Living and Working More Sustainably in a Greener Economy

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LPIP HUB

LIVING AND WORKING MORE SUSTAINABLY IN A GREENER ECONOMY

LOCAL POLICY INNOVATION PARTNERSHIP HUB

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Executive Summary

This report contains a review of the existing academic and policy literature relating to the theme *Living and Working More Sustainably in a Greener Economy*, to determine the current 'state-of-play' and identify key themes and issues Local Partnerships should consider when designing interventions that relate to the environment, climate change and net zero activity. The following is a summary of the key points of the report.

Key finding: Nature recovery is underrepresented in environment policy

In the UK, action to support nature recovery is underdeveloped, with weaker legal targets and significantly less funding despite its role in climate resilience. While new policy has mandated Biodiversity Net Gain in relation to development, it lacks the rigour and enforcement needed to drive large-scale ecosystem improvement.

Key takeaway
Nature recovery goals and metrics should be incorporated in local action plans. It is important to consider the protection and recovery of the natural environment alongside the decarbonisation of the economy and society.

Key finding: Regions have differential strengths and weaknesses

Regions have different industrial compositions and geographies which in turn means that they have different strengths, weaknesses, opportunities and threats in reference to net zero, nature recovery and living sustainably.

Key takeaway
Policy should seek to work with the grain of the regional economy. Some regions will have different timelines to achieving net zero which must be recognised.

Key finding: Early interventions are cheaper in the long run

Earlier interventions will prevent greater costs in the long run in terms of environmental, social and economic impacts. However, long-term policy action is often constrained by short-term policy agendas from central government, short-term funding pots limiting long-term planning, and pressures from businesses to prioritise short-term economic goals over environmental ones.

Key takeaway
The opportunity cost of delay both in terms of nature recovery and decarbonisation is high and not routinely considered in policy agendas.

Key finding: Decarbonisation can be achieved with a place-sensitive approach

Decarbonising the economy can have uneven impacts on communities. However, there are good examples of managing industrial transitions to minimise social and political upheaval through community engagement and targeted policy intervention.

Key Takeaway
Change needs to reflect context and community interests. It is important to plan for a gradual transition which allows places, cultures and communities to adapt. Successful interventions involve local buy-in and engagement from a range of stakeholders and residents.

Key finding: Local, regional and national governments have different but complimentary roles

Multi-scalar governments play important roles in providing funding and infrastructure as well as shaping consumer choices and activity. Successful multi-level environmental policy requires long-term planning, alignment across government levels, empowerment of regions and communities, and institutional place-based partnerships. However, the asymmetric power dynamics of the UK governance system can reduce ambitions and the pace of change on the ground.

Key takeaway
Finding the right balance between decision makers allowing local and regional authorities to have support from national level actors can enhance the impact of environmental policies.

Introduction

About this review

This review is part of a series produced by the LPIP Hub team at City-REDI at the University of Birmingham, offering a state-of-play on the current policy landscapes and debates relating to effective place-based partnerships across the seven primary themes of the Local Policy Innovation Programme (LPIP), as determined by UKRI. The aim of the review is to identify key questions, offer a 'state-of-the-art' picture of current academic and policy literature, and consider key themes and strands of research for further investigation throughout the LPIP programme. The review is designed to help those in local partnerships better understand how to design effective place-based interventions that relate to a given theme, and to understand the common challenges and pitfalls to effective partnership working in each context, as well as examples of good practice to minimise risk.

The review relates to the theme 'living and working in a green economy' and it begins by introducing some important concepts and definitions, and outlines the key questions and debates that have informed the gathering of evidence on this theme. It then provides an overview of the environment, climate and net zero policy context at both national and local levels in the UK, outlines the underlying reasons for differential capacity of places and regions to be able to introduce effective and innovative place-based green economy interventions, and proposes examples of what works both from previous initiatives in the UK and elsewhere. Finally, it offers some concluding thoughts and provocations to explore further in future.

Living and working sustainably in a greener economy

The drive for greater sustainability is underpinned by concern about the environment and climate change and has prompted new policy in relation to nature recovery and securing decarbonised energy systems. These two strands of policy have been developed in parallel, with the latter securing greater attention and this review reflects this imbalance. Most of our focus is on local policy and practice in relation to achieving net zero from decarbonised energy production and use. However, it is important to acknowledge the development of policy designed to recover and improve habitat quality and biodiversity and while we touch on it here, we plan to return to this topic in future work.

The UK's journey to net zero is increasingly crucial for its future, driven by both environmental urgency and economic opportunities. Businesses innovating to decarbonise will spark new technologies and market solutions, propelling the economy forward. However, the pace of this transition depends on the coordinated actions of policy makers over the long-term supported by high-quality partnerships across the private and public sectors, higher education and civil society groups.

The net zero economy (see definition in Table 1) contributes significantly to the UK, supporting 3.8% of GVA and 765,700 jobs[1]. These contributions surpass those of entire regions like Wales and the North East. Moreover, net zero businesses are more productive than the average business outside the defined net zero subsectors. Employment in net zero businesses produces on average £114,300 GVA per full time equivalent employee (FTE), 1.6 times higher than the national average of £72,550. Net zero businesses are also a magnet for investment with £14 billion invested in net zero related FDI in the UK for financial year 2022-23. There is no clear geographical divide in distribution of economic opportunities created by the net zero economy. Some of the most deprived areas of the UK have hotspots of net zero activity and this provides the basis for future growth and development.

Sustainability efforts emphasise the adoption of a circular economy to minimise waste by reusing and recycling resources efficiently. Effective waste management practices are integral to this approach, promoting resource conservation and reducing environmental impact. By implementing circular strategies, communities can shift from linear consumption models to sustainable, regenerative systems.

Green transitions can mean significant industrial restructuring, a process that is most successful when conducted in a way sensitive to the needs of local populations. There are an increasing number of best-practice case studies and a growing literature that indicate that spatially targeted policies, and devolution can help achieve spatial justice[2].

Living and working sustainably in a greener economy involves taking a holistic view of the transition; looking beyond emissions statistics in isolation and considering the ways in which we can build a society with environmental sustainability at its core. Living and working in a greener economy means i) reversing ecological breakdown and ii) reducing carbon emissions to levels that minimise global heating and prevent the worst impacts of climate change.

Definitions

Living and working in a sustainable green economy includes a series of definitions that require some explanation from the outset. Table 1a sets out the most important definitions for this review.

Table 1a: Key Definitions

Net zero	The UN[3] defines net zero as: "cutting greenhouse gas emissions to as close to zero as possible, with any remaining emissions re-absorbed from the atmosphere, by oceans and forests for instance."
Nature recovery	Nature recovery comprises action taken to improve habitat quality, coverage, and connections, to enhance biodiversity and species abundance, requiring a place-based collaborative and community-focussed approach. English local authorities have been charged with the development of Local Nature Recovery Strategies (LNRS) that will help to deliver this action across the country.
Green economy	A green economy is an economic system that aims to reduce environmental risks and ecological scarcities while promoting sustainable development. It focuses on low-carbon, resource-efficient allocation of resources.

Source: Unsplash

Alongside these key definitions there are a wide range of terms used in the fields of climate and environmental policy and research that also warrant explanation (see **Table 2**).

Table 2: Definitions

Carbon capture and storage (CCS)	Carbon Capture and Storage (CCS) is a technology that captures carbon dioxide emissions produced from burning fossil fuels or industrial processes, preventing them from entering the atmosphere. The captured CO2 is then transported and stored underground in geological formations to mitigate climate change.
Carbon offsetting	Carbon offsetting refers to the process of compensating for carbon dioxide (CO2) emissions by investing in projects or activities that reduce or remove an equivalent amount of CO2 from the atmosphere. These projects typically include activities such as reforestation, afforestation, renewable energy initiatives, energy efficiency projects and methane capture from landfills. The idea is to balance out the emissions generated from one source by supporting activities that result in carbon sequestration or emission reductions elsewhere, ultimately aiming to achieve a net zero carbon footprint.
Carbon leakage	Carbon leakage occurs when efforts to reduce greenhouse gas emissions in one region lead to an increase in emissions elsewhere, often due to industries relocating to areas with less stringent environmental regulations. This can undermine global climate efforts by shifting emissions rather than reducing them overall.
Circular Economy	"The circular economy is a model of production and consumption which involves sharing, leasing, reusing, repairing, refurbishing and recycling existing materials and products as long as possible. In this way, the life cycle of products is extended. In practice, it implies reducing waste to a minimum. When a product reaches the end of its life, its materials are kept within the economy wherever possible thanks to recycling. These can be productively used again and again, thereby creating further value."[4]
Climate adaption	Climate adaptation is the process of adjusting to the impacts of climate change in order to reduce harm and take advantage of potential benefits. This can involve physical infrastructure like coastal walls and flood barriers or process changes such as updating skills and provision in healthcare to adapt to new diseases.
Climate resilience	Climate resilience refers to the ability of individuals, communities, ecosystems and economies to withstand and adapt to the impacts of climate change, minimising damage and disruption while maintaining essential functions and structures.
COP - The United Nations Climate Change Conference	The United Nations Climate Change Conference, also known as the Conference of the Parties (COP) of the UNFCCC (United Nations Framework Convention on Climate Change), is an annual gathering where country representatives come together to discuss and negotiate global efforts to address climate change. It serves as a platform for decision-making on international climate policy, agreements and actions aimed at reducing greenhouse gas emissions and adapting to the impacts of climate change.
Greenhouse gas removals (GGRs)	GGRs are methods to actively remove greenhouse gases from the atmosphere, including natural processes like afforestation and engineered techniques like direct air capture. They help mitigate climate change by offsetting emissions and achieving net zero or negative emissions.
Greenhouse gases (GHGs)	Greenhouse gases (GHGs) are atmospheric gases that absorb and emit radiation, trapping heat within the Earth's atmosphere and contributing to global warming. Common examples include carbon dioxide, methane and nitrous oxide.
Green jobs	The ONS defines green jobs as "Employment in an activity that contributes to protecting or restoring the environment, including those that mitigate or adapt to climate change"[5]. However, there is acknowledgement that definitions are not settled across different institutions and sectors.

Greenwashing	Greenwashing is when organisations misleadingly present themselves as environmentally friendly or socially responsible to attract consumers, despite having practices that are harmful to the environment or society.
Intergovernmental Panel on Climate Change (IPCC)	The Intergovernmental Panel on Climate Change (IPCC) is a scientific body established by the United Nations to assess the science related to climate change. It provides policymakers with regular assessments of the scientific understanding of climate change, its impacts, and potential adaptation and mitigation strategies.
Just transition (JT)	Just transition is defined by The International Labour Organization (ILO) as: "Greening the economy in a way that is as fair and inclusive as possible to everyone concerned, creating decent work opportunities and leaving no one behind". However, it is important to note that views on what a just transition entails vary significantly between regions, countries and communities.
Nature-based Solutions	A nature-based solution (NbS) is an approach that utilises natural ecosystems or processes to address environmental challenges, such as climate change, biodiversity loss or water management, while also providing benefits for human well-being.
Net zero economy	The CBI [1] refer to the net zero economy as 'business activity in green or low carbon sectors'. This includes Agritech, Building Technologies, Carbon Capture, Diversion of Biodegradable Waste from Landfill, Energy Cooperatives, Energy Storage, Green Finance, Grid, Heating, Low Carbon, Low Carbon Consultancy Advisory and Offsetting Services, Low Emission Vehicles, Pollution Control and Mitigation, Renewables, Renewable Energy Planning Database, Waste Management and Recycling.
Phasing out vs phasing down	In the context of the UN climate change discussions**:** Phasing **Out** means gradually reducing and eliminating activities or substances contributing to climate change, such as fossil fuel use. **Phasing Down** means gradually reducing but not completely eliminating certain substances, often seen in agreements related to substances that deplete the ozone layer.
Scope 1 emissions	Direct emissions from sources that are owned or controlled by the reporting entity e.g. the firm. Examples include emissions from company-owned vehicles, on-site power generation, and fugitive emissions from company-owned equipment.
Scope 2 emissions	Indirect emissions associated with the consumption of purchased electricity, heat, or steam. These emissions occur as a result of activities carried out by third parties but are associated with the reporting entity's operations. Scope 2 emissions are often easier to measure and manage compared to Scope 1 emissions. Examples include emissions from purchased electricity from the grid, district heating, or steam generated off-site.
Scope 3 emissions	Indirect emissions that occur in the value and supply chain of the reporting entity, including both upstream and downstream sources. These emissions are generally the most challenging to quantify and manage as they often involve multiple stakeholders and complex supply chains. Scope 3 emissions include all other indirect emissions not covered by Scope 1 and Scope 2, such as emissions from purchased goods and services, business travel, employee commuting, transportation and distribution, waste generated in operations, etc.
Sustainable development	The Brundtland report (1987) defined sustainable development as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs'.
Sustainable Development Goals (SDG)	The Sustainable Development Goals (SDGs) are a set of 17 global objectives established by the United Nations in 2015 to address global challenges by 2030. They provide a framework for global action towards a more sustainable and equitable future.

Key questions

The burning questions surrounding living and working sustainably in the green economy are outlined below. These questions aim to uncover the key challenges and opportunities for local, regional and national governments in achieving a sustainable, greener economy. Addressing these questions is vital for developing targeted, effective and inclusive policies that can meet the distinct environmental and economic needs of different areas, fostering both sustainable growth and equitable development.

1. **Removing barriers**
   - What are the barriers to achieving a greener economy for regions?
   - How can policy at various levels address these barriers? For example, are the barriers a lack of infrastructure investment, lack of political support, public support, political resistance? Do barriers play out differently at different scales? If so, how?

2. **Just transition**
   - How can just transitions be achieved? Exploring how the transition to a greener economy can be managed to minimise negative impacts on workers and communities currently dependent on industries with high carbon emissions.

3. **Wellbeing and sustainability**
   - Living a lower impact life does not mean a life with lower well-being. How can we better understand the importance of lowering carbon and ecological footprints without damaging wellbeing?

4. **Embracing and scaling new technologies**
   - Finding new ways of working in agriculture, transport, energy and other industrial sectors to have positive impacts on emissions reduction and sustainability. How can we quantify these impacts, and understand the opportunities whilst avoiding the potential harms of new technologies and local development?
   - How can we identify and celebrate what is already happening to support the transition to a greener economy in different locations, while sharing ideas that reflect local culture and context and engage a wider range of organisations and people?

National policy levers and key challenges

Climate and environmental change are global issues and responses have been developed in an international context as reflected in the UN's 17 SDGs. UN Conference of the Parties (COP) is held annually to review progress towards these goals. Recent developments from the COP have been an increased focus on loss and damage, climate finance, climate adaption and phasing down of coal power. The overarching goal set at the Paris COP in 2015 remains the same: to limit global warming to below 1.5C from pre-industrial levels, a goal some fear is now beyond reach. Alongside goals to curb emissions there is a separate international movement to address biodiversity loss. The UN has designated the 2020s as the 'Decade of Ecosystem Restoration', with the goal of preventing, halting, and reversing ecosystem degradation worldwide. Central to this international effort is the United Nations Environment Programme[6].

Source: UN

National policy sits within the international context and following its inception at the Paris COP, the UK Government became one of the first national governments to commit to realising net zero by 2050[7].

In July 2024, Labour took over as the elected government and has made some changes to climate policy, publishing an updated national strategy entitled 'The Plan for Change'[8]. This national strategy sits above departmental policies, several of which have their own remit for sustainability and realising net zero. **Table 3** provides an overview of UK Government departments and their environmental responsibilities.

Table 3: Overview of UK Government Departments and environmental responsibilities

Department	Department responsibilities
Department for Environment Food and Rural Affairs (DEFRA)	DEFRA is responsible for protecting and improving the environment, supporting more sustainable agriculture, increasing biodiversity, and tackling climate change.
Department for Energy Security & Net zero (DESNZ)	DESNZ leads efforts to achieve net-zero emissions by 2050, focusing on decarbonising energy systems, promoting renewable energy, and advancing energy security in line with the UK's carbon budgets.
Department for Business and Trade (DBT)	DBT supports sustainable trade policies, promoting green technologies and environmentally responsible business practices while fostering the UK's leadership in green innovation and low-carbon trade.
Department for Transport (DfT)	DfT is responsible for reducing carbon emissions across transport sectors, promoting electric vehicles, sustainable transport solutions, and implementing the Transport Decarbonisation Plan.
Ministry of Housing, Communities and Local Government (MHCLG)	MHCLG drives policies related to creating sustainable housing, promoting energy efficiency in buildings, and supporting local communities in adapting to climate change impacts.

The examples given in **Table 3** provide an indication of the most significant policy levers being pulled across different departments, chiefly DESNZ and DEFRA. However, the table is not exhaustive; other UK Government departments also have responsibilities linked to climate and environment policy. HM Treasury plays a role with green financing and investment. Departments also work in collaboration with each other and so policies are not as siloed as they appear in **Table 3**. For example, the Flooding Taskforce[9] which includes: the Cabinet Office, MHCLG, DEFRA and the Home Office.

Differences between the devolved administrations

The net zero policy platform may be a UK Government initiative, but it is also shared with the devolved nations, albeit that there are important, and sometimes very substantial, differences between nations[10] in how, and when objectives are to be reached. The National Audit Office provides an overview of some of these differences and there is considerable value in understanding these differences as it presents opportunities for governments to learn from each other and make better progress to the shared goals of net zero and increased sustainability. This section sets out some of the high-level differences between each nation's approach.

In Wales, the current active legislation is The Environment Act passed in 2016. Within this framework, The Welsh Government has published its net zero strategic plan for 2022[11]. The 2022 strategic plan differs from the UK Government plan as there is no mention of CCS and just one mention of hydrogen. Another key piece of legislation in Wales is the Wellbeing of Future Generations Act 2015[12]. The Act effectively puts into law the expectation that public bodies will not carry out any development that could be detrimental to future generations.

In Scotland, the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 is the key piece of legislation. Within the Act, the Scottish Government has committed to reach net zero by 2045[13], 5 years before the UK and other devolved nations. The Act also includes an interim 2030 target to reduce emissions by 70%. However, recent political developments have seen this commitment dropped.

Legislation in Northern Ireland comes under the Climate Change Act of 2022[14]. The Act has the same timeline (net zero by 2050) as the UK Government, however, there are some areas of differentiation. The Act requires departments in NI when deciding on the proposals and policies to be included in each Climate Action Plan to consider the following five factors:

- The desirability of coordinating with UK and the Republic of Ireland.
- The just transition principle.
- The special economic and social role of agriculture.
- The desirability of using nature-based projects.
  The risk of carbon leakage and the desirability of eliminating or minimising that risk.

Local level overview of key policies

Sub-national policymakers at the regional and local level often have distinct net zero and sustainability strategies. Between 2019 and 2021, many (but not all[15]) county councils, district councils, unitary authorities, London boroughs and metropolitan districts declared a climate emergency. Many areas have also declared an ecological emergency and are pursuing strategies to support nature recovery to improve habitats and biodiversity. This work is central to the development of Local Nature Recovery Strategy[16]. Alongside these declarations, these bodies then made their own commitments to reducing emissions with often significantly different timelines. Bristol City Council[17] has declared an aim to reach net zero by 2030, for example.

Furthermore, regions have different geographies and sectoral mixes which makes achieving net zero more easily achievable in some areas than others. Not surprisingly, there are mixed opinions about the value of regional net zero targets and for some, they add unnecessary complexity to the policy field[18]. Part of the challenge is that regional economies have very high levels of interregional trade and accounting for these linkages and household consumption that occurs outside a region further compounds the difficulty. For example, one region may not have an airport but the one in its neighbouring region will be supporting local demand for air travel. Disentangling the impact of one region's contribution to net zero is not straightforward although the development of regional environment accounts could go some way to improving the capture and management of such emissions.

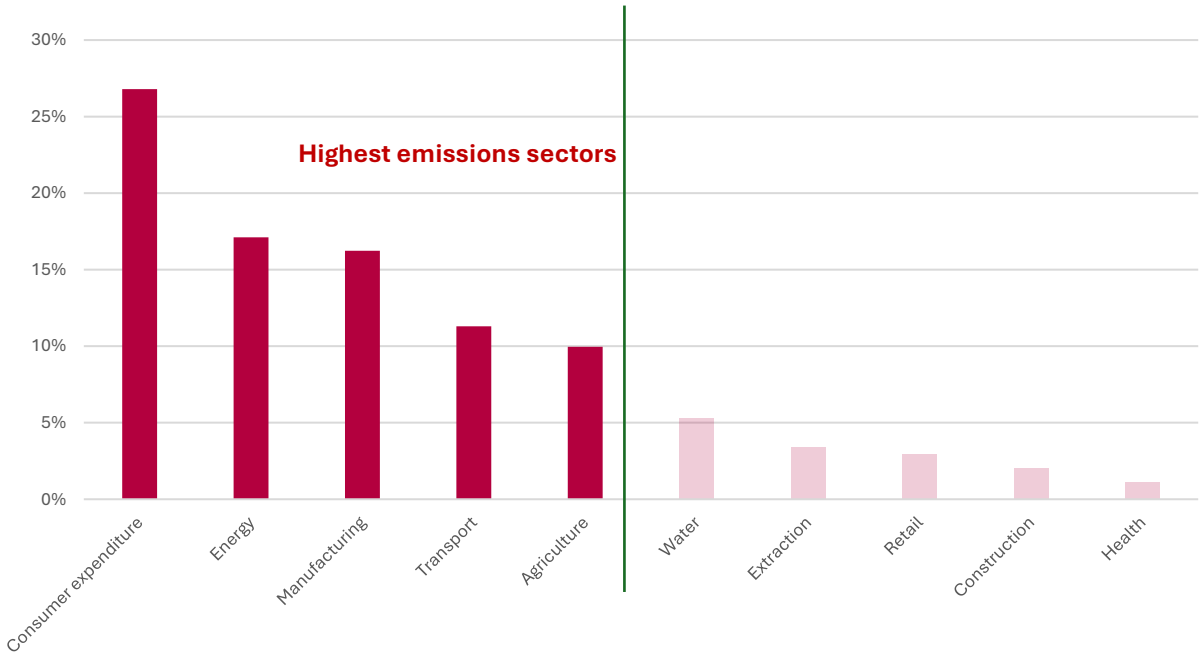
The Department for Energy Security and Net Zero (DESNZ) has published guidance[19] on how the UK government is supporting local areas to achieve net zero. Key policies and programmes include:

- Local Net Zero Accelerator Programme[20]
- Local Net Zero Hubs Programme
- Local Net Zero Forum
- Net Zero Go
- Funding for community energy projects

There is increasing recognition that achieving progress towards net zero ambitions will require a stronger role for devolved regional and local decision-making[21]. Regional and local decision makers face some fundamental governance challenges[22] which require the development of local capabilities and capacities to navigate[23].

In the UK, over 80% of greenhouse gas (GHG) emissions come from five sectors (see **Figure 1**). These comprise of transport, agriculture, manufacturing, energy, and domestic consumption. To live sustainably in a greener economy, the focus is necessarily on reducing emissions, particularly in the five highest emitting sectors in a way that minimises economic disruption and maximises well-being.

Figure 1: Greenhouse gas emissions by sector of the UK economy in 2021 on a residency basis* (top 10 sectors).



*Residency basis estimates include UK residents and businesses, excluding foreign visitors and businesses
Source: Adapted from ONS environment accounts, full list of sectors in Appendix 1.

Net zero and climate informed policy has implications for many areas of policy beyond those specifically outlined by DESNZ. In this section we consider policy relevant to the highest emitting sectors outlined in **Figure 1**: consumer expenditure (demand), energy, manufacturing, transport and agriculture. For each policy area we consider the levers available at the national level (Westminster), the devolved level (devolved nations and metropolitan regions) and at the local level (local authorities).

Addressing consumer demand

In 2021, consumer demand was found to be the highest source of GHG emissions, contributing to 26% of all emissions (**Figure 1**). These emissions reflect how consumers heat their homes, travel, shop and conduct daily tasks. Though it should be noted there is a considerable degree of nuance in how emissions from consumption are measured[24]. Policy can be used to encourage changes in consumer demand to lessen the impact of consumption on our environment and climate change, an area which has been the topic of significant academic research[25, 26]. Some of the ways policy can influence consumer emissions is through:

National levers: Taxes and subsidies are a powerful tool to drive behavioural change. This can be across a range of areas. For example, taxes on higher emitting activities such as private car use or flying. Alternatively, there can be subsidies for activities that reduce emissions for example, subsidies for retrofitting and green technology uptake such as heat pumps, EVs and rooftop solar. The national level can also be appropriate for raising awareness of diet, food waste and transport choices.

Devolved levers: Devolved nations can set their own agenda on the route to reducing emissions and supporting the environment. In Wales, there has been a controversial[27] rollout of a national 20 mph speed limit in residential areas. At the metropolitan level this can include low emissions zones, planning reforms and giving more space to public and active transport to squeeze out private cars.

Local levers: At the neighbourhood level, towns can encourage low traffic neighbourhoods, community gardens and recycling programmes. This level can be important for establishing community support for national agendas and developing policy and practice that better reflects community priorities and local context. There are opportunities for civic and civil society organisations to collaborate to determine shared goals for action in place, securing much greater chance of success[28].

Energy policy

Energy is the second highest emitting sector in the UK representing 17.1% of emissions in 2021 (**Figure 1**). Energy policy is determined primarily by the UK national government. However, some powers are devolved to Wales, Scotland, and Northern Ireland and at the sub-national level, there are further levers available to influence energy policy. English local authorities have a certain degree of influence over local energy initiatives, renewable energy development, planning and development regulations, transport and housing planning.

National levers: The Department for Energy Security and Net Zero (DESNZ) has a major role in the UK's energy policy as outlined in **Table 3**. The levers available at the national level are significant with major interventions such as the Energy Price Guarantee (EPG). The EPG was a temporary measure introduced by the UK Government between October 2022 and March 2024 to cap electricity and gas prices for households after energy prices increased rapidly. The new Labour Government's plans for a publicly owned energy generation company called Great British Energy is designed to increase the number and impact of renewable energy generation projects across the UK.

Devolved levers: Devolved nations have the powers to encourage renewable energy development through permissions and grants. They have the powers to introduce and fund initiatives to address energy efficiency such as the Scottish Government's Heat and Energy Efficiency Agency.

Local levers: At the local authority level councils hold significant powers over planning. Planning powers are crucial for energy projects with onshore wind, solar farms and grid connections all requiring local planning permissions. Local governments and councils can also act within broader frameworks to introduce community energy projects, support investment in retrofit and upgrading public buildings, develop city and community-scale heat networks, and facilitate the improvement of vehicle charging networks. The West Midlands Combined Authority has a series of retrofit schemes which are a good example of local interventions[29]. These schemes include i) the SMART hub which features £10 million in funding for household retrofitting.

Manufacturing policy

Manufacturing is the third highest emitting sector in the UK representing 16.2% of emissions in 2021 (**Figure 1**). At a broad level, manufacturing is covered by a range of industrial policies

through which governments encourage the development and growth of the economy. Today, such industrial strategy is often informed by net zero targets, decarbonisation roadmaps and regulatory frameworks to reduce negative impacts on the environment. Industrial policy with a more explicit focus on climate and environment has featured in several 'green new deals (GND)' as championed by the European Commission[30].

The UK's most recent formal Industrial Strategy was published in 2017[31], and although the government has since pursued sector-specific plans and policies, they have committed to the decarbonisation of the manufacturing sector with particular focus on high-emissions activities such as steel and cement[32].

National levers: National industrial strategy can inform trade policy, education and skills programmes, regulation aimed at impacting sectoral competitiveness, public spending on R&D and other forms of fiscal support that address sectors at a national level. As an example, UKRI is spending £210 million via an Industrial Decarbonisation Challenge Fund[33].

Devolved levers: Devolved nations provide tailored plans based on their sectoral, labour and geographic conditions. This can include infrastructure projects, tax and fiscal incentives for business location and innovation support, training and skills.

Local levers: At the sub-national level, combined authorities will have similar levers as devolved nations without the same degree of spending power, or the ability to set national curriculums, tax rates or make major interventions on infrastructure without additional national support.

Transport policy

Transport is the fourth highest emitting sector in the UK representing 11.2% of emissions in 2021 (**Figure 1**). Transport policy encompasses the strategies and measures implemented by governments to develop and manage transportation systems, aiming to facilitate the efficient, safe, and sustainable movement of people and goods.

National levers: The Department for Transport (DfT) has powers over legislation and regulation, funding and investment and strategic planning. The UK government has the most significant influence over major infrastructure development like HS2 or airport expansions. The UK government has the scope to ban internal combustion engine (ICE) vehicle sales or household boilers reliant on gas, although attempts to do so have proved highly controversial.

Devolved levers: Devolved nations have their own transport plans: National Transport Strategy for Scotland, the Wales Transport Strategy, Regional Transport Strategy for Northern Ireland. These bodies can allocate spending within the nation for transport projects. Examples of significant intervention include the introduction of the default 20mph speed limit on restricted roads across Wales in September 2023. In Scotland, Glasgow's low emissions zone has been found to reduce air pollution by 20% in 2023[34].

Local levers: Local authorities can have significant influence over local transport such as implementing low-traffic neighbourhoods (LTNs), local transport plans, promoting active transport by investing in cycling and walking infrastructure, managing parking regulations and at city-region levels introducing emissions charging zones. Emissions charging zones are in place in eight English cities and four Scottish cities[35].

Agriculture and land use policy

Agriculture is identified as the fifth highest emitting sector of the UK (**Figure 1**) emitting 9.9% of all GHGs in 2021. In recent years, agricultural policy has become politically significant due to the replacement of EU schemes with post Brexit regulations that will be fully implemented by 2028.

National levers: Agricultural policy is primarily determined by the UK Government by the Department for Environment, Food and Rural Affairs (DEFRA)[36]. The Agriculture Act (2020) has paved the way for a new approach to support farmers and land managers for the public goods or ecosystem services produced on their land. The new Environmental Land Management (ELM) system has three tiers of support available. Tier 1 is called the Sustainable Farming Incentive (SFI) with a relatively simple checklist of activities that will attract additional funding such as hedgerow creation, protection and management, new planting regimes, water and waste management. Tier 2 is called Countryside Stewardship and has steeper requirements for improvements in habitat creation and management, and biodiversity gain. The final tier, Landscape Recovery, requires a larger scale and longer-term project that involves landowners and community organisations working together to recover habitats and ecosystems in a more integrated and sustainable way. The government has also provided additional funding for technological innovation in agriculture with potential implications for reaching net zero via activities such as methane capture, processing and use on dairy farms, new crop development, agroforestry and on-farm renewable energy generation. There has been a related increased interest in regenerative farming methods that can contribute to biodiversity and net zero policy goals[37].

Devolved levers: Aspects of agricultural policy can be further developed by each devolved nation in the UK[38]. An example of this can be seen in a subsidy scheme in Wales that requires farmers to allocate 10% for tree planting[39]. There are no regional bodies to address any local differences within England although agriculture is clearly more important to rural and peripheral regions[40].

Local levers: At the local level, policy levers are more limited although active civic and civil society organisations play a critical role in conservation, education, allotment management, community-supported agriculture, forestry, farmer support and new market development. There is scope for statutory bodies to work with the positive energy of these locally focused organisations to deliver significant improvements in the environment and sustainable development.

The differential capacity of places to engage in policy innovation for living and working sustainably in a greener economy

Places have different capacities to act on net zero and environmental protections based on their power, resourcing, geography and sectoral mix. The previous sections have set out how powers differ at different spatial scales (national, devolved, and local). However, there is more nuance at the local scale as some bodies have additional powers associated with City Deals, Trailblazer Deals, and sub-national devolution arrangements. Regions also have different industrial heritages, competitive advantages, and sectoral and labour market profiles. These differences mean that some areas will be more impacted by changes in policy than others and in turn, they will see greater or fewer opportunities and have more or less capacity to act.

The UK is one of the most centrally governed countries in Europe with relatively limited powers and funding extended to regions[41]. Despite recent devolution efforts the Institute for Government (IfG) finds that 'half of England's population is currently not covered by any form of devolution[42]. Where power is devolved to regions it tends to be urban focused,[43] such as through Combined Authorities with mayoral leadership, City-Deals and urban mayors. Powers and resources afforded to regions have changed with successive governments from Regional Development Agencies under the New Labour government, that were replaced with Local Enterprise Partnerships (LEPS) and City-Deals by the Conservative-led governments since 2010. The LEPs have now largely disappeared as a statutory body. However, the City-Deals and wider devolution deals remain active. The devolution deals have been rolled out in waves meaning some regions have more powers and funding to address policy issues like net zero, sustainability and well-being than others. In 2023, the UK Government announced that two regions - Greater Manchester and the West Midlands - were to gain 'trailblazer devolution deals'[44]. It is important to note that some of these regional powers are likely to evolve further with the change of Government in 2024.

There are constraints and enablers that impact the ability of regions in the UK to act on environmental policy and in support of net zero[45]. Indeed, the IfG[46] argues that the UK Government's current efforts to tackle net zero are stymied by a top-down strategy that fails to empower local leaders and authorities to take more ambitious decisions. Constraints include short-term policy agendas from central government, short-term funding pots limiting long-term planning, and pressures from businesses to prioritise short-term economic goals over environmental ones. These constraints reinforce one another, creating short-termism that undermines the green transition. Enablers on the other hand include prominent and consistent national climate policy, coherent central-local strategies, institutions with significant local revenue generation to respond to local environmental challenges, local leadership and capacity to form lasting partnerships with non-state actors. Research finds that enablers tend to be region-specific, narrowly targeted or lacking implementation mechanisms[47].

Successful multi-level environmental policy requires long-term planning, alignment across government levels, empowerment of regions and communities, and institutional partnerships based on trust and cooperation. However, the asymmetric power dynamics of the UK governance system significantly limit these enablers and reduce ambitions and the pace of change on the ground. This issue is exacerbated by the uneven geographic coverage of Combined Authorities.

Differing geographic and industrial contexts

A report by the CBI[1] finds that the net zero economy presents different opportunities for different regions of the UK. The report emphasises how the net zero economy contributes 5.7% of Scotland's GVA (£8 billion) and supports 85,000 jobs. The West Midlands is found to have the highest levels of net zero-related FDI projects in 2022-23 with 34 FDI projects in the region over the course of the year. In Wales, the West Midlands and Yorkshire and The Humber net zero businesses are twice as productive as the respective regions' average industry. The evidence suggests that different parts of the UK are set to be impacted to differing extents dependent on their geography, history and industrial composition.

Regions will have different pathways to net zero and greater sustainability, and will therefore require regionally tailored policy approaches. For example, regions with significant employment in industries associated with high emissions will need to prioritise finding a way to transition that does not disproportionately harm local people and place. This could be through a focus on reskilling and developing new opportunities before closures occur. Regions will also be impacted to differing degrees by global trends[48] as the confluence of demographic change, technological disruption, climate change and geopolitical tensions interact and shape the future economy. For example, the technological disruption from progress in AI has led to the UK Government proposing an AI for growth strategy[49].

Figure 3 shows the proportion of total FTE employment by 18 industrial sectors. High emissions sectors: Agriculture, Energy, Manufacturing and Transport are highlighted in red. The figure shows that for each high emissions sector, there are regions which have a significantly higher proportion of their employment in these high emissions sectors:

- **Agriculture:** Scottish Highlands & Islands (6%), Lincolnshire (4%)
- **Energy:** North Eastern Scotland (13%)
- **Manufacturing**: Cumbria (23%), East Midlands/ North Lincolnshire (25%)
- **Transport:** Leicester, Rutland & Northampton (11%), Outer London West and North (11%)

The North East of Scotland is a significant beneficiary of fossil fuel industries incompatible with national climate targets. A key issue for policy in the region is how to transition away from fossil fuel industries to other green economy sectors like offshore wind and hydropower, and to do it with local consent[50].

In the West Midlands a concern will be the consequences of the ban on the sale of ICE vehicles (currently scheduled for 2030). This would very likely impact on the automotive sector as large firms like Jaguar Land Rover and the ecosystem of smaller supporting firms transition from ICE to EV in line with national policy. This has huge consequences for automotive supply-chains which are often local in structure.

The regional level hides some of the nuance that occurs at the sub-regional scale with some, particularly rural regions, highly dependent on agriculture despite other parts of the same region having greater industrial diversity. Therefore, the examples given here are not exhaustive, but they are useful in highlighting the importance of taking a sub-national view and the benefit that the LPIPs can provide to policymakers throughout the programme.

Figure 3: Employment FTE percentage in high emissions sectors by region (ITL-2) 2022.

Region (ITL-2)	Agriculture	Mining & utilities	Manufacturing	Construction	Transport
Tees Valley and Durham	0%	2%	14%	7%	8%
Northumberland and T & W	1%	1%	12%	5%	6%
Cumbria	2%	2%	23%	8%	5%
Greater Manchester	0%	1%	9%	6%	6%
Lancashire	1%	2%	17%	7%	4%
Cheshire	1%	2%	11%	7%	7%
Merseyside	0%	1%	9%	6%	7%
East Yorkshire/N Lincoln	1%	2%	25%	7%	7%
North Yorkshire	2%	2%	14%	6%	5%
South Yorkshire	0%	1%	14%	7%	9%
West Yorkshire	0%	2%	13%	6%	6%
Derbyshire and Nottinghamshire	1%	2%	16%	7%	7%
Leicestershire, Rutland & Norths	1%	2%	14%	6%	11%
Lincolnshire	4%	2%	16%	8%	5%
Herefordshire, Worcestershire	2%	2%	16%	6%	8%
Shropshire and Staffordshire	1%	1%	17%	6%	9%
West Midlands	0%	2%	13%	5%	7%
East Anglia	2%	2%	12%	7%	6%
Bedfordshire and Hertfordshire	0%	1%	8%	8%	6%
Essex	1%	1%	8%	11%	9%
Inner London – West	0%	1%	1%	2%	2%
Inner London – East	0%	1%	2%	3%	4%
Outer London - East &N	0%	2%	5%	7%	8%
Outer London – South	0%	1%	3%	6%	5%
Outer London -W&N	0%	1%	5%	5%	11%
Berkshire, Buckinghamshire	1%	2%	8%	5%	6%
Surrey, East and West Sussex	1%	2%	7%	6%	5%
Hampshire and Isle of Wight	1%	2%	9%	6%	6%
Kent	2%	2%	8%	9%	8%
Gloucestershire, Wiltshire and	1%	2%	11%	6%	6%
Dorset and Somerset	1%	2%	14%	7%	4%
Cornwall and Isles of Scilly	3%	3%	11%	8%	4%
Devon	1%	2%	13%	8%	5%
West Wales	2%	2%	16%	7%	5%
East Wales	1%	2%	15%	5%	5%
North Eastern Scotland	2%	13%	11%	7%	5%
Highlands and Islands	6%	4%	10%	10%	6%
Eastern Scotland	1%	2%	8%	6%	5%
West Central Scotland	0%	2%	8%	7%	5%
Southern Scotland	3%	3%	13%	9%	4%

Designing effective place-based interventions: what can we learn from existing interventions?

Regional and local governments are at the forefront of innovative policy solutions addressing climate change, environmental sustainability and the transition to a green economy. By leveraging unique regional strengths and fostering partnerships across government, the private and third sector, local leaders can respond to challenges facing their area. This section highlights three examples of where regional and local partnerships have developed initiatives to address specific challenges.

Devolution in the UK means that regions increasingly have the remit and power to help drive carbon emission reducing policies particularly in transport and buildings. The Institute for Government[51] argues that the devolution of powers to mayors in England is being underutilised in the net zero transition as mayors have the potential to coordinate initiatives, integrate net zero goals into regional economic strategies and promote investments in green technologies. Though such initiatives are often stymied by a lack of funding, poor interregional coordination and inadequate data, there are examples of governance bodies showing leadership that can be viewed as best practice for other areas.

Transport Innovation in Manchester

Challenge: Like many urban areas Manchester is facing high levels of air pollution which is estimated to cost 1,200 lives annually[52], and congestion which is estimated to cost the city-region over £1.3bn annually[53] .

Solution: Transport policy at the national level reflects the evidence that higher levels of active travel and public transport use have the potential to reduce carbon emissions and improve the liveability of communities across a range of factors. Greater levels of active transport have benefits for health, community and retail.

Manchester has been a leader in the promotion of active travel and public transport. In 2017, Chris Boardman the Cycling and Walking Commissioner for Manchester (a position which in itself reflects the ambition of the region) set out the 'Made to Move' plan for the region[54]. The goal of the plan is described as:

> *"To double and then double again cycling in Greater Manchester and make walking the natural choice for as many short trips as possible. We must do this by putting people first, creating world class streets for walking, building one of the world's best cycle networks, and create a genuine culture of cycling and walking."*

In the intervening years the 'Bee Network' has been established which includes an expansive network of segregated cycle lanes and an integrated transport system following a 'London style system'. Greater Manchester has also been the first region to bring buses into public ownership since the enactment of the Bus Services Act of 2017.

> *"By accelerating investment in the Bee Network to create a London-style integrated public transport network, and upgrading GM-licensed taxis, we can improve air quality faster than if we introduced a clean air zone, and without causing hardship to our residents or businesses."*

- *Andy Burnham, Mayor of Greater Manchester*

Partners: To implement the various transport innovations listed it required partnerships from different levels of government as well as private sector and third sector partners. At the government level the UK DfT provided funding and regulatory support for infrastructure such as Metrolink. At the city-region level the GMCA and TfGM worked together on strategy, planning and funding. Local councils collaborated and consulted on implementation and community needs. Private sector partners such as Stagecoach, Kelois Amey and Siemens were involved in implementation. Community groups and third sector organisations like cycling charity Sustrans were also involved in supporting project plans.

Net-Zero Power in Teesside

Challenge: Teesside has an industrial history and is one of the UK's highest emissions regions. The region hosts 'hard-to-abate' sectors including chemicals and cement production. Without the development of viable alternatives, increasing net-zero regulations will lead to closures and economic hardship in the region.

Solution: The Net-Zero Teesside Power is a gas-fired power station with carbon capture technology which aims to produce 742 megawatts of low carbon power[55]. The project aims to enable heavy industry in the region to cut emissions without ceasing operations.

Partners: The project is led by BP with a consortium of industry stakeholders including TotalEnergies and Equinor. The partnership is coordinated with the East Coast Cluster and in partnership with UK Government and was backed by investments such as the Carbon Capture Infrastructure Fund (CCSIF).

Impact: The project aims to capture up to 2 million tonnes of CO2 per year. NZT power estimates it would create 3,000 construction jobs and require 1,000 employees during operation. Northern Endurance Partnership estimates suggest the East Coast Cluster could create 25,000 jobs annually from 2030[56].

The local energy market in Cornwall

Challenge: Cornwall's electricity grid is constrained and under pressure from the high level of renewable energy deployment in the region. The problem comes when energy supply either overshoots demand leading to inefficiency as renewable assets are switched off or fails to meet demand which increases use of fossil fuels. This constraint risks holding up Cornwall's energy transition of the region as well as impacting on the wider UK.

Solution: The Cornwall and Isles of Scilly Local Energy Market (LEM) trial[57, 58] has involved decentralising energy generation combined with smart grid technology to better balance energy supply and demand locally. The £16.7 million LEM involves an innovative market system that allows consumers to trade energy providing financial incentives for both producers and consumers.

Partners: The LEM involved partners from Cornwall Council, Centrica, Exeter University, National Grid, Western Power Distribution as well as community participation. The project was funded as part of the European Structural Development Fund.

Impact: The trial has been considered a success with some key metrics including 10,000 tons of CO2 emissions being averted annually, 310 megawatts being traded and 100 homes forming a virtual power plant[59]. The LEM has since been used as an example to be exported to other contexts internationally.

> *"The trial in Cornwall has proved that homes and small businesses can play a role, alongside larger industry, in market-based procurement of flexibility - a genuinely new tool in our low-carbon energy system toolbox."*
>
> ***-Jorge Pikunic, Managing Director, Centrica Business Solutions[60]***

Living and working sustainably in a greener economy: international examples

There are countless examples of policy innovations happening in different countries at a variety of spatial scales. This section discusses examples at city and regional levels that could provide transferable solutions and ideas to assist the transition in the UK. These examples cluster around the following themes:

1. Electrification and decarbonising infrastructure
2. Agricultural systems
3. Just transition
4. Climate mitigation and adaption
5. Transport and planning systems

Electrification and decarbonisation

Energy is one of the top five emitting sectors in the UK (see **Figure 1**). As such it is a priority for national governments to decarbonise industries and ramp up renewable energy. Some regions have high levels of energy demand (West Midlands manufacturing). Some regions have high levels of energy production (West Wales). Some regions have the capacity for massive renewable energy development (North Scotland).

International examples of leadership in decarbonising sectors and supporting electrification are of great interest to this problem. The state of Victoria, Australia has led in the use of electrical grid upgrades and energy storage notably with the 'Big Battery'[61]. The Big Battery allows for more power to be developed and accessed from renewable sources such as wind and solar. The Big Battery is an example of public private partnership, with the site owned and operated by Neoen, a French renewable energy company, supported by $160 million in state investment via the Australian Governments green bank.

The Victorian example is valuable in showing how governments can support green energy supply but consumer choices and particularly consumer transport choices are a driver of emissions. In Norway, 88.9% of new passenger cars registered in 2024 were electric[62]. The success of EV adoption has been linked to the effective subsidies on EV purchasing (through the removal of import duties on vehicles), the widespread availability of rapid charging and low energy costs.

Agricultural systems

Agriculture contributes 9.9% (**Figure 1**) to GHG emissions in the UK. The sector has also been linked to other environmental harms such as pesticide use impacting on wildlife and water quality. Sustainability in the agriculture sector can be defined in terms of resource efficiency, and it can be realised through increased technology and higher outputs or via low-input regenerative systems. The tension between these definitions is a central part of the current debate about how to deliver sustainable, climate resilient food systems. Should policymakers pursue extensification and 'more natural' systems or more intensive systems on some land to free up other land for nature and eco-system services? If the 'more natural' organic definition is used, Austria and Estonia have prominent examples of best-practice with 26% and 23% of their agricultural land designated as organic respectively compared to the EU-wide average of 9.9%[63]. If the 'efficient resource allocation' definition is used there are examples in California, Israel and Australia where a focus on AgriTech has achieved some success[64].

Just transition: Community resilience and empowerment

The Ruhr region, a region of the North Rhine-Westphalia region of Germany has been known as the Coal Pot of Europe for centuries with early mentions of coal production back in the 16th century. The region's economy has been built on coal mining and steel production and is now in the process of the complete closure of coal mining in line with EU climate neutrality goals. The region is in the process of transitioning from a region based on coal mining towards a region focused on renewable energy. Other coal mining regions in Germany - Brandenburg, Saxony and Saxony-Anhalt - are undergoing the same transition supported by the Just Transition Fund[65] , a €2.5 billion allocation of the €19.8 billion EU-wide fund.

The Ruhr region is a well cited example of the just transition in practice[66]. The transition in the region has placed a particular emphasis on justice and redistribution. From a financial perspective, the government has provided significant funds to protect individuals, communities and industry from economic shock. For example, extensive redundancy payments were provided to laid off workers. From a social perspective, there have been considerable efforts to include meaningful participation from different groups in compensation arrangements as well as in devising economic plans. However, despite some success, there have been some pitfalls; not all voices were equally heard and unemployment rates for unskilled workers from producing industries rose significantly. The impact of change has also been felt disproportionately by the young and migrant workers. A 2019 World Wildlife Fund report[67] evaluated the structural change in the Ruhr region to consider where other regions could learn transferable solutions for moving away from coal production. The report provides recommendations for other regions declaring they should: Embrace change proactively, think long-term, support an early transition, encourage bottom-up participation and include a wide constellation of actors.

Climate mitigation and adaption

Climate change is expected to lead to more frequent and severe flooding in the UK and Europe. Internationally cities and coastal regions have been employing different techniques to mitigate the worst impacts of flooding.

Flooding-informed planning techniques have been employed to mitigate urban flooding through the use of green roofs, rain gardens & bioswales, constructed wetlands, flood plain restoration and protecting and expanding urban green spaces.

Copenhagen developed the Cloudburst Management Plan[68] in response to the growing flooding risk. The objectives of the plan are twofold; first, reduce the risk of flooding; second, create new public green spaces. The approach has been considered a success with an estimated net benefit of 5 billion DKK (~£576 million)[69]. The approach is effective, sustainable in the long-term, has the potential to be replicated and provides indirect benefits that address other social problems (cleaner air, physical and mental health benefits).

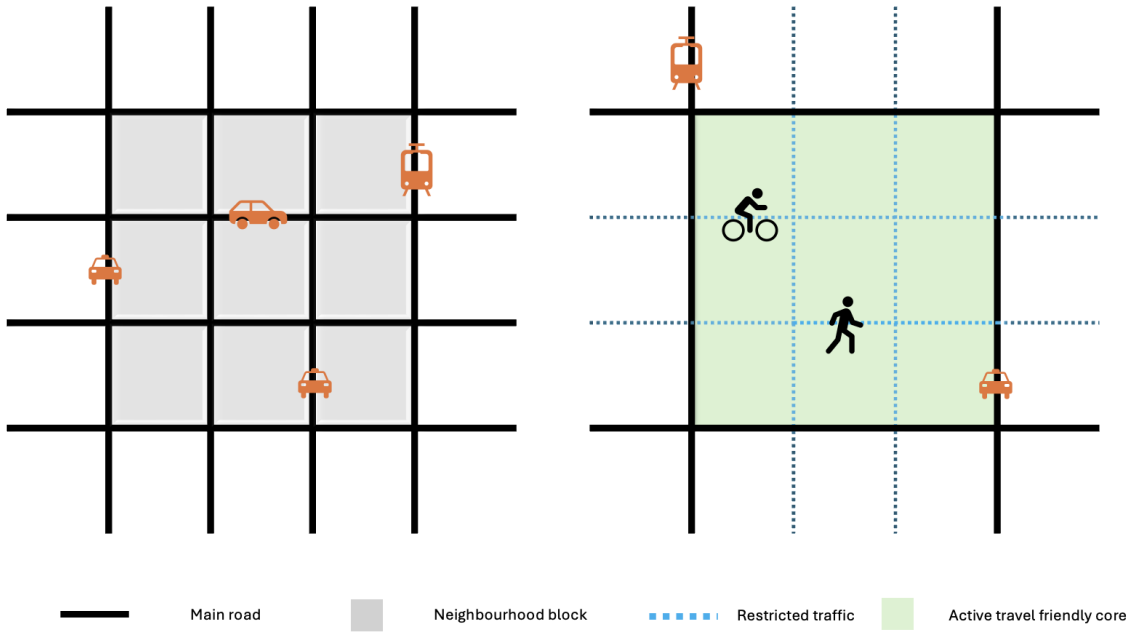
The port city of Rotterdam in the Netherlands is regarded as a successful case study of climate adaption[70, 71]. In the city 40,000 residents are vulnerable to sea level rise and temporary flooding. In response was Rotterdam Climate Proof, a policy initiative to ensure the city is defended against flooding and sea level rise by 2025. One of the reasons the policy of climate adaption has been considered a success in Rotterdam is due to the inclusion of climate adaption investment in the city budget, thereby enabling proactive planning and action.

City-level transport & planning innovation

There is a growing literature that shows private car use in cities can be damaging to health, wellbeing, economy and climate[72, 73]. The literature suggests that making cities more walkable and cyclable has significant benefits to health, economy and environment[74, 75]. Despite the increasing consensus in literature, efforts to move towards modal shift have often been met with political opposition and local push back. Examples of this can be seen with the role out of low traffic neighbourhoods (LTNs)[76], and the ultra-low emissions zone (ULEZ) in London[77]. As such, it is valuable to consider which cities have successfully mounted the planning and political hurdles to improve walkability and cycling.

Barcelona has been lauded as an innovating city in sustainable planning with its roll out of superblocks[78]. The concept involves severely restricting car use within a group of city blocks. Instead giving road space over to pedestrians, bicycles and greenspace. Superblocks were developed in Barcelona in response to excessive air and noise pollution. A quantitative health assessment of the benefits of superblocks found that they could prevent 667 premature deaths annually if implemented in full and add 200 days to the average citizens life expectancy[79]. There is also evidence that superblocks could be established in other cities, even those without a traditional block planning design[80].

Figure 4: Superblock diagram



Source: Adapted from Eggimann, 2022[81]

Other radical interventions to change the way people move in cities have been undertaken in Paris, France and Portland, Oregon which have yielded similarly positive results, not just for health and the environment, but for the economy too. Paris has undergone a major modal shift, in part credited to the leadership of mayor Anne Hidalgo[82]. The mayor's commitment to building cycling infrastructure has led to 11.2% of all trips in 2024 within the city to be by bike; a rise from 3.0% in 2010[83]. A further interesting international example is California which has historically held divergent policies on climate compared to the federal US. This includes higher tailpipe emissions standards which in an economy as large as California has impacted industry[84].

Learning for LPIPs

This review has provided examples of innovation across a range of sectors and geographies to progress towards *Living and Working Sustainably in a Greener Economy*. These examples emphasise the need for local policies to be adaptable, inclusive and proactive in addressing sustainability challenges while leveraging learning from international best practice. To condense the points into some takeaways for LPIPs looking to develop this aspect of their work:

1. **Megatrends**: Global megatrends such as climate change, technological disruption and demographic change impact regions in different ways depending on their geographic, industrial and social context. Local actors and policy should act in a 'megatrend informed' way that acknowledges the future will not look like today.
2. **Public-Private Partnerships**: The Victorian (AUS) example of the "Big Battery" demonstrates the potential for public-private partnerships in advancing green energy projects. Local policies should foster similar collaborations to leverage public funding, private expertise and civil society innovation for large-scale renewable energy projects.
3. **Consumer Incentives**: Norway's success in promoting electric vehicles (EVs) through subsidies and infrastructure highlights the importance of consumer incentives. Local policies could focus on creating incentives for sustainable consumer choices, such as subsidies for EVs or investments in charging infrastructure.
4. **Tailored Agricultural Policies**: The debate between organic, low-input systems and efficient resource allocation in agriculture suggests that regions should adopt agricultural policies that fit their specific environmental and economic contexts. Lessons from Austria, Estonia, and the Netherlands can guide sustainable practices in local agriculture and point to the imperative for proper engagement with farmers and land managers in every location.
5. **Just Transition Strategies**: The Ruhr region's transition from coal to renewable energy underscores the need for policies that ensure a socially acceptable transition for workers and communities. This includes financial support, inclusive planning, and addressing the disproportionate impacts on vulnerable groups.
6. **Climate Mitigation and Adaptation**: Examples from Copenhagen and Rotterdam show the effectiveness of integrating climate adaptation into city planning. Local policies should prioritise proactive climate adaptation measures, such as flood management, nature recovery and the creation of more biodiverse green spaces.
7. **Urban Transport and Planning**: The success of initiatives like Barcelona's superblocks and Paris's cycling infrastructure illustrates the importance of rethinking urban transport to reduce car dependency. Local policies should support pedestrian and cycling-friendly infrastructure to improve health, reduce emissions, and enhance urban liveability.

Conclusions and questions for future research

This evidence review has outlined the key issues that need to be considered if we are to live and work more sustainably in a greener economy. It has provided some context about the powers held by the UK Government, devolved nations and local governments to address some of the main challenges facing regions and localities in successfully getting to net zero whilst improving the environment.

The review has highlighted examples of successful policy interventions both within the UK and internationally and the main contextual points are that:

- Moving towards a greener economy presents differentiated opportunities for regional development policy and practice.
- Different places face different challenges in transitioning to sustainable development.
- There is a complex hierarchy of powers and policy levers that operate at different spatial scales making it impossible to avoid place-based practice and the need for local experiment for success. As such, demonstrating the importance of the LPIPs.

The evidence review has identified some areas where further research could add value and fill gaps in the literature, shaping policy and practice in future:

1. **Removing barriers**: The evidence review has shown that in some areas there are different challenges when it comes to cutting emissions. These may be due to a lack of investment, political resistance to policies that target consumer behaviour or threaten local industry. As such, future research could seek to better understand these barriers and how policy can help to overcome them.

2. **Just Transition**: Living and working sustainably in a greener economy will involve shutting down high emitting industries like coal power. The brunt of the social and economic impact is likely to be felt in specific regions and populations. Greater attention must be paid to how these economic shocks can be implemented without leaving populations in crisis. Future research could seek to understand the scale of potential shocks in UK regions and evaluate how policy could support a socially acceptable transition.

3. **Understanding indirect impacts**: Sustainability and environmentally friendly policies are not bound to a set geography. The indirect impacts of policies may yield positive or negative effects for neighbouring regions or countries. For example, the closure of a steel mill in one region *may* increase demand for steel from another region with higher emission intensities. Future research could map these indirect impacts to better understand the often spatially blind nature of policy interventions.

4. **Policy mapping:** It is still difficult to understand the powers available to different regions and devolved nations to address climate and environment goals. Devolution has led to an ad-hoc arrangement of different powers being attached to places such as those with combined authorities and metro mayors. An important exercise would be to understand the geography of the powers and resources that are available to tackle the different aspects of sustainability set out in this report.

Appendix

Appendix 1: Greenhouse gas emissions by sector of the UK economy in 2021 on a residency basis

Sector	2021
Consumer expenditure	26.80%
Electricity, gas, steam and air conditioning supply	17.12%
Manufacturing	16.23%
Transport and storage	11.29%
Agriculture, forestry and fishing	9.95%
Water supply; sewerage, waste management and remediation activities	5.28%
Mining and quarrying	3.42%
Wholesale and retail trade; repair of motor vehicles and motorcycles	2.97%
Construction	2.03%
Human health and social work activities	1.12%
Public administration and defence; compulsory social security	0.88%
Accommodation and food services	0.69%
Administrative and support service activities	0.65%
Education	0.46%
Professional, scientific and technical activities	0.34%
Arts, entertainment and recreation	0.19%
Other service activities	0.18%
Real estate activities	0.18%
Information and communication	0.15%
Financial and insurance activities	0.05%
Activities of households as employers	0.01%

Source: adapted from ONS environment accounts,

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