

The Journey to Net Zero Carbon Towns & Cities

May 2020



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WITH THANKS TO

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01 Introduction

01 INTRODUCTION

We need to ensure a rapid and just transition to a net zero carbon society. The faster we are able to achieve this, the less the social, environmental, and economic costs are likely to be. However, whilst the destination may be theoretically clear, the route to that position is far from it. Across the UK there are pockets of technology and social change that are signposting some of the shifts we may need, but nothing that provides a comprehensive picture of the needs and activities that could be practically taken across a complex environment involving multiple systems.

Helping urban areas to understand trends, envisage alternative futures, and to understand how they can get to a world they want, rather than one they don't, is a powerful tool for change. Through a collective intelligence activity undertaken across Exeter, Chippenham, London and Glasgow, along with research on other leading sustainable cities, this report provides a picture of the different types of routes, activities and solutions that will be needed to get our urban areas to net zero, and how they may differ between locations. The report makes recommendations to help Innovate UK to plan future programmes and interventions.

02 Climate change and urban areas


02 CLIMATE CHANGE AND URBAN AREAS

To date a total of 274/408 (67%) of district, county, unitary & metropolitan Councils have declared a climate emergency, and 8 combined authorities/city regions. 149 of these have set a target of reaching zero emissions by 2030 or earlier, with the London Borough of Tower Hamlets aiming for 2025, Nottingham 2028 and Leicester 2025 to 2030.¹

The role for urban areas in climate change mitigation is well recognised. The Special Report on Global Warming of 1.5°C (SR1.5)² identifies that Cities have a duty to act quickly, collectively and concertedly to avoid the worst of the predicted outcomes of climate change. This includes urban expansion being a catalyst for adopting new technologies and buildings and infrastructure with low or near zero emissions.

Increasingly we live and work in urban areas where the systems crucial to reducing carbon intersect, alongside the opportunities for stakeholders to work together towards achieving a net zero carbon future.

“The multiple pathways to the future will be determined in no small part by the actions of engaged officials and stakeholders who can influence urban economies, urban form and infrastructure, the critical connectivity between urban and rural areas, and behavioural choices.”³



67% of councils have declared a climate emergency with

37% setting a target for reaching zero emissions by 2030 or earlier.

This central role for urban areas is gathering momentum across the UK and there is significant public and business interest in making these commitments and delivering emissions reduction as early as possible. An increasing number of towns and cities are declaring a climate emergency and identifying net zero carbon targets (in many cases decades ahead of the 2050 ambition set by central government in the Climate Change Act 2008).

Note: As well as being covered by the Climate Change Act, Scotland, Wales and Northern Ireland have separate climate change policies - The Climate Change (Scotland) Act 2009, revised upwards 2017; the Environment (Wales) Act 2016; and targets set in the Northern Ireland Executive, Programme for Government (2011-2015).

Despite the significant number of commitments being made, very few cities have begun to take steps to mobilise activities. It is important to recognise the scale of these commitments and the political and financial environments in which they will need to be addressed. The level of uncertainty for local authorities and business leaders can lead to paralysis, with many local authorities unclear on how to engage residents and businesses or what steps they need to take. Table 1 summarises some of the potential perceptions from different groups.

TABLE 1: POTENTIAL STAKEHOLDER PERCEPTIONS OF CHANGE REQUIRED

Stakeholder Group	Perceptions	
Local Authority Leaders	<p>May see the change as an opportunity to set an example for how cities can act against the climate crisis and a necessary step to ensure cities remain great places to live</p> <p>May see the change as a way to kick-start the economy following COVID-19.</p>	<p>May see the change as likely to involve significant investment and decisions beyond their control.</p>
Politicians	<p>May see the change as an opportunity to respond to growing public support for climate action.</p>	<p>May see the change as requiring policy decisions that may be unpopular to certain groups.</p> <p>May see the change as needing policy decisions beyond their control.</p>
Business Leaders	<p>May see the change as an economic opportunity.</p> <p>May see the change as supporting new partnerships and innovation.</p> <p>May see the change as an important part of investing in their employees and local community.</p>	<p>If their current business model may be affected they may see the change as disruptive, intrusive, and likely to involve loss.</p> <p>May see the change as requiring investment that will affect competitiveness.</p>
Individuals	<p>May see the change as making a vital contribution to the City and the planet.</p> <p>May see the change as locking-in benefits that have been observed through the covid-19 lockdown.</p>	<p>May see the change as disruptive and likely to affect personal freedoms.</p>

The following sections in this report outline the journey that cities will need to take as well as presenting the opportunities that can be exploited.

CONTEXT OF COVID-19 PANDEMIC

Parallels have been drawn between the current COVID-19 pandemic and the likely future challenges associated with climate change. They are both global problems that require international, and local, community collaboration. They are both events that were predicted to happen and carry enormous economic costs, costs which could be reduced with better preparation.

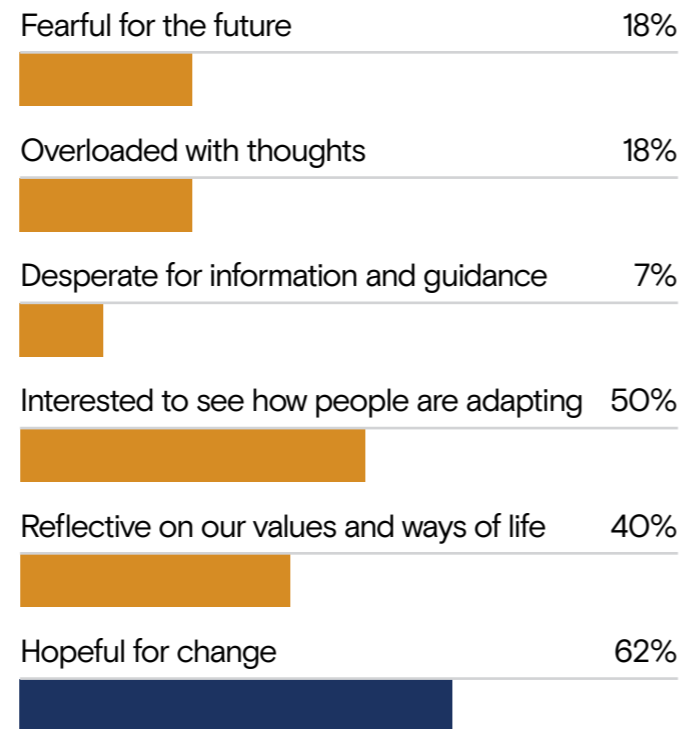
Climate change is a threat multiplier for the current, and likely future, pandemics. Air pollution has been linked to an increased risk of dying from COVID-19⁴ and changes in ecosystems lead to closer proximity between species, increasing the likelihood of zoonotic diseases spreading.

Pandemic related behaviour change has led to a drop in carbon levels, with reductions in pollution and consumption. In the UK alone, overall transport use of road, rail and the Tube in London fell by 60% between early February and the beginning of April according to the Department for Transport. Air pollution levels have dropped significantly across the UK, with daily average levels of nitrogen dioxide (NO₂) down almost 40% on the same period last year, with some cities seeing levels fall by more than 60%, including Brighton and Portsmouth.⁵ There have been 11,000 fewer deaths from air pollution, across the UK and Europe.⁶ Perceptions of what is 'essential' have changed, not least through the massive shift to working from home, and the related reduction in energy consumption of buildings. People have been able to live experiences that would have previously only been possible to think about through visioning or civic imagination exercises. As the weeks progress, changes in our individual behaviour have, in some places, started to be supported through changes in systems that are also aligned with lower carbon futures such as a significant increase in people working from home.

In England, central government has given councils permission to close streets to cars, bypassing the usual procedures that can take weeks to implement, to help people walk and cycle whilst social distancing and mirroring the active transport ambitions that are at the heart of many low carbon plans for towns and cities. Other cities across the globe are doing similar things, with some explicitly recognising this as an opportunity to reopen on a different, more climate friendly basis than before.⁷ London Living Streets has a series of proposals to 'bake in' the idea of walking and cycling in comfort and safety to local shopping hubs, helping to improve the resilience of local economies in the face of online shopping.⁸

Whilst there are risks presented by the COVID-19 pandemic, for example that attention and resources will be directed away from climate change, this does not appear to currently be the case. There is a very strong appetite not to squander this opportunity and, in the midst of an overwhelmingly negative situation, to build on the climate positive changes as part of COVID-19 exit strategies. A recent RSA commissioned YouGov poll highlighted only 9% of Britons want life to return to 'normal' once lockdown is over, with over half having noticed cleaner air.⁹

This sense of not losing the positive changes we have experienced is reflected in our own research for this project. During an online workshop in Exeter, 79 participants voted on how they were feeling about the current COVID-19 environment and the changes it had brought about, within the context of discussing carbon reduction. As you can see, hope for change, interest in how we are adapting, and being reflective on our values and way of life, far outstripped feelings of fear.



How are you feeling about the current covid-19 environment and the changes it has brought about?

There is likely to be a small window of opportunity to retain the benefits from the changes we are already making. It will be critical for carbon neutrality to be supported as part of the restart for economies rather than simply pushing for economic growth at any cost.

Global pandemics and climate change are both complex threats that require change at pace. They put stress on the existing way of doing things; be it government systems for unemployment or health care, or our individual, daily behaviours. Both challenge our understanding of how the economy will work, and highlight the need for longer term policy making cycles, with an increased role and respect for science-led decision making that crosses political divides. Both require widespread and complex change to be implemented and offer considerable opportunity for business.



03 The carbon neutral opportunity for towns and cities

In September 2019 [the World Bank and WHO report on pandemic preparedness](#)¹¹ estimated a global pandemic would cost as much as \$3 trillion, or about 5% of global economic output, with the cost of preparing against the threat being \$3.4 billion a year; or put another way, every \$1 spent on preparation would yield at least \$2 in economic savings, and potentially more if the pandemic is curbed.^[i]

03 THE CARBON NEUTRAL OPPORTUNITY

It is widely accepted that cities will need to be the driver of the UK response to climate change. Our cities and the unprecedented growth of urban environments present both the greatest challenge and opportunity of our lifetime. As drivers of economic growth across wide regions cities are essential to modern life, but unsustainable trends in energy use, as well as congestion and associated negative consequences threaten the health of cities and their citizens. Urban areas and their economies and opportunities are closely linked to changes in the environment.

The [recent volatility in oil and other commodities will increase with the accelerating pace of climate events](#)¹⁰, and will need further shifts in business models; including strategies for resource independence, shifting value chains to resilient low carbon resource models, and working with product designers to pull through the material innovations needed to meet the low carbon economy. The level of disruption we are experiencing now has led to rapid, innovative responses, that highlight the potential for organisations to change very quickly when they decide to do so, enabling huge sections of the workforce to work from home, speeding up or localising supply chains, and inventing new technologies.

"spending \$1.8 trillion in the coming decade on climate-friendly measures would generate \$7.1 trillion in economic benefits"

—WORLD BANK, 2019

Similar figures exist on the economic savings from preparing for climate change in a way that will help keep global warming to 1.5°C. [The World Bank reported in 2019](#) that spending \$1.8 trillion in the coming decade on climate-friendly measures would generate \$7.1 trillion in economic benefits¹². And the Economist Intelligence Unit found that, if the world doesn't do more to cut emissions, the economic cost could be as much as [\\$7.9 trillion each year](#) by the middle of the century¹³.

Despite these large global figures, many of the UK's urban economies are continuing to grow and only a few local authorities are beginning to observe increased costs due to adverse effects from climate change. Gloucestershire County Council reports that the floods in July 2007 cost them an estimated £50million, with the loss to householders, businesses and the insurance companies much more than this. This is the driving force behind [Gloucestershire's carbon neutral plan](#)¹⁴.

The City of London has produced an economic assessment of the effects of climate change on businesses in London and considers risks to businesses to include supply chain resilience, over valuation of investments, inability to insure and lack of skills¹⁵. The document states that the climate change adaptation sector in London has been estimated to have a turnover of £431 million, and to employ around 4,000 people (2011/12 figures).

For the majority of UK cities no such economic analysis exists, with the case for change largely being driven by increased public pressure. As such, this presents a challenge for developing the financial case for the significant investment required to deliver the changes. For example a city seeking to retrofit council housing stock using programmes such as EnergieSprong (or equivalent) will require an investment case for ~£7m for each 100 properties¹⁶. Solutions such as mass transit infrastructure tend to come with price tags of over £500 million. This begins to indicate a significant requirement for accessing innovation and finding new ways of working.

Local authority budgets are decreasing and the need to invest in housing and social care continues to rise, many councils are already starting to consider commercialisation options to cover budget shortfalls and some are looking to find new models for service delivery with private partners. Yet many of the revenues relied upon from councils to fill budget gaps are at odds with the commitments to be carbon neutral. For example, Exeter City Council has declared an aim that the city will be free from all non-essential motorised vehicles, yet they net approximately £6 million per year income from city centre car parks. In Chippenham the opportunity of financial support from central government to expand electric vehicle (EV) charging points has not been taken up because EV charging spaces do not currently provide the same income generation potential as parking charges. There is a need to hold these two conflicting positions and identify innovative solutions, as well as processes and operating models, to achieve the goals and replace the revenue.



How this new reduced carbon position can be maintained, and applied to addressing the climate commitments, is an opportunity many are concerned not to see squandered. Just as customers and employees have the right to ask senior leaders how they are responding to COVID-19 in a responsible and equitable manner, so we should be asking the same with regard to organisations' approaches to carbon reduction and sustainability. The questions are the same: How does it apply to your work? What does it mean for your team, your department, your company and your industry to be ready?

City leaders now have the opportunity to implement policies, innovations and investment that shape the way we live, and our environmental impact, for decades to come. Bold city leaders will be able to exploit these opportunities to stimulate new supply chains and engage with innovative companies. Many may be able to take the role of launching customers, meaning that they can both help their city as well as being able to stimulate a new market and form new revenue streams. In the following sections we present a framework that can be used on the change journey and identify specific challenges and opportunities that towns and cities are facing.

04 Transitioning to a carbon neutral future

04 TRANSITIONING TO A CARBON NEUTRAL FUTURE

The commitment to achieve a carbon neutral city will require significant change to be made at all levels, changes that will affect individuals and businesses as well as the political environment. It is unlikely that any single local authority would be able to address the challenges. Success will only be achieved through a genuinely collective effort, alongside stimulating and accelerating innovation, including with commercial partners.

A climate emergency declaration and target setting are necessary gateways to pass through when plotting a course for a net zero future. An [analysis of common factors between city plans](#)¹⁷ observed how most cities have, in some form, stated a clear undertaking related to a percentage reduction in total carbon emissions. The useful role for target dates and declarations were also raised during this project.

“If we could go back I would introduce the 2030 pledge earlier in the process. The target made everything less abstract, it was something to aim towards. Even if it was hugely ambitious, or suspected of being a political stunt, it focused peoples’ minds and energised the community. It was a way of holding the council to account in their decision making. The energy has grown from the target and the bottom up reaction to the target.”

But declarations and targets are not in themselves sufficient for progress. Instead, a formal change programme needs to be mobilised. Cities who are efficiently mobilising such programmes have found ways to link their declarations to programmes that are about more than climate emergency, strongly connecting with what areas and people need to thrive.

THE CARBON NEUTRAL CHANGE JOURNEY

The carbon neutral change journey can be represented as six distinct stages; beginning with the decision to make a commitment to become carbon neutral and then working through stages of planning and implementation until the change has been completed. The stages of the journey have been drawn from the experiences and insights of the people we spoke with, from the four towns and cities included for primary data collection as part of this project, and also align to theories of change management. The stages provide a framework for understanding how any city can achieve their ambition. Having a common framework provides the ability, at a UK scale, to observe where different cities are and seek to provide the right kinds of support at the right time.

The stages are not necessarily linear. As with most journeys there can be twists and turns, obstacles to surmount and plateaus for when it's necessary to pause, regroup and gather your energy for the next phase.

0 MAKING THE COMMITMENT

STAGE 0: MAKING THE COMMITMENT

The city has made a formal declaration that they will become carbon neutral by a set date. They have responded to the growing acceptance that there is a need for cities to play a role in decarbonising the UK and are likely to be reflecting local demand for change.

- The city has identified the need to transition to a carbon neutral society; ensuring that it remains a great place for future generations
- The city leadership have agreed that there may be a negative impact on their city, financially or politically, if they do not find a way to respond to the climate crisis.

1 FORMULATING THE CHANGE

STAGE 1: FORMULATING THE CHANGE

The city has translated the commitment to become carbon-neutral into a set of tangible objectives and goals that are aligned with the needs and expectations of their own city stakeholders: politicians, business and community leaders, individuals.

- The city has integrated their commitment to become carbon neutral into a future vision and growth strategy
- The city has created a narrative to articulate the scope of change including clarity on expected outcomes of the change and the extent of activities necessary for successful change
- The expected benefits to the city from becoming carbon neutral have been documented.

2 PLANNING THE CHANGE

STAGE 2: PLANNING THE CHANGE

The city has produced a plan for change that integrates people, process, technology, structure, and cultural issues.

- The city has identified and engaged all stakeholders, internal and external, affected by or interested in the outcomes and plan for their ongoing involvement
- The city has outlined a change approach that is aligned with the culture of the city
- The city is aware of the systems, structures, culture, and people that are impacted by or needed for the change. Gaps within financial, political, and technical skills have been identified.

3 IMPLEMENTING THE CHANGE

STAGE 3: IMPLEMENTING THE CHANGE

The city has begun to implement pilot projects and engagement activities to mobilise the plan and test and learn.

- The city has identified areas where specific support is required and begins to implement support activities, for example community engagement, organisational skills development, and so on
- The city has clear communication and engagement strategies in place to inform stakeholders of the ultimate objectives for the change and enable them to actively participate in decisions impacting the change
- The city is measuring and reporting progress against the goals defined in stage 1.

4 MANAGING THE CHANGE TRANSITION

STAGE 4: MANAGING THE CHANGE TRANSITION

The city is transitioning outcomes from pilots into at-scale deployment and implementing mechanisms to sustain long-term changes.

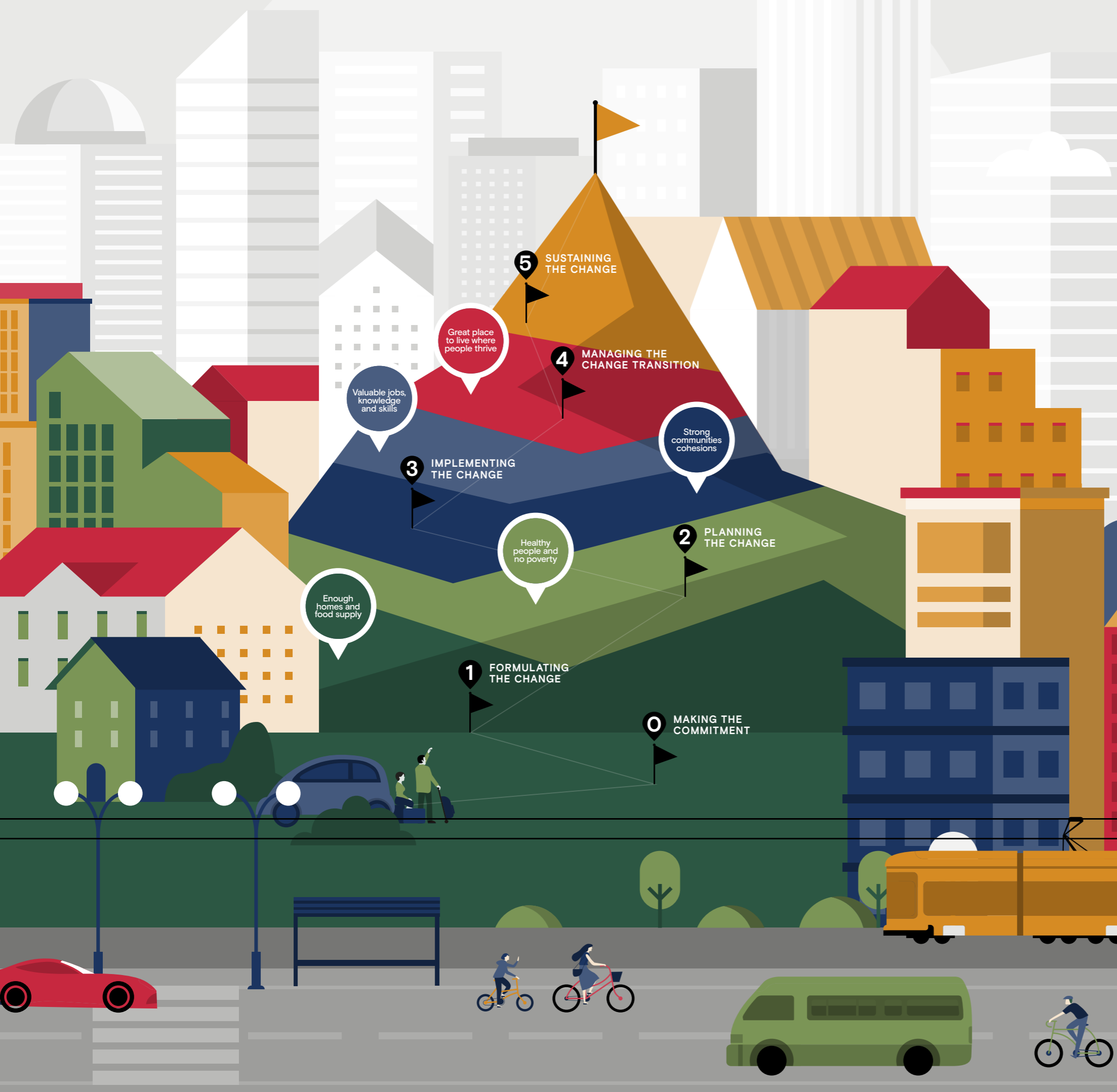
- The city is documenting the learnings to support further projects and pilots
- The city is measuring the adoption rate and the change outcomes and benefits
- The city has a mechanism in place to feedback learnings and adjust the plan to address discrepancies or evolving circumstances.

5 SUSTAINING THE CHANGE

STAGE 5: SUSTAINING THE CHANGE

The city has mobilised ongoing conversations to enable people to make sense of what is happening during the change and to measure the impact on the city.

- The city has established an ongoing conversation with stakeholders to validate progress and enable people to make sense of what is happening during the change
- The city is actively measuring the impact on the city itself, ensuring benefits are felt by people and businesses.



THE CARBON NEUTRAL CHANGE JOURNEY

Local authorities are facing considerable challenges to deliver great places: meeting housing needs, reducing inequality, encouraging investment, creating new jobs and building skills. These challenges can be considered as a mountain to be scaled, with basic needs of citizens at the base, rising to more aspirational outcomes at the peak. Achieving a great place, and a just society, within the means of the planet is the path that many leaders are now choosing to take.

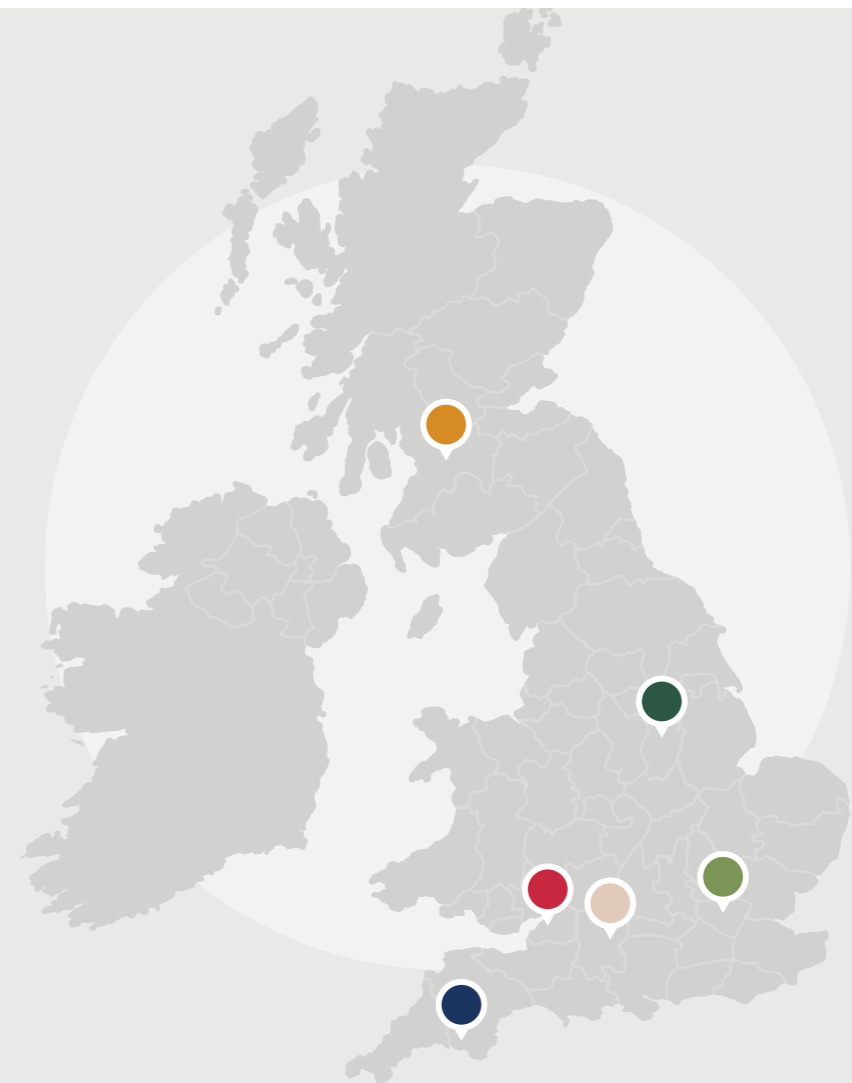
Regardless of their stage in the journey, all towns and cities in the UK would benefit from support, and a chance to learn from each other about the challenges they face and overcome, and the opportunities that exist. This report is intended to help UKRI identify the most effective way they can provide support to towns and cities and to present specific recommendations of where value can be added through public funded support.

05 Overview of towns and cities included in this work

05 OVERVIEW OF TOWNS & CITIES

This project took place during March and April 2020. The approach to data collection was revised throughout, in response to the evolving context of the COVID-19 pandemic. In-person events were replaced with online interviews and workshops. We were also able to use data from in-person workshops that predated the pandemic lockdown.

This report draws on insights from four towns and cities and includes 12 interviews, an online workshop and in-person workshops that took place in February, prior to the lockdown. The four towns and cities we contacted as part of this project are all at different stages of their change journey and highlight how the framework can be used to characterise cities and identify their need for support.





CHIPPENHAM

While Chippenham declared a climate emergency relatively early on, in March 2019, and set a 2030 target, they have not yet entered the first stage of the journey. The Climate Emergency Advisory Group is made up of six councillors and six members of the public, lobbying the Town Council and Wiltshire County Council on what they should focus on to meet the target, and engaging with the wider community to raise awareness.



Key Challenges: There is a lack of commitment by leaders to align decision making with carbon reduction considerations. This is a particular issue for housing development. Chippenham has been designated a 'Growth Town' for Wiltshire Action and housing is being developed without concomitant attraction of employment to the area, and without sufficient energy efficient design. Progress will require coordination with Wiltshire County Council, especially on the most important areas of transport and housing. Current efforts are being led by a community group, Zero Chippenham, with a focus on air quality, zero carbon transport, community energy, community engagement and reforestation.



LONDON

Since 2018, London has been implementing the 1.5C Compatible Plan to achieve zero emissions by 2050. The Mayor of London manifesto for the next election is committed to 2030 and so we await a new London Plan with more details on reducing carbon emissions more quickly. In addition, through the likes of the Participatory Cities Foundation in Barking and Dagenham, there are already many small scale projects taking place across London to contribute to the wider city strategy.



Key Challenges: From the city-wide level, more certainty and support from central government on policy direction is needed, and a clearer commitment to zero carbon generally. In addition de-risking some of the challenges is needed, for example with heat networks developers don't want to take the risk of not having heating when people are moving in and will be willing to spend more for less risk. At a borough level we need to work together with funding to do a piece of work on the plausibility of the challenge and how it could be done. But it's also about finding and scaling the right relationship between ideas & money & equal partnership committed to an iterative, developmental evaluation approach e.g. Participatory Cities Foundation. It has to be owned and governed locally to create locally driven initiatives.

GLASGOW

Glasgow has been reducing its carbon footprint since 2010, with some very ambitious targets set in 2009. These targets were reached and exceeded by 2020 with the help of initiatives such as replacing coal-fired power stations with renewable energy. The next 10 years will prove more difficult and Glasgow (with representation from all four political groups on the Council, as well as citizen activist groups, key policy leaders, and the Glasgow Chamber of Commerce) is working on a new Transition Strategy which was to be published in April but has been delayed due to the pandemic. Their current recommendations are:

- Incorporating climate issues in the refresh of the city's economic development strategy
- Ensuring that climate impact assessments are conducted on the council's budgets and annual budget-setting processes
- Engaging in climate conversations with local residents as part of a refreshed approach to community engagement which brings climate issues to the fore
- Using the council's leadership role and community links to get messages out about climate issues to the public
- Supporting major improvements to the city's public transport network and further shifts towards active travel
- Creating a local Just Transition Commission to ensure that workers' rights are protected and employment opportunities are maximised in a lower carbon economy.



An example of organisations that have been supporting the transition are Scottish Power's investment into renewable energy infrastructure, electric charge points and electric heating.



Key Challenges: The council is currently putting all of its resources into tackling the COVID-19 response and in the longer term the financial strain that this causes may make it difficult to invest in carbon reduction projects. Much of the initial work that has taken place over the past decade has been structural methods of carbon reduction, the difficult part is the next step of encouraging behavioural changes by the residents and businesses of Glasgow. Again the people of Glasgow will find it difficult to prioritise capacity and resources to long term carbon reduction initiatives when they have so many short term issues to deal with after the pandemic. These challenges can be seen as opportunities if those in Glasgow want to avoid another pandemic or climate challenges, and if the Government is willing to invest to help overcome short term challenges. This may be difficult as a global depression after COVID-19 will reduce the income of the council substantially and therefore reduce their long term aspirations.

EXETER

Exeter began its journey towards achieving carbon neutral status way back in 2014. Although it took 3 years before the narrative could be created that sufficiently engaged the public, politicians and businesses and for Exeter to reach the end of Stage 1. An important aspect to note was that it was the existence of the Innovate UK Internet of Things Demonstrator programme that was the original catalyst for the partnership, Exeter City Futures Community Interest Group (CIC), that went on to deliver the net zero Exeter plan.

Exeter City Council declared a climate emergency in March 2019 and the 12 Goals that had been defined by Exeter City Futures CIC as representing the priorities of residents and business within Exeter were agreed as the framework for the city's carbon neutral plan. Exeter moved rapidly through Stage 2 because of the level of engagement and support it had for the 12 goals framework. The Exeter Net Zero 2030 plan was launched in April 2020 bringing Exeter to the end of Stage 2.



Key Challenges: Developing a business model to invest in the retrofit of domestic housing stock in both council-owned and private areas, accessing innovative supply chains to find solutions to retrofit, incentivising housebuilders to build to higher standards than required by building control, as a two tier authority not having control over city transport finding new models for investment, including partnerships with the private sector to raise required levels of finance that can give council control over how the city develops and also potential long term revenue. Significant loss of revenue from car parking that would need to be replaced.



OTHER CITIES ON THE JOURNEY

There are a number of other cities and towns across the UK, outside of this study, that have taken considerable steps on the journey towards becoming carbon neutral.

Bristol has been working at the forefront of sustainability initiatives for many years and set out a framework to deliver carbon reduction back in 2015, as part of its bid to be the European Green Capital. Bristol's climate emergency declaration was made in November 2018. The ambition is linked within the Bristol One City Plan¹⁸ which covers a significantly wider remit. Bristol is judged to be at the start of Stage 3 with a number of pilots beginning across the city including an emerging city fund for carbon projects, a local energy company, and investment in walking and cycling. Bristol has recently declared that its city centre will be free from diesel fueled vehicles¹⁹ but its ambitions have been delayed by central government due to the COVID-19 pandemic²⁰, as well as struggling with technical and governance challenges related to enforcing the diesel-free zone.

Nottingham is another UK city that has made significant progress towards becoming carbon neutral. The city issued its first carbon neutral plan in 2007 and declared a climate emergency in committing to making Nottingham a carbon free city by 2028²¹, two years ahead of the target of many other cities which have taken similar pledges. Nottingham states that they have to date reduced emissions by 39% for the city and 43% per person, and have received government support for substantial investment in electric bus fleets and an electric tram network, as well as cycle corridors, facilities, bike hubs and a cycle hire scheme.

Other areas including Totnes have well developed engagement and are gaining clarity on how the climate emergency links into what local people and businesses want and need. Thanks to the Transition network²², Totnes has a strong outline of the areas that need to be addressed, generated from strong grassroots, citizen engagement,²³ but as yet no clear plans for delivery have been issued.

In light of the pandemic many urban areas are beginning to consider mobilising pilots on roads that are already free of vehicles. However, in order to ensure lasting and sustainable change, as well as seeing return on investment, it is necessary to link pilots into wider city plans and visions to ensure that there is momentum to keep them going.



06 Requirements & challenges across all cities

06 REQUIREMENTS AND CHALLENGES

Each of the cities explored are at different stages on their journey, however there is a significant amount of commonality that can be drawn from the intelligence we have collected. It is clear that, whilst there are several obvious requirements, no one can mandate or stipulate what a town or city should include as part of their plan for a net zero carbon future, or the narrative that they should use that works for their area. In this section we identify key requirements for cities who are working towards becoming carbon neutral as well as common challenges that are being raised.

INTEGRATING THE COMMITMENT INTO THE CITY VISION

What is clear is the need to integrate any carbon reduction goals into an overall vision for creating and sustaining great places to live and work. Carbon reduction is just part of a set of broad goals, owned by everyone, and connected to what matters in their daily lives.

“The core message is not about what you are giving up but how to get a better quality of life through lifestyle change. You have to make messages about the benefits to individuals from improving the community.”

“What resonates? What is your vision for the future? You have to know and understand the community you are working in. Language is really important.”

This also means making sure no communities are left behind in the transition to a carbon neutral future.

“At the moment the vision will depend on where you live in the city. In affluent areas it will be a lifestyle change from big cars to electric vehicles; energy bills will go down; people will shop more sustainably and eat more locally sourced food; their houses will be insulated; there will be more vegan cafes and less meat consumption. In less affluent areas people don't have the budget to source food in that way; they are struggling with fuel poverty on meters; there is no money for electric vehicles or solar panels; low emissions zones and banning cars is harder on those that can't afford public transport. How important is this issue in comparison to dealing with homelessness, health, life expectancy, drug / alcohol abuse, the many challenges people face? How do we achieve a transition to a low carbon economy that is just?”

This approach is supported by an analysis of common factors between existing city plans¹⁷. In many, if not all cities, the routes to deliver the carbon neutral ambition are set out within a thematic framework. The priority focus and themes for each city are strongly reflective of local resident and business desire. Themes of energy and mobility are common across all cities and the inclusion of themes relating to improvement of city policies and raising of community skills are also evident in many.

For example, this connection, between a journey to net zero carbon and a journey towards a place where people want to live and work, is explicitly expressed in the more developed plans for Exeter, Bristol and Nottingham.





STRONG ENGAGEMENT ACROSS THE CITY

Linked to the need to embed the carbon neutral ambition into the city vision and plan is the importance of strong engagement approaches. Cities that are making considerable progress have spent time engaging with residents and businesses, often at a very early stage on the formal journey to net zero carbon. The participation model at the heart of the [Everyone Everyday project](#)²⁴ in Barking and Dagenham preceded, by a number of years, the very recent climate emergency declaration and target setting by the London borough.

“Central to our model is that if you create inclusive participation at the heart of a borough, the impact it has on individuals and the way networks are strengthened by participation at scale, means people are connected more profoundly with the place and other people. These pre-conditions are necessary to impact on the big issues we all care about, including reducing carbon. Participation creates outcomes we think of as being ‘zero carbon’ – the projects people choose have an environmental impact. Participation is linked to the capacity of urban spaces to be sustainable, regenerative cities.”

What resonates with people – politicians, the public and business – is the availability of affordable housing, good quality local jobs, a skilled workforce, access to reliable and affordable transport options, a thriving economy, and being part of a place people want to live and work in. The stages on the journey to a net zero carbon future have to connect with this landscape. Without understanding these basic needs, it’s impossible to plot an effective route.

As an example, during a workshop in Chippenham, despite a very specific focus on priorities in relation to the climate and ecological emergency, it was concerns about transport that topped the list as the issue mentioned most often by attendees. While some comments were about electric vehicle infrastructure, the majority were about affordability and convenience. This suggests that the change narrative that emerges in Chippenham will need to have transport as a central theme.

“Subsidise buses so they are affordable (it’s currently cheaper for me to drive)”

“Put commuter friendly businesses near to the train station”

“Integrate transport policy. E.g. bus and train times to be joined up”

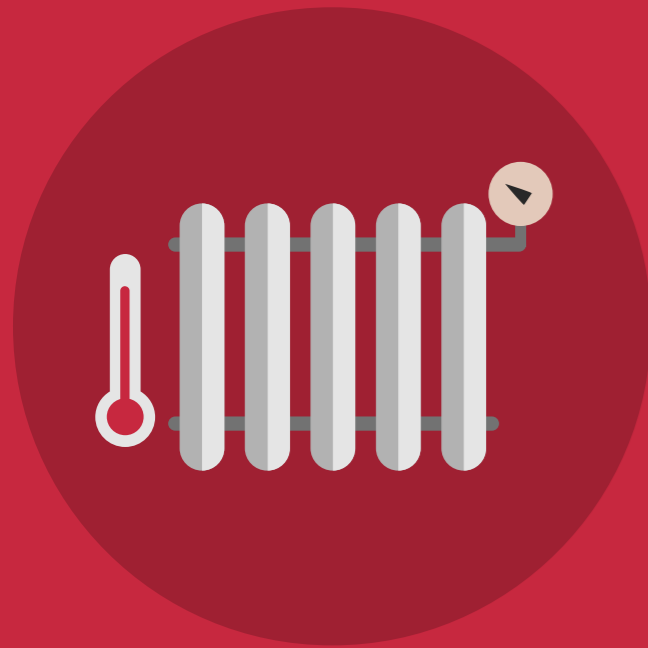
“Options if people need to go to places and it’s too far to walk or cycle, we need affordable transport”

The importance of engagement and partnering cannot be underestimated in order to be successful. Strong engagement and partnership approaches are evident across all the cities under review in this document. Many cities propose co-creation approaches, and both bottom-up methods from the grass-roots and top-down methods from major infrastructure change projects. The philosophy of engaging everyone across the city is widely observed as necessary for sustainable change.

“The (energy) industry has loads of channels in place to share data and case studies, we need help with how to build public support for adaptation commensurate with the pace of change needed”.

CHALLENGES IDENTIFIED

A range of distinct challenges that are being faced by towns and cities emerged through this project. These are key barriers in towns and cities finding routes to net zero, and they cannot be understood or addressed in isolation from each other; or separately from the wider concerns and opportunities of individual towns and cities across the UK. But between the people we spoke with, [international guidance](#)³, the action plans of the cities that are furthest ahead: [Exeter](#), [Nottingham](#), [Bristol](#), and the aspirational visions described by others, there was a consensus that these core areas are central to be addressed in order to reduce carbon in our towns and cities. The challenges cover specific technical areas as well as cross-cutting challenges concerning procurement, supply chains and data.



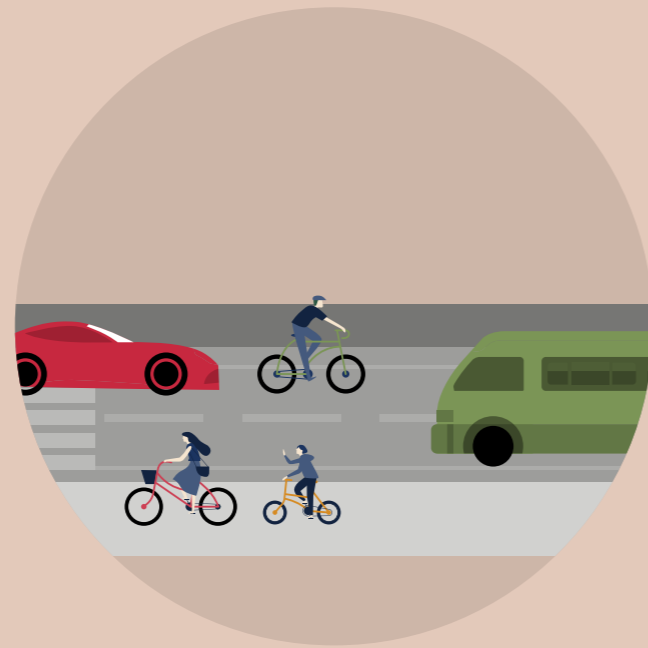
 TECHNICAL CHALLENGE AREAS

CORE CHALLENGE AREA 1

Homes and buildings

—planning requirements that support buildings with high energy efficiency, including fossil free and near zero energy methods, thermal insulation and energy retrofits of existing buildings, adoption of energy efficient technologies, re-use of materials through support for a circular economy.

“Planning policy should change to support net carbon neutral housing development, with lots of incentives for people to retro fit their homes with solar and heat pumps and for proper insulation.”


CORE CHALLENGE AREA 2

Transport

—develop active transport with safe cycling and walking routes, policies to encourage zero emissions vehicles, reliable and affordable public transport, transitioning to low or zero emissions fleets, developments that shorten commute distances, encourage and incentivise local businesses to support lower carbon travel initiatives.

“Public transport would be safe, green, frequent and reliable. It would be safe to walk and cycle. Electric vehicle charging would not be an issue, with on street EV charging and also available in all car parks.”



 TECHNICAL CHALLENGE AREAS

CORE CHALLENGE AREA 3

Renewable energy

—working with neighbouring areas to plan for maximum local renewable energy generation from wind and solar, energy consumption from clean sources, widespread deployment of existing technologies, development of local decentralized energy grids and use of smart meters.

“At a community level we are investing in large district heating networks, these are not necessarily innovative technologies, but we are seeing existing technologies being developed at greater scale.”


CORE CHALLENGE AREA 4

Behaviour change

—recognising and supporting the scale and pace of change that is required in day to day life, through engagement and changes in market and economic barriers.

“The three most important routes to carbon reductions are heat, transport, land use – all of which require changes of behaviour through a combination of incentives and regulation. It is important to build public expectation, understanding, acceptance and support, especially for measures that take you into people’s homes, the public have to be at the heart of the change.”

CROSS-CUTTING CHALLENGES

Bringing Innovation into the Supply Chain: Cities are struggling with stimulating innovation in traditional supply chains. SMEs often struggle to apply for large tenders, especially within the private sector, and support continues to be required to help position innovative SMEs to deliver solutions to city problems.

“Displacement of funds make it hard, you need help with form filling because you are too busy with the day to day” but “anything that creates a story exclusive to a business gives an advantage, helps for recruitment, we don’t know how to get there, we need support to explain to is how to get there.”

“We don't know how, there's no goal for business ie mandatory , if there were some targets and some funding it would help.”

This problem is observed across many sectors including food and waste collection, and particularly evident within the housing market which is dominated by high volume house builders focused on scale, pace and business as usual over quality and innovation.

There is a real challenge for cities to identify the right suppliers, in the right location, who have a solution at the right stage of development to be utilised. The solutions to lower carbon housing are not easy and many are not yet at the stage of being ready to deliver at the scale and pace required. There is a need to get providers interested by showing them that people are interested in clean growth and understanding whether they are willing to pay a premium for it. Or indeed whether the model for delivery can be refreshed to show that the cost of ownership is reduced over the long-term to justify the additional costs.

It is important to find ways to attract, and incentivise, the right sort of developers that share the vision for the city. This may be a local, often SME house builder, who is interested in the opportunities to use better quality, Modern Methods of Construction (MMC) developments. In the current market it is very hard for them to compete with volume house builders.

Challenges to be overcome include:

PROCUREMENT

This process has some bearing, different local authorities have different levels of understanding, skills and resources around procurement. This needs technical understanding to be on top of case law, which moves very quickly, and to have access to the latest examples of procurement exercise. There can be resistance to change from individuals. All of which can influence the extent of control over quality and sustainability goals that it is possible to exercise through procurement.

PLANNING PROCESSES

High volume house builders can challenge planning processes used by local authorities, who have little power to influence them. The house builders acquire green field sites and then attack through planning policy, arguing that the local authority does not have their five year supply. Local authorities are wholly reliant on their planning process, which is weak against prospective proposals. The strategy then becomes one of a “fighting retreat”, with councils trying to get some compromises on quality built into proposals.

SCALE UP SUPPORT

There is a need for support for SMEs to quickly scale up processes and delivery to enable them to compete with volume house builders. Many local authorities are looking for higher quality housing, including carbon neutral and passive house designs. However, until the current providers feel the shock of losing some business, they will remain too comfortable to change. They own massive land banks, to a certain extent underpinned by the government, and will remain focused on profit and pace over quality and low carbon goals.



MOBILISING NEW SUPPLY CHAINS

Achieving carbon neutrality for urban areas will require both innovation within existing supply chains, as well as completely new supply chains to be established to serve new markets. These may be in areas such as development of local circular economies, contributing to the reduction in waste for example by using waste from one business as fuel for another.

The commitment to becoming carbon neutral is likely to also open up the need for new business models. One example of this is office use and how the potential increase of working from home might change the make-up of city centres, employers may consider 'hot officing' rather than 'hot desking', using building space shared between two companies, with half a week allocated to each company, or similar arrangements.

Aspirations to undertake large scale retrofit are a very clear example of the need for new models of investment and the development of new supply chains to deliver. Many cities are stating the need for retrofit of existing properties and this is a costly and technically challenging area. But the potential both for carbon reduction and market growth are considerable.

“80% of the housing stock in Glasgow needs retrofitting – this poses the greatest challenge and the greatest opportunity. If companies can find a way to convert this housing, much of it old, multi occupancy tenement housing stock they would be a beacon of what is possible on some of the most challenging issues for towns and cities seeking to become carbon neutral. There is an opportunity to put some great innovation and ideas into practice in Glasgow”

FINDING NEW MODELS OF INVESTMENT

The likely cost of a city becoming carbon neutral runs into several billion pounds which includes the need for investment in domestic retrofit, shared transport schemes, walking and cycling as well as biodiversity and waste management. It is unlikely that any single local authority could raise the finances to invest in these projects alone. Commercial relationships will need to be formed with private organisations, as well as the willingness to be open to new forms of investment that go beyond traditional government grants.

Changes to the tax system to incentivize carbon reduction by business is something that some councils are beginning to consider. The workplace parking levy scheme in Nottingham is one such example, where the council have imposed a charge on employers who provide workplace parking. The scheme, essentially a type of congestion charging, was introduced in 2012 and raises £9 million a year, is used to fund improvement to public transport in the city²⁵.

However, there is little political will to impose more costs on already stretched businesses. Instead there is a need to find a way to bring the public and private sectors together to share both costs and return on investment. The challenge will be to do this in a way that does not restrict the supply chain only to those with balance sheets capable of investing.

ACCESS TO DATA TO HELP UNDERSTAND THE MARKET AND AID DECISION MAKING

A particularly significant challenge is the lack of data on many areas important for making the case for carbon reduction work, and where there is data it is skewed heavily towards quantitative data stating relative financial costs. This form of quantitative data is the easiest to collect, collate, understand, and compare, basing decisions purely on the short-term and relative cost of options can bias decision-makers in favouring a series of cheaper and simpler options that lead to poorer medium and long term outcomes.

A wider range of quantitative data needs to be made available and combined with a more qualitative analysis of interviews and discussions, to highlight emergent themes and illustrate the overall gains to be made rather than focusing solely on financial results. Our effort to obtain this kind of data is reflected from our discussions, requests for better data and information was pretty consistent across the interviews, and included:

Data on housing

- Passivhaus, zero carbon heat options, A-E ratings are still perceived as expensive and complicated by most people, so they trust the 'bog standard' brand they are familiar with. Upskilling the wider population to support a head shift towards low and zero carbon developments is important to support demand for this kind of housing, and thereby influence house builders. There is a misconception that these kinds of developments are way more expensive, which is not the case and we need to be able to demonstrate that there isn't a cost premium, and potential cost savings and environmental benefits, the purchasers can buy a quality of life, not just a house. This public perception piece needs to be coupled with challenging high volume house builders about the construction cost gap between what they are doing and high quality developments, these are seen as complicated and harder. We need to do more of them so they can be seen as easier and possible.
- There is a great deal of disparity in the data available at different local authorities, which can depend on their in-house resources and so on. While you can't go wrong with more data, it would be useful to have that data from verified, trusted sources such as the Office of National Statistics and the Government Centre for Cities, and specifically framed for the low carbon agenda. For example a Construction Price Index for low carbon housing development would be helpful in making the case for change to house builders by highlighting trends and opportunities, illustrating the sales values achieved, the technical measures of success regarding low carbon and who is achieving them, combined with occupier satisfaction scores and so on.

Data on what people want from where they live:

- There is no hard evidence on what people want as it is all anecdotal, it would be very beneficial to develop the evidence base. For example there were indications in Bristol that people are moving because of the quality of the location, the lifestyle and so on, therefore it would be useful to explore this further.
- Curation of the needs and challenges from a range of groups within cities, and between cities, to create a collective intelligence.

Data on what they are learning and best practice:

- It would be helpful to be able to share best practice across cities. Some local authority leaders have existing links via existing networks, for example with other project's leads on programmes such as Garden City Councils. However they have highlighted that there is never enough opportunity to get together, to share resources and ideas in an area that is very new and developing quickly. There is a desire for opportunities to convene to share real life stories, for example with others currently working on developing sustainability objectives and KPIs for a project document.
- It was stated as being really hard to find good examples of how to do things and measure outcomes, especially in a consistent way. Data on case studies, policy frameworks and step by step guides to pilots to help cities "crib and learn" from each other.

Data on the value for money case for change and investment:

- The returns obtained in terms of future risks reduced, for local authorities, business and public to all understand the trade offs.
- An appeal to people and businesses moving to an area, from being active in addressing carbon emissions and building resilience for climate change, or how pollution levels and congestion are linked to economic prosperity of an area, for example what is the economic case in terms of people moving in, local tax revenue going up, new employment opportunities, and so on. It would be useful to have statements showing that for every pound spent there was an amount saved, a figure that could be used to advocate for investing in carbon reduction initiatives.
- On the financial benefit in recruitment and retention from investing in sustainable business practices.
- On the potential size of the market for the UK in developing solutions to key carbon neutral challenges.

RESTARTING AFTER COVID-19

Many cities are beginning to consider how the changes from COVID-19 could become a catalyst for plans to reach carbon neutrality. There is an increasing feeling, for example from a poll in Exeter, that COVID-19 is bringing a stronger spirit of collaboration and has created demand for a better work-life balance, through policy change and more innovation within business.

Lots of the changes in lifestyle that are popular during this time are also aligned with carbon reduction, most notably less travel due to more working from home for certain business sectors. There is an emerging challenge for cities as we emerge from the pandemic crisis to consider how to invest in new skills, on how to divert skills to green economy industries over the longer term.

07 The need for support from UK government

07 SUPPORT FROM UK GOVERNMENT

Whilst the purpose of this report is to identify routes to net zero for cities and urban places and how Innovate UK can support that transition, it was identified through the workshops that there remains a role for the UK government if we are to achieve the pace of change that is so desperately needed.

There were four strong messages on the role for central government that were heard consistently through this project.

“There is no end of scope for policy to bring forward strategic change, to encourage moves beyond one off pilots and exemplars to achieve systemic change on a larger scale and at a faster pace.”

MESSAGE 1

Policy should send clear signals and incentivise

There is an important role for government policy in signalling, to local authorities and business, the scale and pace of change required. The Scottish government commitment for no new build housing with gas boilers after 2024 is an example, driving housing providers to start investing in new ways of doing things.

“Business could be incentivized to sort out lots of carbon related problems. This is a government policy problem. Once the market and regulatory signal for business is there, with serious penalties attached for fossil fuel and subsidies for non-fossil fuel then things will change. Lots of businesses want to be doing the right thing for the environment, but the playing field needs to be levelled, so it doesn't cost them to do so.”

Whereas the Housing Bonus, an important source of revenue for many local authorities, has no in-built incentives to focus on energy efficient, low carbon development.

“The lack of requirement to coordinate house building with employment strategies is also a signal from central government to build at all costs, regardless of the environmental impact – local authorities have no incentive to delay building for longer term planning, as they lose out on the housing bonus money that they need for other things.”

“There is so much opportunity for innovation in spatial planning, but very few developments where it is done successfully. Central government needs to have a more joined up approach to investing to support this. Homes England future communities is about transport, housing and employment – but you have to approach different government departments to address each bit of the system. The business cases for different areas are so complicated and fragmented (e.g. HIF) that to meet case for each area you lose the essence of the vision of what you are trying to achieve, and the process slows the pace of progress. This process needs to be joined up across the silos.”

MESSAGE 2

Reducing the risk to starting

The inherent risk averse culture in some local authorities and other organisations was seen as a major obstacle to the scale and pace of change required to reach a carbon neutral future. Partnerships with central government, or others such as charitable foundations and businesses, was seen as key to getting things started. Important in these partnerships is that everyone has financial “skin in the game”, formal roles committed to the task that aren't merely an add on to existing responsibilities, and equality between partners.

“Central Government could make it easier for areas to work in a new way, with institutional practices and mindsets that enable, rather than own and control. For example, a London wide fund to match initiatives in local places – to de-risk it for local authorities (both at an institutional level and de-risking for individual staff who want to push for such initiatives in a risk averse culture). Central government needs to avoid running this kind of thing in a traditional procurement or ‘pilot’ model – it has to be owned and governed locally to create locally driven initiatives.”

“Grant funding is important because it is so difficult to find the available funds. But very patient capital investment paid back over a long period of time is also good, for keeping government interested. You need funding for people to be able to concentrate on this work, not trying to fit it in as part of another full-time job. This funding is needed upfront – it's much harder to go back and try and retrofit zero carbon plans into existing work. Need to be able to focus on proper viability and feasibility work up front, which is relatively modest cost when compared with the potential yields from getting developments right.”

MESSAGE 3

Removing barriers

There are a number of areas where central government is, rightly or wrongly, perceived as needing to give permission for innovation to move forward. For example needing to legislate for bus timetable changes can impede more agile, on demand bus schemes. Community energy schemes being unable to trade energy limits the development of new, decentralized energy systems and reduces incentives for participants. The perception of obstacles can be as much of a barrier as any actual change being required.

MESSAGE 4

Showcasing

Central government has a role to play in celebrating, showcasing and creating a brand around areas trying to develop low carbon futures. This kind of formal recognition and the attention that comes with it can attract other areas to the agenda and sends a clear signal that a net zero carbon future is a direction backed by central government. Ideas mentioned included a clean growth ‘badge’ or award, or highlighting exemplar towns and cities in a way that can be promoted by local authorities and is visible for other areas to see and aspire to.

08 How Innovate UK can catalyse change

08 HOW INNOVATE UK CAN CATALYSE CHANGE

This report has summarised key challenges and need for support that has been captured from our engagement with several cities across the UK. There is a clear role for Innovate UK to play in catalysing the change programmes required to achieve the overall UK carbon neutral ambition.

Many cities have made commitments but simply do not know how to stimulate the kinds of collaboration that is required to mobilise projects and pilots. Many local authorities and businesses do not have the risk profile, investment budgets or confidence to set up projects without a body such as Innovate UK to provide a framework through which to work. Funding to assess the feasibility of the challenge and support de-risking starting is extremely important when working with more risk averse organisations, or with organisations that do not traditionally collaborate.

While some cities and UK businesses may be seeking to pursue opportunities relating to climate change on a piecemeal basis, in order to make a significant and lasting impact the challenge must be considered as a systems integration problem. To achieve this requires strong collaboration as well as new innovative approaches across every sector. Ensuring the problem is considered through an integrated systems lens will help drive the market and ultimately deliver economic benefit.

The behaviour of institutions is crucial, local authorities can either adopt a profoundly enabling role in relation to the things citizens want to do to meet the challenge and achieve the goal, and give them the tools to do what they want and let them do it their way; or local authorities can stick with the traditional role of doing it themselves or commissioning a third party to do it for them. With a challenge as complex as addressing climate change it is unlikely that this traditional model will deliver impactful outcomes, nor will it serve to stimulate new markets and encourage formation of strong supply chains.

Innovate UK can play a key role in helping to mobilise city leaders to take bold action, ultimately increasing the ability of the UK to develop and validate solutions that will solve problems being faced by cities across the globe. The potential for return-on-investment is considerable.

The role for Innovate UK is considered to be most valuable in the earliest stages of the change journey to mobilise businesses and help stimulate innovation and build new collaborations. The credibility that Innovate UK involvement can add to projects is not to be underestimated and the opportunity to share the risk of early concept projects is likely to help accelerate mobilisation. As plans are formed and cities move into pilot stages, the networks and knowledge of Innovate UK can help cities to access innovative companies who can offer solutions to these complex problems. Beyond the pilot phase, it will be critical to engage large businesses in order to help scale the outcomes of pilots, there is a role for Innovate UK to help broker partnerships and support at-scale demonstrators that help build markets across the UK.

The table below summarises specific areas where Innovate UK can support cities at each stage of the change journey. The table also identifies the role that SMEs and larger businesses will need to play in order to deliver lasting and sustainable outcomes.

Stage	Opportunity	Role of UKRI
<p>0 MAKING THE COMMITMENT</p> 	<p>Support the case for change and how cities can play a role in supporting UK decarbonisation and creation of new economic opportunity.</p>	<p>Promotion of case studies from cities who can act as examples of how the commitment can benefit the city. Through further research and events to help city officials network and share knowledge.</p>
<p>1 FORMULATING THE CHANGE</p> 	<p>Sharing objectives and concerns to find common goals and challenges.</p> <p>Commitment to working collectively for the benefit of the whole city.</p> <p>Forming partnerships to fill capability gaps.</p>	<p>Auditing the skills and capabilities of each city to help provide a support network and resources pool.</p> <p>Setting out an endorsed framework for understanding the stages of change and helping cities set out what they need to get in place through playbooks and guides.</p>
<p>2 PLANNING THE CHANGE</p> 	<p>Work collectively to agree a framework for delivery of the change that enables each business to take responsibility and play a role.</p> <p>Identify where individual businesses can play a role and what challenges they will need to overcome.</p>	<p>Networking events, such as Domestic Missions, to bring together innovative companies and businesses with challenges to help raise aspiration by seeing what is possible.</p> <p>Acting as a catalyst for new partnerships through Domestic Mission style events or multi-disciplinary residential Innovation Labs in the legal, finance, and technical fields to help scope the problem and build partnerships to develop pilots.</p>
<p>3 IMPLEMENTING THE CHANGE</p> 	<p>Supporting pilots of new products and services to help evaluate potential.</p> <p>Forming partnerships with the public sector and SMEs to build new markets.</p> <p>Investing in technology to help scale-up.</p>	<p>Competitions, such as SBRI, to help derisk mobilisation of project pilots. Stimulates new supply chains and build markets.</p> <p>Brokering partnerships between the public and private sector.</p> <p>Investment accelerators for innovative companies with potential solutions to help them scale.</p> <p>Supporting sharing of learnings between cities to help build markets.</p>
<p>4 MANAGING THE CHANGE TRANSITION</p> 	<p>Businesses catalysed to take ownership of projects as they move to at-scale deployment.</p> <p>Investment in transition of pilots into deployment.</p> <p>Business case development. Openness to new models of shared procurement.</p>	<p>Demonstrator projects to act as exemplars to other cities.</p> <p>Conference/showcase events to share learnings and reach maximum number of businesses.</p> <p>Thought leadership papers into government to influence policy change to help shape markets for new supply chains.</p>
<p>5 SUSTAINING THE CHANGE</p> 	<p>Exploitation of new solutions into global carbon neutral markets.</p> <p>Capture market share for new technologies.</p>	<p>Brand building. Innovate UK adds credibility.</p> <p>Support for new models of data sharing and data trusts to help measure impact. Impact measurement frameworks that enable direct comparison.</p> <p>Conference style events bringing together city leaders and SMEs to hack shared problems and pool experiences.</p>

09 Summary

09 SUMMARY AND RECOMMENDATIONS

This report has summarised the types of activities and solutions that will be needed to get our urban areas to net zero, and how they may differ between locations. The information has been captured from detailed engagement with a range of cities, each of whom is at a different stage on their journey towards carbon neutrality. There are common themes and challenges emerging across all cities as they begin to envisage alternative futures and start their journeys towards becoming carbon neutral. Some of these challenges are related to the need to develop new technical solutions in distinct sectors: housing, transport, renewable energy. Others are related to underpinning (skill-based) needs including understanding the stages of behaviour change, building innovation into procurement, and understanding the new markets.

We believe that there are several key areas where Innovate UK can support UK businesses to develop new innovations and form partnerships to address the challenges of climate change. The opportunity is for the UK to lead the world in developing solutions to our greatest challenge, creating impact and economic growth. Here we present several actions and recommendations to guide planning of future programmes and interventions.

SETTING OUT A COMMON FRAMEWORK FOR CHANGE

Many cities have made climate emergency declarations but are struggling to understand the steps that are required in order to implement a robust programme that delivers lasting impact. This is coupled with the fact that many cities, their local authorities, businesses and individuals, do not have the level of technical understanding about the challenges ahead in acquiring the needed skills, technology, and finances. Innovate UK can play a role here by offering a standardised framework against which cities can identify their current state and where they have existing strengths or weaknesses. A supporting playbook or guide outlining steps to be taken, illustrated with real examples, would also support mobilisation and an online element to the guide would enable sharing of resources and knowledge transfer between areas as they progress on their journeys.

It is recommended that:

Innovate UK commission development of a framework for carbon neutral change that can be published nationally. The framework would be supported with a series of practical actions that cities and businesses can take to ensure their cities remain great places to live. Illustrative examples of where change is being made will provide a model for other cities to build on.

It is recommended that:

Innovate UK mobilise a conference event to bring city leaders, UK business and innovators together to share learning and hack problems. This should not be an event where commercial companies try to sell solutions, but instead a forum where city leaders, community groups, including youth groups, and innovators can come together to share learnings and tackle shared challenges.

STIMULATING NEW PARTNERSHIPS

Within the UK there are many innovative companies who have potential solutions to the challenges that cities face, yet they struggle to get an audience with large businesses or city leadership. On the other hand businesses and local authorities with challenges are largely not sufficiently aware of innovations to know where to look, therefore they exhaust their traditional supply chain and are left with the impression that there are no solutions. This prevents them from committing to bold visions. With support from Innovate UK, seen as a reliable broker, cities with needs can be brought together with SMEs with solutions, that in whole or in part, and begin to form project partnerships to test pilots. Through programmes such as Domestic Missions, Innovation Labs and SBRI, Innovate UK can help mobilise feasibility work which in turn can bolster and encourage local political and business leadership.

It is recommended that:

Innovate UK launch a deeper intelligence gathering programme to formulate specific innovation challenges from a range of cities. Challenges should be linked into city carbon neutral plans and steps should be taken to engage local businesses and residents so that they are motivated by the challenges. Through a programme modelled on Domestic Missions, Innovate UK can facilitate conversations between cities, innovative companies and larger UK businesses to begin to develop partnerships and projects in response to the challenges.

It is recommended that:

work is undertaken to identify the challenges that exist within city processes that are likely to prevent new innovations and suppliers from engaging. These processes include those within legal, insurance, procurement, and finance. The boldest city vision can be set, yet if these operational processes are unable to respond to the vision then nothing will be mobilised, leading to delays and inability to achieve a return on investment. Identifying where these barriers are will enable leaders to identify and take steps to make changes, thus accelerating their ability to exploit new innovations.

MARKET ANALYSIS / ECONOMIC IMPACT

One of the key findings from this report was that it was difficult for business and local authorities to know how to make the case for investment in change. Many of the likely solutions have significant price tags and much of the change relies on being able to incentivise UK businesses to do things a different way. Many local authorities are seeking to make partnership arrangements with larger businesses who can invest but these commercial arrangements are often not to the benefit of the authority and often close out innovative new companies. An open, shared analysis of the potential markets for new technologies to solve challenges such as domestic retrofit, food security, waste and recycling, sharing economies, and so on could serve to help UK business to make decisions to invest in developing new markets. In turn this may make them more open to partnerships with local authorities

It is recommended that:

a study is commissioned to evaluate the market potential of achieving carbon neutrality within UK towns and cities and present this sector by sector to help stimulate research and development and the required investment and partnership decisions within UK businesses.

SUPPORT PATHWAYS FOR CORE CHALLENGE AREAS

There are several very clear, shared, technical challenges that cities are all facing. These relate to widespread domestic retrofit, renewable energy generation and supply, and city mobility. Setting out a support pathway in these areas is likely to encourage cities and UK businesses to commit to bold visions and commence pilots. For change to endure it's important to think at the earliest stage of the transition plan for the project, this also ensures return on investment is obtained as the routes to exploitation are clearly defined at the outset. As cities progress on their journey the responsibility should shift from Innovate UK during early stage innovations to UK business during at-scale deployment, but a clear set of gateways and support programmes would help cities form the right partnerships with a vision on the end goal.

It is recommended that:

Innovate UK launch a programme of staged competitions in the four core challenge areas identified: domestic retrofit, renewable city energy, city transport, and behaviour change. The programme will show how support is available throughout the stages of the journey - missions, then hacks, then SBRI, accelerators, demonstrators. This enables businesses to engage at the earliest stages and gradually assume more responsibility as the funding requirement increases. These core areas have the potential to make a significant impact on climate change targets and are well supported by cities and activist groups.

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