
Cities and the climate and ecological emergency: The Liverpool City Region response

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

2040. The 2040 target will undoubtedly prove difficult to meet. This paper locates the LCR response within the context of the wider global climate and ecological crisis and national UK environmental policy and reflects upon achievements to date and actions which will need to be taken in future. Clearly, ‘business as usual’ will be insufficient and a new politico-institutional dispensation will be required if the net zero-carbon target is to be reached by 2040. An opportunity to undertake deep structural change exists: the COVID-19 pandemic has opened a global debate on how best to Build Back Better. But what any new social contract for sustainability and a just transition might look like remains unclear. This paper concludes by venturing some thoughts on what such a contract might mean for the LCR and its civic leaders.¹

Keywords: *Liverpool City Region (LCR), climate and ecological emergency, net zero-carbon, UK, environmental policy, sustainability transition*

INTRODUCTION

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 May 2019, 16-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.’² Following Thunberg’s address to the United Nations Climate Change Conference (COP24) in Katowice in December 2018, the ‘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 and into 2020 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.

In May 2019, Liverpool City Region Combined Authority (LCRCA)³ Metro Mayor Steve Rotherham declared a ‘climate emergency’ and affirmed LCRCA’s commitment to undertaking proportionate remediating actions. The Metro Mayor has set his sights on LCR becoming net zero-carbon by 2040; local authorities and anchor institutions from the public, private and third sectors have likewise set net zero-carbon targets by or before 2040. This 2040 target will undoubtedly prove difficult to meet.

Liverpool grew as a port city serving both British imperial expansion and the UK industrial revolution. Like many rustbelt port cities, the collapse of empire and deindustrialisation led to a spiral of

decline. Throughout the 20th century the city struggled to reinvent itself and has been described as the classic ‘left behind place’. But today LCR has turned the corner and is once again on the up. LCR

is amid a remarkable renaissance. From the mid-1990s it has enjoyed sustained urban regeneration. Liverpool will continue to grow as a city between now and 2040 — to a limited extent in terms of population, to some extent in terms of employment, and to a large extent in terms of gross value added (GVA) (see Table 1). At the same time, it is aspiring to become the greenest city in the UK.

A daunting challenge thus presents: how might LCR grow the local economy (by enacting a new Local Industrial Strategy [LIS] and progressing its regeneration agenda) while 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 paper we ask:

- What are the global challenges bearing on city-regions?;
- What is the UK doing to tackle the crisis and is it enough?;
- What is being done in LCR?;
- How can LCR scale and accelerate its response to the climate and ecological crisis?



Figure 1: Map of LCRCA boundary (in red)

Source: Geographic Data Sciences Lab, University of Liverpool

WHAT ARE THE GLOBAL CHALLENGES?

In *Doughnut Economics: Seven Ways to Think Like a 21st Century Economist*, British economist Kate Raworth (2017)⁴ argues that the prevailing political-economic model is ill-placed to tackle the

Table 1: Headline historic and projected growth rates, LCR and the UK (Note - pre COVID-19 projections)

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

Source: pers comm LCRCA

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, gross domestic product (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.⁵ 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 2). 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 that we need to thrive. At that point, 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.

Although not an exhaustive list, critical challenges include the following:

Global warming

According to the United Nations (UN) Intergovernmental Panel on Climate Change (IPCC),⁷ the mean surface

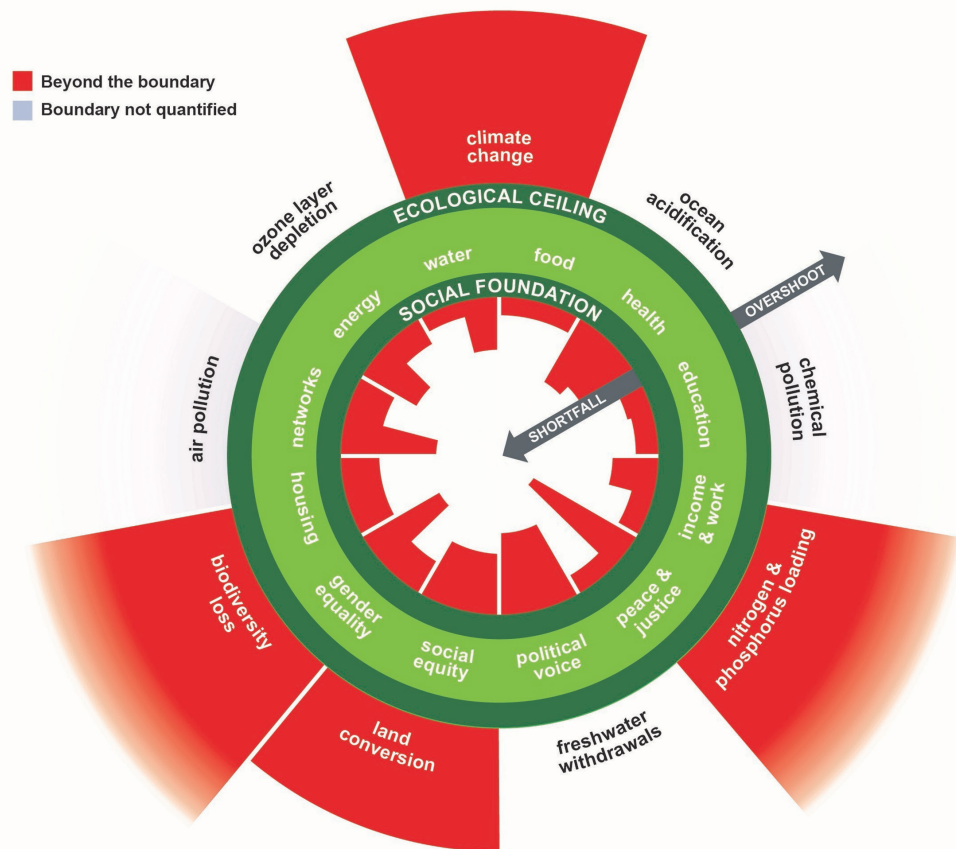


Figure 2: The Raworth doughnut model

Source Raworth⁶

temperature of the earth is now 1°C higher than in the pre-industrial era. While 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 to transform instead of shift waste-to-energy, biomass, geothermal and hydrogen energy. For some, nuclear energy should be added to this list. Unchecked, global warming will have an 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,⁸ 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 renaturing 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 (O₃), nitrogen dioxide (NO₂) and sulphur dioxide (SO₂) 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 Organization⁹ estimates that ambient air pollution causes in excess of 3m 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 up.

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

Waste, or materials which are residual to societal needs at a given moment in time and require disposal, derives from industry, commercial, construction and demolition, municipal, household and agricultural sources, and includes hazardous materials and end-of-life vehicles. Owing to the ongoing reliance on landfill and incineration, waste compromises environmental health and creates economic problems. The relationship between economic growth and waste generation varies according to the waste stream in question. Nevertheless, according to the World Bank¹⁰ without urgent action, global waste will increase by 70 per cent on current levels by 2050. Plastic wastes (constituting 12 per cent 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?

Water scarcity and clean water

Already over 1bn people currently do not have access to clean drinking water, more than 2bn people do not have access to adequate sanitation, and as many as 5m people die every year from preventable, waterborne infectious disease. In addition, tensions over the equitable sharing of water resources are aggravating international conflicts. In 2010, US water resources scientists Peter Gleick and Meena Palaniappan¹¹ argued that population growth, economic development and global warming have conspired to deplete and/or pollute the world’s stock of freshwater resources to the point that it is meaningful to speak in terms of ‘peak water’. According to Gleick, we might be approaching three kinds of ‘peak water’:

- Peak renewable water (where water is drawn from hydrological systems faster than it is replaced);
- Peak non-renewable water (where water is pumped from underground fossil aquifers faster than it is being replaced);
- Peak ecological water (where the ecological and economic costs of transporting water from areas of surplus to areas of deficit is too prohibitive to countenance).

How can we clean our hydrological systems and ensure that water supplies are safe? How can we ensure access to clean water for all?

Human interference

Human interference in the natural environment has not gone without response. Globally, the UN has sought to promote sustainable development, first through its eight Millennium Development Goals (MDGs) (2000–15), and most recently through its 2030 Agenda for Sustainable Development and 17 Sustainable Development Goals (SDGs)

(2016–30). 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) held in Berlin in 1995, the most recent in Madrid in 2019 (COP25) and the next scheduled for Glasgow in 2020 (COP26). Important agreements on the governance of climate have been signed [as a result of] COP meetings — the most recent being the Paris Agreement in 2016, which Committed countries to reducing carbon emissions and checking further temperature rises. Established in 1988, the 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.

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.

NATIONAL POLICY CONTEXT: 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 still 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?

Amid 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 intended to finalise a new ‘Environment (Principles and Governance) Bill’ later in 2019. 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, the Bill's success or failure will depend upon the extent to which:

- The domestic law it proposes to create carries judicial force equal to or greater than existing EU law;
- The list of environmental principles it proposes will be sufficiently comprehensive and properly adhered to;
- The Office of Environmental Protection is empowered and has legal reach;
- 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.

While 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 19th September, 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 Fund¹² argued that a global carbon tax of US\$75 per ton by the year 2030 — a quantum leap from the present US\$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 transformed and reregulated market liberalism 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 Gibbs¹³ 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, 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 will be up to the job?

Other commentators argue that the status quo will no longer do, and that 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 Klein¹⁴ 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 environmental 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'. 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.

Given the outcome of the UK December 2019 general election and the majority commanded by a Johnson Conservative Government, it now seems unlikely that the UK Labour Party policy and the Lucas and Lewis Bill will succeed in gaining traction in Parliament any time soon. Nevertheless the COVID-19 pandemic appears to have put all possibilities back on the table.

While 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, and the freight which the label comes with, we conclude that it is now better to speak in terms of the need for a UK social contract for sustainability and a just transition. We revisit this provocation in the final section.

WHAT IS BEING DONE IN LIVERPOOL CITY REGION?

In what ways does the global climate and ecological emergency bear on Liverpool City Region (LCR)?

Global warming

When set into global relief, UK carbon emissions, measured at 5–5.5 metric tonnes per capita per annum, compare relatively favourably — but still the UK ranks variously between the 40th and 50th largest per capita carbon polluter in the world. The UK has managed to achieve economic growth while reducing emissions. In 2018, carbon emissions in the UK were 44 per cent below 1990 levels. The first (2008–12) and the second carbon budgets (2013–17) have been met and the UK is on track to meet the third (2018–22), but it is not on track to meet the fourth or fifth carbon budgets (covering 2023–7 and 2028–32). Growth of the LCR economy is not expected to be slowed to any great extent by global warming; if anything, it might be boosted. But LCR will be affected by the increased frequency and intensity of extreme weather events — especially, given its coastal maritime location, flooding. In addition, its carbon emissions are contributing and will contribute to the immiserating by the Global North of the Global South. Aside from ethics and the

need to attend to global climate justice, an unstable Global South is liable to rebound on cities in the Global North — not least through climate refugees.

Biodiversity

The biggest threats to terrestrial and freshwater nature in LCR derive from agricultural management, climate change, urbanisation, pollution, hydrological change and woodland management. The 2019 UK State of Nature¹⁵ report states that with respect to the International Union for the Conservation of Nature's (IUCN) Red List categories, of the 8,431 species listed, 15 per cent have been classified as threatened with extinction from the UK and 2 per cent are already extinct. 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. Since 1970, the abundance of 214 species defined as 'priority' or of 'greatest conservation value' declined by 60 per cent and between 2011 and 2016 declined by 22 per cent. Over the long term, 63 per cent of priority species showed strong or moderate decreases in abundance and 22 per cent showed strong or moderate increases; 16 per cent showed little change. Between 1970 and 2016, the distribution of 395 priority species in the UK declined by 27 per cent. Over the long term, 37 per cent of species showed strong or moderate decreases in distribution and 16 per cent showed strong or moderate increases; 46 per cent showed little change.

Air quality

According to Public Health England,¹⁶ 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. LCR 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. Meanwhile pollutants such as PM, O₃, NO₂ and SO₂ are impairing air quality in LCR, causing 700 deaths every year. The impacts of poor air quality are unequally distributed across the region, with poorer communities disproportionately affected. Low-income communities are not the primary generators of high air pollution levels, given the higher prevalence of car ownership in more affluent areas, yet they suffer excessively due to their frequent proximity to busy inner-city roads through which heavy commuting traffic passes.

Growing waste

In 2018, LCR was estimated to have generated almost 4.45m tonnes of waste, comprising local authority collected waste (860,000 tonnes), commercial waste (750,000 tonnes), industrial waste (360,000 tonnes), construction and demolition waste (2,300,000 tonnes), hazardous waste (160,000 tonnes), and agricultural waste (20,000 tonnes). As the local economy has regenerated, waste streams have grown. LCR continues to rely mainly on landfill and incineration. There has yet to emerge a substantial circular economy; only 45 per cent of municipal waste is recycled. Moreover, the Port of Liverpool exports significant quantities of waste to other parts of the world, paid to dispose of UK garbage.

Water quality

The River Mersey was severely polluted with a deadly cocktail of raw sewage and toxic chemicals during the industrial era and was known as the dirtiest river in Europe. In 1985, the Mersey Basin

Campaign was established to improve water quality and encourage waterside regeneration. By 2009 it was announced that the river was now one of the cleanest in the UK, with aquatic life ranging from dolphins, humpback whales, octopus, salmon, grey seals and large cod. Water quality, including drinking water, across the LCR is now high.

Local political leaders are acting swiftly to address these local climate and ecological challenges, and many innovative practices are emerging. At the heart of the local response is the mission to decarbonise LCR. LCRCA has placed 'clean growth' at the centre of its new LIS and has identified 'clean technology' as one of the city's critical 'sector accelerators'. In November 2019, LCRCA established a Climate Partnership to co-ordinate LCR's response to the climate emergency and bring together all organisations that want to play their part in achieving the goal of net zero-carbon by 2040 or sooner. This partnership will be responsible for producing a comprehensive Climate Action Plan by December 2020.

LCR has been designated as one of six UK Centres for Offshore Renewable Engineering (CORE). Businesses locating in the LCR CORE benefit from enterprise zone status, enhanced capital allowances, world-renowned engineering



Figure 3: Extinction Rebellion hold a 'die-in' protest at Liverpool's Anglican Cathedral, 22nd June, 2019

Source: Christopher Middleton/Alamy Live News

capabilities, one of the largest construction halls in Europe, a streamlined planning processes, an extensive supply chain of companies that are already operating in the offshore wind sector, and an array of companies with the capabilities to diversify into the sector. LCR has a commitment to triple the volume of energy generated by offshore wind in Liverpool Bay by 2032.

The River Mersey has the second-highest tidal range in the UK, varying from 4m at neaps to 10m at spring tides. LCR plans to build Europe's largest tidal barrage project by 2030 and has established the Mersey Tidal Commission to scope the project. A Mersey tidal barrage could supply 2–5TWh of energy into the grid by the early 2030s (enough to power 1m homes) at a capital cost of £3.5bn.

LCR has developed specialist expertise in hydrogen power. It participates in HyNet North West, an innovative hydrogen energy and Carbon Capture, Usage and Storage (CCUS) project. It has an ambition to replace all methane with hydrogen from LCR's gas grid by 2035. It plans to deliver a network of at least eight zero-carbon refuelling stations (hydrogen and electric charging) across LCR by 2025.

Meanwhile, Alstom's Widnes Technology Centre is home to the design, build and testing of hydrogen trains. LCR will have 25 zero-emission hydrogen buses (LCR Hydrogen Bus) in operation in 2020.

Local universities have joined forces to birth the LCR Low Carbon Eco-Innovatory (LCEI) and the Centre for Global Eco-Innovation (CGE) to help UK and local small to medium enterprises (SMEs) to shift towards low-carbon power. To date, the CGE and LCEI have collaborated with over 500 SMEs, with the CGE programme creating over 300 jobs and adding £45m gross value added (GVA) to the local low-carbon economy. Recently, the LCRCA has built upon these initiatives and launched a £10m Green Investment Fund designed to help local SMEs improve energy efficiency.

A number of projects have also embraced Nature Based Solutions. A Mersey Forest Plan has recently been expanded to include an ambitious proposal to create a 'Northern Forest' joining Liverpool, Chester, Manchester, Leeds, Sheffield and Hull by planting 50m new trees — among other benefits, the 'Northern Forest' will constitute a national carbon offsetting resource.

LCR has also established a local chapter of the Circular Economy Club and is using a community fund to ensure that the wider benefits of the circular economy are being harvested, including its contribution to crime reduction, food poverty, skills training, loneliness and mental ill health. LCRCA has also invested in the first phase of a £16m 600km Greenways cycling and walking network. It has used a £172m Transforming Cities fund to increase low-carbon public transport and increase walking and cycling.

A 'Brownfield First' approach to development has witnessed a re-greening of industrial wasteland.

LCRCA has also established a Clean Air Taskforce and produced an 'Interim



Figure 4: Offshore wind farm — view from Bootle, Liverpool

Source: en.wikipedia.com

Air Quality Plan'. Meanwhile Liverpool City Council is preparing a new 'Clean Air Plan' and has established the new, public-facing website 'Let's CLEAR the AIR Liverpool'.

Clean public transport lies at the heart of these plans. LCR has invested £460m in new, state-of-the-art trains for the Merseyrail network to improve and futureproof green public transport. It aspires to have the UK's cleanest bus fleet outside of London with 70 per cent of buses already classified as low-emissions.

Of course, even if net zero is achieved globally, climate will continue to warm in the short term, and sea level will continue to rise for centuries. Adaptation measures will be necessary. The Royal Town Planning Institute is working with the LCRCA to develop a climate resilience policy that will be incorporated into the LCR's Spatial Development Strategy to push up standards and safeguard against flooding and extreme weather events alongside other climate threats. This policy is referencing poverty and natural capital as well as economic assets in its attempt to identify which communities and land use merit priority defence.

But of course, there is still much to do:

- Scaling hydrogen power capacity will prove to be costly and technically challenging;
- If it is to be built, the Mersey Tidal Barrage will need to secure financial and political support from national government — hitherto unseen;
- Renovation and retrofitting of the city's housing stock remains a work in progress (Liverpool City Council has submitted a £230m Green City Deal bid to national government focusing on household energy consumption);
- There remains scope to improve public transport, and especially the rail network;
- LCR has work to do to assist the

UK in meeting the Convention on Biological Diversity Aichi targets;

- To realise its full circular economy potential, LCR will need to focus upon changing local business models and practices.

How can LCR scale and accelerate its response to the climate and ecological crisis?

We now revisit our provocation from above and consider what a new UK social contract for sustainability and a just transition might mean for LCR and its capacity to address the climate and ecological crisis. It is clear that there is much going on 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, the LCR Local Enterprise Partnership (LEP), anchor public institutions, LCR businesses, social enterprise and third sector actors, and concerned communities and citizens. While 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. Moreover the COVID-19 global pandemic has opened an 'Overton' window making authentic debate about alternative futures now part of the mainstream.

This new social contract might include:

1. *Proactive government and a green public works programme:* Funding should be provided for ambitious and compelling

- green infrastructure and public works projects which support clean growth;
2. *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;
 3. *Enhanced city region environmental governance capacity*: There is a need to establish which institutions/set of institutions might be needed to furnish the convening power which will be required if LCR 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;
 4. *Affordable finance*: Pioneering new financial tools, packages and rules are needed to secure a new scale of public and private sector capital investment;
 5. *Disciplined and incentivised market delivering clean growth*: Government should adopt fiscal rules and scale business enablers and supports targeted at high-performing and high-impact local green technology and service companies, including innovative SMEs and social enterprises;
 6. *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;
 7. *Promoting environmental justice*: Government 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;
 8. *Improving carbon literacy*: Smart technology and bespoke real-time data feedback could increase the carbon literacy of all energy consumers, helping them to calculate their carbon footprint and clarifying more precisely their carbon offsetting budgets;
 9. *Spatial planning for eco-friendly cities*: Spatial development plans should promote a spatial organisation and land use geography for LCR which maximise ecological objectives;
 10. *New performance metrics*: Governments might further develop bespoke measures of wellbeing which prioritise welfare outcomes and social justice, not simply economic growth. Natural capital approaches should be developed.
 11. *Data trusts*: To enable extraction of the full economic, social and environmental value of big data sustainably while 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.

AUTHORS’ NOTE

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Notes and References

1. This paper derives from an Issues Paper prepared by the Heseltine Institute for Public Policy, Practice and Place at the University of Liverpool as a contribution to the ‘2019 Year of the Environment Liverpool City-Region’, and in particular to

- the Year of Environment LCR Environmental Summit held in November 2019. A summary paper and a full paper can be downloaded from the Heseltine Institute, available at www.liverpool.ac.uk/heseltine-institute (accessed 6th April, 2020); Boyle, M., Crone, S., Endfield, G., Jarvis, S. and McClelland, A. (2019), 'Towards a green future for Liverpool City Region', Heseltine Institute for Public Policy, Practice and Place, University of Liverpool. A version was also published as a blog on the ERDF Urbact III blog, available at <https://www.blog.urbact.eu/2019/11/climate-ecological-crisis-liverpool/> (accessed 6th April, 2020).
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