



UNIVERSITY OF  
LIVERPOOL

Heseltine Institute for Public  
Policy, Practice and Place



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'2019 Year of the Environment 'Environmental  
Summit', Liverpool City Region'

# *Towards a Green Future for Liverpool City Region*

**Issues Paper**

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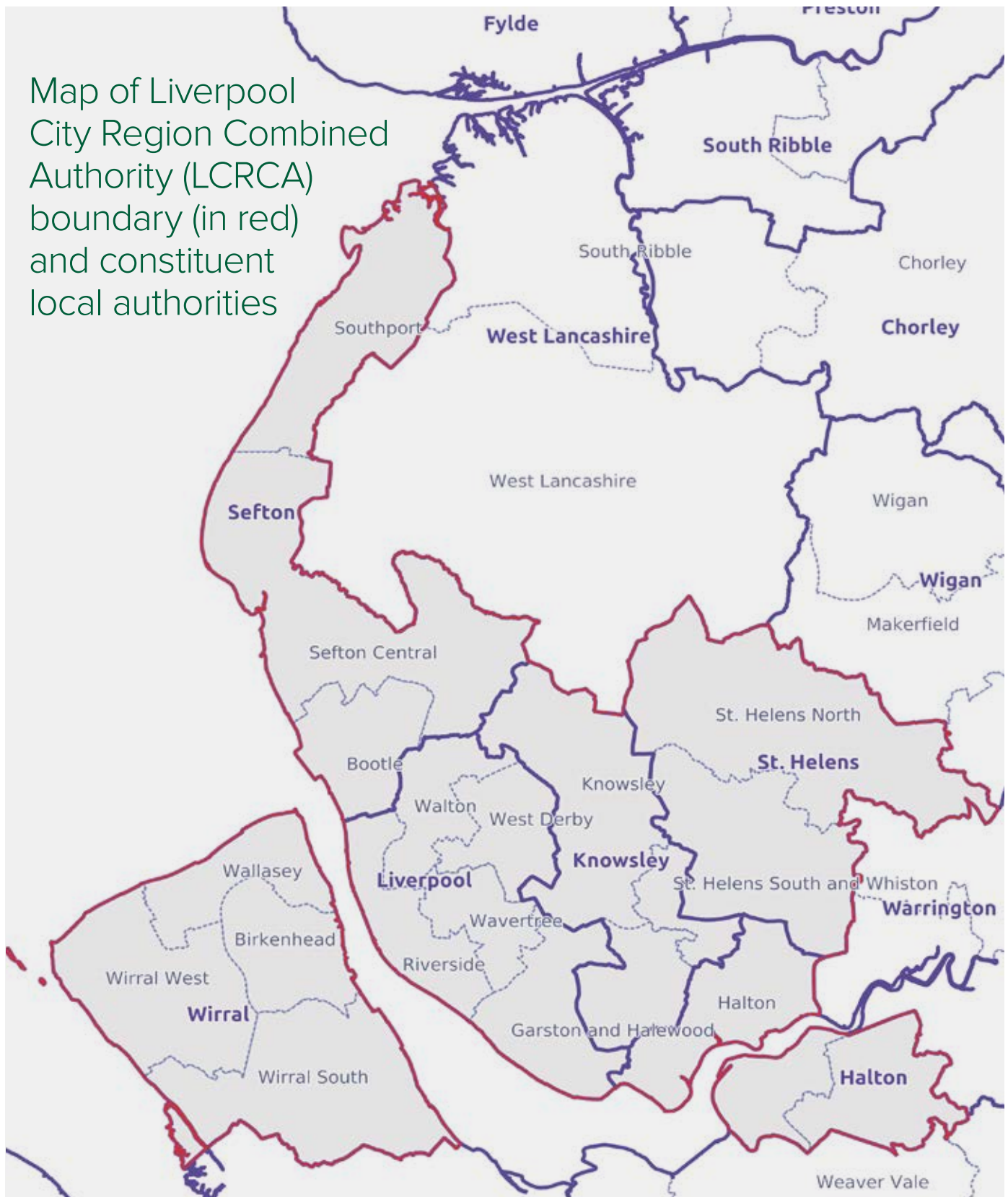


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Map of Liverpool City Region Combined Authority (LCRCA) boundary (in red) and constituent local authorities



**Data sources:** Westminster Parliamentary Constituencies (December 2018 - ONS), Local Authority Districts (December 2018), Boundaries (December 2018 - ONS) and Combined Authorities (December 2018 - ONS)

# 1. CONFRONTING THE CLIMATE AND ECOLOGICAL CRISIS

Today, human interference in the natural environment has grown to the extent that human beings have become ‘geological agents,’ etching onto the earth a stratigraphic record many times more impactful than any other species. This is the age of the Anthropocene – or better still, given the political-economic model that has brought us to this point, the Capitalocene. It is now difficult to identify any remaining pristine or first nature; there exists only human-modified natures which are volatile, unstable and unpredictable. We have breached some, and risk breaching further, crucial life-sustaining planetary boundaries. A global climate and ecological emergency has been the result.

In time, 2019 may well come to be known as the year when the world – or at least (with some notable exceptions) its political leaders – woke up to the full extent of the risks posed by the global climate and ecological emergency.

In May 2019, Liverpool City Region Combined Authority (LCRCA) Metro-Mayor Steve Rotheram declared a ‘climate emergency’ and affirmed LCRCA’s commitment to undertaking proportionate remediating actions. The Metro-Mayor has set his sights on Liverpool City Region (LCR) becoming net zero-carbon by 2040; local authorities and some anchor institutions from the public, private and third sectors have likewise set net zero-carbon targets by or before 2040.

The Department for Environment, Food and Rural Affairs (Defra) declared 2019 to be a national ‘Year of Green Action’ for the UK. Liverpool City Region’s local nature partnership Nature Connected, LCRCA, the City Region’s six local authorities, the Environment Agency, and Natural England subsequently declared 2019 to be a local ‘Year of the Environment’ (YoE). This collaboration has succeeded in further catalysing local conversation on the state of the LCR environment, not least by raising public awareness of the significance of the threats to nature which exist, celebrating local good practice, and focussing minds on the pressing need for further intervention.

The LCR YoE ‘Environmental Summit’ to be held in November 2019 provides an opportunity to intensify reflection upon the meaning and implications of the climate and ecological emergency for LCR stakeholders – and what these stakeholders will need to do if LCR is to transition to become the greenest city region in the UK. LCR is once again on the up. The post-industrial regeneration of the local economy from the mid-1990s is to be welcomed, and notwithstanding a decade of biting austerity, further growth to 2040 is anticipated. But at a moment when LCR is seeking to grow its economy, it is also seeking to lead a green revolution: an acute sustainability challenge therefore now presents.

How might LCR grow the local economy (by enacting a new Local Industrial Strategy [LIS] and progressing its regeneration agenda) whilst reducing its ecological footprint, mitigating growing threats to the natural world, arresting and remediating pollution, and securing for local citizens a new generation of growth which is simultaneously inclusive and clean?

In this Issues Paper we ask:

- **What are the challenges?**
- **What is the UK doing to tackle the crisis and is it enough?**
- **What is being done in Liverpool City Region?**
- **How can we scale and accelerate our efforts?**



Greta Thunberg



SKOLSTREJK  
FÖR  
KLIMATET

## 2. WHAT ARE THE CHALLENGES?

In May 2019, sixteen-year-old Swedish environmental activist Greta Thunberg featured on the front cover of TIME magazine. Less than a year earlier, Thunberg had risen to international prominence by dint of her 'School Strike for Climate' protest held on the doorstep of the Swedish Parliament. "No one," she insists, "is too small to make a difference" (Thunberg, 2019). Following Thunberg's address to the United Nations Climate Change Conference (COP24) in Katowice in December 2018, 'School Strike for Climate' quickly captured the attention of the world's youth, and similar strikes were called in many countries. Addressing the United Nations Climate Action Summit in September 2019, Thunberg lamented world leaders who she claimed were 'not mature enough to tell it like it is'. Bearing a direct, blunt and at times angry message, throughout 2019 Thunberg and likeminded green activists in the UK and elsewhere (the Extinction Rebellion movement, for example) have mobilised popular opinion in a spectacular way; a rush by national, regional and local governments to declare a climate and ecological emergency has followed.

The increasing prominence of global warming and ecological degradation in contemporary public and political life is progress.

The planetary population has grown from an estimated 791 million in 1750 to 7.7 billion today. In 1972, at the behest of the Club of Rome, scientists from the Massachusetts Institute of Technology (MIT) in Cambridge, Boston published a book titled *The Limits to Growth* (Meadows et al., 1972) which both arrested the attention of the world and defined the environmental agenda for a generation (see also Meadows, Meadows and Randers, 1992; Meadows, Randers and Meadows, 2012). *The Limits to Growth* proposed that failure to implement corrective action would result in critical environmental thresholds being breached, population and economic 'overshoot', and eventually at some point in the twenty-first century, societal collapse. But powerful counter-voices disagreed. Often (but not always), the fossil fuel industry has supported a pollutocrats' charter and defended without sufficient criticality the virtues of a carbon economy. More informed critics have called for a careful weighing of the evidence and a suspicious attitude to what 'sceptical environmentalist' Danish economist and statistician Bjorn Lømborg (2001) has labelled the 'environmental litany'. Forecasts such as those offered in *The Limits to Growth* were considered 'simply wrong', and apocalyptic warnings of environmental problems yet to come were overblown. "Cool it!" warns Lømborg (2007); global warming does not rank in the list of the world's top problems or priorities, and decarbonisation is an unfair burden to load onto newly industrialising and peripheral economies.

As the full extent of the climate and ecological crisis reveals itself, this complacency seems misplaced.

Believing that the impact of the human species on the planetary system has reached a tipping point, in 2000, Dutch Nobel Prize-winning atmospheric chemist Paul Crutzen and American limnologist Eugene Stoermer decreed that that we are now entering a new geological time period, the Anthropocene (Crutzen and Stoermer, 2000). The Anthropocene is the Age of Man [sic]. According to Crutzen (2016), from the 1800s onwards, and in particular with the invention in Scotland by James Watt of steam power and the European industrial revolution that followed thereafter, "*human interference in the natural environment has grown to the extent that human beings have become 'geological agents', etching onto the earth a stratigraphic record many times more impactful than any other species*" (Crutzen, 2016), as previously mentioned. For US environmental historian Jason Moore, however, the idea of the Anthropocene is misleading, overly benign, and misses the point; it is not humanity generally but the capitalist economic system specifically which is sending our natural world into crisis. It is more accurate, then, to speak in terms of the Capitalocene (Moore, 2016).

Over the last 500,000 years, the earth's natural tendency towards equilibrium and balance – what British environmentalist James Lovelock vividly refers to as Gaia – has functioned within key natural parameters. US chemist Will Steffen and colleagues (Steffen et al., 2015) argue that in this age of the Anthropocene, four out of nine of these 'planetary boundaries' (climate change, biosphere integrity, land-system change, and biochemical flows) have now been pushed significantly beyond their range of natural variability, driving the earth system into a new 'non-analogue state' (Steffen et al., 2015). Today it is near-impossible to find any remaining original or pure nature; there exists only socially-modified, 'cyborg' or 'Frankenstein' natures, which are historically unprecedented. A global climate and ecological crisis has resulted.

Although not an exhaustive list, critical challenges include:

## Global warming

According to the United Nations (UN) Intergovernmental Panel on Climate Change (Masson-Delmotte et al., 2018), the mean surface temperature of the earth is now 1°C higher than in the pre-industrial era. Whilst no specific limit constitutes a critical threshold, the IPCC concludes that rises above 1.5°C from pre-industrial temperatures and especially rises above 2°C constitute 'dangerous human interference' in the global climate system. Driven by an ever-growing carbon-fuelled economy (oil, natural gas and coal), the world is on track to exceed the 1.5°C threshold by the year 2030. Time is short. Urgent action is needed to decarbonise the economy and reduce emissions. It is necessary to shift towards renewable energy sources such as tidal, wind, hydro, wave and solar power, and waste to energy, biomass, geothermal, and hydrogen energy. For some, nuclear energy should be added to this list. Unchecked, global warming will impact on sea-level rise, human health, labour productivity, agricultural productivity, tourism, energy demand, and weather and weather-related events (violent storms, hurricanes, floods, landslides, land loss, blizzards, heat waves, droughts, crop failure, wildfires, desertification, and tornadoes). There will be a large-scale flight of climate refugees, especially from low-lying coastal areas. Adaptation will be required, especially for vulnerable communities.



**How can we decarbonise the economy? How do we enable effective climate adaptation and build resilience? Who might low-carbon transitions and adaptation leave behind?**

## Biodiversity loss

According to British-American biologist and theoretical ecologist Stuart Pimm (2014), the pre-human rate of extinctions on earth was around 0.1 species per year for every million species. Today, this rate has increased to between 100 and 1,000 species per year for every million species in existence. Reduced biodiversity presents a threat to humanity because our survival is ultimately dependent upon healthy ecosystems, not least for food, carbon capture, medicines, and healthy lives. According to some in the scientific community, we are now on the brink of a sixth mass extinction event. The trigger will not be, as in the past, natural changes in climate or showers of meteorites, but instead human recklessness, deforestation, population growth, economic development, urbanisation, global warming, increased movement of invasive species, and overfishing and overharvesting from the oceans. It is imperative that all species – and in particular those on the International Union for Conservation of Nature's 'Red List of Threatened Species', and in addition particular 'Priority Species' – are saved from extinction through the conservation and management of ecosystems and habitats, rewilding projects and the re-naturing of cities.



**How can we arrest species decline? How can we conserve and rewild habitats and restore urban nature?**

## Poor air quality

Poor air quality derives from the release of pollutants such as particulate matter (PM), ozone (O<sub>3</sub>), nitrogen dioxide (NO<sub>2</sub>), and sulphur dioxide (SO<sub>2</sub>) from sectors such as agriculture, energy, manufacturing, construction and transport. Poor air quality is recognised as one of the largest environmental risks to public health. Globally, the World Health Organization (2016) estimates that ambient air pollution causes in excess of 3 million deaths per year. In the short term, air pollution exacerbates chronic respiratory conditions such as asthma. In the longer term, it contributes to the prevalence of lung cancer and cardiovascular diseases, including strokes and heart attacks, with emerging evidence linking poor air quality to the onset of dementia. Air pollution has significant adverse impacts on the environment and biodiversity, and is a major contributor to global climate change. Policies to reduce smog and clean the air – particularly within cities – need to be scaled.



**How can we tackle urban smog and clean the air we breathe? How can we respond to the health impacts and health inequalities which arise from poor air quality?**



## Growing waste

Wastes, or materials which are residual to societal needs at a given moment in time and require disposal, derive from industry, commercial, construction and demolition, municipal, household, and agricultural sources, and include hazardous materials and end-of-life vehicles. Owing to the ongoing reliance on landfill and incineration, wastes create environmental, health, and economic problems. The relationship between economic growth and waste generation varies according to the waste stream in question. Nevertheless, according to the World Bank (Kaza et al., 2018) without urgent action, global waste will increase by 70% on current levels by 2050. Plastic wastes (constituting 12% of all solid waste) are especially damaging; if not managed effectively, they have the potential to contaminate oceans, waterways and ecosystems for hundreds of years. As waste continues to grow, a key challenge facing the world economy will be to promote 'clean growth' by de-coupling economic growth from waste generation, and through the establishment of a circular economy to convert waste from one process into raw materials for another.



**How can we better manage wastes? How can we move to zero-waste and a circular economy? How can we maximise the environmental, economic, and social benefits of a circular economy?**

Collectively, these challenges are historically significant; for some (especially the world's poor), they are likely to be existential (Guzman, 2013). The impact of climate change on global GDP remains under dispute. The Stern Report famously argued that failure to remediate climate change would be equivalent to losing at least 5% of global GDP each year, now and forever. With wider associated risks and impacts, this could rise to 20% of global GDP (Stern, 2007). According to Burke, Hsiang and Miguel (2015), if future adaptation mimics past adaptation, global warming will reduce average global incomes by 23% by 2100 and will widen global income inequality, relative to scenarios without climate change. Diffenbaugh and Burke (2019) likewise argue that although there is uncertainty as to whether historical global warming has actually benefitted some temperate Global North countries, for most poor countries there is a >90% likelihood that per capita GDP is lower today than if global warming had not occurred. Moreover, they argue that whilst some Global North countries might in fact benefit from global warming in the next 80 years – the UK, Norway and Canada, for instance – the GDP of Global South countries could be reduced by between 17–31% by 2100. Besides, by not sharing equally in the direct benefits of fossil fuel use, many poor countries have been and will be significantly harmed by the warming arising from wealthy countries' energy consumption. Critics, however, including Bjorn Lømborg, have insisted that these estimates are exaggerated and that climate change will do no more harm than one large global economic recession between now and 2100. Whilst a significant problem, global warming will not prove to be fatal. Even if GDP is lower by 2100 than it might otherwise have been, this must be understood against the register that the world will be significantly richer by then.

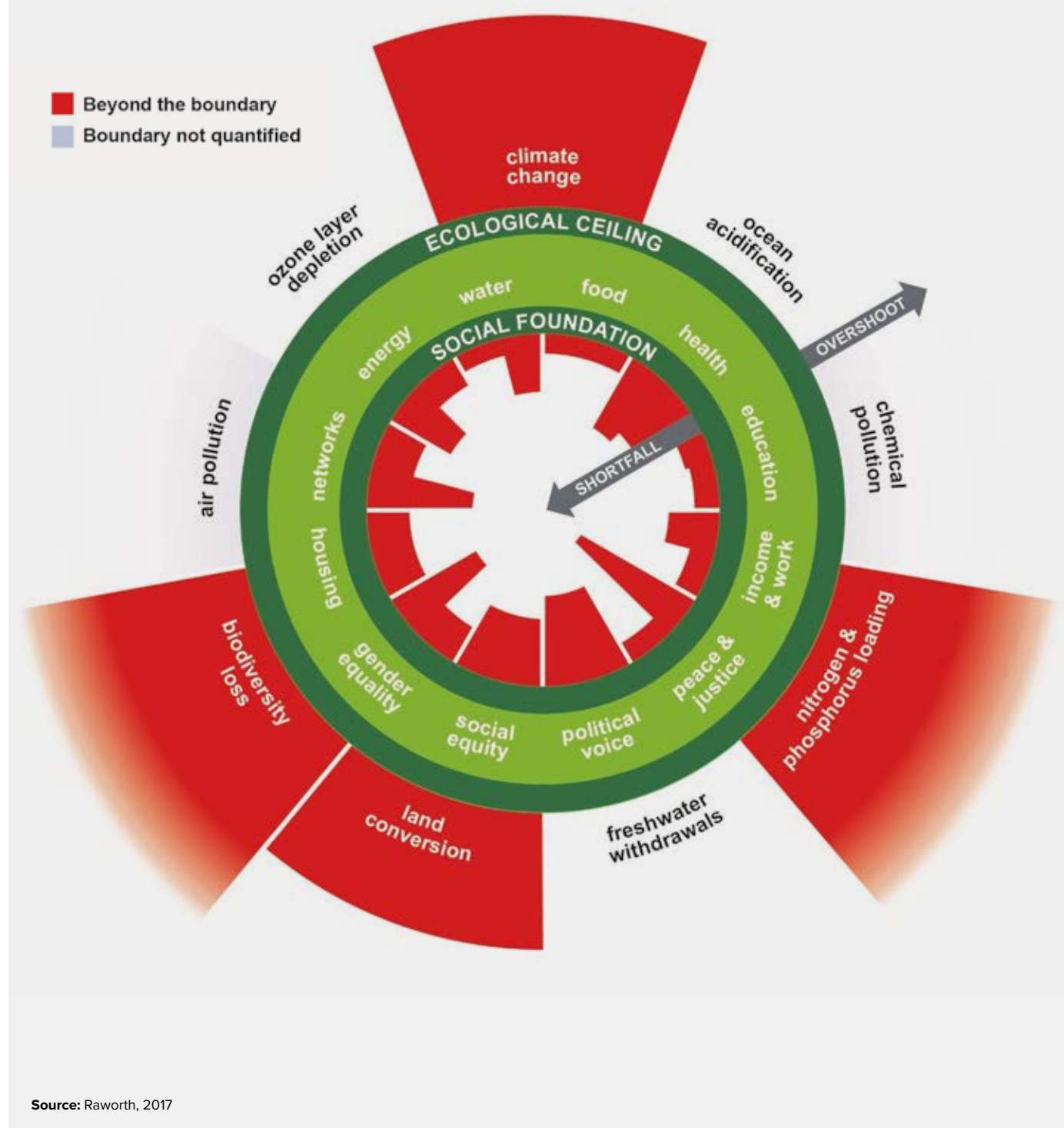
But of course the threats are not simply economic. In 2012, at the request of the Club of Rome, Norwegian management scientist Jørgen Randers provided a forecast of what the world might look like in 2052. Randers's book, *2052: A Global Forecast for the Next Forty Years* (Randers, 2012) argued that whilst

food shortages and resource constraints will continue to be a problem, especially for the world's poor, it will be pollution, and in particular climate change and global warming, that will lead to a painful collapse of the entire global system in the second half of this century. Randers argued that in spite of hopes to the contrary, there will be no reduction in the usage of fossil fuels and carbon emissions in the foreseeable future, and climate change and global warming will emerge as significant burdens. The global temperature will rise by 2°C by 2050, peaking at 2.8°C in 2080. This peak will be sufficient to create 'runaway global warming' which in turn will impact adversely upon global human society through sea-level rise, desertification, wildfires, water shortage, crop failure, extreme weather, disease, climate refugees and increased risk of wars and conflicts.

In *Doughnut Economics: Seven Ways to Think Like a 21<sup>st</sup> Century Economist*, British economist Kate Raworth (2017) likewise argues that the prevailing political-economic model is ill-placed to tackle the scale of the challenge which now presents. This model overlooks the ecological damage it is doing, fails to reward parenting and unpaid work, and produces inequality. For Raworth, GDP growth is a flawed ambition; there is a need to measure human flourishing – or what Hannah Arendt once referred to as human 'natality' – using alternative measures of wellbeing and prosperity (see also Moore and Woodcraft, 2019). To move towards a more sustainable and inclusive world, Raworth proposes a Doughnut Model designed to protect key social foundations without breaching the planet's ecological ceiling (see Figure 1). Humanity requires a basic minimum quantity of resources to meet its social foundations, and provided it conserves those resources, it can thrive. Around the 'doughnut' exist nine planetary boundaries, which delimit ecological ceilings: too much resource extraction and pollution will diminish the very ecosystems we need to thrive. At that point, the earth may not be able to sustain the social foundation. For Raworth, the boundary limits for climate change, biodiversity loss, land conversion, and nitrogen and phosphorus loading have already been breached.

Figure 1

## The Doughnut Model





Human interference in the natural environment has not gone without response. Globally, the UN has sought to promote sustainable development, firstly through its 8 Millennium Development Goals (MDGs) (2000-2015), and most recently through its 2030 Agenda for Sustainable Development and 17 Sustainable Development Goals (SDGs) (2016-2030) (Figure 2). It has also held decennial 'Earth Summits', convening world leaders and promoting sustainable development: the first in Stockholm in 1972, and the most recent in Rio de Janeiro in 2012. Meanwhile, the United Nations Framework Convention on Climate Change (UNFCCC) convenes an annual meeting of the Conference of Parties (COP), the first (COP1) was held in Berlin in 1995, and the most recent in Chile in 2019 (COP25). Important agreements on the governance of climate have been signed at COP meetings, most recently being the Paris Agreement at COP21 in 2016, committing countries to reducing carbon emissions and checking further temperature rises. Established in 1988, the Intergovernmental Panel on Climate Change (IPCC) provides the UNFCCC with scientific evidence on climate change. The IPCC produced its 'Fifth Assessment Report' (AR5) in 2013/14. Its next report, AR6, will be published in 2022.

In this urban age, with more than half of the world's population now living in cities, it is clear that improving the ecological

performance of metropolitan areas will be key if the UN is to meet its SDGs and carbon and climate targets (Gleeson, 2014; Pelling, 2003). As Australian urbanist Brendan Gleeson (2014) puts it, 'Homo urbanus will meet its fate in the cities'. In this era which United States urban scholar Professor Neil Brenner (2019) has called the 'Epoch of Planetary Urbanisation', the ecological footprint of cities is now truly global – the hinterland of cities stretches to the four corners of the earth as urban cores import food, water, energy and construction materials, whilst exporting waste and pollution via global circuits and commodity chains. In response, the UN has convened a series of 'Habitat Conferences', promoting sustainable and resilient cities. A global New Urban Agenda was adopted at Habitat 3 in Quito in 2016, championing a shared vision for a better and more sustainable future. Following this, an Urban Agenda for the EU was launched in May 2016 with the Pact of Amsterdam, building upon the Leipzig Charter on Sustainable European Cities. EU law, finance and research have been aligned to ensure that EU cities deliver the UN SDGs. Fourteen EU Urban Agenda Partnerships are now providing thought leadership and strategic direction to cities on sustainable use of land and nature-based solutions, circular economy, climate adaptation, energy transition, urban mobility, and air quality, among other topics.

Figure 2

## The United Nations Sustainable Development Goals (2016-2030)



Source: United Nations, 2016





Westminster Bridge, London, UK. Organised by Extinction Rebellion, a protest is underway to 'rebel against the British Government for criminal inaction in the face of climate change catastrophe and ecological collapse'. Protesters are blocking the Thames bridges of Westminster, Waterloo, Southwark, Blackfriars and Lambeth, thereby disrupting traffic



### 3. WHAT IS THE UNITED KINGDOM DOING TO TACKLE THE CRISIS AND IS IT ENOUGH?

The capacity of the UK to remediate the climate and ecological emergency will depend upon the political dispensation that emerges from the present political crisis, and whether existing policy agendas continue to apply or a new political agenda rises to meet the challenge. No matter the outcome, questions will need to be asked about precisely *how* a remediating strategy of consequence might work. *Who* will do what needs to be done, and are there grounds to be confident that they will deliver?

Amidst fears that Brexit could lead to a bonfire of EU law and open the door to environmental deregulation, the UK Government has committed to a 'Green Brexit', retaining and even strengthening current EU environmental directives, regulations, and targets. In January 2018, then-Prime Minister Theresa May declared that her Government would be *"the first to leave the environment in a better state than we found it and pass on to the next generation a natural environment protected and enhanced for the future"*. The UK would be 'net zero-carbon' by 2050. To give expression to this ambition, in 2018 the Government published 'A Green Future: Our 25 Year Plan to Improve the Environment', and later in 2019 intends to finalise a new 'Environment (Principles and Governance) Bill'. The Environment Bill seeks to put the 25 year plan on a statutory basis. It establishes nine environmental principles which the UK will adhere to after it has left the EU. It proposes the creation of an independent body or 'green watchdog' – the Office for Environmental Protection (OEP) – to scrutinise environmental law and the Government's Environmental Improvement Plan (EIP), investigate complaints on environmental law, and take enforcement action if required. It establishes the importance of the concept of 'natural capital' in environmental management, and proposes establishing an indicator framework based upon this concept. Should the UK be unable to establish a UK National Greenhouse Gas Emissions Trading System (UK ETS) linked to the EU Emissions Trading System (EU ETS), it proposes to introduce equivalent carbon pricing penalties and incentives, perhaps in the form of a carbon emissions tax. It is placing the calculation and efficiency of carbon offsetting under scrutiny.

It remains to be seen if the Environment (Principles and Governance) Bill will be heard and pass into law. For some, the Bill could prove to be transformative. For others, it represents an important start, but only that. For still more, it lacks ambition and would afford the UK fewer environmental protections. If passed, whether the Bill succeeds or not will depend upon the extent to which:

- The domestic law it proposes to create carries juridical force equal to or greater than existing EU law;
- The list of the environmental principles it proposes will be sufficiently comprehensive and properly adhered to;

- The Office of Environmental Protection is empowered and has legal reach;
- The carbon pricing and carbon offsetting mechanisms are effectively enforced;
- Clarity and agreement are achieved concerning who will bear primary responsibility to lead, finance and deliver proposed policies, actions and interventions.

Whilst proactive, the UK Government continues to view the market as the primary driver of a green transition towards clean growth. In this it is not alone. In its September 19<sup>th</sup> 2019 editorial preface to its special issue titled 'A Warming World: The Climate Issue', *The Economist* warns starkly, *"if capitalism is to hold its place, it must up its game"*, but proceeds to argue that *"to infer climate change should mean shackling capitalism would be wrong-headed and damaging. There is an immense value in the vigour, innovation and adaptability that free markets bring to economies"*. For those who base solutions on market reform, carbon pricing (taxes, caps and trades, feebates and regulations), subsidies and offsetting provide the main policy tools. In a recent report, the International Monetary Fund (2019) argued that a carbon tax of \$75 per ton by the year 2030 – a quantum leap from the present \$2 per ton – could limit global warming to 2°C. Revenue raised might be rerouted to subsidise green projects, especially to help poor communities adapt. The state, in other words, needs to use fiscal levers to create conditions to catalyse green entrepreneurs to innovate and deliver cleaner growth.

This agenda invites debate on whether a transformed and re-regulated market alone will be able to remediate environmental damage for which it itself carries significant culpability, or whether any mission to 'green' capitalism runs the risk of 'greenwashing' capitalism. Krueger and Gibbs (2007) refer to this as the sustainable development paradox. The market will have to play a central role in the search for solutions; it has enormous resources, talent, dynamism, expertise and innovative capacity that needs to be harnessed and directed. But will the market alone or even principally be sufficiently self-starting and socially responsible to generate the scale of renewable energy we need, achieve net zero-carbon, fortify (especially vulnerable) communities by promoting climate adaptation and mitigation, clean our air, protect and enhance biodiversity and reverse species extinction, deliver zero-waste and establish a circular economy, and purify our water? These are complex and large-scale challenges. They are also challenges dogged by persistent market failure and social injustices. Is it prudent to suppose or assume that the market as currently ordered is up to the job?

Other commentators argue that the 'status quo' will no longer do, and to suppose that the present emergency will be solved

through technical adjustments to present policy agendas is to fundamentally misconstrue the enormity, urgency and intractability of the problem. A new paradigm is needed; deeper structural reform and systemic change will be required.

It is against this backdrop that much discussion has recently arisen concerning the concept of a Green New Deal – a new social contract in the spirit of Franklin D. Roosevelt’s 1933 New Deal – to transition politics, economy and society in favour of models of sustainable development. In her new book *On Fire: The Burning Case for a Green New Deal*, Naomi Klein (2019) argues at length that it will only be possible to confront the climate and ecological emergency effectively if we are willing to transform the systems that produced this crisis. A Green New Deal is necessary to reform political and economic institutions and create a fairer and more sustainable economic model. Governments, not markets, need to lead the transition, social justice needs to work in tandem with environment justice, and the market needs to be accompanied by alternative economic models and logics and disciplined so that it serves the public good.

Of course, the idea of a Green New Deal is not a new one. Initially proposed by European Green Parties in 2006 and propagated further by the United Nations Environment Programme (UNEP), it has gained traction recently in the US, in particular through Markey and Ocasio-Cortez’s Green New Deal resolutions proposed in both the Senate and the House of Representatives in spring 2019, and in the campaigns of Sanders, Biden and Warren for the Democratic Party Presidential nomination. In the UK, as early as 2007 and in response to the global financial crash, the New Economics Foundation called for a Green New Deal to address the “triple crunch of the credit crisis, climate change and high oil prices” (New Economics Foundation, 2008). Most recently, at its annual conference in Brighton in September 2019, the Labour Party passed a Green New Deal motion which called on any future Labour Government to “work towards a path to net zero-carbon emissions by 2030” through a “state-led programme of investment and regulation” that will decarbonise the economy. In March 2019, Labour Shadow Treasury Minister Clive Lewis and Green Party MP Caroline Lucas tabled a Private Members’ Bill to enact a Green New Deal in the UK, and in September 2019 published in full ‘The Decarbonisation and Economic Strategy Bill’. This Bill urges the Government to appoint a Green New Deal Commission to draw up a comprehensive action plan on the climate and ecological emergency, change the way it manages the economy to enable extensive public and private investment in a green infrastructure and public works programme, and work towards a net zero-carbon target by 2030. It remains to be seen if the Lucas and Lewis Bill will succeed in gaining traction in Parliament.

Whilst we are sympathetic to the claim that ‘business as usual’ is unlikely to remediate the climate and ecological emergency and that systemic change will be required, we also note that the merits of any Green New Deal will depend upon the substantive content of its final form and the methods through which it will be enacted. Currently, the idea of a Green New Deal presents

only as a stimulus concept or a platform position. Due to this lack of specificity, we conclude this section by speaking not of a Green New Deal but of the need for a UK social contract for sustainability and a just transition (German Advisory Council on Global Change, 2011).

In the spirit of triggering further discussion and advancing local conversation, we end with a provocation signalling the need for such a social contract. Our purpose is to further catalyse and enrich local debate – not to settle it.

## Heseltine Institute Provocation

**To tackle the climate and ecological crisis effectively, there needs to be a deeper systemic reform to the prevailing political-economic model – in the form of a UK social contract for sustainability and a just transition – in which devolution and empowered city regions must play a central role.**

At the heart of this contract should be:

- Proactive Government and a green public works programme
- A Government that leads by example by green-proofing its institutions
- Devolution and stronger city regions
- Enhanced city region environmental governance capacity
- A disciplined and incentivised market delivering clean growth
- Support for anchor institutions to achieve net zero-carbon targets
- Government support for research and innovation
- Enhanced community and citizen participation
- Affordable finance for soft and hard green infrastructure
- Skill strategies to build a green workforce
- Remediation which attends to social justice
- Improved carbon literacy
- Spatial planning for eco-friendly cities
- New performance metrics
- New models of data governance which serve the public good.

We will consider this provocation further in our conclusion, and will unpack its meaning and implications for Liverpool City Region (see also North and Barker, 2011).



## 4. WHAT IS BEING DONE IN LIVERPOOL CITY REGION?

Liverpool City Region (LCR) is already alert to the scale of the emerging crisis; guided by Nature Connected, there exists an established dialogue on how best to conserve, nurture, harness and cherish local natural environmental assets. The LCRCA and its Metro-Mayor, LCR local authorities, the LCRCA Local Enterprise Partnership (LEP), and many anchor institutions, wider stakeholders, communities, and citizens recognise and accept that a grand challenge lies ahead. Whilst there remains much work still to do, remediation has begun. Unique opportunities exist. LCR benefits from natural environmental advantages which will prove helpful in its efforts to confront the climate and ecological emergency: its coastal location (creating opportunities for wind power) and estuaries (tidal and wave power), its urban parks and green spaces, and its rich and diverse rural hinterland, natural ecology and habitats. It also has an abundance of brownfield sites ripe for renaturing.

Although at a slower rate than elsewhere in the UK and when compared with the prior period of 2003–2018, LCR is expected to see growth in its population and employment between 2018–2040. Meanwhile, Gross Value Added (GVA) in the city region is expected to grow at a faster rate than previously, albeit more slowly than increases elsewhere in the UK (Table 1). This is to be welcomed, and must be accelerated. Whilst we share the view that endless growth in GDP is not ultimately sustainable, we also question the idea that only de-growth and managed contraction can resolve the climate and ecological crisis. This message has to be reconciled with ongoing economic inequalities. The local economy remains too small; a decade of austerity has increased deprivation and deepened the difficulties faced by left-behind communities. We need growth, jobs, income, and better economic opportunities for local residents. Economic growth needs to be at the heart of the city's ongoing regeneration.

But such a conclusion comes freighted with a significant reality: in the absence of action, LCR's ecological footprint can only grow. A sustainability challenge – perhaps even paradox – therefore presents.

And so we need to ask: in addition to the good work which is already taking place, how might LCR respond to the emerging climate and ecological emergency? Against the backdrop of global, EU and national policy, how might it design and enact its emerging Local Industrial Strategy (LIS) and support its ongoing regeneration programme, whilst further reducing its ecological weight, mitigating growing threats to the natural world, arresting and remediating environmental degradation, and securing for local citizens a new generation of growth which is simultaneously inclusive and clean? How can clean technology be applied to drive varieties of local economic development that serve the public good?

We now survey the key issues which attend to climate change adaptation and mitigation, and the need to transition to a zero-carbon economy, improving air quality, protecting biodiversity, and moving to a circular economy.

Table 1

### Headline historic and projected growth rates, LCR and the UK

Indicator	Liverpool City Region			UK		
	2018	Growth (2003-18)	Growth (2018-40)	2018	Growth (2003-18)	Growth (2018-40)
<b>Population</b>	1,552,000	4%	1%	66,436,000	11%	7%
<b>Employment</b>	713,000	10%	5%	35,081,000	14%	7%
<b>GVA</b>	£32bn	14%	30%	£1,803bn	28%	37%

Source: LCRCA, 2019

## 4A. TACKLING THE CLIMATE EMERGENCY: IN SEARCH OF A ZERO-CARBON FUTURE

### Policy Environment

Adopted in 2015, the Paris Agreement brings together 195 countries within the United Nations Framework Convention on Climate Change (UNFCCC). It commits Governments to four binding objectives:

- Limit increases in global average temperatures to less than 2°C above pre-industrial levels
- If possible, limit the increase to 1.5°C, as this would reduce the risk and impact of climate change
- Ensure that global emissions peak and then decline as soon as possible, recognising that this will take longer for developing countries
- Undertake rapid reductions in emissions thereafter in accordance with the best science.

In 2018, the Intergovernmental Panel on Climate Change (IPCC), the United Nations body for assessing the science related to climate change, published *The Special Report on Global Warming of 1.5°C*. Based on an assessment of over 6,000 recent scientific papers, the report warned that the window for avoiding the worst climate change impacts could close by 2030 unless urgent action is taken to keep global warming within 1.5°C (Masson-Delmotte et al., 2018).

For the UK, the Climate Change Act 2008 set out a framework to move to a low-carbon economy. This Act committed the UK to reducing greenhouse gas emissions by at least 80% by 2050

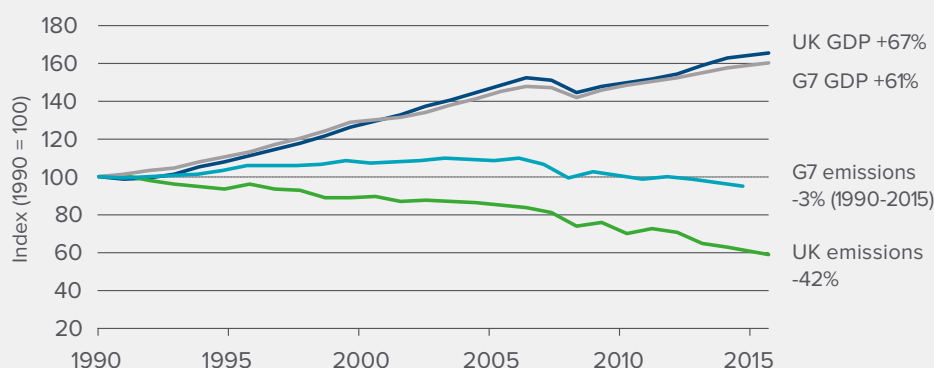
when compared to 1990 levels, through a process of setting five-year caps on greenhouse gas emissions termed 'Carbon Budgets'. These legally binding carbon reduction targets are set by the Climate Change Committee (CCC). The CCC response to the IPCC *Special Report on Global Warming of 1.5°C* provided evidence of the need to reduce greenhouse gas emissions in the UK to zero by 2050, leading to an amendment to the Climate Change Act 2008 so that the new zero target became law (Committee on Climate Change, 2019a).

When set into global relief, UK carbon emissions, variously measured at 5–5.5 metric tonnes per capita p.a., compare relatively favourably; but still the UK ranks variously between the 40<sup>th</sup> and 50<sup>th</sup> largest per capita carbon polluter in the world. The UK has, however, managed to achieve economic growth whilst



Figure 3

### UK and G7 economic growth and emissions reductions (1990–2018)



Source: Department for Business, Energy and Industrial Strategy, 2017



reducing emissions (see Figure 3). In 2018, carbon emissions in the UK were 44% below 1990 levels. The first (2008–12) and the second (2013–17) carbon budgets have been met, and the UK is on track to meet the third (2018–22), but not the fourth or fifth carbon budgets (covering 2023–2027 and 2028–2032).

The Clean Growth Strategy (Department for Business, Energy and Industrial Strategy, 2017) is the UK's plan for emissions reduction and provides a foundation for the action needed to meet a net zero-carbon target. Similarly, the UK Industrial Strategy (HM Government, 2017) identifies 'clean growth' as one of the four 'Grand Challenges' chosen to put the UK at the forefront of the industries of the future. The Clean Growth Strategy predicts that *"the UK low-carbon economy could grow by an estimated 11% per year between 2015 and 2030...and could deliver between £60 billion and £170 billion of export sales of goods and services by 2030"*. Government leadership is recognised to be key in driving clean growth. The strategy identifies a broad set of policies that aim to accelerate the pace of clean growth over the next decade if the UK is to meet its fourth and fifth carbon budget targets. These policy objectives comprise:

Policy Measure	% Source of UK Emissions
Accelerating clean growth, improving business and industry efficiency	25% of UK emissions
Improving the energy efficiency of our homes/rolling out low-carbon heating	13% of UK emissions
Accelerating the shift to low-carbon transport	24% of UK emissions
Delivering clean, smart, flexible power	21% of UK emissions
Enhancing the benefits and value of our natural resources	15% of UK emissions
Leading by example in the public sector	2% of UK emissions

In its progress report to Parliament (2019), the CCC referenced the differential between the Clean Growth Strategy's policy ambition and implementation, noting, *"Tougher targets do not themselves reduce emissions. New plans must be drawn up to deliver them. And even if net zero is achieved globally, our climate will continue to warm in the short-term, and sea-level will continue to rise for centuries. We must plan for this reality. Climate change adaptation is a defining challenge for every Government, yet there is only limited evidence of the present UK Government taking it sufficiently seriously."* (Committee on Climate Change, 2019b.)

In July 2018, the Government outlined the second national climate adaptation programme setting out plans up to 2023 (Department for Environment, Food and Rural Affairs, 2018c). This covers actions to address flooding and coastal change risks to communities, businesses and infrastructure; risks to

health, wellbeing and productivity from high temperatures; risks of shortages in the public water supply for agriculture, energy generation and industry; risks to natural capital including terrestrial, coastal, marine and freshwater ecosystems, soils and biodiversity; and risks to domestic and international food production and trade.

Carbon offsetting has attracted a lot of government and industry interest in the UK. According to Finnegan (2019), theoretically the UK could achieve net zero emissions quickly but at a significant cost. Finnegan notes that in 2017, the UK's total greenhouse gas emissions were 460m tonnes. The Gold Standard carbon offsetting scheme points to an average offsetting cost of circa £10/tonne. A bill of £4.6 billion would therefore result – likely to be too prohibitive to contemplate. Carbon offsetting is also dogged by measurement problems. Finnegan concludes that *"Local authorities need to act now to embrace offsetting"* but only *"alongside the vast number of other options available to each and every one of us"*.

Over the last decade, the Liverpool City Region, LCRCA, and the six local authorities have collectively developed policies, signed up to targets, and taken local action as the underpinning legislative and policy context for climate change has evolved. This provides a solid foundation for future action.

Although not a particularly large producer of carbon dioxide gases (CO<sub>2</sub>) compared to other city regions in the UK, the Liverpool City Region Mini-Stern Review (Regeneris Consulting, 2009) estimated that by 2020, the costs to business and the public sector of not adjusting and adapting to global warming could amount to 1% of the area's GVA. In 2011, Liverpool City Region's Low Carbon Economy Committee produced an action plan (Low Carbon Economy Action Plan 2011–2015) to prioritise and drive forward the economic opportunities arising from developing a low-carbon economy (The Mersey Partnership, 2011). Accelerating investment in the low-carbon economy was a feature of the 2012 Liverpool City Region Deal with Government, which led to LCR being declared as a Centre for Offshore Renewable Engineering (CORE). In 2012, the Local Enterprise Partnership (LEP) launched the Liverpool City Region Sustainable Energy Action Plan (SEAP) to complement the Low Carbon Economy Action Plan (Liverpool City Region Local Enterprise Partnership, 2012). Recognising that energy projects need investment, the 'Blue/Green Economy' was identified as one of the priorities for the Liverpool City Region European Programme 2014–2020.

Local authorities were identified as key players for the SEAP programme. As an example, in 2015 the Mayor of Liverpool City Council (LCC) established a Commission on Environmental Sustainability to undertake an independent review of what might be required to support Liverpool as a sustainable city. In addition, in 2019, the LCC Mayor submitted a bid to new Prime Minister Boris Johnson for a 'Green City Deal' to tackle climate change and boost the economy. If successful, the proposal would provide new skills and housing to transform the city through the granting of new powers and funding to make the city carbon neutral. At the City Region level, the Combined Authority and

its members declared a climate change emergency in May 2019, and agreed to bring forward a detailed Climate Action Plan by December 2019.

The flagship Mersey Tidal Project in particular offers a unique and transformative opportunity to address the UK's medium-term energy supply through clean, sustainable means while embedding the Liverpool City Region as the UK centre for excellence in clean energy innovation and skills (Becker et al., 2017). The project could supply 2-5TWh (terawatt hours) of energy into the grid by the early 2030s, at a capital cost of £2-10 billion (depending on the optimum scale of the project).

#### Indicative actions taken at the scale of LCR:

### Remediating global warming through decarbonisation and adaptation

- LCRCA, local authorities, and other anchor institutions have set a zero-carbon target by 2040 or earlier
- Commitment to triple the volume of energy generated by offshore wind in Liverpool Bay by 2032
- Ambition to replace all methane with hydrogen from the city region's gas grid by 2035
- Goal of delivering a network of at least eight zero-carbon refuelling stations (hydrogen and electric charging) across the city region by 2025
- Plan for the UK's cleanest bus fleet outside of London, with 70% of buses already classified as low-emission, and 25 zero-emission hydrogen buses (LCR Hydrogen Bus) in operation in 2020
- Plan to deliver Europe's largest tidal power project by 2030; established the Mersey Tidal Commission
- Agreed a £10m Green Investment Fund
- Agreed £460m investment in new, state-of-the-art trains for the Merseyrail Network to improve and futureproof green public transport
- Invested in the first phase of a £16m, 600km cycling and walking network
- Used a £172m Transforming Cities fund to increase low-carbon public transport and increase walking and cycling
- Developing (with the Royal Town Planning Institute, RTPI) a climate adaptation strategy
- Participation in HyNet North West, a hydrogen energy and Carbon Capture, Usage and Storage (CCUS) project
- Mayor of LCC has submitted a £230m Green City Deal bid, focussing on household energy consumption.

## Key Issues

#### Scaling up action on climate change to meet 2040 target

Even prior to declaring a climate emergency, at its Annual Meeting in May 2019, Liverpool City Region Combined Authority set a target to achieve net zero-carbon emissions by 2040. This

is ten years ahead of the UK national target, and five years ahead of devolved Governments in Scotland and Wales. But West Yorkshire Combined Authority and Leeds City Region LEP have created a 'climate coalition' to realise their ambition of making the Leeds City Region zero-carbon by 2030. Supported by strong political leadership, Nottingham City Council has committed to becoming the first net zero-carbon city in the UK by 2028. These are perhaps overly ambitious; nationally, there is concern that the UK Government will fail to meet its target of net zero-carbon emissions by 2050. A priority for LCRCA will be to scale up action

#### Case study resources:

### So you have declared a climate emergency? What next? Advice for local authorities

The Arup Group (2019) has produced a guide to help local authorities develop and deliver effective climate action plans. This is framed around nine key steps, and recommends that a senior officer is identified to coordinate climate action across different departments and monitor progress

The Local Government Association, meanwhile, is providing support to local authorities on the actions they can take after declaring a climate emergency. In this respect, the Local Government Chronicle (Hill, 2019) has identified five action areas for local authorities to think about when declaring a climate emergency:

- Can you say you are buying the cleanest energy you possibly can? Encourage your residents to do the same, and make it easier for them to do so by striking a deal with a clean energy provider
- No matter how science-based your climate targets are, ultimately you have to go through a process of building public consent and support. Consider holding a citizens' assembly and encourage a diverse range of voices to be heard
- How sustainable is your procurement policy? In the Council's own fleet, make sure there is a plan for changing to clean vehicles. If you are regenerating your town centre, think about how to encourage people to use public transport, where electric charging points will be, and how to support local retailers
- In terms of retro-fitting homes and planning policies, work out where the national policy gap is and put pressure on Government to shift its policy
- Are you learning from the experiences of other local authorities?



on climate change locally, to ensure it meets its 2040 target. Local political leaders have already made an impressive start, and there is good cause to believe that this target is in reach.

### Resourcing low-carbon transitions

The UK Climate Change Committee has estimated that the cost of reaching the national UK target of net zero-carbon by 2050 will be around 1-2% of GDP annually over the next 30 years, or '8 months delayed growth' by 2050. Others suggest a figure of 2.5% or more will be needed. The way these costs will fall across different sectors is uneven. For example, up to 2030 there will be higher upfront costs in some renewable energy construction, energy and resource savings initiatives, electric car and battery manufacturing, and infrastructure. But these costs will be offset by lower running and fuel costs. The more difficult areas will be treating existing buildings, decarbonising particular energy generation, industrial processes and aviation, and developing technology to extract and store CO<sub>2</sub> from the atmosphere.

#### Case study resources:

## PROSPECT, a new Peer-to-Peer (P2P) learning cycle on innovative financing schemes for energy and climate actions

PROSPECT is a European Union Horizon 2020 research and innovation project led by Energy Cities, Eurocities and FEDARENE, as well as the City of Trnava in Slovakia, the Energy Agency of Barreiro in Portugal, and the Regional Energy Agency of Upper-Austria. Its supposition is that a growing number of European cities and regions are engaging in an energy transition and formulating decarbonisation strategies. Many are signatories to the Covenant of Mayors for Climate and Energy Initiative, and have developed Sustainable Energy and Climate Action Plans (SECAPs) to reduce CO<sub>2</sub> emissions by at least 40% by 2030. But securing financing and a green infrastructure is a significant problem. Austerity, restrained public budgets, and a lack of staff resource mitigates against effective implementation of plans. Public authorities often rely on traditional sources of finance. Today, given the scale of the challenge, these seem inadequate. Cities and regions need to leverage new innovative financing schemes and incentives such as Energy Performance Contracts (EPCs), soft loans, crowdfunding, green bonds, innovative partnerships, and project pooling for their energy and climate actions. PROSPECT connects cities to facilitate peer-to-peer support to do so.



Currently, a mixed economy exists in which the Government is increasingly setting out policies and offering supports to help industries implement the changes required for a green transition. But adopting a 'place-blind' approach has limited the opportunities to address regional and local opportunities and needs. A report by the Institute for Public Policy Research, IPPR (Laybourn-Langton et al., 2017), argues that Government should devolve carbon budgets to UK regions. The North's economy is more carbon-intensive than the average for English regions, and the North of England is also making the most of a number of opportunities presented by low-carbon technologies. A devolved carbon budget would therefore enable regional stakeholders to set and drive progress, address the problem of left-behind places, regional inequalities and the North-South divide, capitalise on the North's strengths in clean technologies, and create opportunities for more impactful bespoke interventions.

### Building a low-carbon economy

With the development of the LCR's Local Industrial Strategy (LIS), there is further opportunity to place carbon reduction at the heart of the local economy. Clean growth is one of the 'Sector Accelerators' identified. LCR's innovation, expertise and capacity in hydrogen production is an emerging strength, which is borne out in key assets such as Alstom's Widnes Technology Centre – home to the design, build and testing of hydrogen trains – and the first H<sub>2</sub> refuelling station in the North of England, using hydrogen from a range of sources including Pilkington and Inovyn. Offshore wind could in theory also be used to generate hydrogen; spare capacity, along with that from any tidal barrage, could be directed to hydrogen production through electrolysis. Though not the most energy efficient way of advancing, this may be the most economically efficient. Meanwhile, LCR participates in HyNet North West, a hydrogen energy and Carbon Capture, Usage and Storage (CCUS) project to reduce carbon emissions from industry, homes and transport. In addition, there are opportunities through the Mersey Tidal Project, and further development of offshore wind through the Ørsted facility.

The new Liverpool Knowledge Quarter has a central role to play in mobilising key local knowledge assets, as a partnership between Liverpool School of Tropical Medicine, the University of Liverpool, Liverpool John Moores University, The Royal Liverpool and Broadgreen University Hospitals NHS Trust, Liverpool City Council, Liverpool Vision, and The Hope Street Community Interest Company. The University of Liverpool's Materials Innovation Factory illustrates the capacity to hand. While there are discrete and technical areas of activity within the low-carbon energy sector, a majority of the green workforce of the future will have skillsets that are grounded in other occupational groups. Specifically, these include metal manufacturing and engineering, construction and civil engineering, marine logistics, electrical engineering and control systems, and professional and financial sectors. The LCRCA Skills Strategy Plan 2018–2023 (Liverpool City Region Combined Authority, and Liverpool City Region Local Enterprise Partnership, 2018) is ensuring that skills, apprenticeships and training programmes are being aligned accordingly.



**Case study resources:**

## Low Carbon Eco-Innovatory (LCEI) and the Centre for Global Eco-Innovation (CGE)

Since 2012, two award-winning large-scale programmes within LCR – the Low Carbon Eco-Innovatory (LCEI) and the Centre for Global Eco-Innovation (CGE) – have supported UK and local priorities in the shift toward a low-carbon economy through assisting local and regional companies to develop, manufacture and use low-carbon technologies, systems and services. These programmes have provided SMEs with access to resources, facilities and world-leading expertise from the University of Liverpool, Liverpool John Moores University, and Lancaster University. As noted by the IPCC, opportunities for low-carbon development should not be bound by sector, as every business on both the supply and demand side needs to reduce emissions to limit global temperature rises. The LCEI and CGE therefore collaborate with businesses in all sectors and a wide variety of disciplines, such as environmental science, engineering, chemistry, electrical engineering, architecture and management. A flexible approach offers a range of short-term and long-term industry-led collaborative research projects to meet a wide array of companies' research needs, from short-term low-carbon technology projects to more intensive assistance, including full-time one-year Masters and three-year PhD projects.

To date, the CGE and LCEI programmes have collaborated with over 500 SMEs, with the CGE programme creating over 300 jobs and adding £45 million gross GVA to the low-carbon economy in LCR and the North West. These outputs not only benefit local businesses in the North West and LCR, but provide exemplars of action that could be implemented by other businesses to develop Clean Growth strategies and enhance sustainability.

**Climate change adaptation**

A common misconception about natural hazards is that populations most at risk are simply those unlucky enough to have been born in parts of the country where nature's extremes are most manifest. Increasingly, it is being recognised that whilst exposure to weather extremes is important, ultimately it is society that puts people at increased risk, and therefore solutions to natural hazards need to tackle the root causes of the social and economic production of vulnerability to hazard events. Although the Liverpool City Region's economy has grown over the last two decades, it continues to suffer from entrenched concentrations of poverty and deprivation. A just transition to a low-carbon

economy will require enhanced protections for vulnerable communities, and those most responsible for pollution to pay a greater price.

The Royal Town Planning Institute is working with the Liverpool City Region Combined Authority to develop a climate resilience policy that will reflect the unique characteristics of the place. This will be incorporated into the City Region's Spatial Development Strategy. Once published, the Spatial Development Strategy will mean planning applications need to take climate change resilience into account, with the Combined Authority hoping the policy will raise standards and safeguard against flooding and extreme weather events alongside other climate threats. Aligned with this, there will be a need to factor environmental impacts into the City Region's framework for investment decisions, including the appraisal methodology for the Combined Authority's £500m Strategic Investment Fund.

**Case Study Resources:**

## Planning for zero-carbon and adaptation

The Town and Country Planning Association (TCPA) and the Royal Town Planning Institute (RTPI) have produced a guide (2018) to help planners and politicians tackle climate change and improve climate resilience. The guide sets out a package of measures to consider, including the following overall climate change objectives in local planning to support the transition to a low-carbon future.

Shaping places to help secure radical cuts in greenhouse gas emissions. This requires the location and layout of new development to be planned to:

- Deliver the highest viable energy efficiency, including the use of decentralised energy
- Reduce the need to travel, particularly by private car
- Secure the highest possible share of trips made by sustainable travel
- Actively support and help to drive the delivery of renewable and low-carbon energy generation and grid infrastructure
- Shape places and secure new development to minimise vulnerability and provide resilience to impacts arising from climate change
- Encourage community-led initiatives such as the promotion of decentralised renewable energy use or securing land for local food sourcing
- Increase sustainable transport use and local transport solutions.





## 4B. IN THE FACE OF SPECIES EXTINCTION: SUPPORTING BIODIVERSITY

### Policy Environment

Globally, the sustained and significant loss of biodiversity as a result of human activity is believed to be so great, at present, as to be beyond fully accurate measure. Against this backdrop, a growing number of scientific experts now argue that Earth stands on the brink of a 'mass extinction event' that would represent just the sixth such event in the billions of years of life on the planet – and the first to be caused not by natural phenomena, but by human beings.

In recent decades, increasingly ambitious (if belated) commitments have been made at an international level, with the stated goal of halting the decrease in biodiversity. The legally binding Convention on Biological Diversity (CBD – to which the UK is a party) provided the first ever framework for collective international action on biodiversity when it was signed in 1992, with the current Strategic Plan for Biodiversity (incorporating the 'Aichi Targets' – see Figure 4) covering the period of 2011–2020. Adopted in 2011, the EU 2020 Biodiversity Strategy aligns with these overarching global targets, as does the UK Post-2010 Biodiversity Framework and the individual biodiversity strategies for England and the devolved administrations.

Recent studies have underlined the failure, both globally and nationally, to arrest and reverse biodiversity decline. In its Global Assessment Report on Biodiversity and Ecosystem Services, the Intergovernmental Science-Policy Platform on Biodiversity and

Figure 4  
Aichi Targets

Source: Convention on Biological Diversity

CBD strategic goal	AICHI TARGET
<b>A. Address underlying causes</b>	1 Improve awareness of biodiversity
	2 Mainstream biodiversity
	3 Reform incentives
	4 Implement plans for sustainability
<b>B. Reduce pressures and promote sustainable use</b>	5 Reduce habitat loss and degradation
	6 Fish sustainably
	7 Make farming and forestry sustainable
	8 Reduce pollution
	9 Tackle invasive species
	10 Minimise climate change impacts
<b>C. Safeguard ecosystems, species and genes</b>	11 Protect and manage critical sites
	12 Prevent extinctions
	13 Maintain genetic diversity
<b>D. Enhance benefits from biodiversity and ecosystems</b>	14 Safeguard ecosystem services
	15 Restore degraded forest
	16 Implement access and benefit sharing
<b>E. Enhance implementation through planning, knowledge management and capacity building</b>	17 Implement NBSAPs
	18 Protect traditional knowledge
	19 Share biodiversity knowledge
	20 Increase conservation finance



Ecosystem Services (2019) concludes that most of the Aichi Biodiversity Targets will not be met by 2020. Biodiversity is currently declining at a faster rate globally than at any time in human history, with economic, social, political and technological change now required on nothing less than a transformative scale if current trajectories are to be corrected and future targets successfully met. In its most recent report to the Convention on Biological Diversity, the Joint Nature Conservation Committee (2019) – the UK public body that advises the UK Government and devolved administrations on UK-wide and international nature conservation – similarly indicated that the UK is on track to meet just five of the 20 Aichi Targets, with high profile reports such as ‘State of Nature’ (Hayhow et al., 2019) also underlining the parlous condition of biodiversity in the UK.

## Key findings from the 2019 UK State of Nature report

The report makes use of two broad types of data. Abundance data for 696 species records the average change in relative abundance across these species. Occupancy data, in contrast, records trends in the geographical distribution of 6,654 species across measurement sites.

The average abundance for 696 terrestrial and freshwater species has fallen by 13% since 1970, with the rate of decline being slightly steeper in the last 10 years.

The average species distribution, covering 6,654 terrestrial and freshwater species, has fallen by 5% since 1970 and is 2% lower than in 2005.

More species have shown strong or moderate decreases in abundance (41%) than increases (26%) since 1970, and likewise, more species have decreased in distribution (27%) than increased (21%) since 1970.

Using the International Union for the Conservation of Nature’s (IUCN) Red List categories, of the 8,431 species listed, 15% have been classified as threatened with extinction from the UK, and 2% are already extinct.

Since 1970, the abundance for 214 species defined as ‘priority’ or of ‘greatest conservation value’ declined by 60%, and between 2011 and 2016 declined by 22%. Over the long-term, 63% of priority species showed strong or moderate decreases in abundance, and 22% showed strong or moderate increases; 16% showed little change.

Between 1970 and 2016, the distribution of 395 priority species in the UK declined by 27%. Over the long-term, 37% of species showed strong or moderate decreases in distribution, and 16% showed strong or moderate increases; 46% showed little change.

The biggest threats to terrestrial and freshwater nature in the UK currently derive from agricultural management, climate change, urbanisation, pollution, hydrological change, and woodland management.

Given the collective failure of Governments so far even to slow down the pace of ecological collapse, there is an expectation that the post-2020 global biodiversity framework – to be negotiated and decided next year at the 15<sup>th</sup> Conference of the Parties to the Convention on Biological Diversity – may need to be significantly more ambitious than the current Strategic Plan (Convention on Biological Diversity, 2019a, 2019b). If this does prove to be the case, then there will almost invariably be knock-on impacts for national Governments, who will be obliged to bring their National Biodiversity Strategies and Action Plans (NBSAPs) into line with the revised global strategy. In turn, closer to home, this will affect local authorities in England, who are already required under the terms of the Natural Environment and Rural Communities (NERC) Act 2006 to ‘have regard’ to the conservation of biodiversity in the exercise of their functions, and who must also take into account the National Planning Policy Framework, which in recent years has increasingly emphasised the need for local planning policy and decision-making to protect and enhance biodiversity.

Proposed or planned shifts in biodiversity policy at a national level arguably suggest a similar direction of travel to that which might soon be signalled at an international level. There are recent proposals from the House of Lords, for example, which if implemented by Government would significantly strengthen and better enforce the ‘biodiversity duty’ for public bodies established by the NERC Act 2006 (House of Lords Select Committee on the Natural Environment and Rural Communities Act 2006, 2018). The Government itself has confirmed an intention, following consultation last year, for its forthcoming Environment Bill to create a ‘biodiversity net gain’ requirement for most planning applications.

Local and combined authorities have the potential to play a major role in promoting biodiversity, through their policies and strategies, their control over planning and development, their management of estates, their procurement of goods and services, and their educational and advisory functions (Local Government Information Unit, 2007). When national Government published the first UK Biodiversity Action Plan in 1994, local authorities across the country were encouraged to develop their own plans in support of national targets and the obligations of the UK as a signatory to the Convention on Biological Diversity. At the time, the LCR local authorities fulfilled this duty through the publication of two separate Local Biodiversity Action Plans (LBAPs). The North Merseyside Biodiversity Action Plan, published in 2001 (and reviewed in 2008), covers Liverpool, Knowsley, St. Helens, and Sefton; the Cheshire Biodiversity Action Plan, covering Halton and Wirral, was published in 1999. Around the same time, some of the local authorities in the city region also published their own plans (Halton Biodiversity Steering Group 2003; Wirral Biodiversity Partnership Technical Group 2003) to complement the policy at county level.

Although a significant period of time has elapsed since the publication of these plans, most local councils around the UK have similarly published only one LBAP (Gaia and Jones, 2017). Perhaps more important is the fact that, in recent years, there has been collaboration between the local authorities of Liverpool

City Region to facilitate policymaking on environment issues at the broader city regional level.

At this level, such strategic action on environmental issues is facilitated in part by Nature Connected – the Local Nature Partnership for the city region established in 2012, which represents not just the combined authority and the constituent local authorities of the city region, but also national Government agencies, housing associations, local enterprise partnerships, environmental charities, and major private developers.

The Liverpool City Region Ecological Network (Merseyside Environmental Advisory Services, 2015) offers an evidence base which comprises ecological and biodiversity information on the City Region's natural assets, including designated sites and priority habitats; linear features such as hedgerows, canals and rivers; Stepping Stone Sites (e.g. ponds); and a Nature Improvement Area including 17 Focus Area profiles. The city region's strategic natural assets were identified as:

- Estuarine and coastal habitats and species
- Water courses and associated wet habitats such as ponds, bogs and mosses, which are crucial in linking habitats and species populations
- Lowland heath (on sandstone in Wirral and Halton, and sand in Sefton)
- Ancient semi-natural woodlands (mainly in Wirral and St. Helens)
- Lowland meadows of acidic and neutral grasslands (mainly in small patches, often highly fragmented)
- Agricultural hinterland.

Liverpool City Region already possesses much of the professional expertise and organisational infrastructure that is needed to inform, shape and evaluate biodiversity policy. It has two Local Environmental Records Centres (LERCs) – the first, Merseyside Biobank, covering Liverpool, Sefton, Knowsley and St. Helens; and the second, RECORD, covering Wirral and Halton as well as the wider Cheshire area. These LERCs function as nodes in the nationwide collection and management of biodiversity records coordinated by the National Biodiversity Network, in addition to acting as local sources of advice and guidance. Further data services, as well as advice on the environmental implications of planning and policy decisions, are available through the Merseyside Environmental Advisory Service (MEAS), a specialist unit that hosts the Merseyside Biobank and other archives.

There are also opportunities presented by a growing Brownfield First Strategy and reclaiming land from old mines and industrial facilities. The DREAM in St. Helens, for example, is a park on the old Sutton coal mine. Next to the M62, it helps reduce the impact from the traffic and provides green recreational opportunities. Such locations could be used both to help offset carbon emissions and reduce the local impact of pollutants.

#### Case study resources:

### Renaturing the city – the URBAN GreenUP H2020 project

URBAN GreenUP is a five-year EU Horizon 2020 funded project that aims to design, apply and replicate innovative solutions to urban environmental problems. As one of three 'runner' cities, Liverpool as a test site for the interventions will help to assess their efficacy, with learning from the exercise informing five 'follower' cities around the world. Using project funds, the 'nature-based solutions' being implemented in three areas of Liverpool are expected to have non-environmental as well as environmental benefits – one of which, importantly, will be biodiversity promotion.

As a project, URBAN GreenUP stands out for its creative solutions to renaturing urban space. As the 'diagnosis report' for Liverpool identifies (URBAN GreenUP, 2017), *"The scope for creation of large-scale new habitat in Liverpool is limited."* As such, the measures taken as part of the project locally that are projected to have positive biodiversity impacts include not only urban tree planting, but also 'green roofs', 'green walls' and 'sustainable urban drainage solutions' that will lead potentially to the restoration, in one test area, of natural wetlands. The project is also noteworthy for the prominent role it ascribes to public engagement activities, with school groups and communities involved in the project, for example through 'forest schools' and 'forest churches', which are hoped to increase awareness of the importance of biodiversity locally. At the same time, however, public engagement is recognised more pragmatically by the project organisers as a valuable opportunity for data collection, thanks to 'citizen science' techniques that will help to monitor change in the intervention areas and thus contribute to evaluating the efficacy of the project overall. The strategic and evidence-based approach of the project is clear. Test sites in Liverpool and other cities were identified based on comprehensive 'diagnoses' of each city, drawing on evidence and expertise available locally. Indeed, the project made extensive use of a software programme developed at the University of Liverpool that helps to visually identify locations for habitat enhancement and the creation of natural corridors through which species can migrate. The success of the project interventions, likewise, are assessed via a suite of key performance indicators that were defined at the outset of the project.





### Indicative actions taken at the scale of LCR:

## Promoting biodiversity

- Designed and enacted Local Biodiversity Action Plans (LBAPs)
- Developed LCR Ecological Network audit of natural assets, including 'designated sites and priority habitats' and a 'Nature Improvement Area'
- Protection in planning of city region's strategic natural assets including: estuarine and coastal habitats and species; water courses and associated wet habitats such as ponds, bogs and mosses; lowland heath; ancient semi-natural woodlands; lowland meadows of acidic and neutral grasslands; and agricultural hinterland
- Created two Local Environmental Records Centres (LERCs): Merseyside Biobank, covering Liverpool, Sefton, Knowsley and St. Helens; and RECORD, covering Wirral and Halton as well as the wider Cheshire area
- Prepared a Mersey Forest Plan. Engaged in an ambitious proposal to create a 'Northern Forest' joining Liverpool, Chester, Manchester, Leeds, Sheffield and Hull by planting 50 million new trees
- Participant in five-year EU Horizon 2020 URBAN GreenUP project aiming to renature cities
- Inspiring grassroots urban greening projects such as Granby 4 Streets Community Land Trust (CLT)
- Developed a 'Brownfield First' approach to development.

## Key Issues

### Progress to date but more to do

A review of the policy framework and structures supporting biodiversity action within the Liverpool City Region suggests that local government is effectively discharging its duties in this area. This is a conclusion with which the comparative literature in the area seems broadly to agree. Indeed, an analysis by Nurse (2013) of the environmental policy performance of Liverpool and the wider City Region relative to the Core Cities and former European Green Capitals found that "*Liverpool and the wider City Region's performance with regards to biodiversity is excellent and should be considered as a central pillar of the city's environmental credentials.*" A more recent set of studies, which examined the sustainability policies of England's combined authorities, was slightly more tempered in its assessment, considering Liverpool City Region Combined Authority to be significantly more advanced in terms of environmental policy generally than some combined authorities, but less advanced than others (Sustainability West Midlands, 2017/2018). In terms of the funding for and management of green spaces, a recent study by Scott and Poggi (2017) similarly offered a mixed assessment of the Liverpool City Region, which was discovered to spend more per capita on open spaces than any of the other city regions compared, but with the lowest proportion of 'local sites' (i.e.

non-statutory areas designated at local level for their significant nature conservation value) in a positive state of conservation management. Given that these studies adopt different analytical lenses and different evaluative tools, the results that they present clearly cannot be seen as directly comparable. Yet, they do arguably support the notion that overall, Liverpool City Region is performing well on biodiversity policy when compared with other combined authority areas, but is not yet best in class.

The pressing question for LCR, looking forward, will be whether current efforts to protect and promote biodiversity are commensurate with the gravity of the 'nature crisis', and whether more could or should be done in this area than is being done already. Certainly, there are a number of obstacles to bolder action on biodiversity. In terms of exogenous factors, the paralysis of the Brexit process creates huge uncertainty over the future direction, complexion and ambition of overarching environmental policy at the national level – with the only certainty for policymakers perhaps being the 'very high risk' that Brexit poses to biodiversity protections, irrespective of its eventual form (Burns, Gravey and Jordan, 2018). In terms of endogenous factors, limited public awareness of environmental issues – and indeed, limited public willingness to make pro-environmental adjustments to their lifestyles – may still have the potential to stymie political action, despite encouraging signs of growing public awareness around environmental issues (Department for Business, Energy and Industrial Strategy, 2019; Smith, 2019). At a local level, another barrier to action is the lack of habitat and (particularly) species data of the quality and at the scale necessary to reliably gauge trends in biodiversity and evaluate the effectiveness of local plans (URBAN GreenUP, 2017). This is a common problem for cities globally (Nilon et al., 2017), and one which, in the UK context, reflects both a lack of data at the national level and the inherent difficulties and costs involved in collecting reliable biodiversity data.

### Recognising the instrumental and intrinsic values of biodiversity

These challenges are significant. Yet there are two compelling reasons for greater action on biodiversity at LCR level: the first, rooted essentially in local self-interest and the instrumental value of biodiversity as an 'ecosystem service' for the area; and the second, underpinned by the intrinsic value of biodiversity and the moral imperative to avert environmental catastrophe for future generations.

In terms of the former, local Governments around the world are increasingly cognisant of the positive, quantifiable benefits that the mainstreaming of biodiversity can have in relation to wellbeing, climate resilience, place-making, and other areas (see, e.g., Convention on Biological Diversity, 2012; Nilon et al., 2017; Parris et al., 2018). These instrumental uses of biodiversity present opportunities to local policymakers that warrant close consideration. The imperative to avoid a sixth mass extinction event – and the contribution that cities and city regions can make to this effort through coordinated and evidence-based action – doubtless issues a stronger clarion call to action. Liverpool City Region contains many areas of important and

**Case study resources:**

## Urbact III: Towards better school meals. Agri-Urban and BioCanteens Projects led by Mouans-Sartoux, France

Agri-Urban is an ERDF Urbact III Good Practice project led by Mouans-Sartoux on the French Riviera. Since 1998, the city has been connecting food, health and environmental issues. To overcome the lack of a local organic food supply, a municipal farm was created and two farmers hired to grow vegetables for school canteens. The outputs meet 85% of the needs of three local schools – 1,000 meals per day. Public procurement rules were changed so that local producers could bid to supply school meals. Today, the city is serving daily meals in its schools that are 100% local and organic. Benefits include:

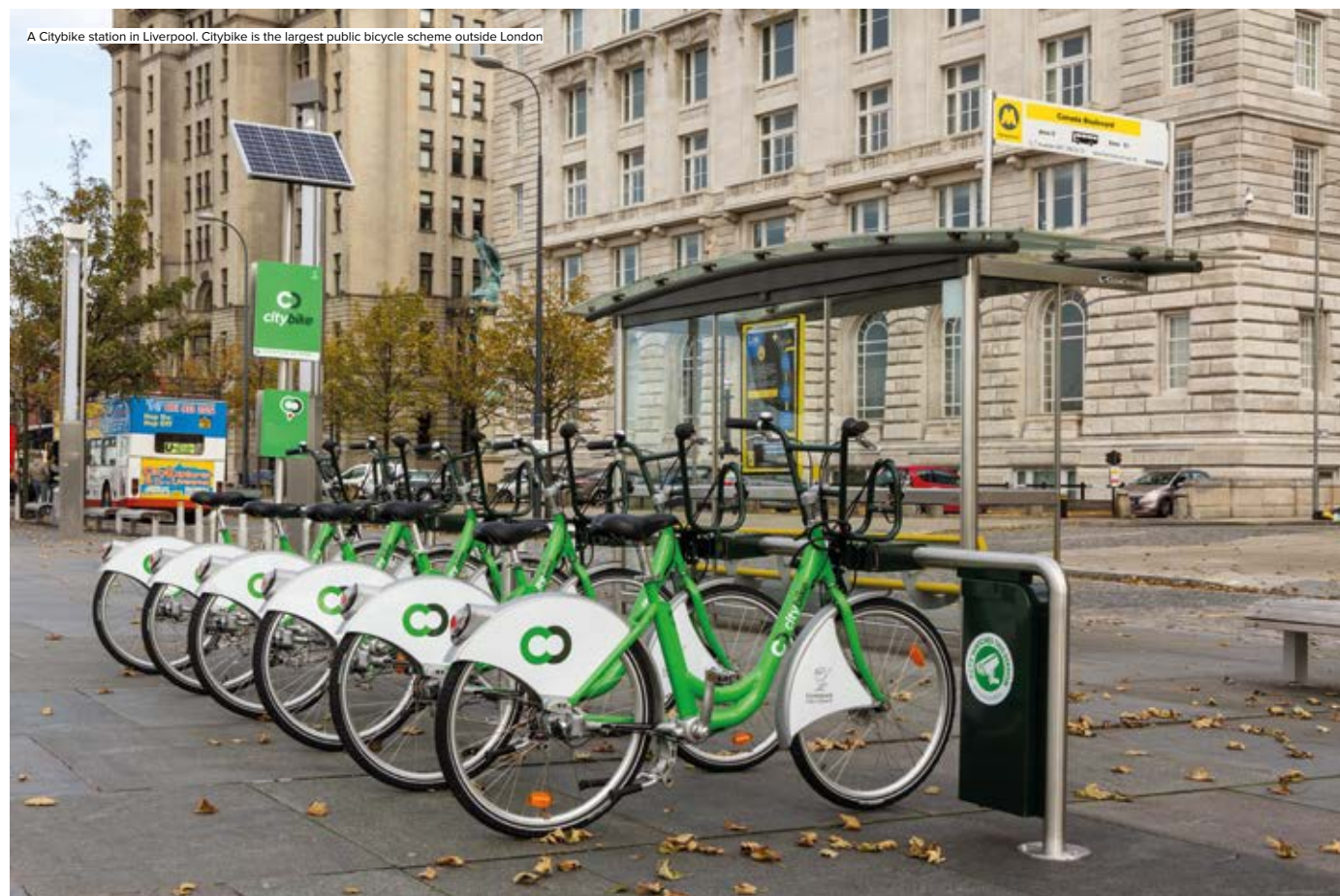
- Creation of a municipal-owned farm to deliver local organic vegetables to the canteens
- 100% organic meals
- Reorientation of public procurement rules towards local products, using a set of criteria focussing on food quality, environment preservation and cost, with no extra costs
- Dramatic reduction of food waste. The economic savings that resulted from local sourcing made it possible to offer 100% organic food in school canteens at a fixed cost
- Employment protection: two municipal farmers collaborate with cooks, a nutritionist, managerial staff and elected representatives. Short supply chains and local consumption have increased employment
- Shift to a healthy diet: food quality and higher nutritional standards, providing for children fresh, seasonal and balanced meals from non-industrial products, local and organic, cooked on-site from raw products. An effort is put into vegetable proteins in the diet, a saving that enables the purchase of better-quality meat
- An Observatory of Sustainable Food (OSF) was created to follow up on actions and track families' food and consumption habits and the evolution of their behaviours
- Sustainable land use: to deal with urban sprawl, the local urban planning strategy protected 112 hectares of agricultural land, thus tripling the area dedicated to farming.

To disseminate this Good Practice, Urbact III subsequently funded Mouans-Sartoux to lead a Transfer Network called 'BioCanteens' to help other cities develop an integrated local agri-food strategy. Participants included cities of LAG Pays des Condruces, Belgium; Vaslui, Romania; Trikala, Greece; Rosignano Marittimo, Italy; Torres Vedras, Portugal; and Troyan, Bulgaria.



highly visible biodiversity value, including the Sefton coast. Yet, perhaps contrary to what many might assume, urban and suburban areas – including private gardens – can also sustain an appreciable degree of biodiversity (Convention on Biological Diversity, 2012; Nilon et al., 2017). As such, there is a great deal that Liverpool City Region can do to enhance biodiversity, as well as a significant contribution that its local expertise can make in terms of complementing and 'sense-checking' incomplete national datasets (Van Dyke, 2008).

If the case for bolder action on biodiversity at a city regional level – the 'why' – can be won, then the question moves on to one of operationalisation – the 'how'. In particular, how can the ambition shown by Liverpool City Region's declaration of a 'Climate Emergency' – and its target of a zero-carbon city region by 2040 – be mirrored in its approach to biodiversity policy, when biodiversity itself has proven so challenging to measure and monitor? In addition, what policies and interventions are likely to maximise biodiversity value within the city region, taking into account its unique environmental makeup compared to other areas, as well as the variability and specificity of habitat from one place within the region to another? Likewise, how can biodiversity objectives be reconciled with the ongoing pressure to ensure economic and urban development, or indeed the pressure to secure improvements in other environmental areas? The solutions to these problems, relating to the technical implementation of policy, will of course depend in large part on the successful mobilisation of public opinion and partnerships for delivery. This is a prerequisite that begs further questions. For example, how can LCRCA and LCR local authorities raise public awareness of, support for, and engagement with biodiversity policies? And how can LCR best bring public bodies, experts, activists, and major landholders together in order to deliver effective interventions? It is beyond the purview of this report to answer these questions, but our concluding section does offer some suggestions as to where the answers might lie.



A Citybike station in Liverpool. Citybike is the largest public bicycle scheme outside London

## 4C. DETOX: CLEANING THE AIR WE BREATHE

### Policy Environment

Across the globe, the World Health Organization (2016) estimates that ambient air pollution causes in excess of 3 million deaths per year. According to Public Health England (2014), air pollution is the biggest environmental threat to health in the UK, with between 28,000 and 36,000 deaths a year attributed to long-term exposure. Liverpool City Region has some of the highest levels of air pollution in the country, with Public Health England estimating that it contributes to around 700 deaths a year locally.

Air pollution, then, is recognised as a major cross-cutting international public policy concern that features prominently on the agendas of key intergovernmental organisations. For instance, in May 2015, WHO Member States (including the UK) adopted resolution *WHA68.8, Health and the environment: addressing the health impact of air pollution*, which urges a redoubling of efforts ‘to identify, address and prevent the health impacts of air pollution’. This resolution was further reinforced at the World Health Assembly in Geneva the subsequent year, where a road map for an enhanced global response to

air pollution was elaborated. Additionally, the WHO’s 2005 Air Quality Guidelines continue to inform policymakers worldwide, providing targets relating to four air pollutants: particulate matter (PM), ozone (O<sub>3</sub>), nitrogen dioxide (NO<sub>2</sub>), and sulphur dioxide (SO<sub>2</sub>). These influential guidelines are under revision, with an expected 2020 publication date.

Legally binding EU targets require emission reductions of the most damaging air pollutants by 2020 and 2030 – see Table 2. In part, these derive from the Ambient Air Quality Directive (2008/50/EC), which replaced much of the previously enacted air quality legislation in the EU, as well as the 1999 Protocol to the UNECE Convention on Long-Range Transboundary Air Pollution. For example, the former sets out limit and target values in relation to concentrations of major air pollutants, with Member States required to produce air quality plans for zones where these values are exceeded, followed by implementation of appropriate abatement measures within the imposed timeframes for compliance. Associated monitoring and reporting regimes place obligations on national Governments to report air quality data to the European Commission (EC) annually. The National



Table 2

## Percentage reduction targets by 2020/30 of five key pollutants from 2005 baseline (EU)

Pollutant	2020 reduction target	2030 reduction target
Fine particulate matter	30%	46%
Ammonia	8%	16%
Nitrogen oxides	55%	73%
Sulphur dioxide	59%	88%
Non-methane volatile organic compounds	32%	39%

Source: adapted from Defra, 2019a, p.97

Emissions Ceilings Directive (2001/81/EC), predominantly interested in 'transboundary air pollution', and the 4<sup>th</sup> air quality daughter-directive Directive (2004/107/EC), which seeks pollution level reductions from arsenic, cadmium, mercury, nickel, and polycyclic aromatic hydrocarbons in the ambient air, are two further EU Directives transposed into UK law.

Following the UK's exit from the EU, the Government indicates that existing European environmental law will continue to have effect, although a new UK Office for Environmental Protection is proposed to oversee scrutiny and enforcement mechanisms currently provided by EU institutions (Department for Environment, Food and Rural Affairs, 2019a, p. 80). However, as Barnes et al. (2018) acknowledge, among other uncertainties, it is unclear whether the UK will be liable post-Brexit for EC fines imposed for infractions occurring during its period of EU membership.

A plethora of legislative provisions, regulations, strategies, standards, and guidelines pertain to air quality in the UK, dating back to the first Clean Air Act in 1956, which was introduced to tackle deadly smogs – the 1952 'London Smog' caused some 4,000 deaths (Longhurst et al., 2016). While the devolved administrations in Scotland, Wales and Northern Ireland are responsible for meeting air quality limit values within their respective jurisdictions, with the Mayor of London also enjoying additional powers, the Department for Environment, Food and Rural Affairs (Defra) oversees and coordinates within England and across the UK as a whole.

In terms of legislation, the Environment Act 1995 legislated for the production of a national air quality strategy and effectively created the prevailing system of local air quality management. Furthermore, the Air Quality (Standards) Regulations 2010 transposed the EU's Ambient Air Quality Directive into English law. In the near future, the UK Government is proposing the introduction of new primary legislation on air quality (Department for Environment, Food and Rural Affairs, 2019a). A draft

Environment (Principles and Governance) Bill was published in December 2018, which, among other things, seeks to ensure that "responsibility for tackling air pollution is shared (across local Government structures and with relevant public bodies)" (Department for Environment, Food and Rural Affairs, 2019b).

In terms of policy, Defra's first national air quality strategy was released in 1997, with subsequent updates culminating in the 2007 Air Quality Strategy for England, Scotland, Wales and Northern Ireland. However, the recently-published Clean Air Strategy 2019 details the cross-Government and societal actions required to improve air quality, representing a key component of delivering the Government's 'A Green Future: Our 25 Year Plan to Improve the Environment' (Department for Environment, Food and Rural Affairs, 2018b). The Clean Air Strategy outlines new goals to combat air pollution, including reducing fine particulate matter concentrations so that the number of people living in UK locations above the WHO guideline levels falls by 50% by 2025 (Department for Environment, Food and Rural Affairs, 2018b). These complement other targets, such as requiring an end to the sale of new petrol and diesel cars and vans in the UK by 2040 (Department for Transport, 2018).

National strategies have also been introduced in relation to specific pollutants, particularly those where the UK is presently failing to meet internationally agreed reduction targets. Thus, Defra and the Department for Transport (DfT) jointly published the UK plan for reducing roadside nitrogen dioxide concentrations in 2017, focussing on reducing road vehicle pollution in particular, and suggesting that local authorities are best positioned to lead local action to improve the situation. This plan followed in the aftermath of a 2015 UK Supreme Court ruling ordering the Government to introduce measures within the national action plan for NO<sub>2</sub> to meet compliance across air pollution zones in the shortest time possible.

Local authorities in the UK have statutory duties to review and assess air quality in their areas against national air

quality standards, preparing Annual Status Reports to central Government. Though local authorities have no responsibility to achieve the Air Quality (Standards) Regulations 2010 transposed from EU law, they are subject to the Air Quality (England) Regulations 2000 (Barnes et al., 2018). Furthermore, under Part IV of the Environment Act 1995, where prescribed objectives are not likely to be achieved in a timely manner, councils are required to designate an Air Quality Management Area (AQMA) accompanied by Air Quality Action Plans setting out how pollution 'hotspots' will be addressed. As of July 2018, 230 AQMAs were active across England (Department for Environment, Food and Rural Affairs, 2018a).

Since 2009, twelve AQMAs have been declared across the Liverpool City Region's six constituent local authorities, including the entirety of the Liverpool City Council area (see Table 3). Additionally, Wirral Council and Knowsley Council have no declared AQMAs, and Sefton Council revoked AQMA1 in August 2018, having successfully reduced particulate matter levels following traffic flow and other improvements in the area (Sefton Council, 2018). Problematically, although corresponding with experience elsewhere in the UK, nitrogen dioxide is the key pollutant in all declared AQMAs within the region, with particulate matter also a concern in Sefton Council's AQMA3. In the context of Liverpool's city-wide AQMA, six road lengths

Table 3

## Extant AQMAs in the Liverpool City Region

Local authority	AQMA	Description	Pollutants	Date declared
Liverpool	Liverpool City AQMA	An area encompassing the whole of the City of Liverpool	Nitrogen dioxide	01/04/2009
Sefton	AQMA2	An area encompassing Princess Way A5036 from the Ewart Road flyover up to & including the roundabout & flyover at the junction with Crosby Road South A565	Nitrogen dioxide	15/01/2009
Sefton	AQMA3	The area around the junction of Millers Bridge A5058 & Derby Rd A565	Nitrogen dioxide Particulate matter	15/01/2009
Sefton	AQMA4	The area around the junction of Crosby Rd North A565 & South Rd, Waterloo	Nitrogen dioxide	01/02/2012
Sefton	AQMA5	The area around the junction of Hawthorne Rd B5422 & Church Rd A5036, Litherland	Nitrogen dioxide	01/02/2012
Halton	Halton Widnes No. 1	Deacon Rd from the junction at Sayce Street, Albert Rd from the Bradley Public House to 150 Albert Rd, Robert Street, Peelhouse Lane from the junction with Albert Rd to the junction with Belvoir Rd	Nitrogen dioxide	01/03/2011
Halton	Halton AQMA No. 2	Milton Rd (starting at the junction with Kingsway heading east), Gerrard Street (incorporating the roundabout by Lugsdale Rd)	Nitrogen dioxide	01/03/2011
St. Helens	M6 AQMA No. 1	An area encompassing the M6 for its entire length within the borough	Nitrogen dioxide	30/04/2009
St. Helens	Newton High Street AQMA (No. 2)	High Street Newton-le-Willows (A49) between the junctions of Ashton Rd & Church Street	Nitrogen dioxide	30/04/2009
St. Helens	AQMA No. 3 (Borough Rd)	Borough Rd St. Helens between the junctions of Westfield Street & Prescott Rd including 5-9 Alexandra Drive & 1-17 Prescott Rd	Nitrogen dioxide	30/11/2011
St. Helens	AQMA No. 4 (Reflection Court)	Reflection Court, Linkway West, St. Helens	Nitrogen dioxide	30/11/2011

Source: Compiled from UK Air Information Service

were specifically identified by Defra as having NO<sub>2</sub> emissions predicted to exceed required maximum concentrations by the mandatory deadline of 2020 (Liverpool City Council, 2019).

#### Case study resources:

### Code of practice for Air Quality Plans

The EU Urban Agenda Partnership on Air Quality led by the cities of Helsinki, London, Utrecht, Milan, Constanta, and Duisburg has established a Code of Practice for Air Quality Plans.

The Air Quality Plan is a strategic planning instrument introduced by the Ambient Air Quality Directive 2008/50/EC (AAQD). The drafting of an Air Quality Plan (AQP) is compulsory for any 'zone' or 'agglomeration' within which the concentrations of pollutants in ambient air 'exceed any limit value or target value' designed for the protection of human health. The AAQD legislation requires that an Air Quality Plan sets out appropriate, cost-effective measures to achieve compliance with air quality limit or target values while keeping the period of exceedance 'as short as possible'.

But it is not easy to find guidelines on how to draft and implement an AQP at local level. Existing guidelines are not up to date, and mainly focus on tools for writing a plan, rather than on the legal and management processes that have to be followed for plan preparation, adoption and implementation. The Partnership therefore drafted a Code of Practice to help cities and local authorities in charge of managing Air Quality Plans to develop effective plans, comply with EU legislation, and better protect the health of citizens and the environment.

The Code is not intended to be a fully exhaustive guide for the preparation and implementation of an AQP. It starts from legislation and the state of the art, and draws inspiration from a list of good practices in drafting Air Quality Plans in full compliance with Directive 2008/50/EC provisions. It provides guidance, advice, methodologies and tools for 'policy issues to be addressed in the preparation of a plan, governance, the selection of measures to be adopted, implementation and monitoring challenges, the specific issues faced by city regions, and lobbying at national and international level'.



Local authorities in England are also empowered to operate Clean Air Zones (CAZs), defined as areas *"where targeted action is taken to improve air quality and resources are prioritised and coordinated in order to shape the urban environment in a way that delivers improved health benefits and supports economic growth"* (Department for Environment, Food and Rural Affairs and Department for Transport, 2017a, pp. 1-2). Local measures permitted include introducing access restrictions to encourage

cleaner vehicles in areas with persistent pollution problems. Moreover, Clean Air Zones can be Non-charging or Charging, the latter referring to areas where vehicle owners must pay to enter, or move within, when their vehicle does not meet the required clean standard for that zone; the choice of zone type is at the discretion of individual local authorities. To date, CAZs have been approved in cities such as Leeds, Birmingham and London.

The Metro-Mayor and LCRCA recognise the creation of an *"environment which allows our children and grandchildren to breathe fresher, cleaner air"* as a pressing public policy concern (Liverpool City Region Combined Authority, 2018). Although local councils are primarily charged with air quality monitoring and implementing reduction strategies, the Combined Authority's statutory remit over transport, as well as other responsibilities in economic development, housing and spatial planning, places an onus on championing, coordinating investments and mobilising effective responses at the city region level. Thus, in March 2019, the Combined Authority created an Air Quality Task Force to raise awareness of the issue and progress recommendations towards an action agenda. Furthermore, the Combined Authority Transport Plan (Liverpool City Region Combined Authority, 2019b, p. 23) identifies the development of a 'mobility system that enhances the health and wellbeing of our citizens' as one of five strategic priorities in tackling 'the challenges of poor air quality' and enabling the move towards a zero-carbon city region by 2040.

In November 2019, LCRCA will seek to endorse an 'interim air quality action plan', developed by its Air Quality Task Force. Proposals include:

- Development of a 600km walking and cycling network
- Investigating scrappage schemes such as a Taxi Scrappage Scheme
- Working towards a net zero-carbon bus fleet by 2040
- Rolling out a network of alternative fuel facilities across the region, such as hydrogen fuelling facilities, linked to a £6.4 million scheme to pilot hydrogen buses in the city region
- Investigating alternative models of bus delivery
- Potential of a boiler scrappage scheme to help address domestic consumption and fuel poverty
- Investigating measures to reduce heat loss from homes, potentially through retrofitting insulation
- Procuring new, cleaner, greener Mersey Ferries vessels to replace the existing, 60-year-old vessels
- Making the case to Government for long-term funding certainty to support the delivery of measures that support clean air.



### Indicative actions taken at the scale of LCR:

## Improving air quality

- Statutory duty to review and assess air quality against national air quality standards; preparing Annual Status Reports to central Government
- Declared 12 Air Quality Management Areas (AQMAs) accompanied by Air Quality Action Plans setting out how pollution 'hotspots' will be addressed
- LCRCA established a Clean Air Taskforce and aspires to introduce an 'interim air quality action plan'
- LCC preparing a new 'Clean Air Plan'
- LCC established new public-facing website 'Let's CLEAR the AIR Liverpool'
- Placed improved air quality at the heart of transport planning.

## Key Issues

### Nitrogen dioxide targets

Failure of the UK and numerous other European countries to adequately address persistent breaches of nitrogen dioxide emission levels remains a critical air quality issue. In the recent past this caused infraction proceedings to be instigated against the Government by the EC, with the potential imposition of substantial fines by the European Court of Justice. At the local level, as per the previous discussion outlined in respect of Liverpool City Region, nitrogen dioxide exceedances are implicated in the declaration of all AQMAs within the region. Both Liverpool City Council and Sefton Council (along with 31 other local authorities in England) were the subject of a Defra Ministerial Direction in March 2018 under the 1995 Environment Act, requiring a feasibility study into proposed measures to ensure future compliance with the statutory limits.

According to the Department for Environment, Food and Rural Affairs and Department for Transport (2017b, p. 17), "road transport is still by far the largest contributor to NO<sub>2</sub> pollution in the local areas where the UK is exceeding limit values". Consequently, reducing vehicle emissions is central to addressing the exceedance problem, including through incentivising the introduction of cleaner vehicles and phasing out the sale of conventional petrol and diesel cars, encouraging the use of public transport, and investing in walking/cycling infrastructure. Presently, Liverpool City Council is collaborating on the URBAN GreenUP project, which promotes the provision of cycle and pedestrian green routes as one multi-objective nature-based solution to increasing the overall sustainability of cities.

It is important to underline that, although the public policy concern with nitrogen dioxide emissions is primarily framed around meeting legally binding targets, measureable health

impacts are also associated with exposure to concentrations below current EU limits (Brunt et al., 2016). This remains the case for other pollutants such as particulate matter, meaning that in places like Liverpool, where relatively low concentrations of the latter are presently observed, "*there is still a health impact on the local population*" (Liverpool City Council, 2019, p. i). The Government indicates that 'whilst challenging', it is 'technically feasible' to meet WHO guidelines on particulate matter across the UK within the envisaged timeframes (Department for Environment, Food and Rural Affairs, 2019b).

### Resourcing air pollution reductions

The Chancellor of the Exchequer in the 2019 Spending Round recently pledged an additional £30 million to 'tackle the crisis in our air quality' (HM Treasury, 2019). However, limited resources are a constraining factor on the implementation of effective strategies and measures, particularly at local authority level, where many responsibilities for addressing pollution hotspots ultimately lie (Barnes et al., 2018; Brunt et al., 2016). Furthermore, austerity measures have reduced the capacity of local authorities through curtailed investment and the loss of key personnel (Moorcroft and Dore, 2013), while Part 2 of the Localism Act 2011 states that fines in relation to the UK's failure to meet EU air pollution targets can be passed down to the local level (Barnes et al., 2018).

Although Government funding has been available to local authorities since 1997 through Defra's Air Quality Grant scheme, this is allocated on a competitive basis, and is modest in scale – 28 projects were awarded over £3 million in the most recent awarding round, including £100,000 for a Sefton Council campaign to 'raise awareness around the issues of domestic burning' (Department for Environment, Food and Rural Affairs, and Department for Transport, 2019).

More substantial funding opportunities for local authorities arise from the 2017 Clean Air Zone Framework for England. This includes a £275 million Implementation Fund, which recently supported Liverpool City Council in preparatory work for its proposed Clean Air Plan (Air Quality News, 2019), and a £220 million Clean Air Fund, which seeks to minimise the impact of local air quality plans on individuals and businesses. The latter funding can support such measures as new Park and Ride services, and improvements to bus fleets. Establishing a Clean Air Zone prospectively provides a competitive advantage to local authorities when bidding for other central Government funding where improvement to air quality is one of the stated assessment criteria (Department for Environment, Food and Rural Affairs, and Department for Transport, 2017a).

Additionally, under the Strategic Priorities Fund, delivered by UK Research and Innovation (UKRI), a joint research programme worth £19.6 million was established in 2018, including a funding stream aimed at developing air pollution solutions with policymakers and businesses. The Clean Air: Analysis & Solutions programme is led by the Natural Environment Research Council (NERC) and the Met Office, and aims to "*support multidisciplinary research and innovation to stimulate practical and usable solutions for*

*clean air*" (Natural Environment Research Council, 2019). The need for innovation in this space is clear, not least in developing readily applicable and lower-cost means for local authorities to measure the improvements in air quality deriving from actions taken (Liverpool City Council, 2019, pp. 5-6).

### Governance of air quality reductions

Several critiques of the present system of governance of air quality reductions are worth underscoring. Firstly, Brunt et al. (2016, p. 57) advocate for the greater integration of public health in the operation of the local air quality management system. In particular, they argue that the role of public health is presently 'poorly defined' in the process, creating a situation "*where Local Governments fail to routinely consult and collaborate with Public Health because it is not specifically prescribed in the process, and Public Health fails to engage and contribute because they are not aware, sufficiently skilled, or routinely invited to do so by Local Governments*". Ensuring such integration takes place would assist at the review and assessment phase, particularly around the sharing and interpretation of data, and the action planning phase, where 'more focussed, coordinated and impactful' measures could be taken in those areas 'where the greatest health gain can be achieved' (Brunt et al., 2016, p. 58).

Secondly, a broader critique of disconnects within UK air quality policy, and between the UK and EU, is elaborated upon by Barnes et al. (2018). They identify multiple inconsistencies between national and local policies and their implementation, not least in the divergent legislative and regulatory responsibilities for achieving and reporting pollutant limit values. Moreover, they recognise a lack of coordination between national and local actions, with criticism of the Government reiterated for the over-reliance placed on local authority implementation without the necessary scope, scale, power or resources. Indeed, the failure of EU and national air quality policies to reduce background nitrogen emissions from vehicles ultimately limits the effectiveness of any action taken by councils to reduce local hotspots. Problematically, poor interdepartmental coordination nationally flows from the separation of managing air quality (Defra) from regulation of the main pollution source of road transport (DfT), partly because of the predominant treatment of air quality in governance terms as an 'environmental' issue (Barnes et al., 2018, p. 35).

Disconnects are also evident in relation to spatial planning, where "*differing priorities between national departments often translate downwards into competing priorities at a local level as divergent agendas are enforced through top-down policy and practice guidance*" (Barnes et al., 2018, p. 36). Indeed, air quality considerations are rarely given determining weight in development management decisions, for example, with housing and economic growth targets usually overriding, in spite of the National Planning Policy Framework making positive reference to air quality improvements (Ministry of Housing Communities and Local Government, 2019).

### Inequality and the 'triple jeopardy' effect

The impacts of poor air quality are unequally distributed between and within countries, regions and cities, with poorer communities disproportionately affected. Globally, the World Health Organization (2019) reports that low- and middle-income countries experience the highest burden of ambient air pollution, particularly in the Asia-Pacific and the South-East Asia regions. Within the UK, the coincidence of the so-called 'triple jeopardy' of air pollution, poor health indicators, and social deprivation compound and exacerbate already existing inequalities (Brunt et al., 2016; Goodman et al., 2011). This is especially inequitable as low income communities are not the primary generators of high air pollution levels, given the higher prevalence of car ownership in more affluent areas (Barnes et al., 2018), yet they suffer excessively due to their frequent proximity to busy inner-city roads through which heavy commuting traffic passes (Liverpool City Region Combined Authority, 2019b). In certain places this coincides with predominantly ethnic minority and immigrant communities (Tonne et al., 2018), reinforcing poor air quality as a social injustice as well as an environmental and health related issue.

### Citizen science and pollution monitoring

Engaging citizens more closely in the monitoring and management of air pollution levels represents a significant opportunity for innovative collaboration between national and local Government, industry, the university sector, civil society, and local communities. Currently, pollution levels are officially monitored at dozens of fixed locations throughout the Liverpool City Region, including several stations at Speke, Widnes and the Wirral, forming part of Defra's Automatic Urban and Rural Network (AURN). Research undertaken as part of the EU-H2020 funded iSCAPE project (Improving the Smart Control of Air Pollution in Europe) suggests substantial benefits from proactively collaborating with local communities in monitoring air pollution, particularly leading to better understanding of exposure levels and related health impacts (Mahajan et al., 2019). Of course, critical issues to the wider adoption of such approaches include the reliability of the low-cost mobile sensors (Jiao et al., 2016), and the limited integration of collected data into official monitoring programmes (Wesseling et al., 2019). However, as Brunt et al. (2016, p. 56) state, communities "*can play an important role in documenting and understanding health concerns and inequities, and fostering corrective action*", especially as they are largely 'disengaged' from local air quality management processes in the UK.

**Case study resources:**

## ERDF Urban Innovative Action DIAMS – Digital Alliance for Marseille Sustainability, Aix-Marseille-Provence metropole

Awarded an Urban Innovative Actions Grant of nearly €4m, the new metropolis of Aix-Marseille-Provence is seeking to exploit digital technology to combat its air quality problems.

The DIAMS project (Digital Alliance for Marseille Sustainability) is working to develop a mass-produced system platform on air quality, using micro-sensor technology and the know-how of local start-ups, digital players and official environmental agencies. It has four main objectives:

- a) Perception: to improve air quality information and produce high quality, detailed data
- b) Balance: to promote a fluid transmission of territorial data and air quality data between urban, regional and national platforms and to ensure their consistency
- c) Creation: to stimulate creativity by harnessing the expertise of citizens and the private sector to co-develop and implement innovative solutions to improve air quality
- d) Movement: to provide personalised and adaptable information to citizens and policymakers to encourage their awareness and engagement.

In concrete terms, the DIAMS project consists of deploying a platform for the exchange of data on air quality and digital services that allows everyone (political decision-makers, experts, citizens, civil society, and economic actors, for example) to commit themselves to developing coordinated action plans at all territorial levels (individual, hyper local, urban, regional, national, and supranational). It will give all stakeholders measurement tools and access to real-time data (provided by the micro sensors), allowing them to better understand their air quality footprint and to monitor, adapt and change their behaviour.



consistent data on local air quality is a problem within many areas in the UK, including the Liverpool City Region, the use of alternative technologies and citizen-science approaches can potentially combine to underpin more robust monitoring and decision-making processes.

Other innovations in air pollution monitoring are also progressing. For instance, Pope et al. (2019) report on advances in the use of high resolution satellite observations from space. Among the suggested benefits, the authors argue that increasingly sophisticated satellite technology addresses coverage gaps in the surface network of the AURN air pollution monitoring stations, prospectively contributing to better monitoring, modelling and forecasting capabilities. Given that the lack of real-time and





## 4D. FROM 'WASTE' TO 'RESOURCE': BUILDING A CIRCULAR ECONOMY

### Policy Environment

The pivotal 'Directive 2008/98/EC of the European Parliament and of the Council' affirmed the EU's commitment to basic waste management principles, including:

- A waste management hierarchy (prevention is preferred over re-use, then recycling, then energy recovery, with finally disposal being a last resort)
- The polluter pays principle and extended producer responsibility (those who create waste take ownership of and pay for its redemption, even if that occurs further down the production chain)
- Self-sufficiency and proximity (waste produced locally should be handled locally)
- The precautionary principle (in governing waste, human health and environmental protection should always take precedence)
- Waste management planning (competent authorities should be mandated to develop area-based strategic waste management plans).

In recognition of the growing imperative to recast waste as a resource, to rethink the lifecycle of materials, and to transition from a linear to a circular economy, in 2015 the European Commission introduced its first Circular Economy Package, which included revised legislative proposals on waste (in particular Directive (EU) 2018/851 of the European Parliament and of the Council, amending Directive 2008/98/EC) and a comprehensive Circular Economy Action Plan comprising 54 concrete actions (European Commission, 2018, 2019). This plan includes actions to strengthen prevention and extend producer responsibility, which in combination have the capacity to impact local authorities significantly in terms of transferring waste management costs to business and improving recycling rates. Galvanised by its enthusiastic reception and successful implementation, in 2018 a second Circular Economy Package followed, which included an 'EU Strategy for Plastics in the Circular Economy', a Monitoring Framework of Indicators for the Circular Economy, and a proposal for a 'Directive on the reduction of the impact of certain plastic products on the environment' which introduces timescales for banning some plastics. Most recently, Finland's presidency of the Council of the EU (1 July–31 December 2019) has prioritised the motif of 'Circular Economy 2.0'.

EU Waste Directives, policies and practices continue to frame and instruct waste management planning and strategies in the United Kingdom.

Reflecting the evolution of EU policy approaches and frameworks, the 2000 'Waste Strategy for England and Wales' was superseded by the 2007 'Waste Strategy for England' and then the 2013 'Waste Management Plan for England'. Historically, EU Waste Directives and policies have for the most part been transposed directly into UK legislation. However, given the uncertainty caused by Brexit, it remains unclear whether the UK will adopt in full the EU Circular Economy Package. In the name of a 'Green Brexit', the UK has moved decisively to engage and promote circular economy ambitions, targets and policies. The circular economy features centrally in the UK's 2018 'A Green Future: Our 25 Year Plan to Improve the Environment' and the subsequent 2018 'Resources and Waste Strategy for England' (Department for Environment, Food & Rural Affairs, and Environment Agency, 2018). Included are actions to extend produce responsibility and introduce deposit return schemes (all within the context of the circular economy), the mission to reduce greenhouse gases, and the objective of conserving natural capital. The strategy also has direct links to the UK Government Clean Growth Strategy, affirming the importance of waste in economic development and pointing to its importance in the Local Industrial Strategies which prioritise clean growth.

The Merseyside Recycling and Waste Authority (MRWA) was established in 1986 as a joint authority to manage waste generated by the five constituent councils of Knowsley, Liverpool, Sefton, St. Helens, and Wirral. The Merseyside and Halton Waste Partnership (MHWP) includes Halton Borough Council, which has a separate but aligned waste strategy.

In an effort to generate sufficient waste infrastructure to deal with contingent future trajectories, the Joint Merseyside and Halton Waste Local Plan 2013–2027 provided pessimistic (maximum waste created) and optimistic (minimum waste generated) estimates for competing waste streams from 2010–2030 – see Table 4.

When set into a wider context, it is evident that Liverpool City Region generates less overall waste per capita, produces lower per capita construction, demolition, extraction, hazardous, and agricultural wastes, but deposits higher per capita commercial and industrial wastes. Whilst mode of disposal is difficult to estimate and varies by waste stream, LCR mirrors national trends, continuing to rely on landfill, incineration and recycling; whilst recycling rates have followed the national trend and increased significantly over the long-term, they have slightly declined very recently, with just over 40% of household waste being recycled – below the national average of 46%.

**Table 4**

## Forecasts of waste streams used in the Joint Merseyside and Halton Waste Local Plan 2013–2027 (pessimistic [maximum waste created] and optimistic [minimum waste generated] in Thousands of Tonnes [TT])

Waste stream by potential future scenario	2010 TT	2015 TT	2020 TT	2025 TT	2030 TT
<b>Local Authority Collected Waste – Pessimistic</b>	836	848	860	860	860
<b>Local Authority Collected Waste – Optimistic</b>	836	805	787	803	819
<b>Commercial Waste – Pessimistic</b>	751	742	772	791	791
<b>Commercial Waste – Optimistic</b>	751	742	733	733	733
<b>Industrial Waste – Pessimistic</b>	363	363	363	363	363
<b>Industrial Waste – Optimistic</b>	354	331	331	331	331
<b>Construction and Demolition Waste – Pessimistic</b>	2220	2233	2280	2336	2385
<b>Construction and Demolition Waste – Optimistic</b>	2220	2220	2231	2253	2270

Source: Joint Merseyside and Halton Waste Local Plan 2013–2027

Merseyside 2011–2041 (MRWA, 2011) provides a strategic ‘route map’ to deliver sustainable waste management in the MRWA area. It prioritises reducing the climate change/carbon impacts of waste management; maximising waste prevention; maximising landfill diversion/recovery of residual waste; maximising sustainable economic activity associated with waste management; reducing the ecological footprint of waste management activities; and promoting behavioural/cultural change that delivers the objectives of the strategy. Meanwhile, the Joint Merseyside and Halton Waste Local Plan 2013–2027 is the first Local Plan which has been successfully produced as a result of collaborative working between the constituent authorities comprising MHWP. As noted, this plan forecasts likely

waste streams to 2027, and develops a systematic approach to increasing waste management infrastructure (such as landfill, incineration, and recycling facilities) to service predicted waste volumes.

Waste management in MRWA has been further impacted by four developments. Firstly, in 2016 the Liverpool City Region Metro-Mayor and other MRWA leaders commissioned an independent strategic review of waste management to identify opportunities for efficiency savings, given austerity cuts and shrinking council budgets (Local Partnerships, 2016). This review concluded that whilst MRWA run an efficient waste disposal service and whilst there is limited savings potential, potential savings in the range

Table 5

## MHWP Targets Tracker (as of October 2019)

Year	Target	Source
2020	50% of waste from households prepared for reuse or recycled	EU Waste Framework Directive 2008/The Waste (England & Wales) Regulations 2011/Joint Recycling & Waste Management Strategy (JRWMS) for Merseyside 2011–2041
2020	Reduce the amount of local authority collected municipal waste (LACMW) landfilled to 10%	JRWMS
2025	55% of municipal waste reused or recycled	Revised EU Waste Framework Directive 2018
2025	20% reduction in UK food and drink waste and carbon emissions compared with 2015	Courtauld Commitment
2025	All plastic packaging placed on the market being recyclable, reusable or compostable	Our Waste, Our Resources: A Strategy for England 2018
2025	70% of all plastics packaging waste effectively recycled or composted	UK Plastics Pact 2018
2030	Eliminate landfilling of food waste	Clean Growth Strategy 2017
2030	Reduce the amount of LACMW landfilled to 2%	JRWMS
2030	Reduce total waste arising from households by 8% based on 2011 levels	JRWMS: Merseyside
2030	60% of municipal waste reused or recycled	Revised EU Waste Framework Directive 2018
2035	65% of municipal waste reused or recycled	Revised EU Waste Framework Directive 2018
2035	Landfill of municipal waste limited to 10%	Revised EU Waste Framework Directive 2018
2040	Zero-carbon Liverpool City Region	LCR Metro-Mayor
2042	Eliminate avoidable plastic waste	25 Year Environment Plan 2018
2050	Zero avoidable waste and a doubling of resource productivity	Clean Growth Strategy 2017
2050	Reduce carbon emissions by 100% of 1990 levels	Climate Change Act 2008 (amended 2019)

Source: Constructed by staff at MRWA, October 2019)



of £11m to £19m were possible through greater collaboration, more partnership working, and increased integration. Secondly, in 2018 MRWA joined with a range of partners to form the Liverpool City Region's new Circular Economy Club, a forum to engage with best international practice via a network of more than 2,600 circular economy professionals and organisations across 60 countries. The Club aims to accelerate circular economy activities across the Liverpool City Region. Thirdly, MRWA is a signatory to 'Courtauld 2025', a voluntary agreement that brings together stakeholders to reduce waste arising from within the food system. Finally, the MRWA and Veolia Community Fund provides annual funds to support recycling projects in Merseyside and Halton, and which have the potential to recycle, upcycle and prevent waste. This fund provides training opportunities and supports isolated, vulnerable, and low-income households.

In combination, the policies of the EU/UK/Merseyside Recycling and Waste Authority (MRWA) and Merseyside and Halton Waste Partnership (MHWP) prescribe a set of key targets and metrics for the city region to 2050 – see Table 5.

#### Indicative actions taken at the scale of LCR:

### Managing and reducing waste

- Merseyside 2011–2041 Plan provides a strategic 'route map' to deliver sustainable waste management in the Merseyside Recycling and Waste Authority (MRWA) area
- Introduced the Joint Merseyside and Halton Waste Local Plan 2013–2027, the first Local Plan produced as a result of collaborative working between the constituent LCR local authorities
- Built new hard and soft infrastructure; significant investment in recycling infrastructure, including recycling centres; nationally significant energy from waste facility – Runcorn Energy from Waste (EfW)
- Independent strategic review of waste management to identify opportunities for efficiency savings, given austerity cuts and shrinking council budgets
- MRWA joined with a range of local partners to form the Liverpool City Region's new Circular Economy Club
- MRWA is a signatory to 'Courtauld 2025', a voluntary agreement that brings together stakeholders to reduce waste arising from within the food system
- MRWA and Veolia Community Fund provides annual funds to support community recycling projects in Merseyside and Halton, which have the potential to recycle, upcycle and prevent rising waste
- A not-for-profit 'Changing Streams' initiative designed to eradicate the use of plastics at source.

## Key Issues

### From managing waste to building a circular economy

A chief conceptual shift has occurred in the past decade, through which waste is being rethought of as a resource (Stahel, 2016; Merli, Preziosi and Acampora, 2018). According to the Waste and Resources Action Programme, *"a circular economy is an alternative to a traditional linear economy (make, use, dispose) in which we keep resources in use for as long as possible, extract the maximum value from them whilst in use, then recover and regenerate products and materials at the end of each service life"* (De Groene and WBSDC, 2015). The Ellen MacArthur Foundation (2018) has produced a Circular Economy in Cities Project Guide, in the belief that cities can drive the circular economy agenda forward to unlock the social, economic and environmental benefits which come from approaching waste management differently. According to the foundation, a circular economy comprises *"an industrial system that is restorative or regenerative by intention and design. It replaces the end-of-life concept with restoration, shifts towards the use of renewable energy, eliminates the use of toxic chemicals, which impair reuse and return to the biosphere, and aims for the elimination of waste through the superior design of materials, products, systems and business models"*.

Strengthening the Liverpool City Region's circular economy will not only ameliorate any residual damage wrought by landfill and incineration (potential leachate, water table, ambient smell, and negative land use externalities); it will also play an important role in helping the Liverpool Combined Authority meet its net zero-carbon 2040 target. Plastics, and in particular single-use plastics, constitute a priority area for action. As elsewhere – and being a port city – Liverpool City Region is being negatively affected by the way plastics are currently designed, produced, used, and discarded, and enter the sea and water ecosystem. LCR has knowledge assets which might enable it to lead research and development in materials manufacturing. The Materials Innovation Factory, co-founded by the University of Liverpool and Unilever as part of the UK Research Partnership Investment Fund (UKRPIF), provides a case in point.

### The need for circular economy business models

The circular economy has a central role to play in the Local Industrial Strategy, not least in regard to its importance in supporting 'clean growth'. It has the potential to support action on jobs, skills, health, and business innovation. But to achieve its potential, a focus upon changing business models and practices will be required (Ayres and Ayres, 1996; Deutz and Ioppolo, 2015; Blomsma and Brennan, 2017; and Korhonen, Honkasalo and Seppälä, 2018). Established cultures and practices need to be reset, and a market for waste as a resource cultivated. Alas, data on industrial, commercial, construction and demolition wastes at the scale of local authorities is lacking. It is clear, though, that it is sufficient to merit priority attention, and business-to-business waste loops need to be fortified urgently.

According to Zero Waste Scotland, circular economy business models can offer new commercial opportunities, contribute to business growth and sustainability, generate new revenue, transform a business's relationship with its customers, and protect an economy against resource shortages and the rising cost of materials. Examples of circular economy business models mooted by Zero Waste Scotland include:

**Hire and Leasing** – hire or leasing of products as an alternative to purchasing

**Performance/Service System** – providing a service based on delivering the performance outputs of a product where the manufacturer retains ownership, has greater control over the production of a product, and therefore has more interest in producing a product that lasts

**Incentivised Return** – offering a financial or other incentive for the return of 'used' products; products can be refurbished and re-sold

**Asset Management** – maximising product lifetime and minimising new purchase through tracking an organisation's assets, and planning what can be re-used, repaired or redeployed at a different site

**Collaborative Consumption** – rental or sharing of products between members of the public or businesses, often through peer-to-peer networks

**Long Life Products** – designed for long life, supported by guarantees and trusted repair services

### The social benefits of a circular economy

Circular economies support wider social improvements, and their wider social significance beyond waste must be recognised. The MRWA Community Fund provides important support for household prevention, reuse and recycling; given recent downward trends in recycling in LCR, this fund looks set to play an even more important role. It needs to work in tandem with innovative community incentive schemes. Recycling can help to combat a wider range of social issues, including crime, food poverty, skills training, loneliness, mental ill health, and so on. Liverpool has a strong community/activist base to draw upon.

### The need for a fresh strategic plan

Finally, as the city region transitions through waste management to zero waste and a circular economy, it might be productive to revisit its local strategy. The shift is paradigmatic and the new orientation merits fresh approaches. Whilst local plans are still live, given the ongoing shift in philosophy and thinking which is now taking place, there is scope to consider updating these plans or even beginning the process of creating a new Local Waste Plan afresh. A plan dedicated to building a circular economy in the Liverpool City Region might further help to focus future action.

### Case study resources:

## San Francisco's Cradle to Cradle Carpets for City Buildings Project

In the United States, over 80% of end-of-life carpets are deposited in landfills. In San Francisco, the city Government examined the lifecycle, health and environmental impacts of carpet materials and concluded that action was needed. The aim was to reduce the amount of discarded carpets sent to landfill and ensure the wellbeing of visitors and staff in San Francisco City Departments. In spring 2018, San Francisco adopted a new regulation requiring that all carpets installed in City Departments be at least 'Cradle to Cradle Certified Silver or better', and that they could not contain antimicrobials, fluorinated compounds, flame retardant chemicals, or other chemicals of concern. Additionally, both the backing materials and the carpet fibres had to contain minimum amounts of recycled materials, and ultimately be recyclable at end-of-use. SMEs responded to the challenge. The process inspired material and business innovation in the city. This regulation also limits future flooring purchases to carpet tiles, given that they are easily replaceable and help minimise waste. By focussing on the built environment supply chain, San Francisco was able to work towards meeting environmental and material health goals within city buildings – whilst creating a niche local SME sector with the capability of expanding to serve markets elsewhere.



**Case study resources:**

## ERDF Urbact III – Circular economy and social inclusion

The ERDF Urbact III Programme awarded the title of Good Practice City to 95 cities. Two of the awards were for urban initiatives which exploited the idea of the circular economy for social gain.

**Tropa Verde, rewarding recycling! Boosting environmental responsibility through gaming and rewarding**

Tropa Verde is a multimedia platform set up by Santiago de Compostela to encourage environmentally responsible behaviour. The project started after a 2015 survey showed that many inhabitants were reluctant to recycle due to habit and a lack of information. Using a game-based web platform, citizens can now win recycling vouchers and exchange them for rewards from the City Council and local retailers. In just a year and a half, they have obtained: high citizen participation, with over 2,500 users; 115 sponsors; 1,500 rewards offered; more than €15,000 in prizes and rewards; 22 centres issuing vouchers; over 16,000 vouchers given; more than 1,230 Facebook followers; and more than 440 Twitter followers. There are also workshops, street actions, and other promotional activities. School campaigns have collected 2,356 litres of used cooking oil and 3,299 electrical and electronic appliances, thanks to the participation of 2,416 students.

**Second Chance: Recovery and Repair – recovery of furniture providing recovery for people**

A cooperation between the Gothenburg City administration for social welfare allocation and two local IKEA department stores was launched in 2014 to provide homeless people with a step towards the labour market. The partnership enables people who have lived with isolation and abuse to strengthen their self-esteem, gain meaningful work, and furnish their homes. IKEA's recovery department has furniture that they can no longer sell because of transport damage to packaging or to the products themselves. Participants use a truck to pick up the discarded pieces of furniture at IKEA, fix them in a workshop, then display the repaired items. Other people in the group can then choose the furniture they need. It is a win-win model: participants and furniture all get a second chance. The benefits of the scheme are job training, recycling of discarded furniture, enhanced social inclusion, and cooperation between the municipal and the private sectors.





**Case study resources:**

## ERDF Urban Innovative Action, Super Circular Estate – Kerkrade, Netherlands

Awarded an Urban Innovative Actions Grant of over €4m, the municipality of Kerkrade in the Netherlands is currently undertaking a circular economy experiment aimed at 100% reusing and recycling of materials acquired from the demolition of an outdated social housing high-rise. In the next 30 years, the Parkstad Limburg region's population will shrink by 27% due to population ageing and youth migration to cities such as Amsterdam and Rotterdam. Less housing will be required. High-rise apartment buildings, which were mainly built in the 1960s when housing shortages existed, no longer satisfy residents' requirements. Three vacant high-rise apartment buildings in the project area in the city which contain valuable materials will be demolished. The objective of the Super Circular Estate is to reuse these materials within the project area itself to minimise waste, boost the local economy and create a high-quality and desirable urban environment.

The expected results for the Super Circular Estate Project are:

- The circular demolition of a high-rise apartment building of 100 dwellings, resulting in 24 material streams
- The establishment of four pilot housing units based upon different reuse techniques, each harvesting materials from the demolished high-rise buildings
- Approximately 125 former inhabitants of the area moving back into the new neighbourhood after the project is completed
- A closed water cycle providing 35 households with high-quality drinking water
- A community hub providing six services to strengthen social cohesion and build community capacity to reduce waste
- Building of a mobility platform providing e-cars, e-bikes and mobility scooters
- Reduction of CO2 emissions by 805,000 kilos less than would have been required were new houses built using new materials.



## 5. HOW CAN WE SCALE AND ACCELERATE OUR EFFORTS?

We now revisit our provocation from Section 3, and consider what a new UK social contract for sustainability and a just transition might mean for Liverpool City Region and its capacity to address the climate and ecological crisis. It is clear that there is much going in LCR to provide a sense of optimism. Local political leaders are acting swiftly to address climate and ecological challenges, and many innovative practices are emerging. In the spirit of triggering further discussion and advancing local conversation, we end by suggesting a number of reinforcing and additional priority actions for LCR stakeholders: LCRCA, LCR local authorities, LCR Local Enterprise Partnership (LEP), anchor public institutions, LCR businesses, social enterprise and third sector actors, and concerned communities and citizens. Whilst these actions could, to varying degrees, be undertaken within the existing political-economic model, our provocation is that their capacity to be enacted and their impact would be greatly enhanced if they were supported by a new UK social contract for sustainability and a just transition.

### • Proactive Government and a green public works programme:

LCR should lobby for, participate in the design of and play a role in executing a new UK social contract, and should identify and bring forth ambitious and compelling green infrastructure and public works projects which support clean growth. The Mersey Tidal Power Project signals the appropriate scale of ambition. Using budgets such as the LCRCA's Strategic Investment Fund, LCR itself has the capacity to lead and commission green public works projects.

### • Government needs to lead by example by green-proofing its institutions:

LCR anchor public institutions should ensure that their own practices are 'green-proofed' and that their procurement policies support environmental values.

### • Devolution and stronger City Regions:

More democratic power and resources need to be transferred to LCRCA and LCR local authorities to strengthen local capacity to enact bespoke remediation actions. Future City-Deals might become or include Green City-Deals. Austerity has savaged the capacity of local government to respond to the climate and ecological crisis. Effective local remediation demands an end to austerity and a new financial dispensation for local authorities.

### • Enhanced City Region environmental governance capacity:

Within LCR there is a need to establish which institutions/set of institutions might be needed to furnish the convening power

which will be required if the City Region is to drive forward a strategic and joined-up local response to the climate and ecological emergency – not least given the extent to which environmental problems range widely across climate, air, water, waste, and biodiversity, and additionally impinge upon a broad range of policy areas including economic development and regeneration, health, transport, housing, and education. A local conversation is required to establish a vision of what 'good' looks like – what would be the hallmarks of the greenest city region in the UK – and a media and public education campaign should keep this vision active and alive in the public square. The LCR Year of Environment has provided a good launch pad. Is there a need to support Nature Connected by establishing a time-limited LCR Green Commission? There must also be scope for disruptive and potentially risky public sector green entrepreneurship and leadership.

### • A disciplined and incentivised market delivering clean growth:

LCRCA, LCR local authorities and the LEP should scale business enablers and supports targeted at high-performing and high-impact local green technology and service companies, including innovative SMEs and social enterprises. The clean growth pillar of the Local Industrial Strategy (LIS) merits particular focus. There should be investment in a new generation of local climate and green services.

### • Encouragement for anchor institutions to achieve net zero-carbon targets:

LCRCA and LCR local authorities should offer encouragement to local anchor institutions from the public, private and third sectors who have set net zero-carbon targets by or before

2040 by or before 2040 and who are strategically contributing to decarbonisation and green actions.

### • **Government support for research and innovation:**

Strategic knowledge assets need to be scaled and mobilised. Partnerships such as the Liverpool Knowledge Quarter (LKQ) have a central role to play in convening research leaders and building local capacity for innovation in green technology and climate adaptation. There is a need to connect the LKQ to the city's transport system, including by opening a new local railway station. Much work remains to be done to extract value from hydrogen fuel. LCR should reflect upon an appropriate research agenda to underpin future technology, infrastructure and human resources development.

### • **Enhanced community and citizen participation:**

Communities need to be empowered to enable them to build resourcefulness and capacity to deliver green outcomes for their neighbourhoods and enjoy 'ownership' of green projects. Initiatives like Granby 4 Streets CLT, Transition Towns Liverpool, and Engage can help to inspire and foster grassroots projects.

### • **Affordable finance for soft and hard green infrastructure:**

LCR should lobby for and access pioneering new financial tools, packages, and rules to secure a new scale of public sector capital investment. LCR local authorities should be empowered to raise Municipal Green Bonds. LCR needs to consider the impact of the potential loss of EU Structural Funds after Brexit, and approach any new UK Shared Prosperity Fund as a potential source of equivalent revenue for capital projects and green innovation.

### • **Skill strategies to build a green workforce:**

Through the emerging Local Industrial Strategy (LIS) and aligned skills, training and apprenticeship plans, strategies and programmes, the LCRCA, LCR local authorities, LEP, FEI and HEIs should work to secure better understanding of the future world of work and generate the 'green' human resources necessary for a future economy predicated upon clean growth.

### • **Remediation which attends to social justice:**

**Promoting environmental justice locally:** LCRCA and LCR local authorities should work to redress environmental injustices by increasing the accountability of those most responsible for creating pollution and waste, and strengthening the ability of vulnerable groups to cope with the impacts of climate change.

**Promoting environmental justice nationally:** LCR stakeholders should position bids for green infrastructure within the context of the capacity of green investments to address regional inequalities. Currently, UK infrastructure spending is spatially blind and de facto concentrated in London and the South-East.

As identified by the UK2070 Kerslake Commission's *Inquiry into Regional Inequalities in the UK*, clean growth which aspires to deliver climate justice might instead be focussed on de-industrialised City Regions and left-behind places to ensure that the cost of climate change is not borne disproportionately by the UK's poorest regions.

**Promoting environmental justice globally:** When working towards their targets of achieving a net zero-carbon economy by 2040 or before, LCR stakeholders need to reflect upon the extent to which this ambition is to be defined territorially (a zero-carbon City Region) or globally (a City Region with a zero-carbon global footprint). It might place under scrutiny the impact of the waste which is exported through the Port on recipient countries, and further champion the self-sufficiency principle. It might develop further global responsibility partnerships, such as those between Liverpool City Council and the Poseidon Foundation.

### • **Improving carbon literacy:**

LCR might give more sustained scrutiny to greening its Smart Cities agenda and capitalising on initiatives such as Sensor City and its 5G rollout. Smart technology and bespoke real-time data feedback could increase the carbon literacy of all energy consumers, helping them calculate their carbon footprint and clarifying more precisely their carbon offsetting budgets.

### • **Spatial planning for eco-friendly cities:**

The first LCRCA Spatial Development Strategy (SDS) and other LCR spatial development plans should promote a spatial organisation and land use geography for LCR which maximises ecological objectives.

### • **New performance metrics:**

LCR might further develop bespoke measures of wellbeing which prioritise welfare outcomes and social justice, not simply economic growth. Inspired by pioneering methodology and mapping tools currently being developed to inform the LCRCA Spatial Development Plan, LCR should develop further analytical competency and specialist expertise in the application and use of natural capital approaches; there could be potential to develop a recalibrated natural capital approach, designed to enable and direct the local implementation of any new social contract. This could then factor into the City Region's framework for investment decisions, including the appraisal methodology for the LCRCA's Strategic Investment Fund.

### • **New models of data governance which serve the public good:**

To enable extraction of the full economic, social, and environmental value of big data sustainably and whilst maintaining public trust, LCR might create a 'civic data trust' for sharing climate and environmental data and enabling a new generation of climate services which serve all communities, including vulnerable communities.



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