic growth and instead concentrate more directly on promoting well-being within environmental limits. While this sounds very appealing, it also presents some difficult practical challenges. Part of the problem is that the ways that we produce and consume are hardwired into society's discourses, rules, institutions and behavioural norms. Perhaps even more important is the fact that employment levels and tax revenues are also closely linked to growth in GDP. If GDP is shrinking, it would therefore be highly disruptive and have major implications for the financing of the welfare state, public health and education, and social justice. It could also make it very hard to finance public debt or the investments needed to achieve sustainability transitions, particularly if voters favour short-term actions to protect incomes and jobs over more long-term and indirect benefits from climate and environmental protection. These realities highlight an important truth: the fact that GDP growth has been harmful for the environment does not necessarily mean that declining GDP would be good for the environment. Even the sharp reduction of economic activity in 2020 brought only a modest reduction in greenhouse gas emissions, suggesting that making the economic system sustainable simply by shrinking has important limitations.

Governments therefore face a difficult dilemma. In its existing form, unending GDP growth is unlikely to be compatible with environmental limits. Yet in the socio-economic system as currently structured, shrinking GDP could be very socially disruptive.

The European Green Deal provides a clear and logical response to this problem, grounded in the logic of green growth. It adopts a strongly pro-growth stance, providing a basis to sustain employment levels and secure the resources needed to increase public welfare, promote social cohesion and make necessary investments. But it also seeks to adjust

the form of economic growth, transforming production and consumption in ways that reconcile increasing GDP with environmental limits.

The EGD's promotion of green growth clearly makes sense in a socio-economic system which is currently so dependent on GDP growth for stability and social cohesion. And the EGD also embodies a vital step forward in creating an integrated framework that brings together transformative, systems-oriented policies with measures to promote innovation, sustainable finance and the just transition. The EGD's transformative agenda is therefore essential, and Europe needs to find ways to make it the greatest possible success.

Nevertheless, there are some tensions and uncertainties inherent in relying only on a green growth strategy to achieve sustainable development. As already noted, it is not yet clear whether Europe can, in fact, achieve sufficient decoupling to keep increasing GDP indefinitely while also operating within environmental limits. And these uncertainties about future growth are further compounded by other challenges, including both long-term megatrends and more short-term shocks. A variety of developments already appear to be suppressing economic growth and creating challenges for fiscal and monetary policy — a process known as 'secular stagnation'. Population ageing, for example, will reduce the human capital available to generate economic output, increase the burden of health and pension expenditure, and thereby squeeze the resources available for investing in innovation and systemic change. Meanwhile, global crises may well become more frequent as international systems become more closely intertwined and ecological resilience diminishes. The financial crisis of 2008 and the COVID-19 pandemic vividly demonstrate the risks of contagion in globalised systems and the economic and social turmoil that can result. It is also certain that, even with the most ambitious global mitigation efforts, climate change and associated impacts will continue to worsen in coming decades due to 'climate change commitment', i.e. the inertia built into geophysical and socio-economic systems.

These downward pressures on economic output certainly do not imply that a green growth strategy is doomed to fail in coming decades or should not be pursued. They do, however, point to some risks, and suggest that as the EU and its Member States look to extend and build on the EGD, there would be advantages in also exploring ways to make European societies less dependent on economic growth. For the EU, creating an economy that is less reliant on growth would contribute concretely to its 'overall goals of increasing the well-being and the resilience of our economies and societies' as set out in the EGD. Crucially, it would involve building on and complementing the EGD's transformative agenda, including the emphasis on decoupling, rather than replacing it.

What would this mean in practice? While there are surely many dimensions to such a change, this report concludes with a focus on the central issue of fiscal sustainability. It explores how governments can secure revenues and manage expenditures in ways that provide for society's needs and enable transitions to sustainability, even if operating in a context of negligible or negative economic growth.

An obvious starting point involves taking measures to counteract the ongoing tax base erosion arising from trends such as population ageing and technological change. There are certainly opportunities to increase taxation of greenhouse gas emissions, pollution and resource use, which would help deter environmentally harmful activities as well as generating revenues. In the long term, however, there are limitations in the potential contributions of environmental and energy taxes to public budgets because their success in driving behavioural change effectively reduces the tax base. It is therefore important to complement such tools with other taxes that target more stable revenue sources, such as consumption, property, wealth and corporate incomes.

While reconfiguration of the tax base is likely to be essential, it will probably not be enough to meet the growing demands on public budgets in coming decades if economic output is shrinking. Reductions in GDP would imply a smaller aggregate tax base, which would ultimately limit the gains from switching between different revenue sources. To reduce growth dependence, governments will therefore need to identify ways to alleviate the demands for public spending.

Rather than simply focusing on opportunities to increase the efficiency of public service provision (which have been the focus of government attention for decades), there may be a need to look more deeply at why public spending is needed in the first place. Karl Polanyi, for example, saw the emergence of the welfare state as a countermovement necessitated by the social disruption and environmental harm arising from laissez faire policies in 19th century Europe. In a similar vein, a growing number of high-profile economists and international organisations have highlighted the deeply counter-productive outcomes generated by the dominant economic model, which rewards and incentivises the promotion of short-term, private gains and the externalisation of environmental and social harms.

Common to many of the recent critiques is a call to reorient or reimagine capitalism in ways that sustain its vitality and dynamism but mitigate its selfish, short-sighted and self-defeating characteristics. Crucially, doing so could reduce the need for ever greater government action to remedy social and environmental ills, ranging from poverty and chronic disease to pollution and climate change impacts.

In practice, creating a more equitable and sustainable economic system in Europe will require that the choices and actions of economic actors at all scales — corporations, small businesses, entrepreneurs, consumers — are guided by society's collective and long-term interests. This obviously presents a major challenge. With the primacy of profit maximisation currently

so firmly embedded in existing laws, institutions, mindsets and public discourses, individual business leaders face significant constraints on their ability to drive change. Public policies and institutions therefore have an essential role to play in reorienting corporate behaviour, for example using regulations to coordinate actions across whole industries; creating the legal frameworks and metrics that can transform corporate governance; and rewiring financial flows throughout the economy.

Alongside efforts to transform the culture and purpose of businesses, there is a need to reorient innovation processes and empower society to find solutions to social needs. At present, far too much human ingenuity and financial capital is invested in creating wasteful or actively harmful products and services; society's interests are marginalised in market-driven innovation and the public often stands as a passive observer. Channelling the transformational potential of innovation and entrepreneurship towards sustainable development and providing the needed financial support to good ideas will require experimentation and learning, backed up by harmonised evidence about social and environmental impacts. Governments again have a vital role in creating the enabling environment for sustainable innovation, including facilitating the needed flows of finance and knowledge, and developing supporting legal frameworks and skills.

Constructing a more resilient and sustainable socio-economic model that is less dependent on growth will require a shift in the economic paradigm. While this sounds radical, the seeds for this transformation are already emerging in policy and practice, for example in the EU's sustainable finance agenda. Europe needs to build on these foundations and take them much further and faster. Essential in this will be a knowledge system that can enable thinking and action at a pace and scale commensurate with the challenges we face. Creating such a system will require the engagement of society as a whole. But governments have a unique capacity to set the direction, create shared infrastructures, and mobilise and coordinate action. It is essential they do so.

1 Evolving economic and policy perspectives on sustainable development

The idea that our economies and societies need to develop within environmental limits is at the heart of EU policy. The flagship strategic roadmap, the European Green Deal (EGD) (EC, 2019b), aims to create an EU economy 'where there are no net emissions of greenhouse gases in 2050 and where economic growth is decoupled from resource use', while acting 'to protect, conserve and enhance the EU's natural capital'. The draft 8th Environment Action Programme (8th EAP) likewise envisages that, by 2050, Europe will 'live well, within the planet's ecological limits' (EC, 2020r).

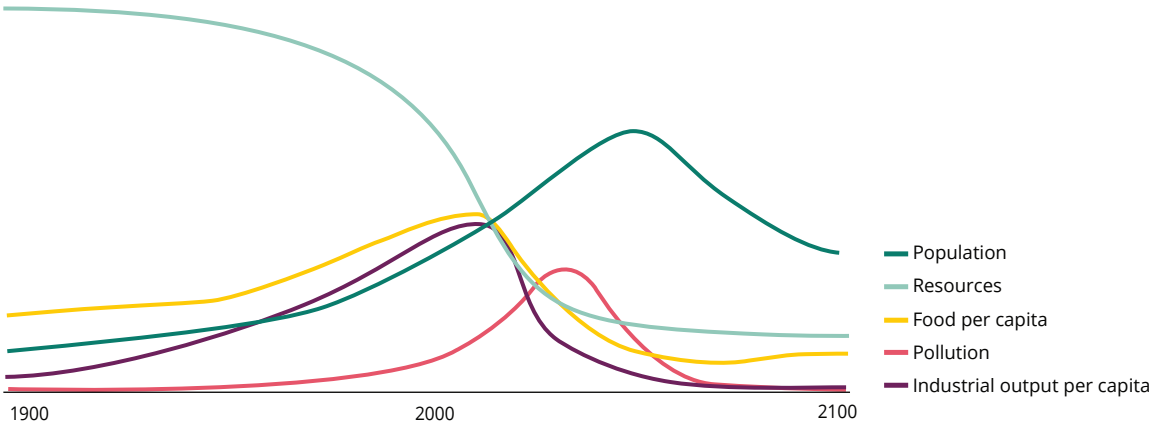
The language in these strategic policies draws in part on the notion of 'planetary boundaries' and a 'safe operating space' for human activities. These concepts were devised by Johan Rockström and colleagues just over a decade ago (Rockström et al., 2009), building on earlier ideas such as Boulding's concept of 'spaceship Earth', the Club of Rome's work on 'limits to growth', and the concepts of 'tolerable windows' and 'guardrails' in German research of the 1990s (Boulding, 1966; Meadows et al., 1972; WBGU, 1996, 2000). Yet debate about the relationship between economic output and environmental resources extends back more than two centuries. The earliest economists — including Quesnay, Smith, Ricardo, Malthus and George — put heavy emphasis on the role of land and agricultural production in economic wealth. Malthus, in particular, highlighted the Earth's finite capacity to support human populations in ways that clearly prefigured today's discussions about planetary boundaries (Malthus, 1798). John Stuart Mill (1848) extended this thinking further, arguing that physical limits would eventually constrain economic growth, necessitating a 'stationary-state economy' — an early prototype for Herman Daly's 'steady-state economy' (Daly, 1973) and the concept of sustainable development more broadly.

Support for Malthusian thinking declined in the second half of the 19th century, as innovations in farming and industry enabled societies to extract, cultivate and use ever more natural resources. But its popularity grew again in the second half of the 20th century, as the 'great acceleration' of humanity's socio-economic activity brought with it escalating environmental impacts. In the early 1970s, new analytical approaches raised more urgent questions about the sustainability of growth. These included Nicolas Georgescu-Roegen's (1971) application of the entropy law to the economic process and the Club of Rome's influential report *The limits to growth* (Meadows et al., 1972), which used computer simulations to model the interactions of economic and population growth with resource use. The latter argued that continued economic growth would lead to a collapse of the population and the economic system during the 21st century (Figure 1.1).

Such analysis helped trigger new ways of thinking about the relationship between the environment and the economy within academia. During the 1980s, ecological economics was established as a separate school of thought. Whereas mainstream economic theory treats economic output as a function of capital and labour stocks, ecological economics highlights the contributions of a broader range of inputs, notably resource flows and ecosystem services (Daly, 1996). Ecological economics also argues that the economy operates as a sub-system of the environment, whereas mainstream economics posits the opposite relationship (Faber et al., 2020).

The limits to growth also exerted a powerful influence on public and political discourse (Dolter and Victor, 2017). The emerging narrative was further reinforced by a succession of disasters caused by human activities, including Seveso (1976), Three Mile Island (1979), Chernobyl (1986) and the Exxon Valdez oil spill (1989), as well as water pollution of rivers and forest dieback in Europe during the 1980s. During these decades, international institutions began to acknowledge the scale of environmental degradation and the importance of natural capital for economic development. The United Nations

Figure 1.1 The Club of Rome's World3 model's 'business as usual' scenario



Source: Adapted from Meadows et al. (1972).

Conference on the Human Environment in 1972 identified key principles in its Stockholm Declaration. These contributed to the formalisation of the concept of sustainable development by the Brundtland Commission in 1987 ('Our common future') and at the United Nations Conference on Environment and Development held in Rio in 1992.

1.1 The microeconomic approach to sustainability

In general, the political impetus for environmentalism in the 1970s and 1980s reflected a growing understanding that unending economic growth is likely to be unsustainable in a world of finite resources and ecosystems. This was an essentially macroeconomic framing, which centred attention on the impacts of production and consumption across the entire economy. Despite this, the environmental policy frameworks that began to emerge during these decades were largely rooted in microeconomics, which focuses on the behaviours and decisions of individuals and firms, rather than the economic system as a whole. Writing in 1991, Herman Daly observed that, 'Environmental economics, as it is taught in universities and practiced in government agencies and development banks, is overwhelmingly microeconomics.'

Building on Arthur Pigou's (1920) foundational work on welfare economics, microeconomic analysis shows that market prices often misrepresent the full social and environmental costs and benefits of individual choices. As a result, they incentivise harmful levels of resource use and pollution. In addition to explaining how markets may contribute to environmental degradation, these insights offer clear guidance for governance. Governments should introduce taxes or other pricing mechanisms that correct prices, internalising the externalised environmental costs or setting prices at levels that will achieve environmental targets (Baumol, 1972).

Such thinking has had a substantial influence on policy. It underpins the 'polluter pays principle', which was formally established in the 1970s as a policy principle after the work done by the Organisation for Economic Co-operation and Development, and is recognised as a key principle of EU policy within the Treaty of European Union (OECD, 1992; EU, 2012). It also provides the basis for market-based instruments in environmental policies (e.g. Baumol and Oates, 1976) and cost-benefit analysis of investments, from local projects up to the macro scale, for example Stern's wide-ranging analysis of the economics of climate change (Stern, 2007).

For governments, businesses and consumers alike, the microeconomic framing of environmental problems has obvious appeal, offering an apparently simple solution to complex sustainability problems. When prices are corrected, markets can be allowed to run their course and will produce socially desirable outcomes. Indeed, the apparent conflict between economic growth and environmental sustainability seems to fade away. As Herman Daly (sceptically) summarised the microeconomic position: 'Once prices are right the environmental problem is 'solved' — there is no macroeconomic dimension' (Daly, 1991).

This way of understanding environmental problems and responses was particularly well suited to the free-market, deregulatory ethos of the 1980s. The concept of the 'green economy' that emerged at that time (e.g. Pearce et al., 1989) was shaped by this context. Faith in the capacity of markets to solve environmental governance problems was further reinforced by the concept of the Environmental Kuznets Curve (EKC), which emerged in the early 1990s. The EKC appeared to show that economic growth leads to environmental degradation during early stages of economic development but later results in environmental improvements as wealth increases further (Stern, 2004). In this telling, economic growth is not just compatible with a healthy environment but actually promotes it (e.g. Grossman and Krueger, 1991).

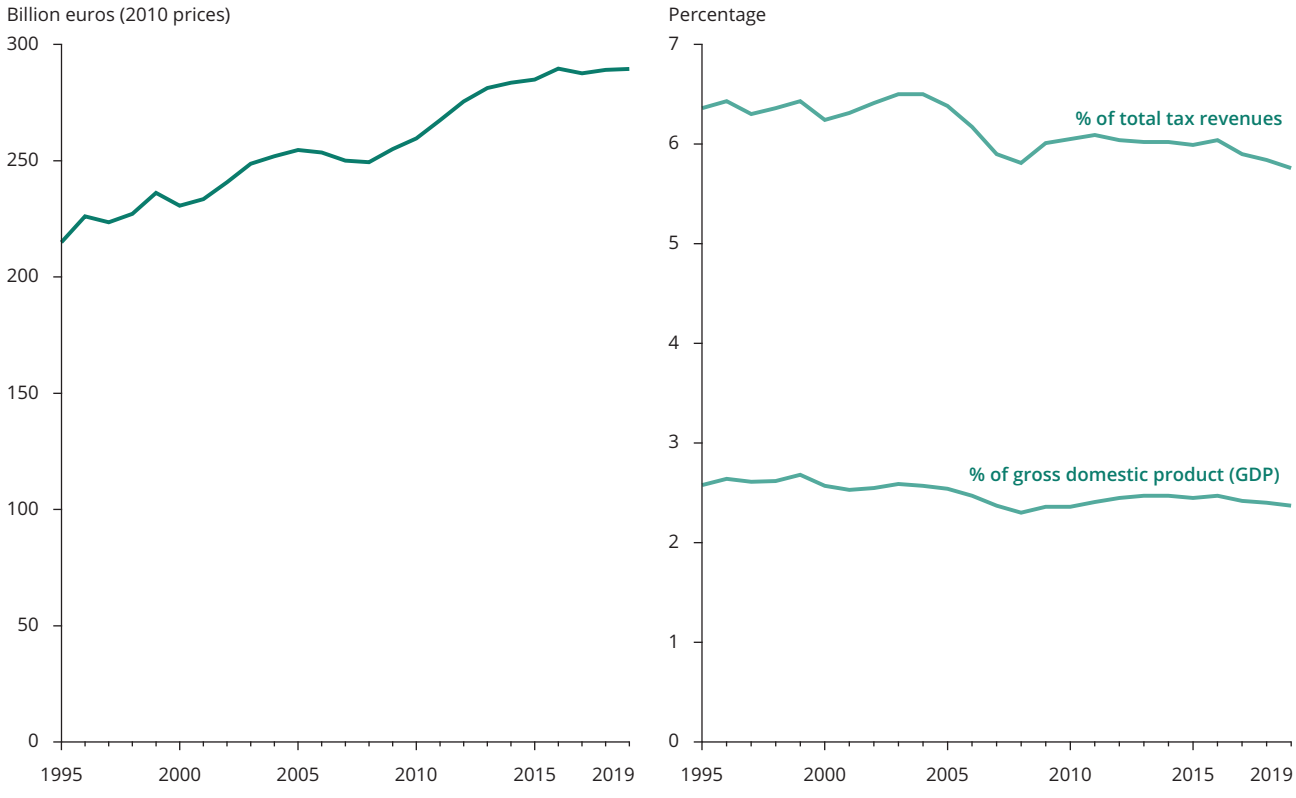
Optimism about purely market-driven sustainability diminished in the subsequent decades. The EKC has proven to have limited application beyond local and short-term pollution issues (Dinda, 2004). And while microeconomics continues to provide a major contribution to environmental policy, few today think that 'getting the prices right' alone can provide a solution to environmental and sustainability problems.

In practice, governments have very seldom introduced economic instruments at levels that would incentivise the needed changes in production and consumption. Scientists sometimes interpret this lack of policy action as a signal that governments have not understood the scale of environmental and climate problems or how to design and implement the most effective policy responses. Their solution is therefore to provide governments with more information to support rational policymaking. In reality, however, the continued absence of stringent economic policy instruments and effective implementation largely reflects the real-world trade-offs and barriers that governments face. For example:

- Governments encounter considerable pressure from influential sectors such as energy, agriculture and transport (e.g. Hillman and Hitt, 1999; Geels, 2014), and from consumers affected by price increases for essentials such as food and fuel.
- Environmental and energy taxes are often regressive, disproportionately affecting the poorest and also specific groups (e.g. rural communities) (e.g. EEA, 2011).
- Governments are reluctant to undermine the competitiveness of domestic businesses, particularly if it simply means that production moves overseas to countries with less stringent environmental policies.
- Taxing the resources and greenhouse gas emissions associated with imports is difficult, both because of problems calculating them and because of international trade rules.
- Political and electoral incentives can promote short-termism, making it hard to impose stringent policies that generate social benefits over decades or centuries.
- Shifting towards environmental and energy taxes may weaken fiscal sustainability because it means relying on a shrinking tax base in the long run.

For these different reasons, and despite ideas about how to resolve some of them (e.g. EEA, 2011), the long-awaited shift of the tax burden away from labour and on to pollution and resource use has not yet occurred. In the EU-27, environmental tax revenues actually declined as a percentage of gross domestic product (GDP) and of total tax revenues in the period 1995-2019 (Figure 1.2).

Figure 1.2 EU-27 environmental tax revenues, 1995-2019



Source: Eurostat (2021a).

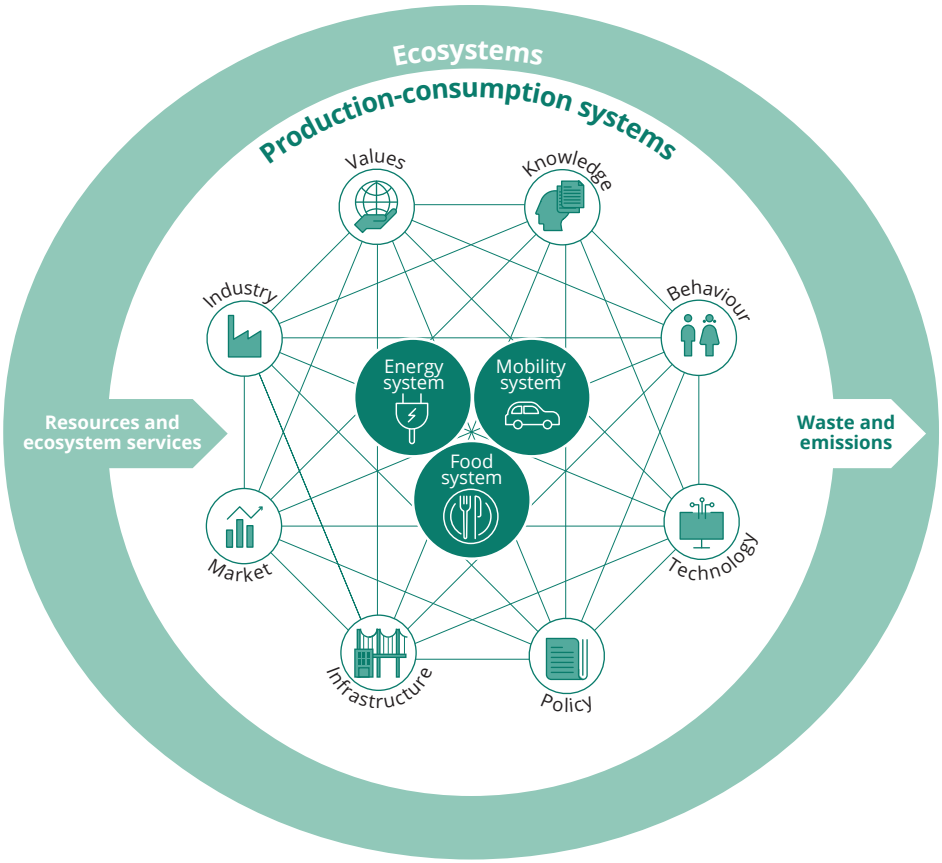
1.2 Systemic challenges and sustainability transitions

By the late 1990s, persistent environmental problems and growing global pressures highlighted the limitations of the microeconomic perspective as a framework for understanding sustainability challenges and designing policy responses. These deficiencies pointed to the need for a new paradigm. Emerging research on sustainability transitions provided a new perspective, expanding the focus from the microeconomic scale of individual businesses and consumers to include the meso-economic scale of whole sectors and systems of production and consumption.

At the heart of the transitions perspective is an understanding that the key socio-economic and environmental challenges facing society, including climate change, biodiversity loss and inequality, are particularly hard to solve because they are 'systemic'. Figure 1.3 illustrates this idea. As it shows, the systems that meet society's essential needs, such as energy, food and mobility, impose a burden on the environment by extracting resources and producing waste and emissions. Yet these systems are also closely linked with socio-economic and institutional developments that co-evolve with system technologies, creating 'socio-technical systems'.

For example, the energy system is tied in complex ways to jobs and earnings across the value chain; to major investments in infrastructure, machinery, skills and knowledge; to cultural norms and ways of living; and to public policies and institutions. These interlinkages mean that efforts to alter one aspect of these complex societal systems are likely to produce a mixture of costs and benefits elsewhere, generating an uncertain mixture of resistance, feedback and trade-offs. Society is locked into existing ways of producing and consuming, and it is very difficult to effect the changes needed to achieve sustainability.

Figure 1.3 **Production-consumption systems driving environmental pressures**



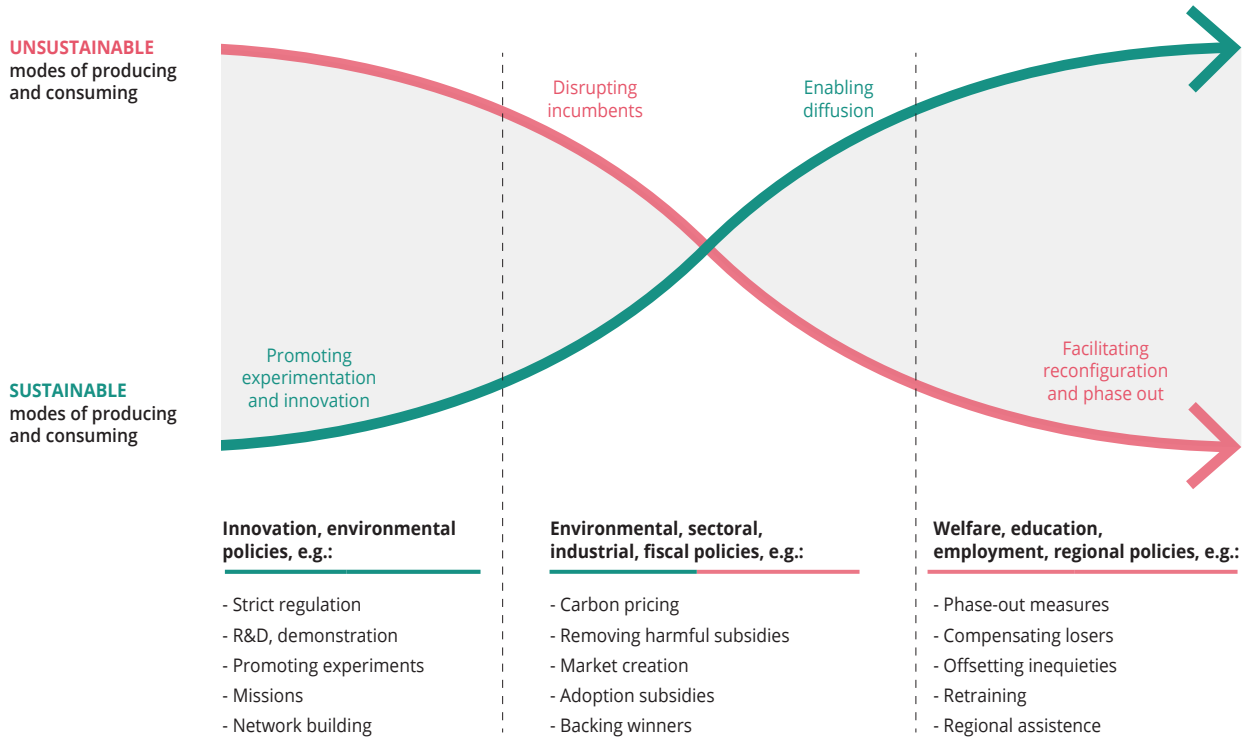
Source: EEA (2019a).

Taking a systemic perspective helps to explain the barriers that governments face when seeking to correct market prices or use other policy tools to achieve sustainability goals. It also offers insights into how systemic change occurs and what this implies for policy. Drawing on neo-Schumpeterian and evolutionary economics, transitions research argues that systemic change depends critically on the emergence and spread of diverse forms of innovation that trigger alternative ways of thinking and living — new social practices, technologies, business models, organisational forms and so on. It is impossible to know in advance precisely what innovations will emerge, whether or how they will be integrated into lifestyles, and how they will affect sustainability outcomes. Transitions therefore involve numerous uncertainties, conflicts and tradeoffs (EEA, 2017).

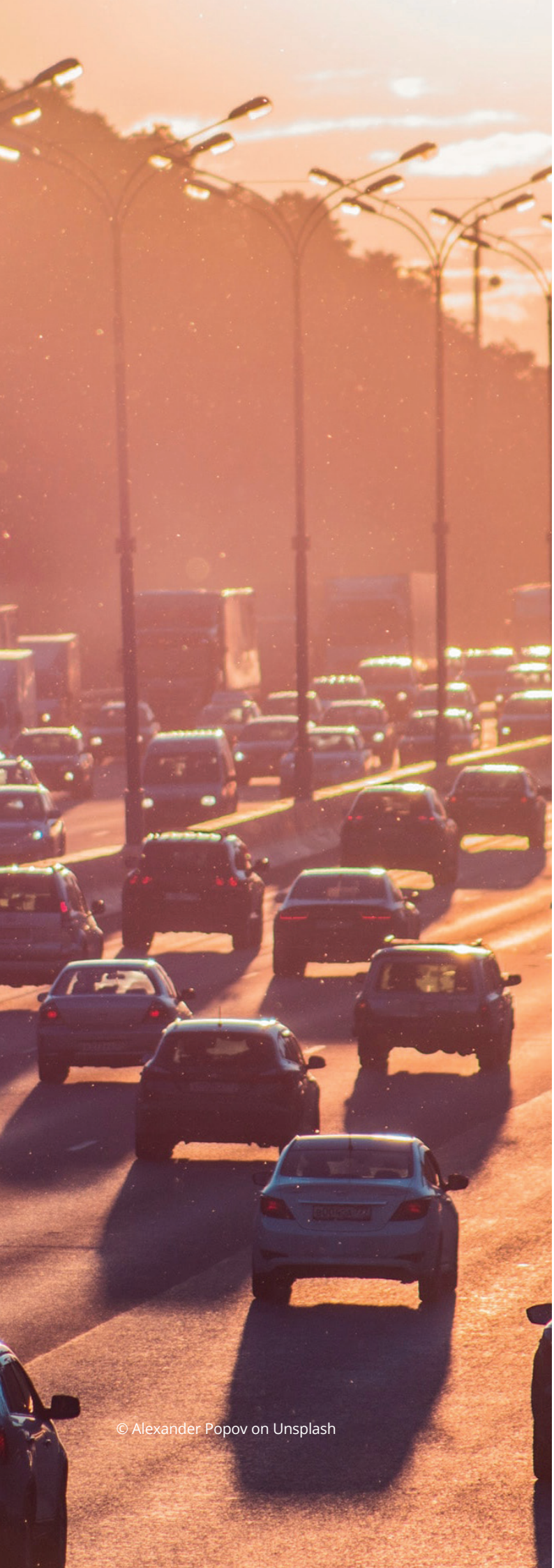
This understanding of systemic change has important implications for governance. The perceived role of government shifts from acting as a 'pilot', with the knowledge and tools to steer society towards sustainability, to a role as an enabler of society-wide innovation and transformation. Top-down planning still has a role in some contexts. But governments also need to find ways to leverage the powers of citizens, communities and businesses.

Achieving this requires contributions from across policy areas and levels of government, with all stakeholders working together towards common goals. Market-based instruments and other environmental policy tools remain essential — and the EGD (EC, 2019b) accordingly includes numerous references to the need for tax reforms and other economic instruments. But enabling systemic change will require a much broader policy mix to promote innovation and experimentation, to enable new ideas and approaches to spread, and to ensure that structural economic change produces beneficial and fair outcomes (Figure 1.4). This means developing a broad array of policies to facilitate the phase out of existing production-consumption systems and ensure a 'just transition'. It is not enough to promote economic growth and then seek to address harmful side effects by using social and environmental policies. Instead, sustainability must become the guiding principle of policies and actions across society.

Figure 1.4 Diverse policy mixes supporting sustainability transitions



Source: Adapted from Loorbach (2017).



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With Europe facing simultaneous crises in recent years — including economic turbulence, social inequalities, and climate and ecosystem degradation — transitions thinking has moved rapidly from research to the centre of sustainability policy. Since 2015, the EU has adopted a series of long-term frameworks oriented towards transforming key systems such as mobility, energy and (most recently) food (EC, 2015, 2017a, 2020h). They are characterised by multidimensional goals, addressing themes such as jobs, competitiveness, fair access to resources and sustainability; a focus on diverse societal actors and creating stakeholder platforms; and an increasing emphasis on system innovation. The EGD brings these system-oriented policies together into an integrated framework. It includes a specific focus on cross-cutting themes such as innovation, finance and the 'just transition' and provides a basis for more far-reaching strategies to trigger and orient systemic transitions in coming years.

The EGD clearly embraces the idea that achieving sustainability transitions requires coherent contributions from diverse policy areas. As it stipulates: 'All EU actions and policies will have to contribute to the EGD objectives. The policy response must be bold and comprehensive ... It will require intense coordination to exploit the available synergies across all policy areas' (EC, 2019b).

1.3 The need for macro-level perspectives on transitions

The emergence of transitions thinking in research and policy is important. Analysing sustainability challenges at the meso-economic scale provides insights that are largely lacking from a purely microeconomic perspective, for example helping to clarify the tensions that hinder established policy approaches and the opportunities to overcome those barriers and enable systemic change. Yet the meso-economic perspective can still be criticised for focusing too narrowly and marginalising important issues. The resulting tensions point to the need to complement the micro- and meso-economic approaches with broader, macro-level perspectives on societal change.

Sustainability transitions research centres attention on transforming individual production-consumption systems in ways that enable society to meet its basic needs, while also achieving desired environmental goals. It largely sets aside issues such as the effects of interactions between production-consumption systems and the cumulative effects of transitions in multiple systems. This is an important oversight: Europe's food, energy, mobility and other systems are connected in complex ways and rely on a shared base of ecosystems and natural resources. This means that efforts to transform different production-consumption systems will produce synergies and trade-offs, with cumulative impacts that may be harmful for communities and natural systems.

Equally, transitions research generally ignores the aggregated, macroeconomic implications of systemic change, for example in terms of effects on national income, growth rates and employment levels, or the operation of fiscal and financial systems. In some respects, this seems quite appealing. The idea that societies should focus on meeting their needs within environmental limits and pay less attention to GDP growth chimes with recent calls for developed regions to shift from relentlessly pursuing GDP growth towards an 'agnostic' or 'agrowth' attitude (Raworth, 2017; van den Bergh, 2017). Yet, appealing as it sounds, this approach has the effect of ignoring, rather than resolving, some very difficult questions for governance — questions that go to the heart of the political, social and economic feasibility of sustainability transitions. For example:

- If the aggregate effect of transforming core systems is to reduce economic output, what will this imply for employment levels and inequality?
- What will it imply for public budgets? How will governments finance public debt and the welfare state?
- Will the state have resources to invest in the innovations, infrastructures and skills needed to enable transitions?
- Will the state be able to invest in ecosystems and natural capital?

Some transitions researchers have already begun to ask these questions. For example, Antal and van den Bergh (2013) note that 'a transition to a sustainable economy cannot be well understood without a serious analysis of macroeconomic constraints and implications', adding that 'A lack of understanding of macroeconomic complexities easily results in the design of policies that are ineffective'.

The EGD implicitly recognises the importance of these macro-level questions and responds to them clearly. First, it is very explicitly a strategy to achieve economic growth. Second, it clearly acknowledges the need for economic development to proceed within environmental limits, in line with the vision of the 8th EAP. The goal of the EGD is to transform the EU's society and economy in ways that 'protect, conserve and enhance the EU's natural capital'.

As such, the EGD clearly articulates a 'green growth' logic, which treats economic growth as necessary, desirable and compatible with environmental limits. As explored in the next chapter, however, the twin objectives of promoting growth and preserving natural capital create important tensions and uncertainties that may affect the EU's efforts to achieve its long-term sustainability targets.

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2 Economic growth and sustainable development

To understand the tensions inherent in the green growth paradigm, it is necessary to understand the relationship between economic activity and environmental limits. In this context, many of the issues and questions that arise centre on the concept of gross domestic product (GDP). Is it possible, for example, to preserve resilient and healthy ecosystems if GDP keeps growing? Equally, is it possible to achieve a healthy, prosperous and equitable society without GDP growth? Given the prominence of GDP within these discussions, it is useful to start by clarifying what GDP is and how it relates to sustainability.

2.1 Gross domestic product

GDP provides a monetary measure of the value that an economy generates in a certain period of time. This total value can be calculated in three ways, focusing on:

1. production: the total value added at each stage of production across the entire economy;

2. expenditure: the total of all final expenditure on consuming and investing in goods and services, plus net exports;

3. income: the total of all income (including labour income, corporate profits and investment income).

Each of these calculations produces the same total for GDP. This reflects the simple fact that the total value added by producers is determined by how much people spend on outputs of production. Equally, the total value added by producers determines how much income they secure. The fact that total expenditure is identical to total income has an obvious but very important implication: measures to reduce environmental pressures by reducing demand for goods and services will necessarily reduce total incomes. They will therefore also reduce the total tax base that finances the operations of the state, its investments and welfare payments.

In the EU-27, like most other regions, final household and government consumption accounts for about three quarters of GDP (Figure 2.1). In recent years, this contribution has declined, from a peak of 78 % in 2009 to 74 % in 2019. Investment peaked at more than 24 % in 2007 before declining after the financial crisis to below 20 % in 2013 then rising to above 22 % in 2019. Net exports have increased in relevance over time, contributing less than 1 % of GDP in 2009 and more than 4 % since 2015. In fact, the relatively small external trade balance disguises the contribution of international trade to GDP. Exports of goods from the EU-27 to other regions totalled more than EUR 2.1 trillion in 2019 (Eurostat, 2021b), which is equivalent to 15 % of GDP. In addition to making a major contribution to jobs and earnings within the EU and internationally, the globalisation of trade contributes to economic growth by a variety of means, including by incentivising specialisation (Eaton and Kortum, 2012), increasing the overall market size and thereby increasing economies of scale (Krugman, 1979; Melitz, 2003), and facilitating technology transfer (Azariadis, 1996).

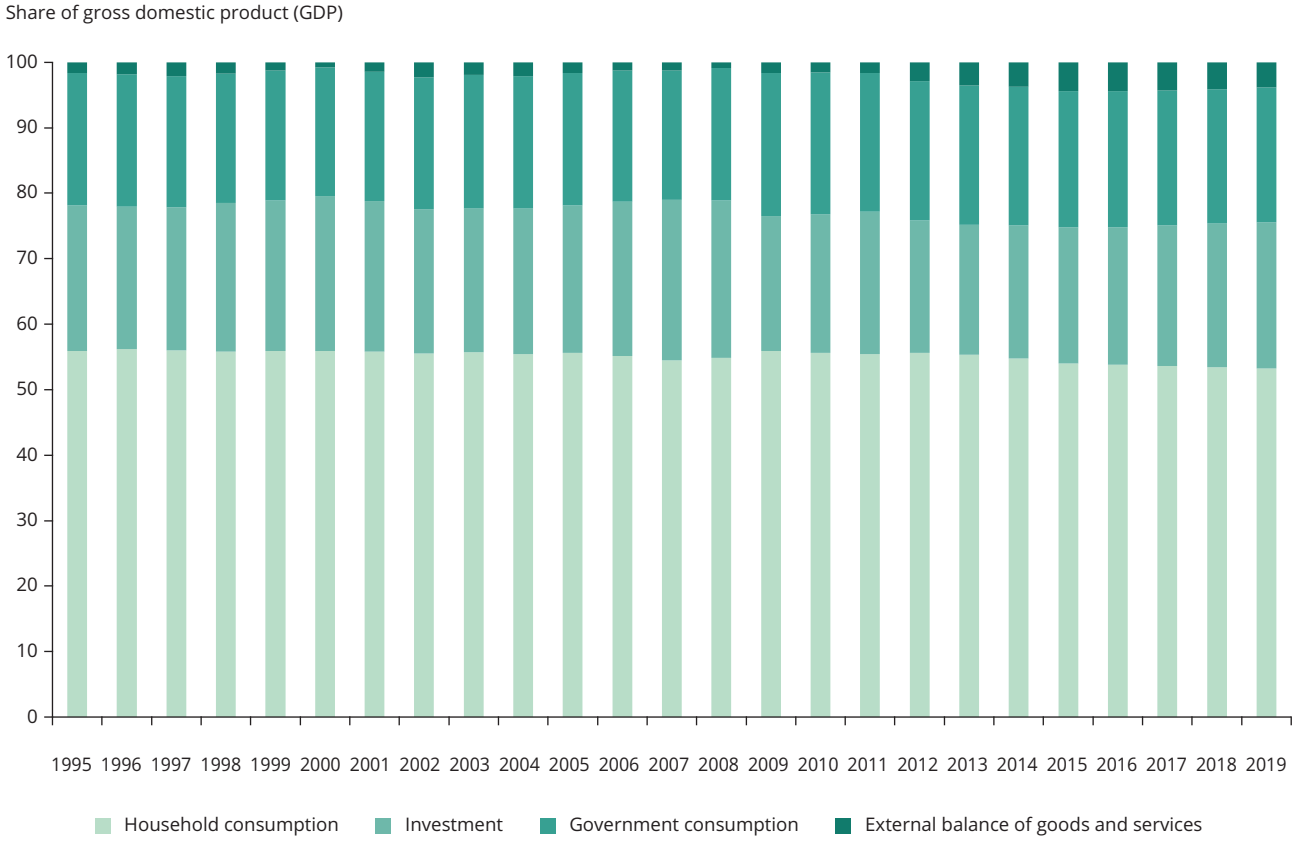
2.2 Economic growth and natural capital

Much of the controversy around GDP centres on its use as a proxy for societal progress or standards of living. The risks and difficulties associated with this usage have long been acknowledged. Simon Kuznets, who first developed the concept of GDP for the US government, himself warned that: 'The welfare of a nation can, therefore, scarcely be inferred from a measurement of national income' (Kuznets, 1934). In subsequent decades, analysis of GDP's shortcomings has proliferated. Critics highlight, for example, the fact that GDP misrepresents or excludes the environmental and social harms associated with economic output, the value of non-market activities and the non-monetary economy, and the sustainability of the underlying foundations of economic output. Such criticisms have driven calls for governments to development and use better frameworks for measuring and guiding societal progress (e.g. EC, 2009; Stiglitz et al., 2009; OECD, 2021b).

The limitations of using GDP as a measure of societal progress are particularly obvious in the harms that have accompanied GDP growth since the mid-20th century. The 'great acceleration' of social and economic activity improved living standards significantly in much of the world, while also bringing proportionate increases in resource use and environmental pressures (Figure 2.2). Since 1950, the global population has tripled to 7.7 billion, while economic output has expanded 12-fold, matched by a similar increase in the use of nitrogen, phosphate and potassium fertilisers.

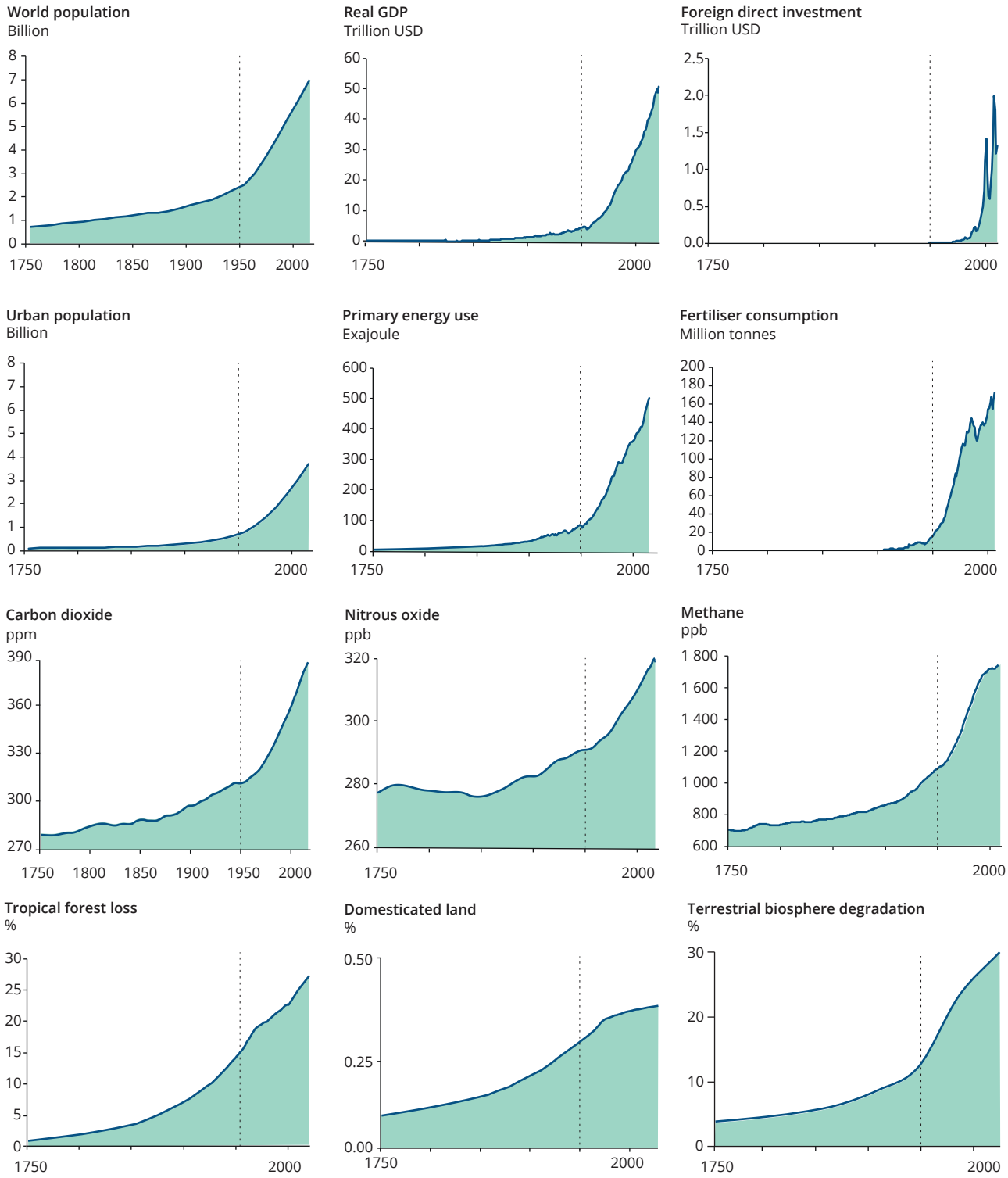
Primary energy use has increased five-fold, water use has tripled and marine fish capture has quadrupled. Globally, about 75 % of the terrestrial environment and 40 % of the marine environment are now severely altered. The Earth is experiencing exceptionally rapid loss of biodiversity, and more species are threatened with extinction now than at any point in human history. Indeed, there is evidence that a sixth mass extinction of biodiversity is under way. Many of the changes in the global climate system since the 1950s are unprecedented over millennia (EEA, 2019b).

Figure 2.1 Components of GDP in the EU-27, 1995-2019



Source: Eurostat (2021c).

Figure 2.2 **Indicators of the 'great acceleration' of global socio-economic activity and environmental pressures**



Source: Steffen et al. (2015).

Both directly and indirectly, these pressures are inflicting tremendous harm on human health and well-being. The global burden of disease and premature death related to environmental pollution is already three times greater than that from AIDS, tuberculosis and malaria combined (Landrigan et al., 2017). But the continuation of the great acceleration could create even more far-reaching threats if pressures trigger the collapse of ecosystems such as the Arctic, coral reefs and the Amazon forest. Sudden and irreversible shifts in the physical climate system and ecosystems could severely disrupt nature's ability to deliver essential services such as supplying food and resources, maintaining clean water and fertile soils, and providing a buffer against natural disasters. All such disruptions will have implications for people's livelihoods and well-being.

In addition to direct impacts on human well-being, the destruction of ecosystems also influences the potential for future GDP growth. As set out in the 'four capitals' framework (Ekins et al., 2008), a country's long-term economic output is largely determined by the state of underlying capital stocks, specifically:

- natural capital: assets such as forests, minerals, water, biodiversity and land, which provide both resources and ecosystem services (see e.g. Dasgupta, 2021);
- physical or manufactured capital: material goods or fixed assets such as machinery, buildings, equipment and infrastructure;
- human capital: population size and status in terms of health, knowledge, skills, etc.;
- social or institutional capital: resources such as trust and norms embedded in social structures and relationships, e.g. families, communities, businesses, trade unions and political institutions.

Since the 1970s, debate has centred around the substitutability or complementarity between natural capital and other forms of capital. If climate change causes desertification in a region then we will have less natural capital to support future production. But can we compensate for this loss by investing in other forms of capital such as new technologies or infrastructure? Such questions give rise to the differentiation of 'weak' and 'strong' sustainability (Dietz and Neumayer, 2007; Stiglitz et al., 2009).

Proponents of weak sustainability argue that substituting capital stocks is possible: depleting natural resource stocks and degrading environmental systems can be sustainable if it is offset by equivalent or greater increases in other forms of capital. This position is implicit in some definitions and measurement frameworks for sustainable development. For example, the United Nations Environment Programme (UNEP) has defined sustainability as requiring that 'each generation must bequeath to the next as large a productive base as it inherited from its predecessor' (UNEP, 2018). Similarly, some indicators, such as the World Bank's Adjusted Net Savings (Lange et al., 2018) and UNEP's Inclusive Wealth Index (UNEP, 2018), estimate economic sustainability by simply totalling estimates of capital stocks, implying that decreases in one stock can be offset by increases in others.

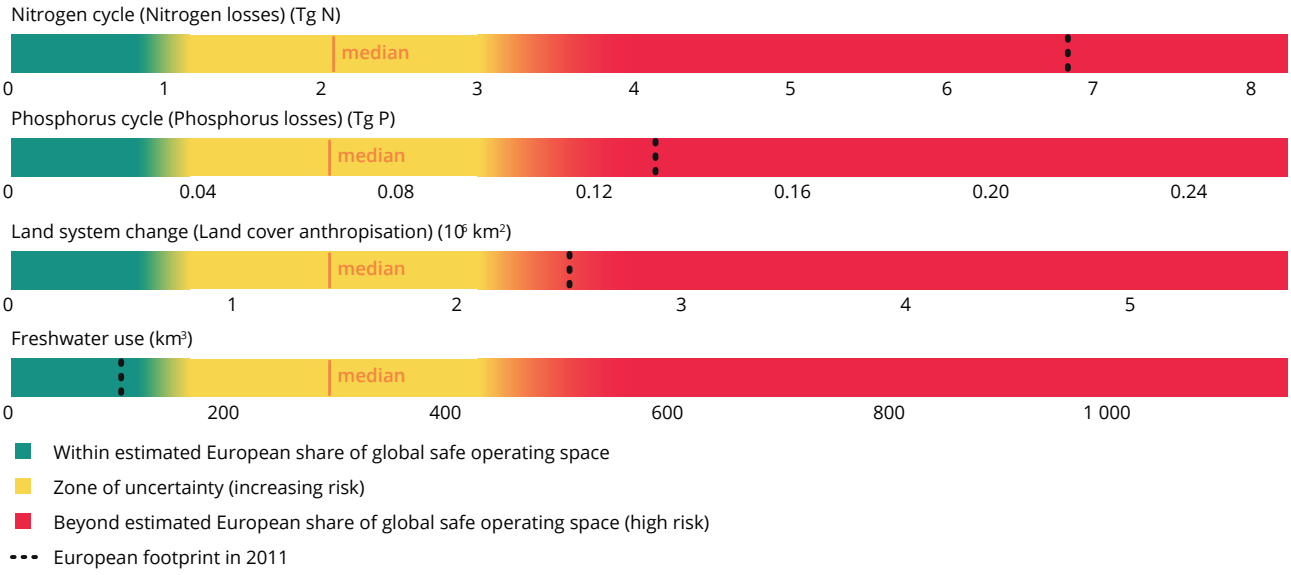
In contrast, advocates of strong sustainability are far more sceptical about substitutability. They argue that natural capital is often a complement to machinery and other forms of capital, rather than a substitute. Pearce and Turner (1990) add further nuance, noting that natural capital is characterised by four types of functions: provision of raw materials, assimilation of wastes, amenity services and life support. The feasibility and cost of substituting natural capital vary according to its function. Life support systems and other forms of 'critical natural capital' (Ekins et al., 2003) are almost impossible to substitute and therefore require extremely careful management (Dietz and Neumayer, 2007).

Environmental science provides further evidence of the need to put hard limits on environmental pressures. Research into ecological resilience finds that complex environmental systems are normally stable and able to recover from short-term shocks. However, if subjected to excessive pressures (for example related to global resource use, pollution or ecosystem degradation) they may reach tipping points, at which small changes in conditions lead to large, abrupt and irreversible changes in ecosystem functions.

The principle of strong sustainability is prominent in today's policies, such as the EU's vision of 'living well, within environmental limits', as set out in the draft 8th Environment Action Programme. It is also represented in key assessment tools, most notably the 'planetary boundaries' framework, which indicates that humanity is already creating dangerous pressures.

As a developed region, Europe contributes disproportionately to global pressures on the environment and climate. For example, an analysis of several planetary boundaries at the European scale (EEA and FOEN, 2020) finds that Europe currently exceeds its safe operating space for the nitrogen cycle by a factor of 3.3, the phosphorus cycle by a factor of 2.0 and land system change by a factor of 1.8 (Figure 2.3). Minimising the risk of catastrophic impacts from climate change will likewise require massive reductions in greenhouse gas emissions in Europe and globally in coming years.

Figure 2.3 **European performance against planetary boundaries on biogeochemical flows, land system change and freshwater use**



Note: The EEA and the Swiss Federal Office for the Environment (FOEN) calculated Europe's performance against several planetary boundaries using a consumption-based perspective, which conveys the global environmental pressures associated with final demand for goods and services. Five alternative normative principles were identified to define Europe's share of the global 'safe operating space'. This ranged from 4.1 % to 12.5 % of the global total, with a median of 7.3 %.

Source: EEA and FOEN (2020).

As populations in lower income regions increasingly shift towards the lifestyles and consumption patterns of high-income regions, global environmental pressures are likely to increase. O'Neill et al. (2018) sum up the scale of the international challenge in fairly stark terms:

> We find that no country meets basic needs for its citizens at a globally sustainable level of resource use. Physical needs such as nutrition, sanitation, access to electricity and the elimination of extreme poverty could likely be met for all people without transgressing planetary boundaries. However, the universal achievement of more qualitative goals (for example, high life satisfaction) would require a level of resource use that is 2-6 times the sustainable level, based on current relationship (O'Neill et al., 2018).

Collectively, these realities indicate that socio-economic development cannot continue along the trajectory of the last century, when economic growth was accompanied by a massive loss of natural capital. Either societies will need to find ways to sustain GDP growth without degrading natural capital or they will need to find ways to sustain improvements in living standards without relying on GDP growth. These alternatives point towards two prominent strategies for sustainable development: green growth and degrowth.

2.3 Decoupling GDP growth from environmental pressures

The idea that societies can decouple GDP growth from environmental pressures is central to the concepts of 'green growth' and 'the green economy'. These ideas were popularised in the 1980s and received renewed attention after the 2008-2009 financial crisis, with the publication of UNEP's green economy report and the Organisation for Economic Co-operation and Development's green growth strategy (OECD, 2011; UNEP, 2011). Central to these approaches is an optimism that technological advances and market-driven innovations will improve the efficiency of production, enabling GDP growth to continue indefinitely.

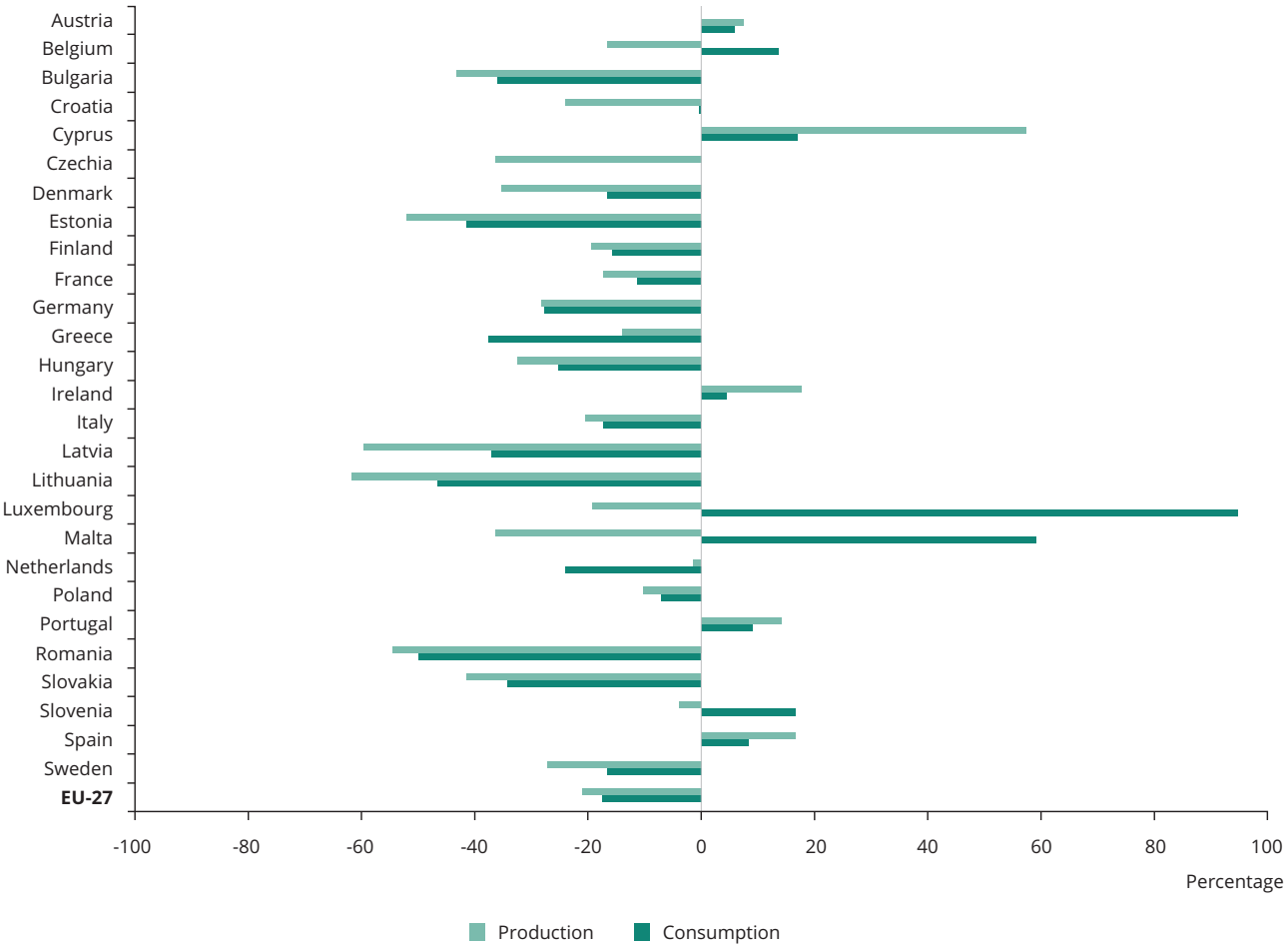
At the abstract level, the idea that GDP growth can be decoupled from environmental pressures is contested. Ekins (2017), for example, argues that 'there is no theoretical contradiction between finite limits to physical growth and the possibility of indefinite economic growth'. Yet biophysical economists are more pessimistic, reasoning that increasingly complex societies inevitably depend on increasing throughputs of energy and materials to sustain themselves (e.g. Hall and Klitgaard, 2018), and that this dependence is seldom reflected in assessments of decoupling (Wiedenhofer et al., 2020).

Turning to empirical evidence, the literature is conflicting on the question of whether or not decoupling is actually happening. Some of the uncertainty centres on the question of whether environmental harms are the responsibility of the producers of goods and services or the consumers. The idea that producers are responsible is called the 'polluter pays principle', whereas the idea that final consumers bear this responsibility based on a life-cycle analysis is called the 'user pays principle' (Dommen, 1993). Both approaches have merits, although the former better reflects current political realities, as it is the basis of international carbon accounting systems and targets such as those of the Paris Agreement on climate change (UNFCCC, 2015).

From a production-based perspective, it is clear that European countries have achieved some absolute decoupling of GDP activity from environmental pollution and resource use (EEA, 2019b), meaning that GDP is increasing while pollution and resource use are declining. Yet these figures are heavily debated, as international trade flows are not considered, meaning that the environmental impacts associated with a substantial proportion of European consumption are ignored (Parrique et al., 2019; Wiedmann et al., 2020).

'Footprint-based analysis' of the environmental pressures associated with consumption reveals that many industrialised countries are net importers of carbon emissions and other environmental pressures. Yet it also points to some progress towards decoupling. For example, consumption-based measures of Europe's total GHG emissions have declined in absolute terms in recent years (OECD, 2019a). As illustrated in Figure 2.4, national GHG emission reductions in the EU are generally smaller from a consumption perspective than from a production perspective but not necessarily hugely so. Looking ahead, a recent study by McKinsey (2020) focusing narrowly on GHG emissions suggests that Europe can achieve climate neutrality through large investment programmes in key sectors: power, industry, transport, buildings and agriculture. Prognos et al. (2020) likewise outline a scenario for a climate-neutral Germany in 2050, assuming average economic growth of 1.3 % annually.

Figure 2.4 **Percentage change in national GHG emissions (1990-2018) in the EU-27, from production and consumption perspectives**



Source: Friedlingstein et al. (2020). Reproduced under the terms and conditions of Creative Commons CC BY 4.0 licence (https://creativecommons.org/licenses/by/4.0).

Other studies present a less optimistic picture. When including a broad set of environmental footprints (e.g. water, materials, biodiversity), research indicates that decoupling of growth from the pressures associated with EU consumption is often relative and varies between countries (Sanyé-Mengual et al., 2019; Bjelle et al., 2021).

In general, EU Member States and other advanced economies have environmental footprints that significantly exceed environmental limits, pointing to the need for unprecedented decoupling efforts. Whether or not this can be achieved through a green growth strategy can certainly be questioned. Based on a systematic review of the decoupling literature, Haberl et al. (2020) conclude that 'large rapid absolute reductions of resource use and GHG emissions cannot be achieved through observed decoupling rates, hence decoupling needs to be complemented by sufficiency-oriented strategies and strict enforcement of absolute reduction targets'. Similarly, a detailed study by Parrique et al. (2019) argues that 'Of all the studies reviewed, we have found no trace that would warrant the hopes currently invested into the decoupling strategy. Overall, the idea that green growth can effectively address the ongoing environmental crises is insufficiently supported by empirical foundations.'

Of course, the fact that decoupling has been inadequate in the past does not mean that future efforts are necessarily destined to fail. As the environmental and climate crises become more salient in public and political discourse, they are likely to drive more stringent regulations, more ambitious investments and more urgent innovation processes (van den Bergh, 2011). But, in the context of complex, globalised economic systems, green growth strategies face major obstacles (Parrique et al., 2019), for example:

- The benefits of technological improvements are often partially or wholly cancelled out by rebound effects, which occur because efficiency gains make goods cheaper, incentivising consumption.
- Shifting from a linear to fully circular model of production and consumption is limited in practice by the laws of thermodynamics and the fact that recycling itself requires materials and energy.
- Efforts to solve problems in one area can also create problems elsewhere — for example, the shift to electric vehicles may alleviate carbon emissions but increase demand for land, water and metals.
- In globalised markets, reduced demand for a commodity in one region may depress prices, incentivising increased consumption by others.
- Similarly, addressing problems in one country may simply lead to burden shifting, with production shifting to regions with less stringent environmental or social protection.
- In the context of transition processes, investments in renewable infrastructure in the energy and transport sectors will dramatically increase the demand for critical raw materials ([1]).

In summary, decoupling is certainly an essential part of transforming Europe's economic system to a genuinely sustainable model. Yet it is highly uncertain whether it will be possible for Europe to achieve decoupling at the level required to reconcile continued economic growth with the needed reductions in environmental pressures. This raises fundamental questions about the wisdom of relying solely on a green growth strategy to achieve sustainable development.

2.4 Engaging with the possibility of declining GDP

Given the uncertainties about whether societies can achieve sustainability via green growth, it is necessary to consider whether reducing GDP could provide a better route to realising the EU's vision of 'living well, within environmental limits'. This issue is increasingly the focus of research and political debate. Having languished since the 1970s, discussion about 'limits to growth' and 'degrowth' were revived in the early 2000s, for example by Serge Latouche (2003). Degrowth emerged as an international research area in 2008 at the first Degrowth Conference in Paris. The financial and economic crisis of 2008-2009 further increased interest, with a sharp increase in academic research on 'degrowth' in subsequent years (Weiss and Cattaneo, 2017).

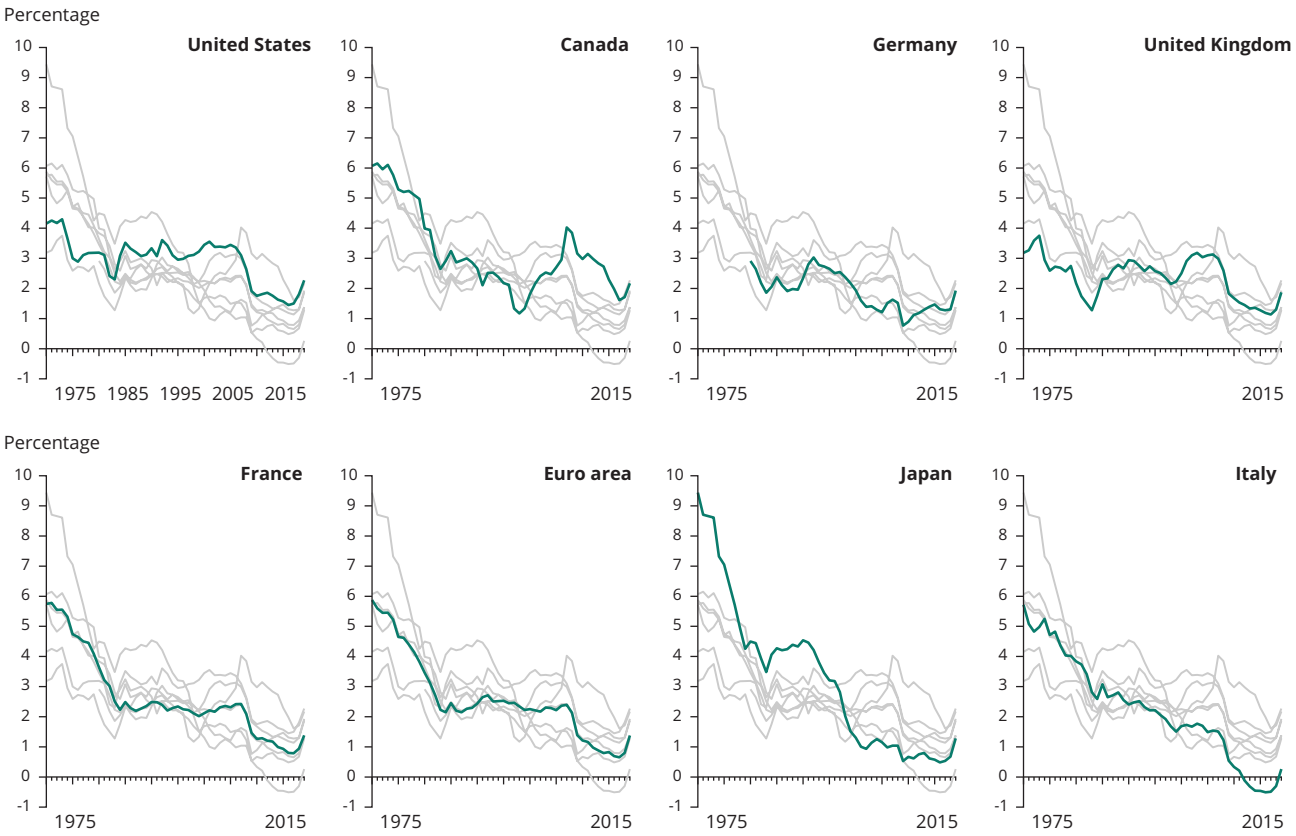
'Degrowth' is an umbrella term for a set of academic, political and social movements that emphasise the need to reduce production and consumption and define goals other than economic growth (Demaria et al., 2013). Different authors offer contrasting viewpoint on precisely what should 'degrow'. For example, van den Bergh (2011) identifies five main interpretations, focusing on GDP, consumption, worktime, the economy's physical size and 'radical degrowth' (referring to a wholesale transformation of the economic system).

([1]) EC (2020l) estimates that the EU's (pre COVID-19) climate-neutrality scenarios for 2050 imply that 'For electric vehicle batteries and energy storage, the EU would need up to 18 times more lithium and 5 times more cobalt in 2030, and almost 60 times more lithium and 15 times more cobalt in 2050, compared to the current supply to the whole EU economy … Demand for rare earths used in permanent magnets, e.g. for electric vehicles, digital technologies or wind generators, could increase tenfold by 2050.'

Recent years have also seen increasing use of the term 'post-growth', which refers to 'a way of seeing and being in the world that comes after the growth story' (Reichel, 2016). This concept is often interpreted more broadly than 'degrowth', adopting a more 'agnostic' position towards the desirability and viability of continued economic growth, and accommodating a broader range of possible futures. The post-growth concept is also open to different explanations for declining economic output. Whereas degrowth is often characterised as a deliberate choice, post-growth thinking acknowledges that societies may face negligible or negative GDP growth regardless of their ambitions and goals. For example, declining GDP might occur as a consequence of successful efforts to transform core societal systems so that they meet basic needs (for food, mobility, shelter, etc.) while preserving and enhancing natural capital.

The broader 'post-growth' concept seems highly relevant for Europe and other developed regions as they face increasing uncertainties about future GDP growth. In 2013, economist Larry Summers questioned whether the feeble growth in developed regions (Figure 2.5) was linked to the financial crisis five years earlier or instead reflected a more profound 'secular stagnation', determined by underlying economic trends (Summers, forthcoming). Since then, many prominent economists have contributed to the secular stagnation debate (e.g. Baldwin and Teulings, 2014), highlighting factors on both the supply and demand sides of the economy that may be suppressing growth rates. These factors include ageing populations, slower rates of innovation, declining growth in human capital, rising inequality, private and public debt levels, the growth of the service sector and the financialisation of the economy. With these constraints in mind, Jackson (2019) argues that 'The ''post-growth'' challenge is not so much about trying to ''turn growth off'' but rather about protecting social progress and environmental integrity in the face of what some well-known economists are now prepared to call the ''new normal'''.

Figure 2.5 Annual growth of GDP (2010 USD), rolling average for previous 10 years



Source: World Bank (2021).

Alongside the long-term 'headwinds' associated with secular stagnation, the COVID-19 pandemic highlights the challenges arising from more short-term shocks. Coming just a decade after the 2008-2009 global financial crisis, the pandemic highlights concerns that, in an increasingly interconnected and interdependent world, the scale and frequency of crises may increase (Goldin and Mariathasan, 2015).

Will recurrent global shocks become another dimension of the 'new normal'? Certainly, the risks associated with environmental crises are likely to increase as humanity continues to encroach on planetary boundaries and erode ecosystem resilience. Moreover, as epidemiologist Seth Berkley (2020) notes, the world is sure to face future crises like COVID-19, since 'the emergence of novel viruses of pandemic potential is an evolutionary certainty'. Such shocks are likely to exacerbate economic and financial risks, for example by driving up public and private debt to unsustainable levels (Reinhart, 2020).

Collectively, this combination of pressures and risks explains the growing interest in finding ways for governments and societies to flourish in a post-growth environment. As Raworth (2017) summarises: 'what we need are economies that make us thrive, whether or not they grow'.

2.5 Growth dependencies

The idea of finding ways to prosper that do not rely on growth has obvious appeal but it also presents some very difficult practical challenges. Part of the problem is that the culture of growth is hardwired into society's discourses, rules, institutions and behavioural norms. Commercial incentives drive efficiency gains and promote materialistic lifestyles. At the individual level, people are often strongly motivated to consume far beyond their basic material needs, partly as a means to signal their status relative to social peers (Frank, 1985). Innovation also plays a role. Quilley (2017), for example, argues that the dynamism of human creativity is simply not compatible with a static economy.

Perhaps even more importantly, governments also have good reasons to promote economic growth. As Jackson (2020) notes, 'The conventional economic system contains a complex set of 'growth dependencies' that tend to militate against changes to the over-arching model'. Societies effectively depend on GDP growth to function. For example, GDP growth is strongly associated with employment levels. This is because businesses survive in competitive markets by increasing their productivity by using new technologies, production processes and so on to extract more value from their inputs of labour and resources. This continual improvement in labour productivity means that the value generated by a work force will grow over time. Conversely, if GDP is stagnant or shrinking then fewer workers will be needed to produce that output. Unemployment will increase, causing direct hardship for the individuals and communities affected, and wider socio-economic impacts (such as changing inequalities).

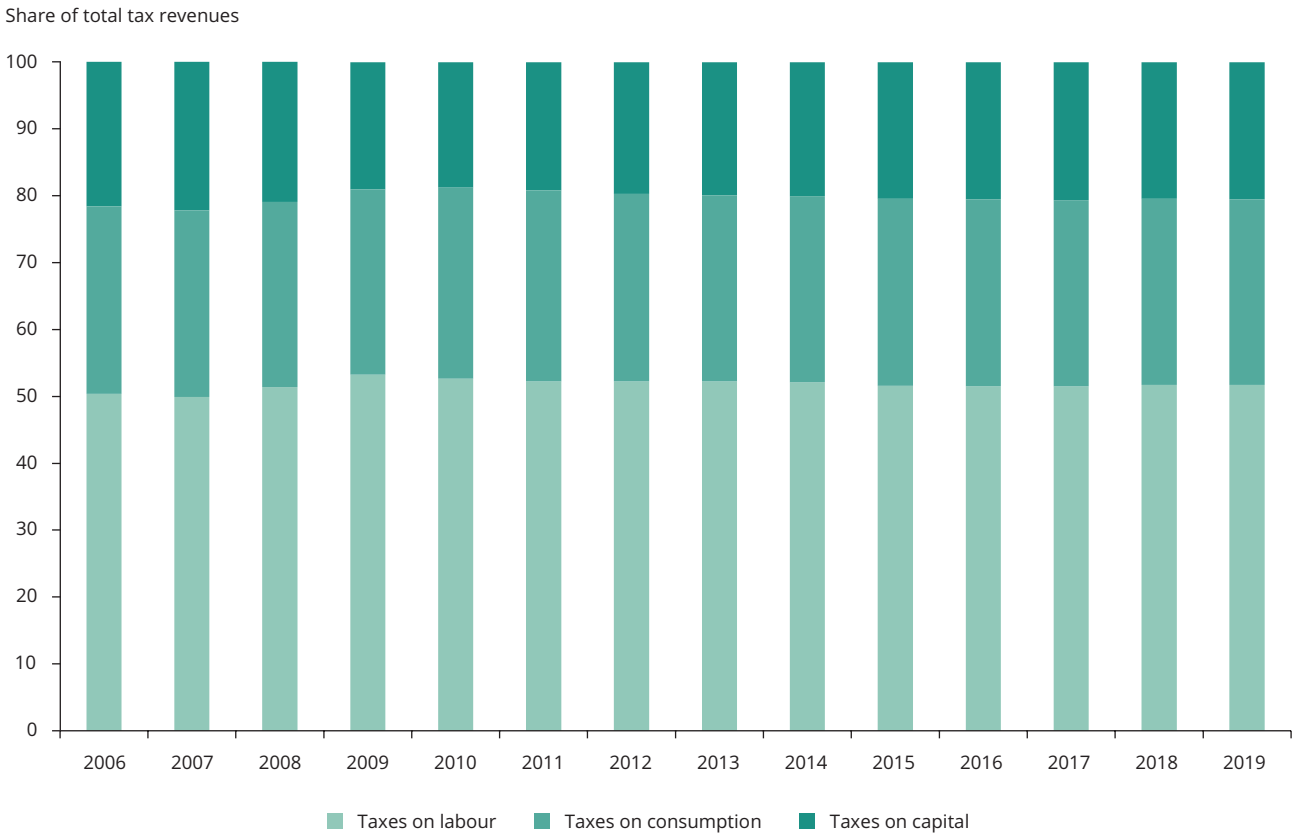
The value of investments and the income that they generate is also closely tied to GDP growth. For example, 'investment returns and share prices tend to respond pro-cyclically, rising as the economy expands and declining as it retreats, leaving pensions, investments and the stability of the stock market vulnerable to fluctuations in the growth rate' (Jackson, 2020).

In general, the degrowth paradigm has not been applied in business management. What would it actually mean for businesses? Downscaling consumption and reducing or slowing economic activity (GDP) would obviously mean that businesses would reduce production, implying reduced investments in technology and a reduction in competitiveness (Binswanger, 2019). While this may have positive environmental effects, it would be likely to have negative impacts on employment, prosperity and living conditions for broad sectors of the population (Pollin, 2018). This is partly because GDP growth is strongly associated with fiscal sustainability. As illustrated in Figure 2.6, tax revenues in the EU-27 derive from three main sources: labour income (52 % in the period 2006-2019); capital income and stocks (20 %) and consumption (28 %) (EC, 2021m). Incomes and consumption expenditure are therefore essential tax bases, generating a very substantial proportion of total tax revenues.

Downscaling production and consumption would negatively affect the tax take (Bailey, 2020), with implications for the financing of the welfare state and social justice. In 2019 EU-27 Member States spent, on average, two thirds of total government expenditure on health, education and social protection (including sickness benefits, pensions, unemployment benefits and family support) (Figure 2.7). As currently organised, societal structures and institutions, such as social security systems (pensions, health, etc.) and overall tax and transfer systems, are dependent on economic growth (EEA, 2020b; Petschow et al., 2020; Corlet Walker et al., 2021). As a consequence, Bailey (2020) argues that 'detaching a growth imperative from the state is impossible to imagine'.

Decreasing governmental revenues could also lead to increasing government debt (see for example D'Alessandro et al., 2018; Jackson and Victor, 2019) with potentially unfavourable consequences for public budgets, particularly if increasing interest rates augment government debt repayments in the medium to long term (Strunz and Schindler, 2018). Achieving sustainable public debt is already difficult but would be even more of a challenge in a degrowth environment (Pasche, 2018), requiring either an increase in taxes or a reduction in spending. Trends such as population ageing and increasing health risks (such as the COVID-19 pandemics) are likely to further increase demands

Figure 2.6 EU-27 tax revenues by tax base, 2006-2018



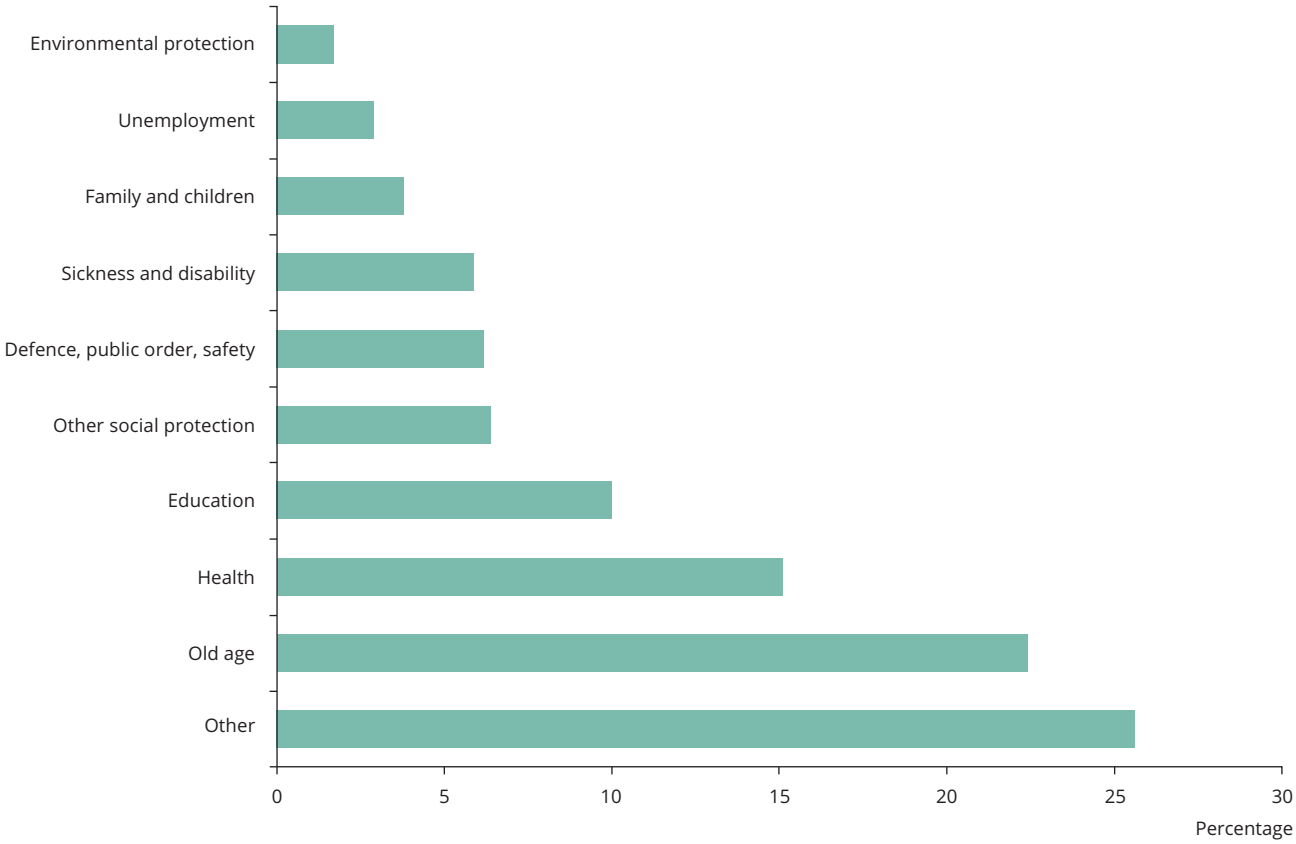
Source: EC (2021m).

on public budgets and weaken fiscal revenues (EEA, 2020b). For example, the European Commission reports that the 'fiscal impact of ageing is projected to represent a significant challenge in almost all Member States' (EC, 2021s).

Governments also face huge investment needs in coming decades. According to the European Commission, European government investments in public infrastructure such as schools, roads, and water supplies and sanitation have been inadequate during the last decade and require increased public investment of EUR 100-190 billion annually (EC, 2020b). Public spending also has a critical role to play in enabling the transformation of production-consumption systems towards more sustainable models, for example in financing investments in public goods, which produce substantial benefits for society but seldom attract sufficient private investment. These include, for example, investments in basic research and development; in green innovations that are not yet competitive with established technologies; in physical infrastructure that supports the diffusion of innovations (e.g. electric vehicle charging networks); and in green infrastructure and natural-based solutions, which provide widely dispersed ecosystem services (EEA, 2019a).

If GDP is shrinking, it may be very hard to finance these kinds of investments, particularly if voters favour short-term actions to protect incomes and jobs over more long-term and indirect benefits from climate and environmental protection. These realities highlight an important truth: the fact that GDP growth has been harmful for the environment does not necessarily mean that degrowth will be good for the environment. Indeed, the same is true for the social dimensions of sustainability: although economic growth has done little for low-income and marginalised groups in recent decades, degrowth could easily make things worse.

Figure 2.7 EU-27 general government expenditure by main functions, 2019



Source: Eurostat (2021d).

2.6 A narrow pathway to sustainability

In summary, the brief review of the potential for economic growth within environmental limits in this chapter leads to the following reflections:

- Societies in Europe and elsewhere are heavily dependent on economic growth to maintain social welfare and enable systemic transformation. Yet continued economic growth in its current form is unsustainable because it is undermining the natural capital base that provides the foundations for future economic activity.
- It is unclear whether GDP growth can be completely decoupled from environmental impacts, in part because of rebound effects, substitution effects, etc. Decoupling is particularly challenging in a global system, where gains in one region may be offset elsewhere.
- The macroeconomic implications of sustainability transitions are uncertain. Transforming production and consumption systems so that they operate within environmental limits may not be consistent with GDP growth.
- In the context of existing socio-economic and political arrangements, degrowth is likely to destabilise society — reducing employment, decreasing resources for social services, welfare and investments critical to transitions, and weakening government capacities — with potentially harmful environmental impacts.
- Societies in Europe and elsewhere may have to contend with weak, stagnant or negative growth in the coming decades anyway as a result of long-term trends and short-term shocks.

Together, these reflections add up to a very difficult governance challenge in coming decades. Chapter 3 explores how the EGD responds to these challenges, seeking to navigate between growth dependence and environmental limits in an increasingly uncertain world.

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3
Promoting growth within environmental limits: the European Green Deal

The European Green Deal (EGD), adopted by the European Commission in December 2019 (EC, 2019b), is the EU's new strategy for transforming the EU into a sustainable economy and implementing the United Nation's 2030 Agenda for Sustainable Development and its Sustainable Development Goals (SDGs) (UN, 2015). The EGD embodies a major step forwards in the EU's response to the sustainability challenges facing Europe. In combination with the EU's draft 8th Environment Action Programme (8th EAP) (EC, 2020r), the EGD very clearly moves beyond a narrow framing reliant on microeconomic and regulatory policy tools to shape choices. Instead, it emphasises the need for all areas of policy to contribute to enabling fundamental structural transformation of the societal systems driving sustainability problems, towards a climate-neutral, resource-efficient and regenerative economy.

The EGD includes a range of ambitious environmental and climate objectives. For example, it aims to reduce Europe's net greenhouse gas (GHG) emissions to zero by 2050; increase the efficient use of resources by moving to a clean, circular economy; preserve and restore Europe's natural capital; and create a toxic-free environment (Figure 3.1). It also sets out complementary socio-economic goals, as listed in the European Commission's Annual Sustainable Growth Strategy 2020 (EC, 2019a). These include enabling Europe to be 'at the forefront of future economic growth and become a global leader in an increasingly digitalised world'; completing the EU's Economic and Monetary Union to increase resilience to future economic shocks; and ensuring fair and inclusive transitions, especially for regions, industries and workers most impacted.

To achieve these objectives, the EGD is complemented by a broad array of supporting strategies and policy instruments. These include a variety of frameworks for transforming key systems, such as food, energy, buildings, mobility and industrial production, e.g. the Farm to Fork Strategy and the action plan for developing organic production (EC, 2020h, 2021l); strategies for energy system integration, hydrogen power and offshore wind (EC, 2020d, 2020o, 2020e); the Renovation Wave and New Bauhaus initiatives (EC, 2020k, 2021p); the Strategy on Sustainable and Smart Mobility (EC, 2020n); the EU Industrial Strategy (EC, 2020j, 2021j); and the Climate Adaptation Strategy (EC, 2021g).

They also include cross-cutting strategies for reducing resource use and harmful emissions resulting from production and consumption, and preserving Europe's ecosystems, e.g. the EU Climate Law the European Climate Pact and the new climate adaptation strategy (EC, 2020s, 2021e, 2021g); the new Circular Economy Action Plan (EC, 2020i); a new approach for the blue economy (EC, 2021k); the Zero Pollution Action Plan and the strategy to reduce methane emissions (EC, 2020p, 2021h); the Chemicals Strategy for Sustainability (EC, 2020f); and the 2030 Biodiversity Strategy (EC, 2020m).

Building on the EGD's 'blueprint for transformational change', the EU's 'Fit for 55' package sets out legislative proposals to 'deliver the transformational change needed across our economy, society and industry' (EC, 2021f). The package includes a total of 13 proposals, of which eight strengthen already existing policies and a further five comprise new initiatives addressing climate, energy and fuels, transport, buildings, land use and forestry. Recognising the limitations of both regulatory and market-based approaches when used in isolation, the package combines pricing, targets, standards and support measures.

The EGD contains a variety of measures that aim to enable structural change in Europe's economy, which can be grouped into four main pillars: investment, innovation, the just transition and international action. These four pillars are described in more detail below.

Figure 3.1 **Architecture of the European Green Deal**

Source: The European Green Deal.

3.1 Four pillars of the European Green Deal supporting structural change

3.1.1 Pillar 1: investment

Making Europe climate neutral by 2050 will require substantial investments in low-carbon systems. In December 2020 the EU agreed to increase its 2030 GHG emission reduction target from 40 % to at least 55 % compared with 1990 levels. This is an important commitment. It provides a clear signal to all market players about the speed of the EU's green transition and its determination to achieve climate neutrality by 2050. The European Commission's Fit for 55 package reinforces this signal through carbon pricing measures, such as: strengthening and extending the emissions trading system in the areas of aviation, maritime, road transport and buildings; updating the Energy Taxation Directive; and introducing a Carbon Border Adjustment Mechanism (EC, 2021f).

Achieving the 55 % target in 2030 will require additional investment in the order of EUR 3.5 trillion up to 2030 (von der Leyen and Hoyer, 2021). Faced with these huge investment needs, the EU has agreed to devote 30 % of its long-term budget (2021-2027) to climate action, as well as 37 % of its Recovery and Resilience Facility (RRF), which is the main tool of the EU's post-Covid recovery package, 'NextGenerationEU'. The RFF provides EUR 672.5 billion in loans and grants to EU Member States to support their reforms and investments. The Member States are developing national recovery and resilience plans, setting out country-specific policy reform packages and indicating how the funds will be spent up to 2026 (see e.g. Bruegel, 2021; Wuppertal Institute and E3G, 2021). To ensure that these funds are used effectively and that other EU budget expenditure does not undermine progress towards achieving climate goals, the EU has developed a solid methodology to monitor spending and report on it annually (EC, 2021c).

Ultimately, addressing Europe's green investment gap will require a fundamental reorientation of public and private investment flows. The European Commission has

taken steps to help mobilise private capital, for example by releasing the European Action Plan for Financing Sustainable Growth in March 2018 (EC, 2018a) in response to recommendations from the High-Level Expert Group on Sustainable Finance (EC, 2017b). It has three objectives: to reorient capital flows towards sustainable investment in order to achieve sustainable and inclusive growth; to manage financial risks stemming from climate change, resource depletion, environmental degradation and social issues; and to foster transparency and long-termism in financial and economic activity.

One major pillar of this action plan is the EU taxonomy for sustainable activities, which identifies economic activities that can be considered environmentally sustainable (EC, 2021d). Definitions and performance thresholds are developed by assessing whether activities contribute substantially to achieving one of six environmental objectives (climate change mitigation and adaptation, water and marine resources, ecosystems, pollution prevention and control, and circular economy) and avoid causing significant harm to any of the other five objectives. In addition, social safeguards apply. This work relies on extensive input from experts in the Platform on Sustainable Finance, which is tasked with advising the European Commission on further developing the EU taxonomy and improving its usability, and also on developing a robust monitoring framework to measure capital flows.

As it is implemented and developed further, the EU taxonomy will improve transparency in financial markets, creating a robust framework to help governments, businesses and investors demonstrate the sustainability of their activities. For example, it has an important role in underpinning the credibility of financial instruments such as the EU Green Bond Standard and the pending EU Eco-Label for green financial products. The Taxonomy Regulation (EC, 2021d) enables investors to make better informed decisions, assessing the sustainability footprint of their portfolios and potentially repositioning them towards more sustainable businesses. It can also help shareholders assess management on their progress towards achieving sustainability objectives.

3.1.2 Pillar 2: innovation

Innovation is the driving force for decarbonisation and will be at the core of the transformation of EU industry. To achieve climate neutrality while leading global decarbonisation from an industrial standpoint, Europe must become a global innovation powerhouse for clean energy, clean mobility and smart building technologies.

An EU industrial policy for the EGD notably needs to tackle two highly relevant issues in the green economy agenda: fostering disruptive innovation and creating a market for innovative green products in Europe. Several aspects of this agenda are addressed in the update of the 2020 New Industrial Strategy which was published by the European Commission in May 2021 (EC, 2021j). Public funding often plays an important role in financing basic research and development (R&D), as returns tend to be uncertain and hard for investors to capture. It is therefore important that the EU's new Horizon Europe research and innovation framework programme will devote at least 35 % of its funds to achieving climate goals (EU, 2021). The Fit for 55 package identifies this as an essential tool, in particular to support SMEs and start-ups.

In the framework of the EGD, three existing EU initiatives could be enhanced and used to stimulate more R&D investment in clean disruptive technologies by the business enterprise sector. The first tool is the European Innovation Council (EIC) (EC, 2020q), currently in pilot phase. This was inspired by the US Defense Advanced Research Projects Agency (DARPA), an agency of the US Department of Defense that has significantly contributed towards the development of many technologies, including the internet and the global positioning system (GPS).

The second tool is the LIFE programme, and in particular its 'close-to-market' scheme (EC, 2021o) helping companies bring their green products, technologies, services and processes to the market. These 'close-to-market' projects launch innovative, demonstrative solutions that offer clear environmental or climate benefits. Examples could be in waste management, the circular economy, resource efficiency, water, air or climate change mitigation. These projects also have a high level of technical and business readiness, i.e. solutions could be implemented in close-to-market conditions (at industrial or commercial scale) during the course of the project or shortly after its completion. Overall, the LIFE Programme is the only EU funding programme entirely dedicated to environmental, climate and clean energy objectives, with a budget of around EUR 5.4 billion for the 2021-2027 period.

The third tool is the Innovation Fund (IF) (EC, 2019c), which will be extended in scope and size pursuant to the Fit for 55 package. Established under the EU Emissions Trading System (ETS) for the period 2021-2030, the IF supports the demonstration of low-carbon technologies and processes in energy-intensive industries, carbon capture and utilisation (CCU) and carbon capture and storage (CCS), as well as innovative renewable energy and energy storage technologies. It has been endowed with at least 450 million carbon allowances, amounting at current carbon price levels to about EUR 11 billion. A sensible way to further scale up the IF would be to rapidly reduce the number of allowances allocated for free under the ETS, and to use the resulting revenues for the IF.

Fostering disruptive innovation will require a significant amount of risk taking and an acceptance that there will be failures. New support models that provide numerous and still sizeable grants in a relatively non-bureaucratic way are crucial to enable disruptive ideas to emerge. Accepting that a significant proportion of these ideas will fail is better than putting money on safe but non-disruptive bets. As Rodrik (2014) puts it, 'failure is part and parcel of a successful industrial policy effort'. Governments have a variety of tools available to create a receptive market for innovative companies, ranging from fiscal measures and regulations that can tilt the economic playing field in favour of green innovations, through measures to support the development of venture capital markets, to direct public investments in promising businesses or in complementary public infrastructure (e.g. electric vehicle charging networks). For the EU, three particularly important interventions stand out:

1. The first, most general, action is the completion of the EU internal market. Fragmentation in environmental standards, energy taxation schemes and support measures for clean technologies prevent innovative European cleantech companies from scaling up in the way that their US and Chinese competitors do in their domestic markets. It is vital to develop a solid regulatory framework, focused on ensuring competition and access to a truly single market, with common environmental standards. To do this, national industrial policies need to be coordinated — otherwise they will create distortions that lead to further fragmentation of the EU single market. Failing to coordinate policies would hamper the full exploitation of the size of the EU market and related economies of scale.

2. The second, more specific, tool is public procurement. In the EU, this is estimated to amount to more than 14 % of GDP (EC, 2021r). Given its scale, public procurement represents a unique tool to foster innovation. For example, requiring clean mobility solutions in public procurement tenders could provide a solid boost to the demand for electric cars and buses, helping transform the European automotive industry. To become the global leader in electric cars, China did not focus on public funding for innovation, but rather on creating demand for them through supportive government policy, including public procurement programmes.

3. The third tool is carbon-based contracts for difference, which could provide a technology-neutral support mechanism for the deployment of low-carbon technologies including the scaling up of the production of hydrogen. As in the renewables sector, with auctioned feed-in premiums, industrial producers of carbon-intensive products would obtain a public subsidy for each unit sold. For example, a steel producer that only needs 0.5 tonnes of CO_2 to produce 1 tonne of steel (compared with a benchmark of 1.5 tonnes of CO_2/tonne of steel), and that manages to secure a carbon price of EUR 50 per tonne through the system of carbon-based contracts for difference, would receive EUR 25 for each tonne of its low-carbon steel when the EU ETS price is EUR 25. These carbon contracts for difference can be auctioned to ensure competition between companies for the most efficient technologies (Gerres and Linares, 2020). This policy tool has also been proposed by the Commission in the updated industrial strategy (EC, 2021j).

3.1.3 Pillar 3: Just Transition Mechanism

The EGD has at its core the aim of ensuring a 'just transition' to a climate neutral Europe. This has two main implications: first, addressing the distributional effects of environment and climate policies; second, supporting regions, sectors or specific social groups that are particularly negatively affected by transition processes. Attention in recent years has focused on the socio-economic impacts of phasing out fossil fuels or carbon-intensive industrial processes. However, the transformations of the mobility and food systems are also likely to have wide-ranging implications, creating new jobs and opportunities for growth but also leading to the decline and phasing out of some activities.

Climate policies, such as emissions standards for cars, renewables support financed through levies on household electricity consumption and carbon pricing for heating fuels, can disproportionately affect low-income households (EEA and Eurofound, 2021). They may therefore increase inequality (EEA, 2011; Flues and Thomas, 2015; Pizer and Sexton, 2017). The impact will be particularly significant for the lowest deciles of the income scale, those in rural and suburban areas (who will be most affected by fuel price increases), specific vulnerable social groups, and regions where fossil fuel production accounts for a large proportion of economic output and employment. This means that some segments of the population and some regions particularly affected by the transition will require special assistance.

From a political perspective, what makes the situation more difficult is that the gains from successful climate policies are often invisible and occur in the future, while the costs of climate policies are immediate and tangible, especially for the finances of the most vulnerable population groups. It is also true that climate change mitigation policies can generate positive environmental co-benefits, such as improved air quality, which tend to benefit lower income and vulnerable households disproportionately (e.g. in terms of health and well-being) and thus reduce environmental inequalities. However, due to the direct impact of carbon and energy taxes on individual budgets, a public backlash is quite possible, as illustrated by the 'gilets jaunes' movement, which led the French government to abandon an expected carbon tax increase. To avoid this kind of reaction, climate mitigation policy design needs to consider social impacts, for example by targeting win-win climate policies such as energy efficiency in buildings and active mobility infrastructures. Designing compensation schemes to counterbalance and minimise adverse distributional effects could also help in maximising the non-monetary co-benefits and make climate policy fairer, which is key for social acceptance.

Having acknowledged that supporting policy action is necessary for the social viability and political feasibility of the EU's transition to climate neutrality, the European Commission introduced the Just Transition Mechanism within its EGD framework. Its objective is to leave no one behind and it is based on three pillars:

1. creation of a new Just Transition Fund of EUR 17.5 billion that will mobilise EUR 30 billion of investments for the regions most affected by transition;

2. an InvestEU just transition scheme providing budgetary guarantees under the InvestEU programme;

3. creation of a new public sector loan facility at the European Investment Bank, partly financed by the EU budget, to mobilise between EUR 25 billion and EUR 30 billion of additional public investments in 2021-2027.

The Social Climate Fund proposed in the 'Fit for 55' package complements existing measures by specifically targeting the households most exposed to energy price increases. The fund is projected to mobilise EUR 72.2 billion for the period 2025-2032 (with 25 % coming from EU ETS auctioning revenues) and an additional EUR 72.2 billion through a matching contribution from Member States. This fund will target in particular people affected by the extension of the EU ETS to building and transport, provide direct support to the most vulnerable people, and support investment in energy efficiency in buildings and zero-emission mobility.

3.1.4 Pillar 4: global transitions to sustainability

The EU produces less than 10 % of global GHG emissions. This implies that to have an impact on global temperature levels the EU needs to push the implementation of the EGD beyond its borders. The EU has two main instruments to achieve this goal: first, the EU budget and NextGenerationEU; and second, EU development cooperation policy. Already, a small part of the EU ETS auctioning revenue is spent on climate action outside the EU.

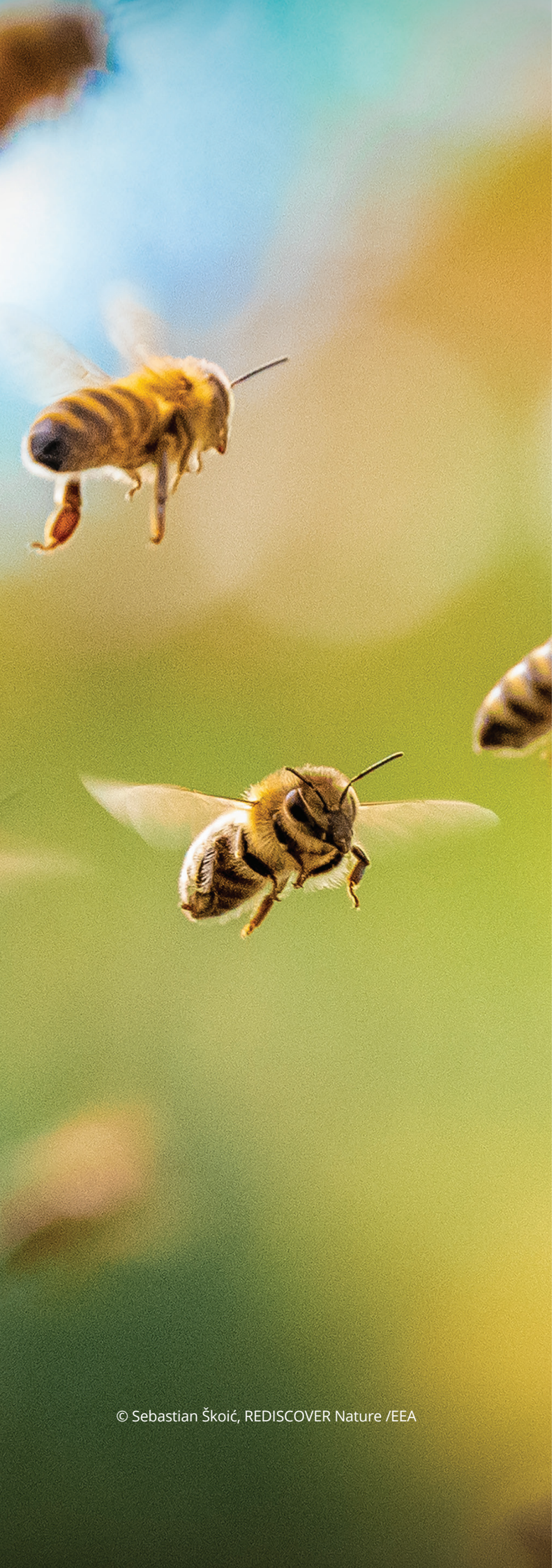
As noted, the EU has pledged to devote 30 % of its long-term budget and 37 % of NextGenerationEU funds to climate action. This entails that between 2021 and 2027 around EUR 600 billion of 'fresh' EU resources will be made available for the green transition. Some of the resources earmarked for climate action could also be used to export the EGD to countries neighbouring the EU and beyond. Such an approach, basically entailing the provision of grants, loans and guarantees for sustainable energy projects in partner countries, could achieve a triple win for the EU. First, it would help meet global climate objectives more efficiently, as European neighbourhood countries and countries in the developing world have lower marginal abatement costs for CO_2 emission reductions than EU countries. Second, this approach would enable EU industry to enter into new, rapidly growing markets — turning into a formidable tool of EU green industrial policy. Third, it would promote economic development and diversification in EU partner countries (and most notably in oil- and gas-producing countries), providing an invaluable foreign policy dividend for the EU.

From a climate finance perspective, the EU remains committed to contributing towards the UNFCCC goal of mobilising from different sources USD 100 billion per year by 2020 (goal extended to 2025) to support developing countries (EC, 2021n). The European Union and its member states are the largest provider of climate finance to developing countries (OECD, 2021c). More broadly, the EU and its Member States are also the world's leading donor of official development assistance (ODA), with EUR 75.2 billion being disbursed in 2019. This amounted to 55 % of global ODA. With its new budget for 2021-2027, the EU will have at its disposal a new tool designed to bring together all EU funds for external policies: the Neighbourhood, Development and International Cooperation Instrument (NDICI) (EC, 2018b). The introduction of the NDICI — with a budget of EUR 70-90 billion for 2021-2027 — represents a sensible step towards increasing the EU's visibility and leverage in developing countries. EU development policy has historically been fragmented, leading to overlaps, gaps and inefficiencies. As proposed in 2019, a further step towards the consolidation of the EU's development policy would be to create a single entity, such as a European climate and sustainable development bank (ESDB) (HLGWP, 2019; Hoyer, 2020). The NDICI and a new ESDB could become key tools for exporting the EGD to the developing world, starting with Africa.

In addition to these mechanisms, the Carbon Border Adjustment Mechanism proposed in the Fit for 55 package aims to 'introduce a market dynamic that protects the integrity of EU and global climate policy by reducing GHG emissions in the EU and globally, and induces the relevant sectors to modernise, become more sustainable, and drive down their carbon content' (EC, 2021f). The CBAM should help avoid a situation where increasingly stringent climate policy in the EU drives production to other parts of the world where rules are more lax (a process known as 'carbon leakage').

3.2 Dynamics influenced and triggered by the European Green Deal

Having outlined the EGD's main instruments, it is useful to build a clearer picture of the systemic challenges that the EGD aims to address, the logic of its interventions, and their direct, indirect and induced outcomes. As described in Box 3.1, causal loop analysis provides a useful tool for developing this understanding, helping to make sense of the dynamics that drive economic growth and the associated environmental degradation, and the ways that the EGD aims to alter these dynamics and thereby enable green growth.



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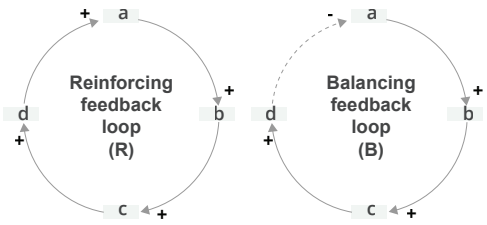
Box 3.1 Causal loop analysis explained

Pioneered by Jay W. Forrester in the late 1950s, system dynamics is a modelling approach used to understand complex real-world issues and guide decision-making. System dynamics models enable social, economic and environmental indicators to be integrated into a single framework of analysis, thereby improving the understanding and forecasting of the outcomes of decisions across sectors and economic actors (Probst and Bassi, 2014). Based on an understanding that structure drives behaviour, they use causal relationships to link variables.

The pillars of system dynamics models are feedback, delays and non-linearity, which are identified by creating causal maps or causal loop diagrams (CLDs). These qualitative maps represent the soft side of systems theory and can be very helpful in creating a shared understanding of how systems work, sometimes producing unexpected or counter-intuitive outcomes. They are also helpful in identifying entry points for (human) interventions, such as public policies. When this is done using a participatory approach, it helps to bring people together, creating the building blocks required for co-creating a shared and effective theory of change.

CLDs include variables and arrows (causal links) that link variables together with a sign indicating a positive (+) or negative (-) causal relationship. A positive causal link from variable A to variable B will cause the two variables to change in the same direction. A negative link implies that a change in A produces a change in B in the opposite direction. Circular causal relationships between variables form causal, or feedback, loops. Reinforcing (R) feedback loops occur when an intervention in the system triggers other changes that amplify the effect of that intervention. Balancing (B) feedback loops tend towards achieving a goal or equilibrium, balancing the forces in the system (Forrester, 1961).



Efforts to quantify the links in complex systems and forecast their change over time (e.g. using system dynamics models) represent the hard side of systems theory. System dynamics models make it possible to quantify policy outcomes across social, economic and environmental indicators (UNEP, 2014), providing insights into the relative strength of various drivers of change (scenario analysis) and supporting the identification and prioritisation of policy interventions (policy analysis). These models can be bottom up or top down (UNEP, 2011; Probst and Bassi, 2014).

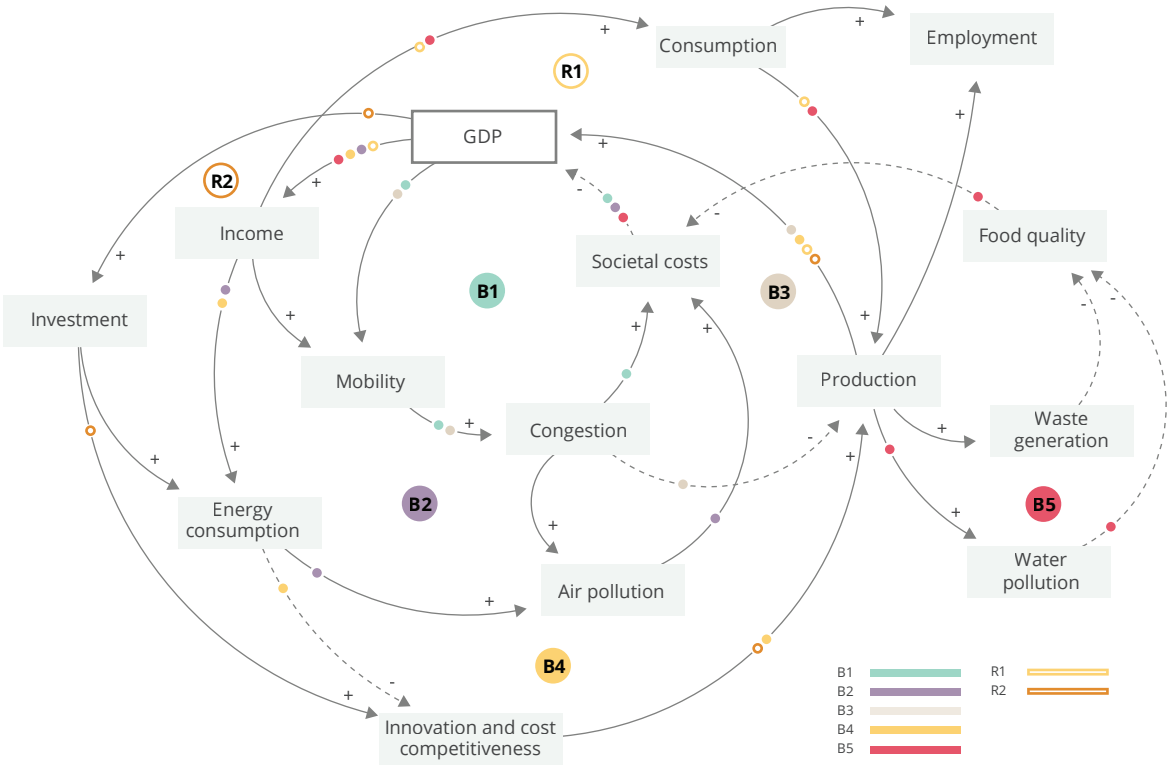
3.2.1 *Dynamics driving economic growth and environmental impacts*

Figure 3.2 provides a simplified representation of the dynamics that link different elements within Europe's socio-economic and environmental systems (in grey boxes), based on an analysis of the ways that these elements have interacted causally in the past. The grey arrows in the figure represent the direction of the causal links and their character (positive or negative).

Europe's GDP has increased steadily in recent decades, with relatively few interruptions. As shown in Figure 3.2, this trend has two main outcomes: first, income increases, leading to higher GDP via increased consumption and production (reinforcing loop R1); second, investment increases, leading to more innovation and cost competitiveness, in turn increasing production and GDP (reinforcing loop R2). These two reinforcing loops (R1 and R2) also trigger economic growth through employment creation and trade.

Economic growth also gives rise to many balancing loops, which slow the increase in GDP. The EGD itself highlights a variety of costs to society, which have been integrated into Figure 3.2. For example, economic growth typically leads to increased demand for mobility, which results, among other things, in congestion. This reduces time spent at work and at home, creating societal costs and lessening GDP (balancing loop B1). It also reduces production and value added (balancing loop B3). Increased energy use leads to air pollution, which affects labour productivity via health (balancing loop B2). The increase in energy use also implies increased energy spending, which heightens vulnerability to market dynamics and extreme weather events, affecting competitiveness and innovation (B4) and negatively impacting production. Production, in turn, leads to the generation of waste and water pollution, which affect food quality, creating societal costs in both urban and rural areas (B5).

Figure 3.2 Simplified representation of dynamics linking elements in Europe's socio-economic and environmental systems



Notes: Grey boxes represent socio-economic and environmental systems. The solid grey arrows represent positive (+) causal links and the dashed grey arrows represent negative (-) causal links.
B, balancing loop; R, reinforcing loop.

Source: ETC/WMGE (2021).

The balancing loops presented in Figure 3.2 represent just a few examples of the growing costs to society associated with economic growth. Such costs are not emerging to the same extent in all countries and regions. For example, urban areas are affected more by air pollution than rural areas.

In the past, reinforcing loops R1 and R2 dominated the system dynamics. As a result, GDP, consumption and investment have grown over time, as have congestion and related societal costs. Since 1990, EU-27 GDP has increased by 62.8 % in real terms. The financial crisis caused EU-27 GDP to decrease by 4.3 % in 2009, and GDP did not reach the 2008 level again until 2014. Since 2014, the EU-27 economy has increased steadily, with GDP 11.3 % higher by 2019.

At the same time, the balancing loops associated with energy consumption and waste generation have weakened during recent decades. Partly as a result of improved energy efficiency and resource management, GDP growth has not resulted in increased energy consumption, emissions or waste generation. Gross inland energy consumption was broadly stable between 1990 and 2019, decreasing by just 1.1 % (Eurostat, 2021e). In contrast, GHG emissions fell by 24 % in the same period (EEA, 2021c). Waste generation (excluding major mineral waste) increased by 4.2 % between 2004 and 2018 (Eurostat, 2021f).

3.2.2 Dynamics influenced and triggered by the European Green Deal

The system dynamics depicted in Figure 3.2 provide a basis for understanding how the EGD seeks to enable the shift to a sustainable European economy. As outlined previously, the EGD uses a variety of policies and legislative measures to influence energy, buildings, transport, waste and food production. These policy interventions are integrated into the causal loop analysis in Figure 3.3 (shown in green boxes). The outcomes expected from these EGD interventions are described in red text. The latter include cleaner air, water and soils as a result of interventions related to energy efficiency, clean energy, waste reduction, recycling and reuse (the promotion of a circular economy), and improved agriculture practices. They also include improved human health, better transport options and better access to distributed power generation options (and so better access to more modern and resilient services).

The interactions mapped out in Figure 3.3 indicate that the EGD aims to adjust the dynamics of the system in the following ways:

- Interventions to promote energy efficiency, clean energy and affordable energy aim to reduce energy consumption and air pollution, while increasing innovation and competitiveness. As a result, these interventions strengthen reinforcing loops R1 and R2 via GDP, consumption and investment. At the same time, balancing loops B2, B3 and B4 will become weaker, further stimulating economic growth by reducing societal costs and making production more effective. Investments to realise these opportunities include renovating homes, schools and hospitals (energy efficiency), renewable energy use, the installation of charging stations for electric vehicles and the adoption of environmentally friendly technologies (clean and affordable energy).

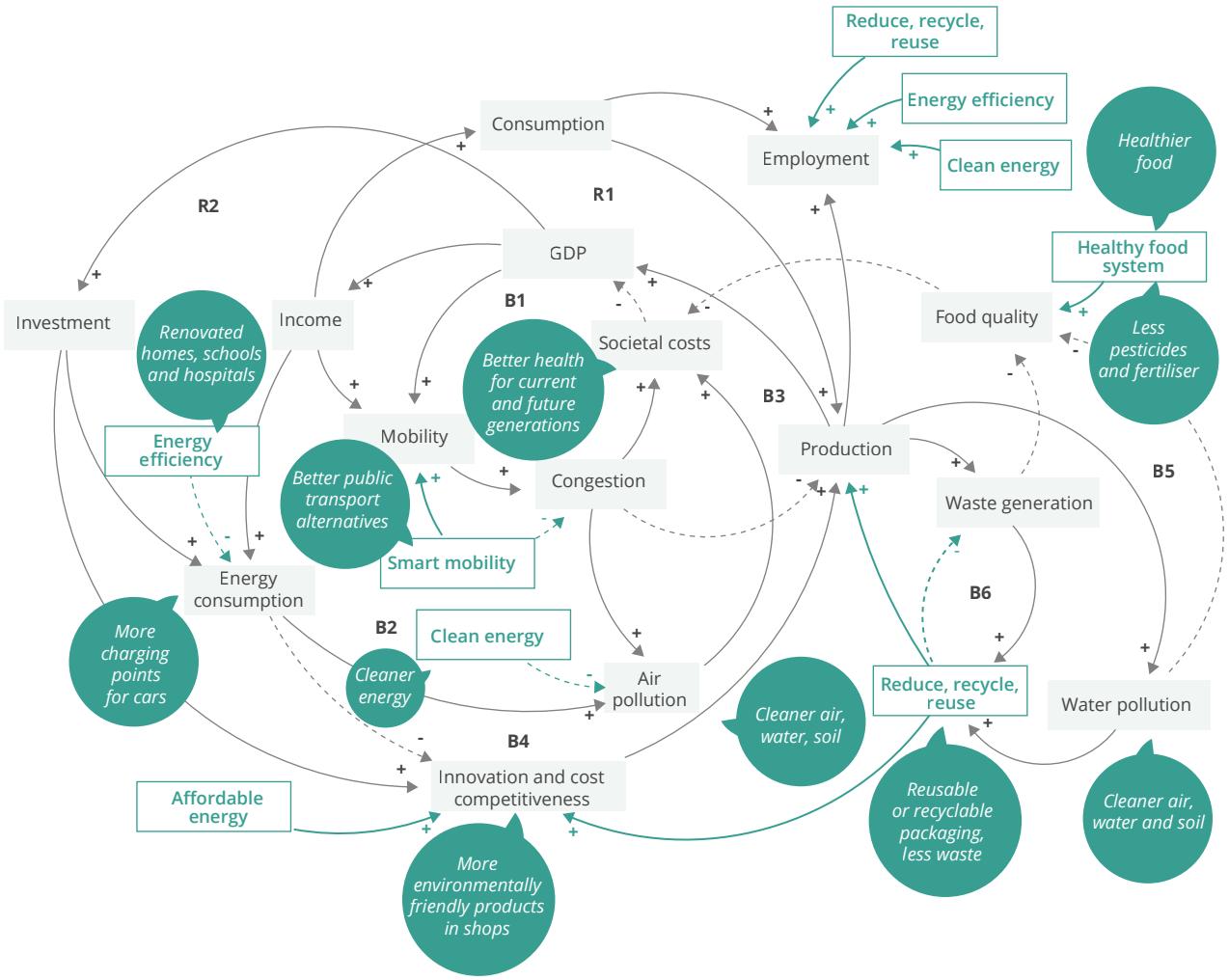
- Inventions to promote smart mobility via better public transport and non-motorised transport will make balancing loops B1 and B2 weaker by reducing congestion, energy use and emissions, leading to lower societal costs (e.g. health costs) and more effective production activities. Outcomes include better health for current and future generations, via cleaner air, water and soil (also in conjunction with waste reduction, recycling and reuse).

- Interventions to promote waste reduction, recycling and reuse primarily affect balancing loops B5 and B6, which then indirectly affect reinforcing loops R1 and R2. As a result, reducing waste both unlocks opportunities for existing drivers of growth and stimulates new paths for sustainable growth by stimulating innovation and competitiveness.

- Actions to promote healthy food systems are expected to increase food quality by reducing the use of fertilisers and pesticides. This reduces societal costs (B2 and B3), increasing labour productivity and lowering public and private costs, and resulting in a stimulus taking place through R1 and R2.

Collectively, these insights indicate that the EGD's basic approach is to promote green growth by building on the efficiency gains of recent years: strengthening the reinforcing loops driving GDP growth, while weakening balancing loops linked to factors such as pollution, congestion and waste. The EGD thereby seeks to enable the economy to continue growing but in more sustainable and resilient ways.

Figure 3.3 Simplified representation of dynamics influenced and triggered by the EGD



Notes: Green boxes represent the key intervention areas (e.g. energy, mobility, food), grey boxes represent socio-economic and environmental systems and the text in the circles indicates the intended benefits of the EGD. The solid grey arrows represent positive (+) causal links and the dashed grey arrows represent negative (-) causal links.

B, balancing loop; R, reinforcing loop.

Source: ETC/WMGE (2021).

3.3 The logic and ambitions of the European Green Deal

The overview of the EGD's structure and logic presented here provides a basis for a clearer assessment in the context of the framework developed in previous chapters.

First, microeconomic policy tools (market-based instruments) are identified as a key part of the policy mix, helping 'redirect public investment, consumption and taxation to green priorities'. Yet these instruments are seen as much as a mechanism to promote growth as to alleviate environmental pressures. For example, the EGD stresses that, 'Well-designed tax reforms can boost economic growth and resilience to climate shocks and help contribute to a fairer society and to a just transition. They play a direct role by sending the right price signals and providing the right incentives for sustainable behaviour by producers, users and consumers.' (EC, 2019b)

Second, the EGD implicitly acknowledges the limitations of relying only on microeconomic policy instruments to deliver sustainability, embracing the need for a comprehensive policy response to deliver sustainability transitions. This is evident in the rhetoric employed, for example the overarching goal of 'Transforming the EU's economy for a sustainable future' using 'a set of deeply transformative policies'; in the EGD's overall structure, which focuses on key production-consumption systems (food, energy, mobility, housing, industry); and in the emphasis on policy measures to stimulate innovation and manage the social and economic disruption associated with structural economic change (Pillars 2 and 3 above).

Third, the EGD engages with the aggregated, macro-level dimensions of transitions, in terms of both aggregated economic output and environmental pressures. It adopts a strongly pro-growth stance — both explicitly in its opening paragraphs but also implicitly in its strong investment programme and emphasis on an industrial and innovation strategy. Yet, in aiming to achieve climate neutrality, zero pollution and healthy ecosystems, the EGD adopts a strong sustainability framework, with environmental limits setting the boundaries within which economic growth and system transitions need to occur. By combining the different system-oriented strategies and cross-cutting strategies into an overarching framework, the EGD acknowledges the complex synergies and trade-offs between them and their cumulative impacts. The EGD also acknowledges the interdependence between European and global systems, and the urgent need to support sustainability transitions outside Europe.

The EGD therefore offers a clear response to the sustainability challenges facing Europe, centred on reorganising production and consumption in ways that enable economic growth to continue within environmental limits. As discussed in Chapter 4, this emphasis on decoupling growth from environmental impacts is essential. Nevertheless, promoting a model for sustainable development that depends on economic growth for its success also involves some risks in the context of the downward pressures on growth anticipated in coming decades. There may therefore be value in building on the EGD in ways that can make Europe's economy more resilient and better able to cope with potential periods of flat or negative GDP growth.

4
Creating a resilient and prosperous Europe

Governments and societies face unappealing choices in coming decades as they seek to maintain and enhance prosperity within environmental limits. Jackson (2009) summarises the twin challenge neatly, explaining that:

- On one hand, 'growth is unsustainable — at least in its current form. Burgeoning resource consumption and rising environmental costs are compounding profound disparities in social wellbeing'.

- On the other hand, 'degrowth is unstable — at least under present conditions. Declining consumer demand leads to rising unemployment, falling competitiveness and a spiral of recession.'

Jackson's framing points to two strategies for resolving the dilemma: first, changing the form of growth to make it more sustainable; second, changing the socio-economic system in ways that make potential periods of economic contraction less socially disruptive.

As explained in Chapter 3, the European Green Deal (EGD) primarily aims to tackle the first challenge: making economic growth sustainable. Within the EGD's green growth logic, economic expansion is promoted with the aim of sustaining employment levels and providing the resources to increase public welfare, promote social cohesion and make the investments needed to transform European systems of production and consumption. At the same time, by defining ambitious goals for protecting and restoring natural capital, the EGD aims to preserve the critical resources that underpin human well-being.

The EGD's promotion of green growth makes sense in an economic system which currently depends so much on GDP growth to sustain employment levels, social welfare and investments in transitions. The EGD also embodies a vital step forward in responding to the interlinked, systemic sustainability challenges facing Europe. It clearly transcends a narrow reliance on microeconomic policy tools to shape incentives across the economy, instead creating an integrated framework that brings together transformative, systems-oriented policies with measures to promote innovation, sustainable finance and the just transition.

The EGD's transformative agenda is therefore essential, and Europe needs to find ways to make it the greatest possible success. Nevertheless, there are tensions and uncertainties inherent in the green growth strategy promoted in the EGD. As outlined in Chapter 2, sustaining economic growth while operating within environmental limits will require Europe to achieve unprecedented levels of decoupling. Whether this is technically feasible is currently unclear (EEA, 2021a). The EGD itself aims to put Europe at the forefront of global growth and envisages huge investments in the energy and mobility systems, which will entail very substantial resource demands. Yet the EGD also aims to reduce resource use, eliminate greenhouse gas (GHG) emissions and enhance natural capital. Are these objectives coherent?

Such reflections highlight some uncertainties about Europe's long-term economic growth. And these uncertainties are further compounded by other challenges, including both long-term megatrends and more short-term shocks. As described in chapter 2, a variety of factors on both the demand and supply sides of the economy already appear to be suppressing economic growth and creating challenges for fiscal and monetary policy — a process known as 'secular stagnation'. Population ageing, for example, will reduce the human capital available to generate economic output, increase the burden of health and pension expenditure, and thereby squeeze the resources available for investing in innovation and systemic change. Meanwhile, global crises may well become more frequent as international systems become more closely intertwined and ecological resilience diminishes. The financial crisis of 2008 and the COVID-19 pandemic vividly demonstrate the risks of contagion in globalised systems and the economic and social turmoil that can result. It is also certain that, even with the most ambitious global mitigation efforts, climate change and associated impacts will continue to worsen in coming decades due to 'climate change commitment', i.e. the

inertia built into geophysical and socio-economic systems (IPCC, 2017).

These downward pressures on economic output certainly do not imply that a green growth strategy is doomed to fail in coming decades or should not be pursued. They do, however, point to some risks, and suggest that there would be advantages in also engaging with the second strategy outlined above, i.e., exploring whether there are ways to make European societies less dependent on economic growth.

Petschow et al. (2020) describe this as a 'precautionary' approach: promoting green growth as much as possible while also finding ways to make the economy more resilient to recurrent shocks and potential periods of flat or negative growth. The European Economic and Social Committee has argued along similar lines in its opinion, *The sustainable economy we need,* which affirms that 'building the wellbeing economy must start by adopting a precautionary approach in which macroeconomic stability does not depend on GDP growth' (EESC, 2020).

For the EU, creating an economy that is less reliant on growth would contribute concretely to its 'overall goals of increasing the well-being and the resilience of our economies and societies' as set out in the EGD, the draft 8th EAP and the Annual Sustainable Growth Strategy 2021 ([2]). Crucially, it would involve building on and complementing the EGD's transformative agenda, including the emphasis on decoupling, rather than replacing it. As Jakob et al. (2020) stress, 'Decoupling emissions from economic output ... would be necessary even in a shrinking global economy'.

Alleviating the state's dependence on growth

This final chapter begins to explore actions that could help alleviate growth dependence and create a more resilient economic system. The focus here is on the critical issue of fiscal sustainability, exploring how can governments secure revenues and manage expenditures in ways that provide for society's needs and enable transitions to sustainability, even if operating in a context of negligible or negative economic growth.

One approach to addressing these challenges is to take measures to counteract the ongoing tax base erosion arising from trends such as population ageing and technological change. Section 4.1 takes up this theme, outlining a variety of ways that the tax base could be reconfigured to produce more sustainable and equitable outcomes.

Such measures are likely to be essential. But they will probably not be sufficient to meet the growing demands on public budgets in coming decades, especially if economic output is not growing. Reductions in GDP would imply a smaller aggregate tax base, which would ultimately limit the gains from switching between different revenue sources. To reduce growth dependence, governments will therefore need to identify ways to alleviate the demands for public spending.

How can this be achieved? An obvious first response is to find ways to increase the efficiency of state activities — achieving more, while reducing spending. Yet governments have been seeking to increase efficiency for decades, so there are unlikely to be opportunities for substantial improvements within existing models for public service delivery. In practice, cutting fiscal spending often means reducing the level of services provided. For example, fiscal austerity after the 2008-2009 economic and financial crisis translated into reductions in public service delivery in Europe, with direct human impacts, such as increased disease and deaths (Karanikolos et al., 2013).

A more fundamental response would look at why public spending is needed in the first place. Is it possible to tackle underlying problems in ways that mitigate the need for government interventions? Karl Polanyi (1944), for example, saw the emergence of the welfare state as a countermovement necessitated by the marketisation of society. In Polanyi's account, the promotion of laissez faire policies in 19th century Europe was integral to growing prosperity but also caused tremendous social disruption and environmental harm, demanding increasingly far-reaching government responses.

The same forces can be seen at work today (Block and Somers, 2016). Following the resurgence of free market thinking since the 1970s, high-income countries in Europe and elsewhere have developed an economic model that rewards and incentivises the promotion of short-term, private gains and the externalisation of environmental and social harms across society and across generations. The emphasis on short-term shareholder returns and profit maximisation has been justified in theory by the claim that it will maximise gains for society. Yet the system as currently designed often seems to be self-defeating. In developed regions, stagnating incomes for lower earners and disruptive structural change have produced powerful counter-movements, ranging from the emergence of populist leaders hostile to immigration and climate action, to growing calls for measures such as basic incomes or job guarantees that can protect societies against the effects of deregulated markets. Governments are called on to remedy the growing social and environmental problems. But in a globalised economy and facing recurrent shocks, they often lack the powers to remedy all market failures, or to respond to all claims for help.

([2]) The EU defines resilience as 'the ability not only to withstand and cope with challenges but also to undergo transitions in a sustainable, fair, and democratic manner' (EC, 2020a, 2020g).

In this context, questions about the viability of the current economic paradigm are increasingly moving from the fringe of academic and policy debates into the mainstream. According to Michael Jacobs and Mariana Mazzucato (2016), 'the performance of Western capitalism in recent decades has been deeply problematic. The problem is that these failings are not temporary; they are structural'. Klaus Schwab (2020), Executive Chairman of the World Economic Forum, suggests that 'we will need to reconsider our commitment to capitalism as we know it'. The OECD (2020) likewise states that: 'We do not claim that there is as yet a new fully-developed model of economic policy which can simply replace those which have been dominant over the last forty years ... But we do believe that a new approach is needed.'

Common to many of the recent critiques, including those from prominent economists (e.g. Collier, 2019; Henderson, 2020; Carney, 2021), is a call to reorient or reimagine capitalism in ways that sustain its vitality and dynamism but mitigate its selfish, short-sighted and self-defeating characteristics. Crucially, doing so could reduce the need for ever greater government action to remedy social and environmental ills, ranging from poverty and chronic disease to pollution and climate change impacts.

In practice, creating a more equitable and sustainable economic system in Europe will require that the choices and actions of economic actors at all scales — corporations, small businesses, entrepreneurs, consumers — are guided by society's collective and long-term interests. Sections 4.2 and 4.3 focus on two particularly important dimensions of this shift: first, rewiring economic and financial systems in ways that drive businesses to promote social goals, rather than only focusing on private interests (Section 4.2); second, supporting the emergence and diffusion of transformative social innovations that can empower individuals, communities and societies to tackle problems (Section 4.3).

These overlapping themes together offer important ways to alleviate demands on government, potentially reducing the state's dependence on economic growth. Encouragingly, the EU and national governments are already beginning to construct the foundations that can support needed changes.

4.1 Creating sustainable and resilient tax systems

The foundations of the taxation system have shifted since the welfare state was established in the last century. In 2021, there is widespread recognition that tax systems must be overhauled. The European Commission's 2020 report on the EU tax system, for example, sets out the challenges and opportunities in clear terms:

> The upcoming 5 years will be crucially important for tax policy. Changes in climate, technology and demography are transforming our societies and way of life, leaving EU citizens anxious about their own and their children's future. In the face of these challenges, tax policy plays a vital role in supporting a just transition to a sustainable and digital economy compatible with the principles of our social market economy (EC, 2020t).

There are many options for shifting the tax base and thereby addressing these challenges, although their potential contributions to fiscal sustainability need to be carefully assessed. For example, environmental and resource taxes are often identified as untapped revenue sources that could enable a large-scale shift of the tax burden. There are, however, important barriers to imposing environmental and resource taxes (Section 1.1), meaning that governments will need to look at a broader array of taxation options.

A recurrent obstacle to designing a future-proof fiscal system is the difficulty of collecting taxes in a globalised economy, where externalities are widely dispersed across value chains, capital flows freely across borders and jurisdictions compete for business by engaging in a race to the bottom on tax rates. Taxing domestic industries may simply drive production overseas. Estimating and taxing the resources, social harms and environmental impacts embodied in imports is technically and legally very difficult. Transparency and international cooperation have been in limited supply during recent years. More encouragingly, however, digitalisation and the recent increase in multilateralism in tackling tax avoidance and evasion may offer ways to improve fiscal sustainability.

Challenges and opportunities in taxing energy, pollution and resource use

In the environment and climate policy field, many (including the European Commission) have called for widespread implementation of carbon pricing, in the form of carbon taxes or emission trading schemes. Such tools certainly have an important role to play in shaping the incentives guiding innovation, investment and consumption choices, and could generate substantial revenue in the short term. In 2019, for example, the share of energy taxes in total tax revenue ranged from 3.3 % in Austria to 9.1 % in Bulgaria, with an EU average of 4.6 %. The European Commission's impact assessment of the proposed extension of the EU's Emissions Trading System similarly estimates substantial increases in revenues up to 2030 (EC, 2021b)

In the long term, however, there are limitations in the potential contributions of energy taxes to public budgets because successful climate and energy policies will effectively eliminate the tax base (EEA, 2016, 2020b; OECD and ITF, 2019). For example, the International Energy Agency's 'net-zero emissions by 2050 scenario' projects that 'tax revenue from oil and natural gas retail sales falls by close to 90 % between 2020 and 2050', meaning that 'Governments are likely to need to rely on some combination of other tax revenues and public spending reforms to compensate' (IEA, 2021).

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While affirming the importance of energy taxes, the European Commission has itself highlighted the risk that 'changes in the way people travel or heat their homes could lead to drastic revenue losses from energy taxation'. In contrast, 'Sustainable tax revenues come from tax bases that do not erode and secure sufficient funding for current spending and probably increased spending in the future' (EC, 2020t). In a similar vein, the Commission has noted elsewhere that the 'extension of carbon pricing to a wider range of sectors [residential, heating and transport sector] of the economy should therefore not be seen as a game-changer in terms of the structure of public finances' (EC, 2020c).

European countries can offset future losses in energy tax revenues linked to tax base erosion by increasing energy tax rates. Although such increases can run into strong resistance from citizens (Chapter 2), it may be possible to increase public support for energy and environmental taxation schemes by reframing them as 'dividends', with revenues from taxing harmful activities shared across the population to minimise regressive effects. This approach is already used successfully in Canada and Switzerland (Klenert et al., 2018) but is not yet a large part of EU carbon pricing policy. However, EU policies do allow for some direct recycling of funds to support investments in energy networks and just transitions in lower-income EU Member States via the Modernisation Fund, which is partly funded by the EU ETS (EC, 2021a). Moreover, the Social Climate Fund proposed in the new Fit for 55 package will also be partly funded by money recycled from EU ETS auctioning revenues.

Increasing environmental taxes is also likely to generate resistance from businesses if it puts them at a disadvantage relative to international competitors. For this reason, efforts to increase energy taxes and carbon prices are closely linked to the EU's planned implementation of a carbon border adjustment mechanism (CBAM) as part of the EGD (EC, 2021q). The CBAM aims to ensure fair international competition by correcting the price of imports so that they reflect the carbon content and reduce the risks of 'carbon leakage'.

New and redesigned economic instruments in the transport field could also offer additional tax revenues. Measures such as comprehensive revision of vehicle taxation and distance-based charges reflecting the pollution costs and congestion implications of different types of vehicles could support the transition to zero-emission mobility (e.g. Gago et al., 2019), as well as compensating for declining revenues from energy taxes.

Resource or material taxes are also widely discussed as a tool to foster the transitions to a circular economy and increase resource efficiency. While conceptually appealing, such measures face many practical difficulties in a globalised economy (Eckermann et al., 2015). For example, taxing individual resources is likely to drive substitution of inputs to production, with uncertain environmental impacts. There are also difficulties in identifying where to apply taxes across value

chains: taxing consumption is fraught with technical difficulties; taxing domestic producers risks driving production overseas to less stringent jurisdictions; taxing imports (e.g. using border tax adjustments) is likewise technically and politically very difficult; and agreeing common resource taxes at the global level seems implausible. Such challenges may help explain why so little progress has been achieved in implementing resource taxes, despite vigorous promotion by researchers, think tanks and civil society groups over many years.

Options for reconfiguring the tax base

Given the apparent limitations of environmental and resource taxes for meeting current and future public spending needs, governments will need to explore other options. As highlighted by international organisations such as the Organisation for Economic Co-operation and Development (OECD) and the International Monetary Fund (IMF), there are diverse opportunities to extend and broaden the tax base, ranging from further postponing legal retirement ages, to reviving inheritance and wealth taxes (Drometer et al., 2018; OECD, 2018; EEA, 2020b; Scheuer and Slemrod, 2020; IMF, 2021). For example:

- A robot tax is promoted by some entrepreneurs and academics and was discussed (but rejected) by the European Parliament in 2017. It is criticised as a possible obstacle to further innovation and for hampering the adoption of robots in industry (Reuters, 2017).

- Digital taxation aims to overcome the limitations of corporate taxation rules, which have struggled in the past to deal with businesses operating in the digital economy, where profits are often shifted from the countries where value is created. Digital taxation schemes are already implemented or proposed in several EU Member States, but others oppose them.

- Financial transaction tax (FTT) aims to address financial market instabilities and to generate revenues for the public budget by imposing a levy on financial transactions, such as trade in stocks, shares and bonds.

- Consumption taxes, such as VAT, are often advocated as offering a means to expand the tax base with minimal impacts on economic competitiveness. However, European countries today rely heavily on VAT revenues and the OECD has argued that further increases could actually decrease total tax receipts due to disincentives and tax avoidance effects (Rouzet et al., 2019).

- Property taxation, in particular recurrent taxes on immovable property ('land value taxation'), is considered desirable as it has minimal impacts on economic growth given the immobility of the tax base (EC, 2019d). It can also stimulate the use or turnover of wealth instead of 'passive' ownership.

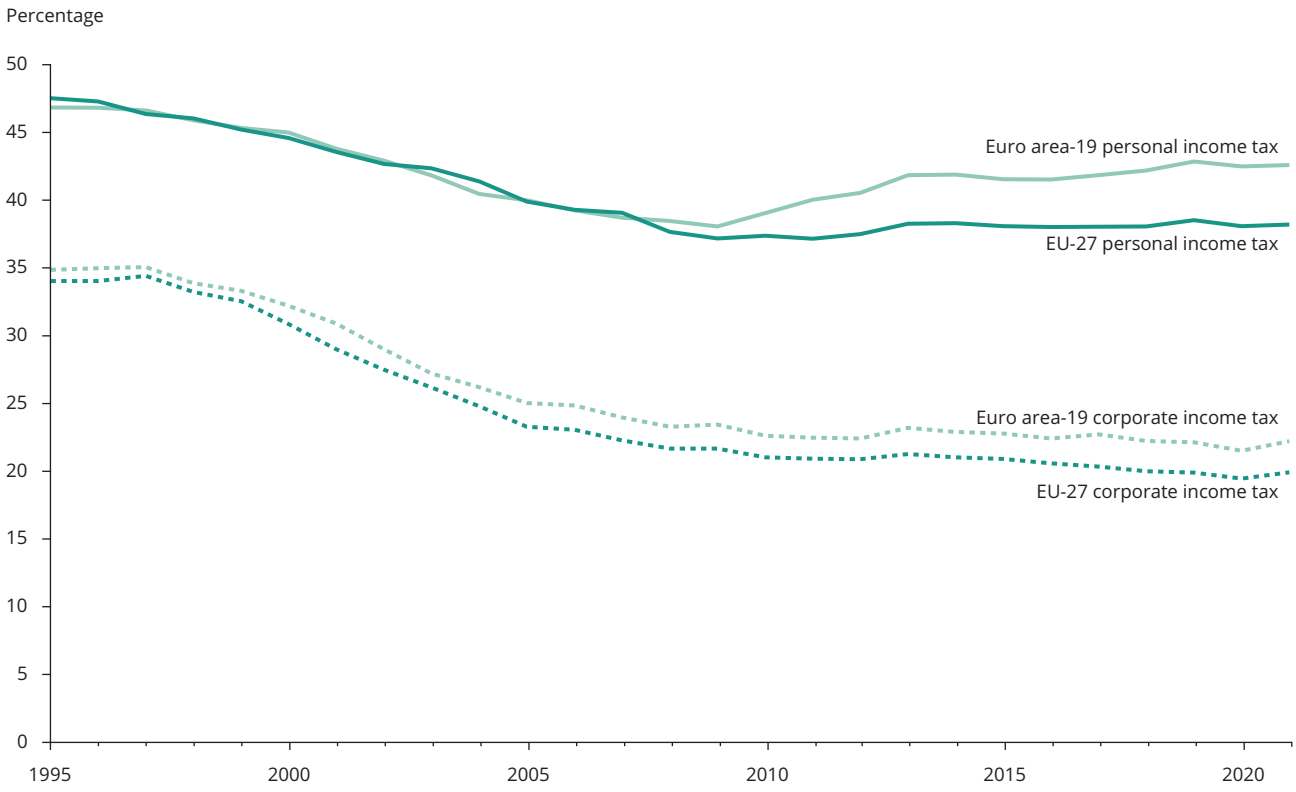
- Wealth taxes target net wealth (assets minus liabilities), comprising all types of assets. They therefore represent a much larger tax base than property taxes, implying that a small rate could raise substantial revenue. However, in a world of highly mobile capital, estimating and collecting wealth taxes can present major challenges (Bogetic et al., 2015).

In 2021, however, the area attracting most immediate attention is corporate income taxation. Tax rates on corporate profits have declined globally in recent decades as governments have competed to attract investment and sought to counter tax avoidance strategies by multinationals, especially the new digital economy giants. In eurozone countries, for example, the average corporate income tax rate fell from 35 % in 1995 to 22 % in 2021, while personal income tax rates declined far less (from 47 % to 43 %) (Figure 4.1). Global discussions on tackling tax avoidance have achieved little in the past but are gaining momentum as governments confront the problem of financing COVID-19 recovery policies and paying down large public debts. Among the international initiatives currently under way, the OECD/G20 Inclusive Framework on Base Erosion and Profit Sharing (BEPS) is the most significant, aiming 'to put an end to tax avoidance strategies that exploit gaps and mismatches in tax rules to avoid paying tax' (OECD, 2021a). Another key dimension of the political debate is the need to tackle inequality, which has grown in recent decades in many countries and increased further as a result of the pandemic.

In June 2021, G7 finance ministers tackled the issue of tax avoidance in the digitalised global economy and committed to a global minimum corporate tax rate of 15 %. If and when it is implemented globally, the proposed minimum corporate tax rate would greatly reduce international tax competition and help ensure that the largest multinational companies pay their fair share into the budget of the countries where they operate. It might also signal the possibility of a new era of multilateralism in coordinating global economic governance. Yet the new minimum rate is unlikely to raise massive amounts of revenues for the public budgets of EU Member States. A report published by the newly established European Tax Observatory estimated that an internationally coordinated corporation tax set at 15 % would generate approximately EUR 50 billion annually in the EU (Barake et al., 2021). This corresponds to an increase of roughly 1 % of the total tax take of the 27 EU Member States and a 13 % increase in the tax levied on corporation income (based on 2019 figures).

These numbers underline, once again, the need for much more work on finding ways in which countries can reconfigure tax bases to make them more resilient in the context of ongoing technological, social, environmental and economic change.

Figure 4.1 Average top rates of personal and corporate income taxes in eurozone countries, 1995-2021



Note: EA-19, 19 countries of the euro area from 1 January 2015.

Source: EC (2021m).

4.2 Promoting business with social purpose

Businesses are at the core of capitalism and their behaviour plays a major role in shaping the form and outcomes of the economic system. The ethos that has guided most business activity in recent decades arguably finds its clearest expression in Milton Friedman's 'doctrine' that the sole purpose of business is to maximise returns to shareholders within the legal constraints set by governments (Friedman, 1962). The Friedman doctrine has fundamentally shaped the evolution of business practices, rules and norms in recent decades. According to Mayer (2021), 'nearly all policy in the post-WW2 period has been directed towards enhancing it: competition policy, monopoly regulation, investor protection, corporate performance, and corporate law all take this as their fundamental premise'. As a consequence, financial markets, financial institutions and hedge-fund activists demand ever more short-term returns. Businesses, meanwhile, invest huge sums in influencing the legal constraints on their operations in ways that can enhance profits.

An alternative and increasingly prominent view argues that a business's purpose primarily consists of meeting obligations to its stakeholders, in particular its customers and workforce, as well as to society more broadly. In this account, 'Profitability is not the objective; it is a constraint that has to be satisfied in order to achieve these objectives on a sustainable basis' (Collier, 2019). Or, as John Kay has expressed it crisply, 'Profit is no more the purpose of business than breathing is the point of living' (Kay, 2014).

A systematic reorientation of business activity along these lines could have profound implications for the operation of the economy as a whole. Yet there are major barriers to such a transition. With the primacy of profit maximisation so firmly embedded in existing laws, institutions, mindsets and public discourses, individual business leaders face significant constraints on their ability to drive change. There is therefore a need to rewire the system guiding corporate behaviour and the circulation of public and private finance throughout the economy. This implies an essential role for public policy and institutions. Three interlinked entry points stand out.

Cross-industry coordination and standards

The first point relates to coordination of activities across industries to remedy collective action problems, i.e. instances where an industry or society as a whole could gain from addressing a problem together but commercial incentives deter firms from cooperating. For example, individual businesses

can find it difficult to reorient their business models if their competitors continue to externalise social and environmental harms. In these situations, industry coordination processes (e.g. the Sustainable Palm Oil Initiative (UNDP, 2021)) can play a valuable role and can be supported by civil society activities such as certification initiatives. But such approaches have limitations, as illustrated by the well documented failure of industry efforts to tackle deforestation in countries such as Indonesia (e.g. Slavin, 2018). Public policies and institutions therefore have a critical role in coordinating activities and creating a level playing field by enforcing shared standards.

Perhaps counter-intuitively, businesses themselves may welcome regulations that impose new obligations if they can create a clear and level playing field. For example, a recent study for the European Commission on requiring companies to identify, prevent, mitigate and account for adverse impacts on human rights and the environment across their supply chains found that: 'The majority of stakeholders indicated that mandatory due diligence as a legal standard of care ... may provide potential benefits to business relating to harmonization, legal certainty, a level playing field, and increasing leverage in their business relationships throughout the supply chain through a non-negotiable standard.' (Smit et al., 2020).

While regulations alone will not drive the needed transformation of the economy, they have a major role to play, not least in defining the boundaries for corporate behaviour. Ultimately, creating a sustainable socio-economic system is likely to require that governments collectively translate planetary boundaries into legal constraints that can shape business and catalyse innovation.

Sustainable corporate governance

The second point relates to corporate governance. As set out in a study for the European Commission on directors duties and sustainable corporate governance, there is clear evidence that publicly listed companies in the EU focus on short-term financial returns to shareholders rather than sustainable, value creation (EY, 2020). This not only runs counter to the long-term interests of businesses but drives environmental and social harms. As the study notes, 'Short-term time horizons that fail to capture the full extent of long-term sustainability risks and impacts could amount to overwhelming environmental, social and economic consequences for companies, shareholders, investors, and society at large. Moreover, the achievement of the goals of the Paris Agreement on climate change and the UN SDGs is unlikely, given the status quo.'

The drivers of short-termism are diverse. Corporate governance frameworks seldom give sufficient voice to the long-term interests of important stakeholders, including employees, creditors, customers and local communities ([3]). Legal obligations on directors to act in the long-term interests of their business are seldom enforced. Company boards often have remuneration structures that incentivise a short-term focus on shareholder returns, and may also lack relevant expertise in sustainability issues. Pressure from investors likewise tends to favour rapid financial returns over long-term value creation. EU actions in each of these areas would help ensure a level playing field for European companies (EY, 2020). Recent amendments to EU rules on fiduciary duties, investment and insurance advice mark a useful step forwards, helping to ensure that financial firms include sustainability in their procedures and their investment advice to clients (EC, 2021d).

A final and critically important driver of unsustainable corporate governance is the weakness and inconsistency of company sustainability strategies and reporting on non-financial issues, such as the social and environmental impacts of their operations. The EU took an initial step to formalise reporting requirements for approximately 11 700 large public interest companies (banks, insurance firms and listed companies) with its Non-Financial Reporting Directive (NFRD) in 2014. However, subsequent analysis by the European Commission has shown that the NFRD fails to provide meaningful, comprehensive and comparable non-financial information. The lack of external verification further undermines credibility. As a consequence, the sustainability information disclosed so far does not allow businesses, investors or other actors to understand and compare companies' impacts (EFRAG, 2021).

The context for sustainability reporting has changed substantially since 2014, with the adoption of the SDGs and the EU's sustainable finance plan, and the growth of reporting initiatives such as those developed by B Lab, the Global Impact Investment Network, the Global Reporting Initiative and the World Economic Forum (B Lab, 2021; GIIN, 2021; GRI, 2021; WEF, 2021). A standardised, comprehensive system of measurement is still lacking, however, which makes it hard to understand or manage sustainability outcomes. Perhaps even more crucially, rewiring of financial flows throughout the economy depends on this kind of information. For this reason, the EU's planned Corporate Sustainability Reporting Directive and its related harmonised standards are of absolutely central importance to driving economic transformation, as discussed further below.

([3]) Current rules and practices on stakeholder engagement differ substantially across Europe. A mixture of business structures (for example cooperative or mutuals) normally exists within countries, providing stakeholders such as employees and customers with different rights in terms of decision-making and profit sharing. Corporate governance practice rules also vary according to the variety of capitalism in which they are embedded. For example, shareholder models contrast with stakeholder models (e.g. in Austria, Germany and the Netherlands), which engage employees and others in codetermination processes (Vitols, 1999).

Targeting finance at social outcomes

The third entry point for public policy relates to finance. Creating a sustainable economic system will require a fundamental reorientation of private financial flows. As emphasised in the EU's Action Plan on Financing Sustainable Growth, governments need to redouble efforts to create the right incentive structures and mechanisms to guide private investment. Encouragingly, there is evidence that a growing number of institutional investors, including pension funds, insurance companies, foundations and investment funds, are actively seeking financial products that support sustainability, without compromising returns, liquidity or pricing (EEA, 2020a). As outlined above, however, matching long-term and sustainability-oriented investors with purpose-driven firms is not possible without robust, reliable and comparable metrics that quantify environmental, social and governance (ESG) impacts.

The EU is taking steps to address this knowledge gap as part of its sustainable finance agenda. Article 8 of the Taxonomy Regulation specifically requires all large companies listed on European stock markets to report what percentage of their turnover, investment and operational cost meets the taxonomy technical screening criteria and complies with the 'do no significant harm' principle. At present, the degree of alignment with the taxonomy remains low. According to a study by the European Banking Authority, 8 % of EU banking sector assets can be classified as sustainable according to the taxonomy framework in 2021. However, this percentage is likely to increase as the scope of the taxonomy increases, and it is foreseen that capital flows towards taxonomy-aligned activities are scaled up (EBA, 2021).

The EU's planned Corporate Sustainability Reporting Directive (CSRD) will go still further in creating the evidence and knowledge needed to redirect financial flows. The proposal includes indicators that disclose the negative and positive impact of company-level economic activities on climate mitigation, climate adaptation, biodiversity, water and marine resources, circular economy and pollution prevention and control — the six objectives of the EU sustainable finance agenda. The proposal extends coverage from the 11 700 businesses covered by the NFRD to all 49 000 companies listed on regulated markets. It also requires more detailed reporting to mandatory EU sustainability reporting standards, as well as auditing and tagging of reported information so that it feeds into a single European access point.

Together with the taxonomy, the mass of new data on social and environmental impacts represents an extremely important resource, enabling the development of financial instruments that link lending criteria with sustainability performance indicators. Further to this, the new Strategy for Financing the Transition to a Sustainable Economy (EC, 2021i) provides that the European Commission will develop new standards and labels to channel finance to companies, issuers and investors as they shift to more sustainable activities and business models. This includes working on new bonds labels, such as transition or sustainability-linked bond labels, an ESG Benchmark label and minimum sustainability criteria for financial products. Further ahead, a more general framework for labels for financial instruments could help bring transparency and coherence, and promote future market innovation.

Such advances open the possibility of creating bonds that make lending to businesses conditional on achieving specific transitional goals within a certain time frame. For example, future research could explore the usefulness and relevance of concepts like contingent convertible ('CoCo') bonds in promoting sustainability goals. Popular after the financial crisis of 2008-2009, CoCo bonds convert into equity if the borrowing institution fails to maintain a defined solvency ratio. Introducing this kind of conditionality into financial instruments supporting sustainability transitions could create an additional safeguard to stakeholders, fostering responsible governance and incentivising management to reposition their business towards more sustainable pathways.

The financial crisis may provide further lessons in terms of approaches to managing toxic assets. Following the crisis, financial institutions exposed to subprime assets used various techniques to ringfence these toxic holdings in 'bad banks'. By isolating and running down assets that could impair the entire balance sheet, management was able to focus on the sustainable part of the business. A similar approach could be applied on business segments that operate in harmful activities (see e.g. Nair and Herbst-Bayliss, 2021). Again, transparent reporting plays an important role, enabling investors to assess and monitor progress in companies that are in transition.

Monetary policy can also help unleash financial capital for green investments in a variety of ways (NGFS, 2021a). The European Central Bank (ECB) has opened the door to using the ECB's large asset purchase scheme to pursue green objectives under the public sector purchase programme and the corporate sector purchase programme. President Christine Lagarde has stated that the ECB 'has to look at all the business lines and the operations in which it is engaged in order to tackle climate change, because at the end of the day, money talks' (Khalaf and Arnold, 2020).

ECB board member Isabel Schnabel has further developed this vision, identifying three major avenues through which the ECB, and central banks more generally, can contribute. First, the ECB is involved in defining rules and standards, and supporting research into the implications of climate change for financial markets and monetary policy. Second, the ECB can ensure that it is an environmentally mindful and responsible investor, for instance when it comes to its pension fund investments and other non-monetary policy portfolios. Third, the ECB can take climate considerations into account when designing and implementing monetary policy operations (Schnabel, 2020, 2021).

Additional recommendations for central banks in tackling climate change are discussed at the global level in the Network for Greening the Financial System, which brings together 83 central banks and supervisors to accelerate the upscaling of green finance (NGFS, 2021b). Initiatives such as the ECB roadmap to greening monetary policy promise to influence the green investment trajectory in Europe and beyond. However, the journey has just begun.

4.3 Supporting transformative social innovation

Alongside efforts to transform the culture and purpose of businesses, achieving more resilient and sustainable socio-economic systems will depend on identifying how society more broadly can be engaged and empowered to find solutions to social needs. Europe must clearly make major investments to transform its systems of production and consumption but it cannot achieve the SDGs simply by increasing funding. There is a need for innovation and social change, and this will mean tapping into the creativity and resources across society. In practice, many of the most disruptive and innovative new ideas, practices and business models emerge in niches or local contexts rather than in businesses, which often have strong vested interests in sustaining existing products and services.

Recognising this, the last two decades have witnessed a surge in interest in social innovation, i.e. creating new products or services that challenge established practices and open routes to more sustainable ways of living and working. The growing calls for 'social' innovation reflect a recognition of the failings of past governance approaches. Just as market forces and public policies have failed to steer the resources and dynamism of corporations to socially desirable ends, they have also failed to channel the transformational potential of innovation towards sustainable development. In their pursuit of economic growth, governments have tended to treat all innovation as good and have promoted it in an undifferentiated way, despite its frequently counterproductive outcomes (EEA, 2021d).

As Diercks et al. (2018) note, it is an 'unavoidable observation that many of the societal challenges confronting the world today are caused by the direct effects or indirect consequences of previous innovations'. Indeed, there is a growing sense that far too much human and financial capital is invested in creating wasteful or actively harmful products, such as extraordinarily sophisticated weapons or financial instruments, rather than in addressing society's most important challenges. Too often, society's interests are marginalised in market-driven innovation processes. The public frequently stands as a passive observer and public interests are seldom the primary motivation for innovation (Mulgan, 2019).

Social innovation aims to respond to these failings by employing social means to achieve social ends (EC, 2013; Mulgan, 2019). In terms of their means, transformative social innovations emerge through the active engagement of diverse social actors (not merely universities, industry and government) and normally function by creating new practices, relationships or forms of social organisation. In terms of their ends, social innovations aim to serve a collective, social purpose — promoting sustainability in all its dimensions and across generations — rather than maximising private returns and externalising social and environmental costs.

As European societies confront the need to restructure production-consumption systems amid uncertainties about future growth, social innovations potentially offer novel ways to respond to problems, address unmet societal needs and deliver public services. They may also provide triggers for broader transformation of the socio-economic system, including the move towards new lifestyles and cultural norms.

Social innovations are often linked to different visions and pathways for sustainability transitions. These tend to be more radical than business-driven greening efforts or technological fixes developed for commercial purposes, which can reinforce existing power structures and modes of producing and consuming. In contrast, social innovations may question conventional consumerism and advocate change in user practices and lifestyles (EEA, 2019a). They are often more oriented towards social justice or alternative economic rationales, such as community ownership, the shortening of supply chains, self-sufficiency and degrowth.

For example, initiatives such as food councils provide means to restructure value chains or alter power relationships within socio-technical systems. Activities such as urban agriculture or industrial ecology offer novel ways of employing resources for production. Crowdfunding or local cooperatives provide ways to generate finance for socially oriented and sustainable activities or investments. Local currencies can encourage the circulation of value in towns, rural areas or poor neighbourhoods. 'Timebanking' can help mobilise untapped community resources for mutual support, giving value to activities and individuals that are often undervalued (Seyfang, 2006). New models of welfare such as basic incomes or guaranteed public employment could facilitate structural economic change and mitigate its harmful impacts, while maintaining and enhancing human capital stocks.

As these examples illustrate, social innovations include but extend well beyond grassroots and community-led activities. Governments and businesses are often important actors and high-tech, science-based and market-driven innovations play a role. Technologies can offer powerful tools to respond to social needs by reconfiguring existing practices, relationships and structures. For example, information and communication technologies potentially open the way to new models of

welfare, social services and healthcare provision, engaging public institutions, communities and families in different modes of social, peer-to-peer and commercial partnerships. Big data and artificial intelligence potentially offer ways to assess risks, such as the likelihood of elderly people requiring hospital care or former prisoners reoffending. New technologies and community initiatives centred on lifelong learning and new ways of working could help people to remain active in the workforce. They could also enable patients to manage their conditions, receive care and administer treatments at home (Mulgan, 2019).

Many of these examples could reduce demands on the public sector by creating socially sourced alternatives. Yet it is, of course, vitally important that social innovations are not used as an excuse to dismantle essential public services (Transmit, 2017). Equally important, it is clear that social innovations — like all innovation — are characterised by huge uncertainties in terms of their implications and impacts. New ideas or forms of social organisation may prove to have limited scope for upscaling or to produce unanticipated and undesirable outcomes. For example, new business models and platform economy initiatives such as car sharing offer ways for society to meet its needs with less resource use. Yet, while the growth of the sharing economy surely has an important role to play in the shift to a more sustainable Europe, the emergence of platforms like Uber and Airbnb have generated decidedly mixed results, with governance challenges ranging from rebound effects to concerns about working conditions, wages and tax evasion (Frenken and Schor, 2017).

As with other forms of innovation, the key mechanism for orienting social innovation towards sustainable outcomes is through experimentation and learning about their impacts as they are taken up and used in society. This requires a broad engagement of actors in innovation processes — from users and citizens to charities, non-governmental organisations, communities and cities (Kuhlmann and Rip, 2018). It necessitates a greater emphasis on real-world living labs and experimental spaces to explore how new ideas unfold in practice. Moreover, it also demands networking, strategic collaboration and new knowledge systems (Transmit, 2017).

There is already a great deal of social innovation and entrepreneurship under way in communities, start-ups and local authorities across Europe, and there could surely be much more. But if Europe lacks a knowledge system that can draw together evidence about what is happening and the associated social and environmental outcomes then it significantly constrains its ability to learn, support and orient social change.

Just as with businesses, evidence about social and environmental impacts is also of decisive importance in reorienting financial flows towards innovations and programmes that meet society's needs and promote sustainable development. Impact investment tools such as 'social impact bonds' (SIBs) have emerged in recent years as powerful tools for mobilising private finance for social entrepreneurship and initiatives, thereby alleviating financial burdens and risks on government.

With SIBs, investors finance an initiative and receive both their principle and a return back from government if the programme achieves its intended outcomes. For public authorities this arrangement means that they pay less for achieving social outcomes and may not have to pay anything if a minimum outcome is achieved. For example, the first social impact bond was a project launched in 2010 to reduce reoffending among released prisoners in the UK. Investors raised GBP 5 million to finance charitable service providers working with prisoners at Peterborough jail, with the agreement that government would repay the investment if reoffending fell by 7.5 % or more, with interest according to the reduction achieved. Ultimately the SIB achieved a 9.7 % reduction in convictions at a time when reoffending was increasing in the UK as a whole, and the government paid investors 3.1 % per year on top of their investment. Crucially, however, that expense represented only 30-50 % of the money saved by public authorities on law courts and prisons (Cohen, 2021).

This highlights the opportunity inherent in SIBs and similar tools. Essentially they align the incentives of private and public actors and enable them to split the gains from the resulting social or environmental benefits that are achieved. As the OECD (2019b) notes:

> The paradigm for financing sustainable development is shifting ... Social impact investment not only mobilises private financing to contribute to achieving the SDGs but, most importantly, it catalyses innovative new approaches to social, environmental and economic challenges. In addition, social impact investment brings accountability. Social impact investment is predicated on the intention of having a social impact in addition to financial return. Therefore, defining and measuring impact is critical. As investors increasingly engage in sustainable finance, it is imperative that impact is explicitly monitored, assessed and reported.

Again, this underlines the critical importance of creating a knowledge system that can support the emergence of the new financial and innovation paradigm. Governments can support the emergence of such knowledge, for example by developing common standards for monitoring, assessing and reporting impacts, as the EU is doing at the scale of large businesses. They can also publish standardised estimates of the costs of social and environmental issues (e.g. of the cost of recidivism or homelessness) for use in calculating financial returns. Portugal has begun this work (One value, 2021).

Numerous other government measures are needed to promote a thriving social impact investment sector. In the broadest terms, there is a need for governments and the EU to act as a market facilitator — creating systems to enable and

educate about impact investment; as a market participant — commissioning and procuring impact products and services; and as a market regulator — implementing laws that support the impact ecosystem (GSG, 2018; OECD, 2019b). Relevant actions are already under way across Europe. Countries such as France and Portugal have established dedicated government units to promote impact investment; introduced regulatory or fiscal policy changes to incentivise investments in relevant funds and businesses; and established well-resourced impact wholesale funds to distribute resources to impact investment firms. The EU itself actively supports social entrepreneurship through its Social Impact Accelerator, a EUR 243 million initiative that invests in social impact funds targeting social enterprises in Europe (Cohen, 2021).

These are valuable first steps towards a shift in the financial paradigm. And beyond finance and knowledge, governments can do more to promote transformative social innovation directly, for example, by creating more supportive regulations and legal frameworks; further opening up public procurement processes; using more public assets (e.g. unused land) in socially innovative ways; and further raising awareness and building skills to enable people to take advantage of these opportunities (Gabriel, 2016).

4.4 The way ahead: supporting the paradigm shift

In 2021, the European Green Deal provides the compass for EU policy. Its focus on transforming the core systems driving environmental pressures is essential and Europe needs to make it the greatest possible success. Yet there are also opportunities to build on the EGD and create a more resilient and sustainable socio-economic model that is less dependent on growth. Achieving this will require a profound transformation of the economic system from where we stand today. It will necessitate a reorientation of business and innovation and a rewiring of the financial flows. The aim would be to reshape capitalism in ways that remove its self-defeating characteristics and instead imbue economic activities at all scale with social purpose. It would mean finding a middle ground between the two dominant forms of capitalism existing today: the shareholder capitalism of the West, which incentivises short-termism and private gains at the expense of sustainable development; and the political capitalism of China, which empowers a dominant state to promote collective and long-term interests but is beset by entrenched corruption and civil liberty concerns (Milanovic, 2019; Schwab and Vanham, 2021).

This sounds like radical change. Yet the seeds for this transformation are already emerging in policy and practice, for example in the EU's emerging sustainable finance agenda. Europe needs to build on these foundations and take them much further.

Transforming the European economy in ways that enable it to delivery prosperity within environmental limits will ultimately rely on the emergence and diffusion of new ways of working, living and thinking. Promoting and orienting the emergence and spread of these diverse forms of innovation — whether by public policies, markets or networks — requires widespread experimentation and learning, backed up by a knowledge system that can make sense of what is happening across Europe and understand the ways that promising ideas can be scaled up and thereby extend their impact.

A knowledge system capable of supporting the needed socio-economic transformation would also have many other dimensions that are lacking today. It would, for example, provide much clearer insights into the environmental boundaries that set the limits of economic activity; it would draw on diverse sources, including big data and collective intelligence, to build a much more complete picture of the systems driving social and environmental outcomes, their lock-ins and dynamics; it would employ foresight approaches to build a better understanding of the trade-offs and assumptions inherent in alternative possible futures and their implications in the present; and it would engage a broad spectrum of societal actors in co-creation processes that support the development, uptake and use of knowledge (EEA, 2021b).

At present, Europe lacks a knowledge system that can enable thinking and action at a pace and scale commensurate with the challenges we face. Instead, 'in far too many fields the most important data and knowledge are flawed and fragmented, lacking the organisation that is needed to make them easy to access and use, and no one has the capacity to bring them together' (Mulgan, 2018). Creating a knowledge system capable of supporting the needed economic transformation will require the engagement of society as a whole. But governments have a unique capacity to set the direction, create shared infrastructures, and mobilise and coordinate action. It is urgent that they do so.

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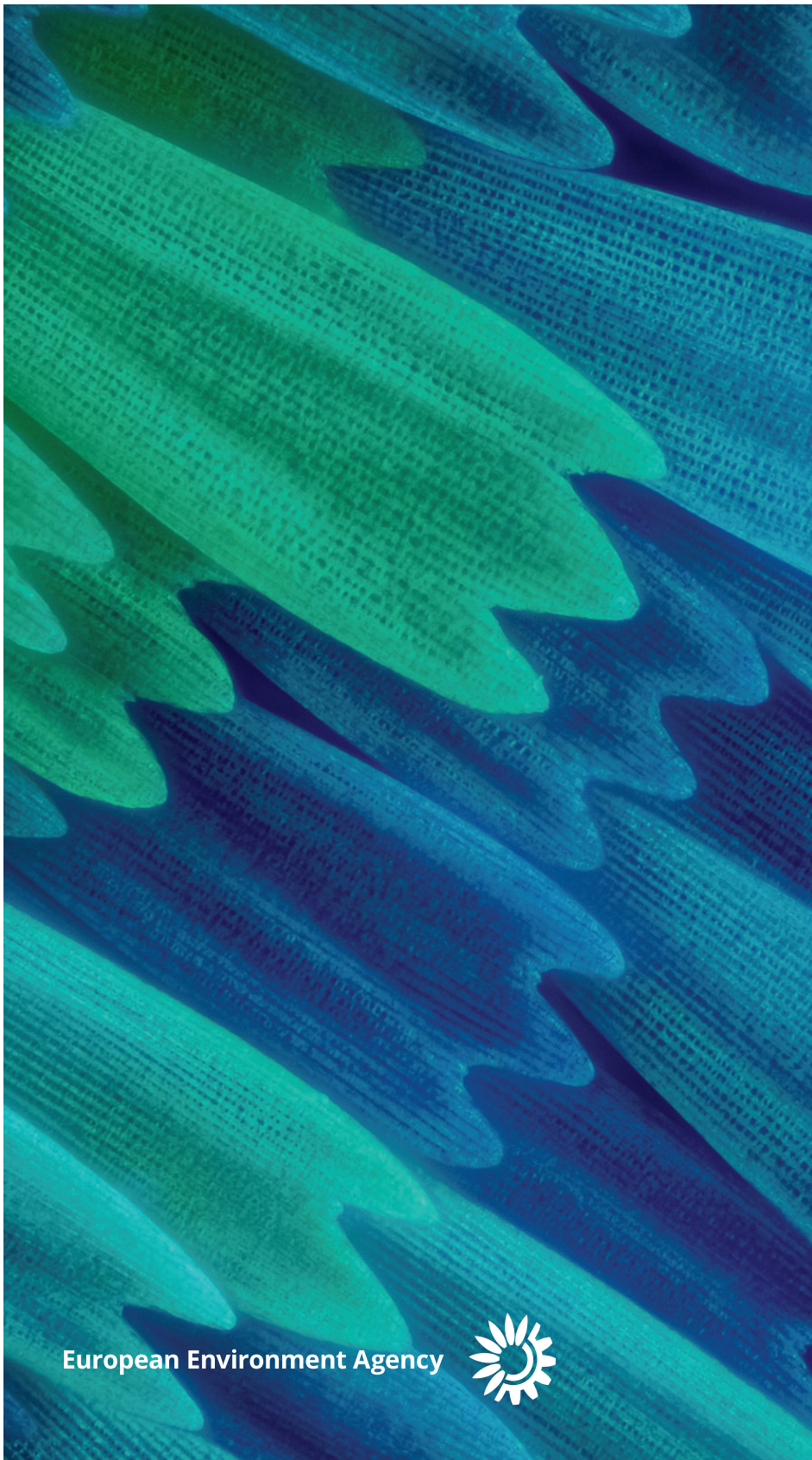

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