

Circular Peterborough

Circular City Roadmap - an ambitious
plan & performance monitoring
framework towards 2021

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Foreword

Peterborough has established itself as a pioneering city in the circular economy transition. At the heart of our Circular Peterborough initiative is our collaborative approach, which recently saw our programme being recognised in the World Economic Forum’s report on Circular Economy in Cities. The initiative stemmed from engaging and listening to local businesses to better understand the challenges they faced through our Future Peterborough programme, formerly known as Peterborough DNA. We’re not becoming ‘circular’ for the badge, we’re becoming circular because it is helping us address real challenges in our city.

Applying circular economy principles at the city level provides us with a way to overcome challenges and build greater resilience within our businesses and communities. As one of the fastest growing cities in the UK, the circular economy provides us with a framework to deliver sustainable growth.

- 
- Listen & Engage
 - Co-Create
 - Experiment & Trial
 - Enable Change
 - Play the Catalyst
 - Continue Learning

Developing our Circular Peterborough Commitment saw stakeholders from across the city come together to work out a way forward together, which now includes our vision for a Circular City and our practical steps to becoming one – our 7Rs.

Our 7 Rs – rethink, redesign, repurpose (reuse & share), repair, remanufacture, recycle and recover – make the concept real to local people and businesses. They break down what can be seen as quite a complex, abstract concept into practical, achievable steps.

As a medium-sized city, we are uniquely placed to test new, collaborative circular models and approaches that can be scaled up across larger cities. We've already achieved great successes, from being awarded World Smart City in 2015 to launching the UK's first city-led sharing economy platform for local organisations. With strong political commitment to achieve our Circular City ambitions, coupled with an enthused business community, we are in an exciting position to be the UK's leading Circular City.

Through following the actions set out in our Roadmap, Peterborough aims to continue to be a progressive city at the forefront of circular economy innovation.

Steve Bowyer

CEO of Opportunity Peterborough



Introduction

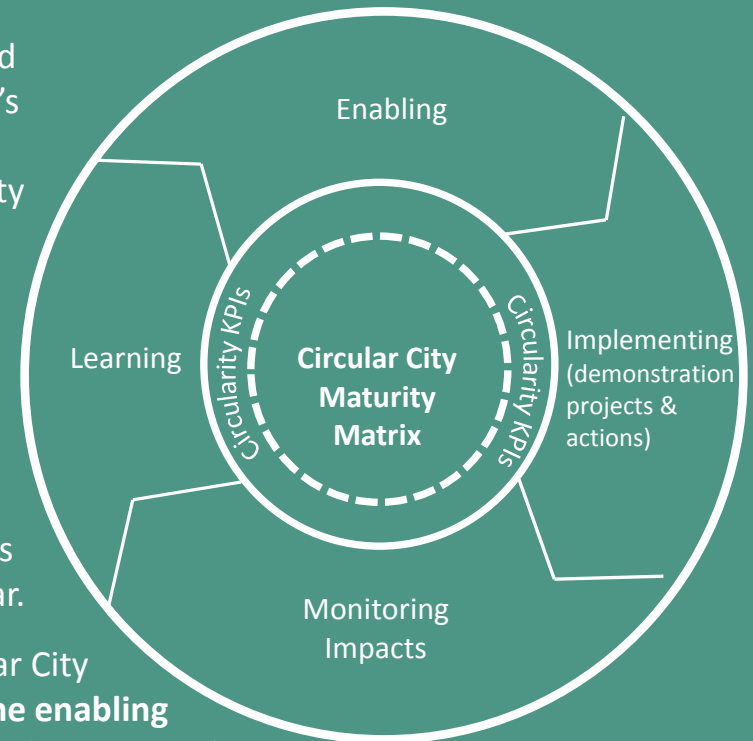
Overview

This document provides a ‘preview’ of our Circular City Roadmap. We’ve intended it to provide a very open and honest account of the story so far, reflecting on how it’s been developed and detailing why we’ve taken the approach we have. The preview provides an opportunity for our stakeholders within and beyond Peterborough to see where we’re currently at and provide us with any feedback, which we will then use to inform the second stage of the Roadmap’s development.

The diagram opposite provides an overview of the thinking behind our Roadmap, essentially an iterative process from *enabling* change to *implementing* projects to *monitoring* and *learning* from what we’ve done so far.

The Roadmap consists of an **introduction** to our Circular City vision, aims and objectives; a **framework to develop the enabling conditions and measure progress**, including KPIs, key milestones and our Circular City Maturity Matrix; **demonstration projects** within key sectors; and a **list of organisations** that have supported the Roadmap development and **next steps**.

Whilst reading the Roadmap, you can track where you are by following the section timeline at the bottom of each slide.



Why are we going 'Circular'?

- Cities are made up of a number of different systems. These systems contains lots of varying material and resource flows – including food, energy, water, traffic and of course people.
- As the image opposite shows, many of these materials and resources flow into the city, and then out. We're not making the most of the resources and assets that we have; valuable materials, nutrients and skills are leaking out of the system and assets are not being fully utilised.
- We want to shift these inefficient, linear systems to closed loop systems, where we're maximising the value from all resources and optimising asset use.



Circular City Vision

A circular city is one where we make the most of all the resources we have locally and ensure they stay circulating in the economy for as long as possible.

We will do this by rethinking, redesigning, repairing, reusing, remanufacturing, recycling and recovering products and services in our city - our 7 Rs. This will enable us to maximise the full potential of resources and reconnect people, places, business, organisations and communities, support economic resilience, develop strong communities and increase environmental sustainability.

It will contribute to achieving the city's vision of ensuring people live longer, healthier, more prosperous lives with better skills in a safe and sustainable environment that only uses the resources of one planet.



Aims & Objectives

Strategic Aims:

1. Drive business growth and support economic resilience (economic)
2. Connect communities and better meet people's needs (social)
3. Reduce our environmental impact to ensure we are living within the resources of one planet (environmental)

Specific Objectives:

1. Improve business productivity and profitability
2. Generating new business opportunities
3. Build knowledge and skills for human resilience
4. Strengthen community cohesion, capacity and resilience
5. Reduce GHG emissions
6. Cut waste

Our Roadmap Approach

- **Action-oriented** – we’ve focused on practical actions, setting out our early priorities to stimulate wider change.
- **Agile** – we intend for our Roadmap to be a ‘living document’, growing as our city does. We know that things change and we want to make sure that we respond to this. We’ll continue to monitor our progress and keep at the forefront of international best practice to adjust our approach as necessary.
- **Systems thinking** – to achieve systemic change, we need to think about all the different systems that operate in our city. We need to consider the knock-on effects of implementing a project in one part of the city or a particular sector, and we need to think about the system-wide changes required for a circular future. We can’t put circular solutions back into linear systems and expect them to flourish.
- **Human-centred** – we’ve continued to put people at the centre of what we’re doing. Peterborough’s Smart City initiative is internationally recognised for its citizen-centric approach and we have the ambition to be a ‘Circular City’, rather than a city with a circular economy. The key difference for us – people. Our systemic approach ensures that people and their values, needs, wellbeing and culture, will be designed-in to our Circular City.
- **Ambitious** - we’ve set out an ambitious action plan because we feel that we’ve set strong foundations and believe that’s what needed to create a step-change in our city. This will critically require significant support and commitment of stakeholders across Peterborough to deliver the potential economic, social and environmental benefits to the city.



Circular City Framework

– developing the enabling conditions & measuring progress

How do we measure our progress towards becoming a Circular City?

To ensure that we sustain the momentum of the Circular Peterborough initiative and continue to make substantial progress towards our ambition of operating as a truly circular city by 2050, we need to find a way that we can measure our progress. Due to the complex systems operating within cities and the relative infancy of the ‘circular city’ concept, this is no easy task. So, this is a brief snapshot of the work we’ve done in the area:

Nov 2016 How do we measure progress towards developing a circular economy at the city level? In the absence of an existing city-wide performance monitoring framework, one of our initial ideas was to look at developing a Circular City Maturity Model that would outline the basic steps to becoming more circular. To build this maturity model, we completed a process of extensive desk based research to see what circular economy indicators and metrics were already out there, including at the product, business, city and national levels. We then questioned how these indicators related to our approach in Peterborough; we started mapping the identified metrics onto our 7Rs – our practical steps to becoming a circular city. We found that this process worked really well and began developing a maturity model that aligned with our 7 Rs.

Jan 2017 During teams discussions, we realised that what we had developed could be adapted to both the business and city scales to measure progress. We decided to start by testing the model with local businesses, taking essentially a modular approach where we would obtain results from local businesses which could be accumulated to build an overview of the city’s overall circular maturity.



March 2017 We presented the basic framework for the Circular Business Maturity Model at a workshop with local organisations in March. Organisations were asked, firstly, to define each of the 7 Rs and, secondly, to review and edit our initial ideas for the different levels of maturity. What we found was that local businesses weren't actually ready for a model that measured their progress to embedding circular economy principles into their operations, what they actually wanted was more of a guide to doing this. So we used the insights from this workshop and a further workshop with our Circular City Champions to develop a Circular Business Guide, which still aligns with our 7 Rs.

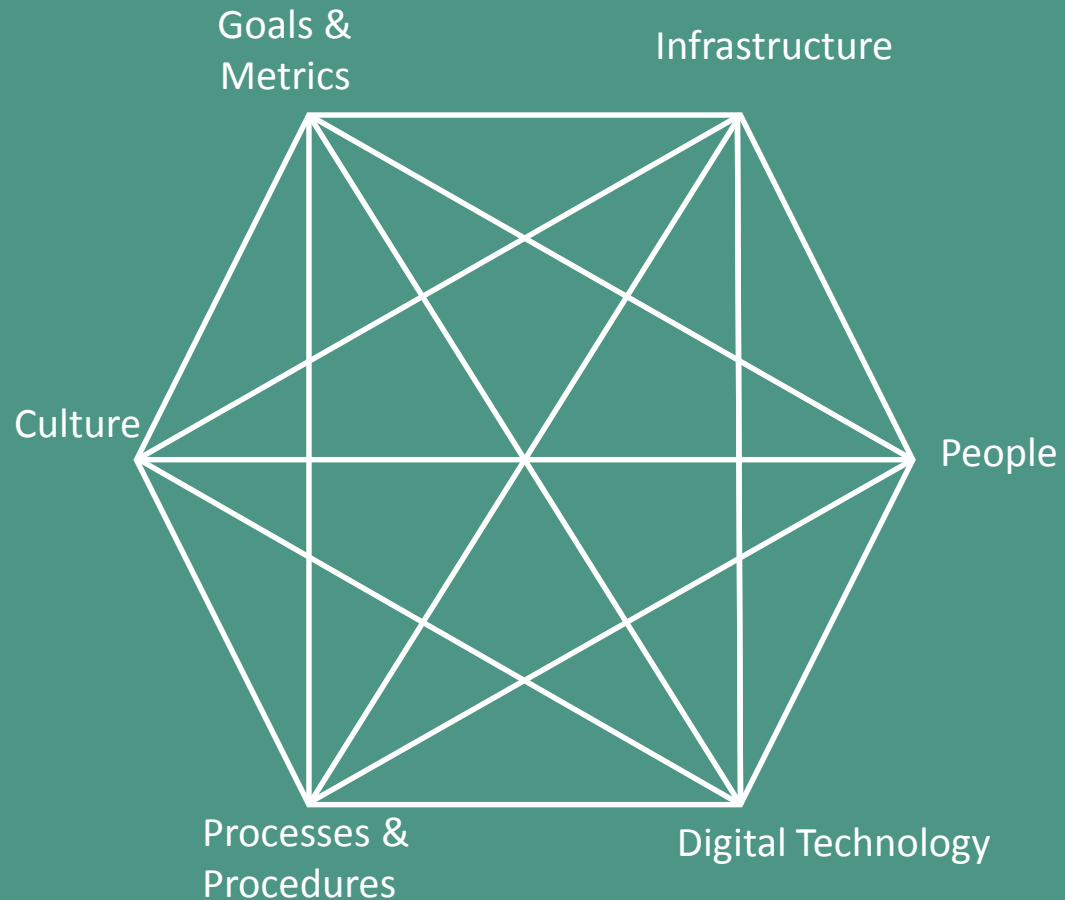
July 2017 So, 9 months on and we still faced the challenge of how to measure progress towards creating a circular economy at the city level. Although the 7 Rs worked well for directing individual's and business's progress, we decided at the city level we needed a more systems thinking approach.

Sep 2017 It was interesting to hear at a workshop we had with Zero Waste Scotland that they had come to similar conclusions that a systemic approach is needed, which provided us with further confidence that we were on the right track. As a local authority and the city's economic development company, we've always felt that our role in the circular transition is creating the enabling conditions for a circular city. So we decided to look at a systems thinking approach to measuring progress to developing the enabling conditions for a circular city. Indeed, in MI-ROG's recent White Paper on measuring circular economy performance, it is highlighted that enabler-based metrics are gaining credence.¹

Although it is widely recognised that the transition towards the circular economy requires systems thinking, there appeared to be an absence of a systemic approach to embed circular principles across urban systems. In light of this, we decided to explore using a simple, socio-technical systems thinking (STST) model developed by Davis et al.² The framework has been used to date in the context of disaster analysis, risk forecasting and sustainability in the workplace, but we also feel that it is relevant to circular cities. 'Resilience' is interestingly a common thread through these existing applications of the model which also extends to the circular economy. Applying the framework to the circular city concept is a new and unique application and very much responds to both a gap within the circular economy field and also a call for bravery by Davis et al. to extend the application of the framework to other domains.

City Systems

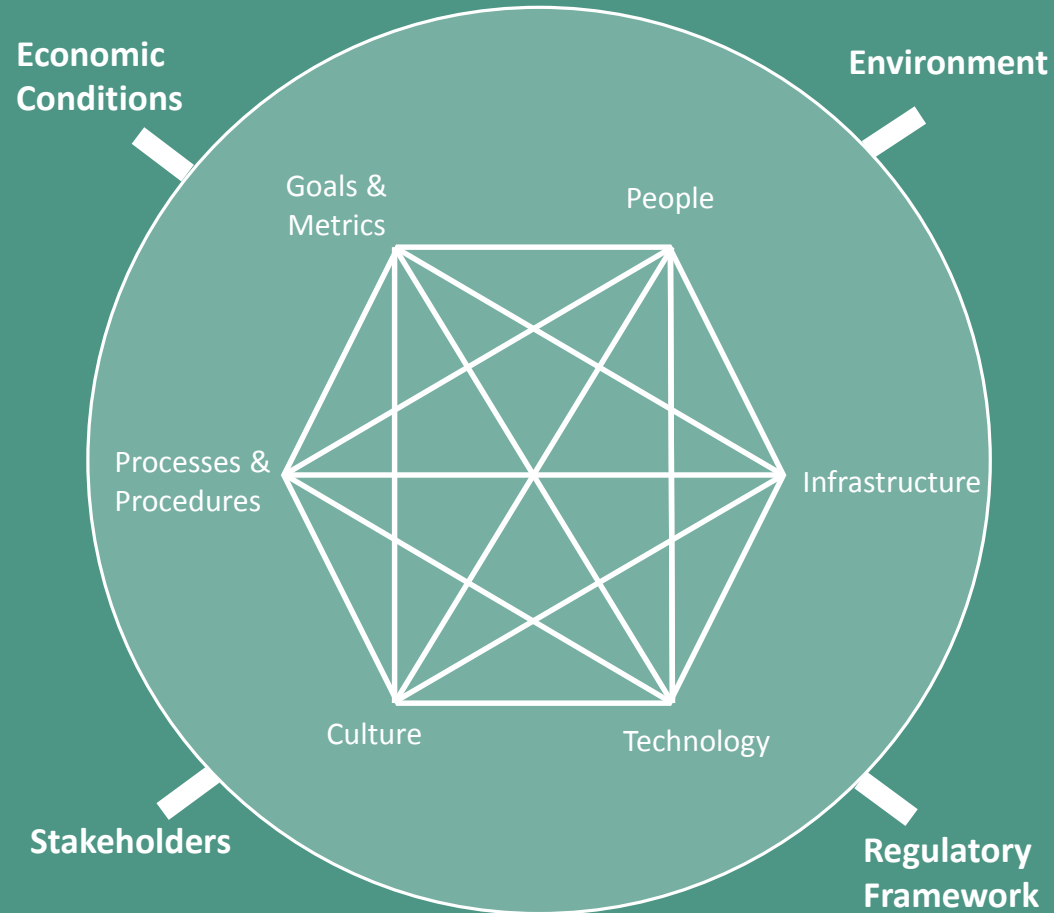
- **Systems thinking** - the model highlights how all the different elements of a system are interconnected. The key strength of the framework is that it provides a simple, yet powerful representation of the interdependent nature of city systems and helps us to think about the relationships between the different social and technical aspects. All urban components need to be aligned in order to create a circular city.
- **Enabling systems** – the framework provides key components that are needed to be in place in order to create a Circular City, from changing the *culture* away from a throwaway society to making sure that we have the right *digital technology* in place to enable circular innovations.



Source: Davis et al. (2014)

City Systems within Context

- According to Davis et al., the model presents systems embedded within an external context, consisting of financial/economic circumstances, regulatory frameworks and stakeholders.
- As the urban environment is a key part of creating our Circular City, we've decided to adapt the model to include this within our monitoring framework.
- These external conditions may influence progress made towards creating a Circular City, but our progress may also exert influence on the external conditions. For example, national regulation may influence city goals, whilst businesses shifting to more circular operating models may boost economic resilience and hence improve economic conditions. It's a two-way process.



Adapted: Davis et al. (2014)

Circular City Maturity Model: Peterborough Context

Our Circular City Maturity Model provides a quick way to measure progress towards developing the enabling conditions for a circular city. The matrix below provides an indication of where Peterborough is at now (X) and where we hope to be by 2021 (X). Our performance monitoring framework and key city milestones outlined over the next slides will help us to achieve this progress.

	Initiating	Developing	City-wide Action	Progressive	Optimising
	Topics/issues on the agenda, but minimal actions planned to achieve substantial change.	Actions have commenced and evidence of impact (e.g., pilot projects)	Action on city-wide level/ scaling up of pilot projects. Some key milestones have been achieved. Experience from pilot projects informs Roadmap development.	Significant progress has been made. System component is no longer a barrier to the development of the circular economy.	Component is fully 'circular'. Framework condition drives further optimization of resource flows within a regenerative urban system.
Circular Goals - city goals and ambitions drive Peterborough towards operating as a truly circular city by 2050.			X		X
Circular People - citizens actively participate in our Circular City, and are reaping the benefits.		X		X	
Circular Infrastructure - innovation-led city infrastructure that enables us to make the most of local materials and resources.	X			X	
Circular Technology - digital technology provides the information and connectivity to enable a city that is more restorative and regenerative.			X	X	
Circular Culture – having more, owning less and truly valuing materials and resources.	X		X		
Circular Processes & Procedures - operate across systems, breaking down siloed-thinking, to make it easy for the circular economy to develop.	X		X		



Foreword



Introduction



Circular City Framework



Demonstration Projects



Next Steps

Circular City Performance Monitoring Framework

Using the adapted socio-technical systems thinking model outlined previously from Davis et al. (2014), we've created a performance monitoring framework to measure and direct our progress towards becoming a circular city.

The table shown in the next slides includes a concise definition of what we mean by each system component (e.g., goals, technology, culture) and a short justification of why the element is important in creating a circular city ['System Component in a Circular City']. The table also includes further details of what the system component would look like in a circular city ['Enabling Conditions'], and how we will work towards achieving these and measuring progress ['KPIs & Milestones']. The KPIs and milestones are provisional, with further work needed to ascertain the feasibility of collecting the required and to ensure that they will truly reflect progress towards creating a circular city. As shown in the last column of the table, identified KPIs are a combination of enabler-focused and impact-focused indicators to provide a balance of capturing progress made towards creating the enabling conditions for a circular city and monitoring the social, economic and environmental impacts of actions.

We've also included a timeline of key milestones already achieved and those to be achieved towards 2021, which will be delivered by partners across the city .

System Component in a Circular City	Enabling Conditions	KPIs & Milestones
<p>Circular Goals – city goals and ambitions drive Peterborough towards operating as a truly circular city by 2050 .</p> <p>Goals direct a city’s progress and we need to make sure we’re moving in the right direction. The Achieving Growth within Report (2017) indicates that whilst companies buy into the attractiveness of the circular economy, there is still uncertainty surrounding if, and when, the transition will happen.³ In Peterborough, we’ve set out our vision to be operating as a truly circular city by 2050 to demonstrate our long term commitment and inspire confidence in our stakeholders. We now need to make sure other city ambitions support this vision.</p>	<ul style="list-style-type: none"> • Clear aims and objectives for creating a Circular City will drive our progress, with clear measures of success identified and publicly reported against (aligned where relevant with the UN SDGs). 	<p>KPIs – enabling conditions:</p> <ul style="list-style-type: none"> • Awareness of CE among businesses as monitored by the Rawlinsons Greater Peterborough Business Survey. • Progress made against KPIs (continual improvement) <p>Milestones:</p> <ul style="list-style-type: none"> ✓ CE ambition mentioned in Local Plan <input type="checkbox"/> Circular City Roadmap published online <input type="checkbox"/> Published list of research areas for academic partners <input type="checkbox"/> Circularity indicators/metrics developed at project, organizational and city-wide levels <input type="checkbox"/> Utility operators and other city system providers publicly committed to going fully circular
<p>Circular People – citizens actively participate in our Circular City, and are reaping the benefits.</p> <p>People are at the heart of cities. Today, 54% of the world’s population live in urban areas and by 2050, 75% of people will live in cities.</p> <p>The current, linear economy has significant impacts on how people live and interact with others and the city environment. People living in cities can face negative impacts from today’s take-make-dispose economy, such as air, water and noise pollution.⁴</p> <p>We also know that the linear economy has only deepened socio-economic inequalities and continues to fail to meet peoples needs across the whole of society. In Peterborough, we have higher than the UK’s average number of people living in deprived areas.⁵</p>	<ul style="list-style-type: none"> • People are better connected to each other and resources/assets through the sharing economy, and have time to share skills and participate in other community sharing activities. • People are empowered with the necessary information, skills and services to make better use of the materials and resources in the city, from repairing products to realising circular business opportunities. • Conditions are in place (e.g., training programmes, circular procurement) to support the creation of meaningful and fulfilling jobs within the CE. 	<p>KPIs – outcome/impact focused:</p> <ul style="list-style-type: none"> • Awareness of CE among citizens • Number of jobs within the CE • Measures of wellbeing and quality of life • Measure of equity within the local economy • Number of maker and resource sharing facilities in the city (e.g., makers spaces and ‘libraries of things’). <p>Milestones:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Network of maker spaces established <input type="checkbox"/> Mechanism for makers and communities to share skills, knowledge, spaces and tools <input type="checkbox"/> Network of ‘Library of Things’ established across the city <input type="checkbox"/> Simple, easy-to-follow lesson plans to develop CE skills used in schools <input type="checkbox"/> Circular Skills Academy established locally - mentorship programme for skills needed in the CE <input type="checkbox"/> Mechanism established to enable citizens to set up their own community based projects <input type="checkbox"/> Exploratory, feasibility research on a Universal Basic Income trial

System Component in a Circular City	Enabling Conditions	KPIs & Milestones
<p>Circular Infrastructure – innovation-led physical and digital infrastructure that enables us to make the most of local materials and resources.</p> <p>Growing populations in cities put increasing pressures on urban infrastructure. Within key related sectors, including mobility and the built environment, resources are not fully utilised resulting in both economic losses and negative environmental impacts:</p> <ul style="list-style-type: none"> • The average office in Europe is used for only 35-50% within working hours, whilst the average car is parked for 92% of the time⁶ • Traffic congestion has negative impacts on productivity, estimated to cost US drivers nearly USD 300 billion in 2016⁷ 	<ul style="list-style-type: none"> • Infrastructure is designed using a systemic and human centred-approach, where end-users and other relevant stakeholders are involved in the process. • Infrastructure is designed and constructed with CE principles, such as modularity, adaptability and material reuse. • City assets (including buildings and infrastructure) are collaboratively managed to exploit synergies between different assets (e.g., opportunities for increased asset productivity or industrial symbiosis). • Infrastructure is in place enable digital connectivity and to power the city on renewably energy. 	<p>KPIs – outcome/impact focused:</p> <ul style="list-style-type: none"> • Volume of non-municipal waste • Proportion of energy in the city produced from renewable sources <p>Milestones:</p> <ul style="list-style-type: none"> ✓ Energy Recovery Facility operating in the city ☐ Planning guide developed for co-design process with end-users/stakeholders developed (e.g., workshop guides) ☐ Established evidence base for the economic, social and environmental benefits of circular infrastructure
<p>Circular Technology – digital technology provides the information and connectivity to enable a city that is more restorative and regenerative.</p> <p>There will be between 25-50 billion connected devices by 2020⁸. This offers vast potential for the circular economy, from asset tracking to improved connectivity between people. Digital technology can support the circular economy through radical virtualization, dematerialisation and greater transparency of resource and product flows. Many cities, including Peterborough, are currently challenged by a lack of available data on urban resource flows to make intelligent decisions on specific interventions. Through digital technologies, such as, asset tagging, networks of sensors and geo-spatial mapping, cities have the potential to collect and analyse data on assets and resources (including people), map flows, identify key areas of structural waste and inform more data-driven decision making.</p>	<ul style="list-style-type: none"> • Infrastructure is in place (e.g., networks of sensors, sustainable data platform) to create an intelligent ‘digital nervous system’ to enable virtual modelling of urban systems and effective urban planning for the circular economy. • As part of the digital nervous system, city stakeholders are digitally empowered to identify circular opportunities using city data, stimulating innovation and create new value with the data. • Feedback is systematically used to drive improvements in resource use within organisational and urban systems. • Digital solutions enable the sharing of assets/resources and circular flows of materials (e.g., apps). 	<p>KPIs - enabling conditions:</p> <ul style="list-style-type: none"> • Available output from sensors across the city • Number of city-wide datasets available for use • Number of circular opportunities realised from city data <p>KPIs – outcome focused:</p> <ul style="list-style-type: none"> • Rates of business productivity <p>Milestones:</p> <ul style="list-style-type: none"> ✓ B2B sharing economy platform established (Share Peterborough) ☐ Baseline mapping/audit completed of what data we already have and what we don’t have (gaps) ☐ Digital connectivity established for sensor interoperability ☐ Education programme in schools developed to nurture digital skills ☐ City-wide sustainable data platform established

System Component in a Circular City	Enabling Conditions	KPIs & Milestones
<p>Circular Culture – having more, owning less and truly valuing materials and resources.</p> <p>Do we need to own stuff?</p> <ul style="list-style-type: none"> The average European car is parked for 92% of the time The average power drill is used for 20 mins of its lifetime ⁹ The average number of times a garment is worn before it ceases to be used has decreased 36% compared to 25 years ago, with some garments estimated to be worn between 7 – 10 times ¹⁰ <p>At the same time as massive economic losses resulting from ineffective utilisation of assets, we also tend to not value the planet’s resources, living in what has become known as a ‘throwaway society’.</p>	<ul style="list-style-type: none"> Substantial shift away from throwaway culture; citizens and businesses value materials and resources. Inclusive culture in which diversity is valued and the culture of sharing is developed and nurtured A shift in consumer perception in favour of leasing, rather than ownership (having more, owning less). 	<p>KPIs – enabling conditions</p> <ul style="list-style-type: none"> Citizen attitudes towards ownership and materiality Number of schools that include circular economy in their curriculum <p>KPIs – outcome focused:</p> <ul style="list-style-type: none"> Amount of household waste produced Rates of fly-tipping <p>Milestones:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Simple, easy-to-follow lesson plans to teach students about CE principles used in schools <input type="checkbox"/> Circular Office campaign launched in Peterborough <input type="checkbox"/> Network of repair facilities established across the city
<p>Circular Processes & Procedures – city level processes and procedures operate across systems, breaking down siloed-thinking, to make it easy for the circular economy to develop.</p> <p>Public procurement and the purchasing of services, works and supplies cover about 14% of European gross domestic product (GDP).¹¹ Consequently, leveraging public procurement has an immense power to stimulate the circular economy. Other city processes and procedures present a similar opportunity for innovation, cutting costs and delivering environmental benefits.</p>	<ul style="list-style-type: none"> Circular public procurement policies adopted across city administration. CE principles embedded in city processes and leadership of city-wide change is embedded in the roles of senior management across the council. Systems in place to enable effective performance monitoring of ecological and human feedback loops to ensure we are living within our natural limits. 	<p>KPIs</p> <ul style="list-style-type: none"> Proportion of public procurements that include circular economy requirements <p>Milestones:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Internal CE working group established <input type="checkbox"/> Public procurement policies aligned with CE principles <input type="checkbox"/> Digitally enabled feedback systems are in place



System Component in a Circular City	Enabling Conditions	KPIs & Milestones
<p>Environment - living within the resources of one planet and minimising harmful effects on the environment.</p> <p>The current linear economy has a significant impact on the urban environment, including air, water and noise pollution. With 67% of emissions from material management, the circular economy provides a great potential to dramatically reduce global GHGs. ¹²</p> <p>In Peterborough, we are committed to creating the UK's Environment Capital. Put simply this means living within the resources of one planet by 2050. At present, the average UK citizen would need three planets worth of resources to sustain our current lifestyles. Clearly things need to change.</p>	<ul style="list-style-type: none"> • The environment and its natural resources are valued. • Systems in place to protect and restore natural capital. • High quality local environment where we are living within the resources of one planet. 	<p>KPIs – outcome/impact focused:</p> <ul style="list-style-type: none"> • Peterborough's per capita CO2 emissions (as measured in Environment Capital Action Plan) • Air quality (measurement tbc) • Water quality (measurement tbc) <p>Milestones:</p> <ul style="list-style-type: none"> ✓ Action plan towards creating the UK's Environment Capital established ☐ Networks of sensors established across the city to measure environmental quality
<p>Stakeholders – citizens, organisations, communities, schools and other city stakeholders working collaboratively to change the way we do things.</p> <p>The circular economy requires unprecedented collaboration between stakeholders.</p> <p>Peterborough has already been recognised for its truly collaborative approach across sectors in the World Economic Forum's report on Circular Economy in Cities. ¹³ We aim to build on this strong collaborative ecosystem and continue to work together to create a circular city.</p>	<ul style="list-style-type: none"> • Strong city-wide collaboration across all sectors, with stakeholders involved in co-designing demonstration projects and the overall development of the Circular Peterborough programme. • Feedback loops are in place to ensure learning is systematically fed back into improved delivery plans. • Individuals, businesses, community groups and others have access to the support required to make changes towards the circular economy. 	<p>KPIs – enabling conditions:</p> <ul style="list-style-type: none"> • Number of stakeholders that have pledged their support to the Circular Peterborough Commitment and actively engaged <p>Milestones</p> <ul style="list-style-type: none"> ✓ Circular Peterborough Commitment co-created and launched ✓ Circular City Champions scheme established with key stakeholders in the city ☐ Comprehensive case study library published online to showcase best practice and inspire ☐ Circular Guide/Maturity Model to support and measure local organisations' transition towards the circular economy ☐ International circular economy conference



System Component in a Circular City	Enabling Conditions	KPIs & Milestones
<p>Regulatory Framework – local, national and international policies and regulation support and incentivise the development of the circular economy.</p> <p>There are currently a number of regulatory blockers that are stalling progress towards the circular economy being made. These needs to swiftly be identified, alongside other additional policies to support the development of the circular economy.</p>	<ul style="list-style-type: none"> • The necessary policy, planning processes and regulations are in place to enable circular activities. • Policies are coordinated across sectors. • Continuous evaluation of regulatory blockers and mechanisms in place to swiftly implement changes or lobby national government where necessary. 	<p>KPIs – proxy measures:</p> <ul style="list-style-type: none"> • Perceptions of businesses attending Circular Peterborough workshops around regulatory barriers <p>Milestones:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Report published on policy/regulation barriers that local businesses are currently facing <input type="checkbox"/> Circular economy agenda embedded in local plan policy
<p>Economic Conditions – a strong, resilient local economy that both supports and is supported by circular approaches.</p> <p>With finite resources on our planet, there’s not much room for expansion using the current linear economic model. Indeed, cities in the West are experiencing stalling growth rates.¹⁴ The circular economy provides a framework to deliver sustainable economic growth, creating a thriving local economy where economic growth is decoupled from raw material consumption.</p> <p>The circular economy is identified as a key lever in the Industrial Strategy White Paper to address the UK’s falling levels of productivity.¹⁵</p> <p>We need to redesign our approach to economic development so that it delivers benefits for all of the city – organisations, citizens and the environment.</p>	<ul style="list-style-type: none"> • CE is embedded in the city’s strategic economic priorities. • CE is how we do economic development and attract inward investment. • Businesses have access to funding/finance to support their transition towards circular business models. • Businesses are connect to create a rich, collaborative business ecosystem that encourages innovation. 	<p>KPIs – outcome-focused:</p> <ul style="list-style-type: none"> • Awareness and adoption of circular economy principles among local businesses (captured in Rawlinsons Business Survey) • Productivity (GVA/Job) <p>Milestones</p> <ul style="list-style-type: none"> <input type="checkbox"/> Circular economy focused inward investment ‘Action Plan’ developed and implemented <input type="checkbox"/> Investment Fund available to support businesses (will require wider collaboration)



From measuring progress to measuring outcomes

City-wide outcome focused KPIs

Jan 2018 To develop a series of circularity KPIs to complement the Circular City Maturity Model, we set a project brief to a group of MSc students from UCL (see Appendix A. for project findings). This was an incredibly useful task, as we quickly realised (1) the challenging nature of developing discrete KPIs for the enabling system components; and (2) the difficulty in creating KPIs to measure circularity using readily available available city-wide data. We also discussed city-wide KPIs with LWARB and Cambridge Econometrics as part of a project they had commissioned, where similar findings were echoed. For us, this highlighted the importance of having a two-track approach: using KPIs to measure our progress towards creating the enabling conditions for a Circular City (summarised in our Circular City Maturity Model on the previous slide) and having more outcome-focused, city wide KPIs exploiting existing datasets.

You can find a summary of the projects outcomes in Appendix A. It is important to note that we recognise that the proposed indicators do not truly measure a city's circularity, but complement measuring progress through using our enabling conditions monitoring framework.

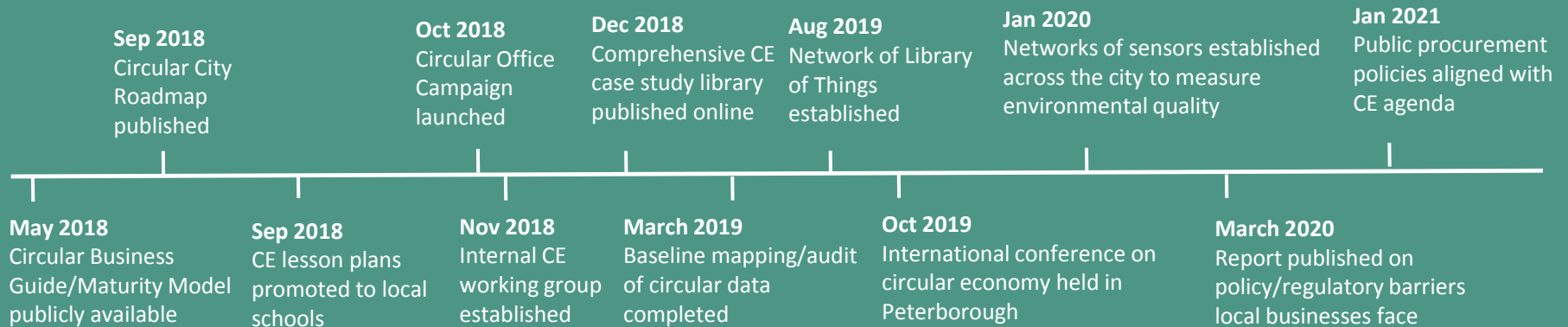
Key City Milestones...



....Achieved



Key City Milestones...

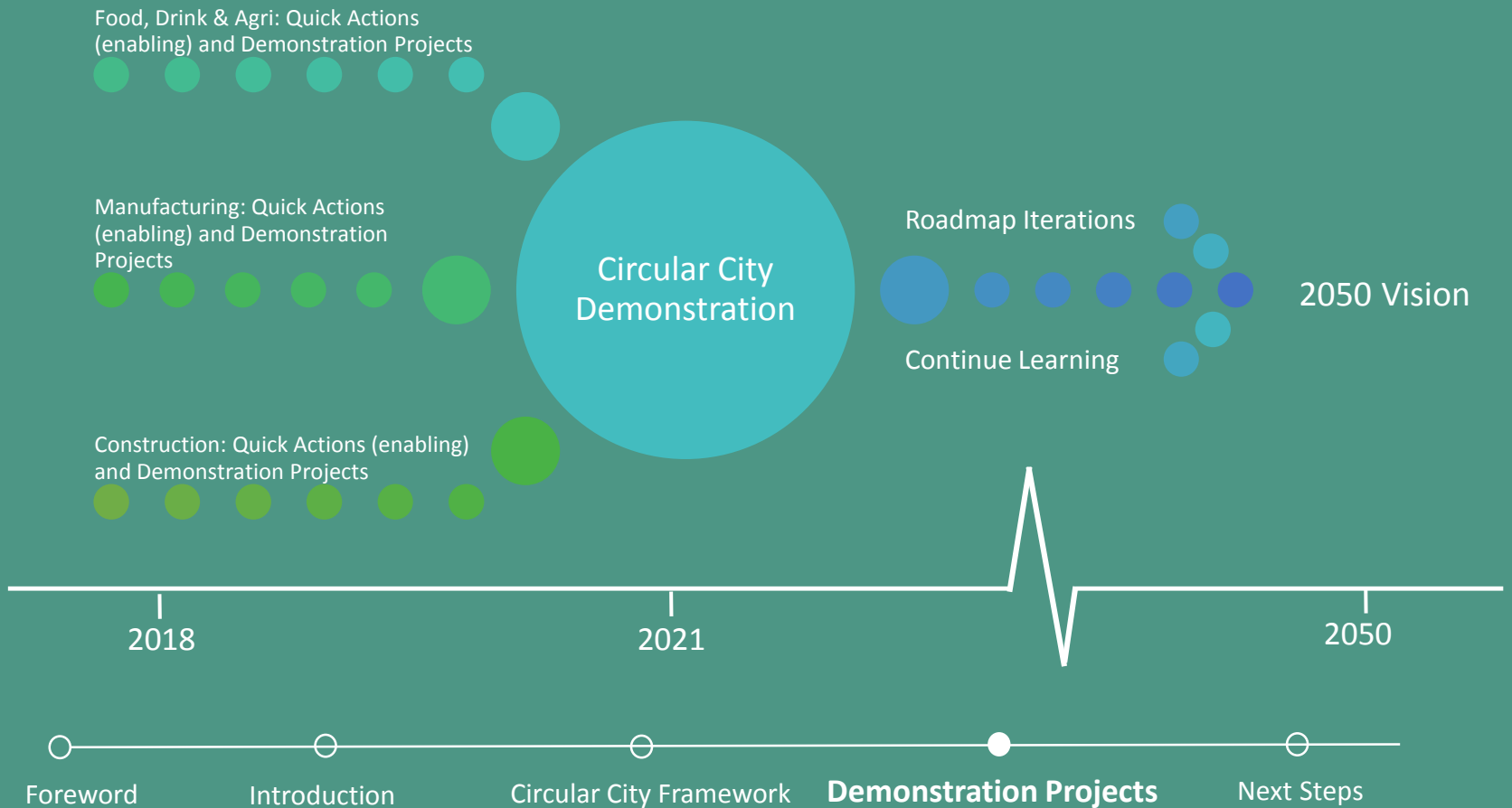


....to Achieve



Demonstration Projects

Summary of High-Impact Demonstration Projects

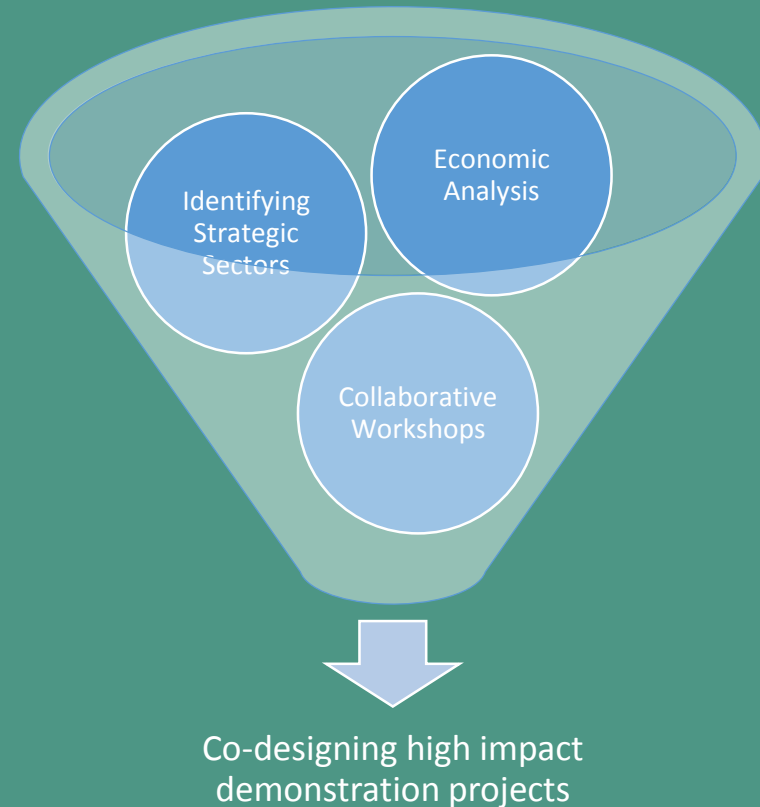


Why are we developing demonstration projects?

- 1. To build an evidence base** – there is a somewhat limited evidence base of the social, economic and environmental impacts of the circular economy. This is not only important in building confidence in circular solutions and encouraging other actors to follow suit, but also important in changing policies to support the circular economy.
- 2. To inspire** – large scale demonstration projects have the potential to show other organisations in Peterborough what is possible and catalyse action across the city. It can highlight the opportunity for innovation and show other businesses that there is a different way of doing things, a way that can deliver both economic and environmental gains.
- 3. To make progress** - high impact demonstration projects will contribute to creating a 'circular' Peterborough, closing resource flow loops and making the most of all the resources we have.

Developing our high impact demonstration projects

1. **Economic Analysis** – we started by looking at Peterborough’s key economic sectors, understanding their productivity levels and how each sector contributes to Peterborough’s overall economy.
2. **Identifying Strategic Sectors** – we then analysed the commercial opportunities within the circular economy across key performing economic sectors to identify 3 high impact demonstration areas.
3. **Collaborative Workshops** – we invited stakeholders across the value chain to a series of sector-focused innovation workshops to better understand the challenges these businesses were facing and to start working together to develop ideas for circular demonstration projects.
4. **Co-designing demonstration projects** – using the insights from the workshops, we worked with relevant stakeholders to develop demonstration projects. We took a very practical and pragmatic approach: looking at the ease of implementation, required buy-in and the level of expected impact to prioritise projects.



Circular Food, Drink & Agri systems

Peterborough Context

- Within ONS sectoral data, food sits within a rather unusual conglomeration of ‘Distribution, Transport, Accommodation and Food’, which is the largest contributor to local output as well as providing the fastest growth in GVA.¹⁶
- Peterborough has a rural hinterland of approximately 4,000 farms, with Greater Peterborough’s agri-food industry generating around £4 billion of food related trade each year.
- There are over 400 food manufacturing and food related firms in Peterborough which provide more than 6,000 local jobs, covering machinery and equipment manufacturing, cold storage, packaging, labelling and haulage.
- With such a wide range of food, drink and agri-related firms, local organisations cover the whole value chain from farm to fork.

Circular Opportunity

- The existing linear food system faces a number of challenges, with forecasts that we have less than 60 years remaining of topsoil, 31% of food is wasted across the value chain and 1 in 4 low income families in the UK struggle to eat regularly. Our current food system results in structural economic losses, environmental degradation and does not meet the basic needs of all citizens.
- As Peterborough firms cover the whole of the sector’s value chain, there is an exciting opportunity to create a circular food system, which is sustainable for the planet, makes the most of all the resources we have and provides healthy outcomes. A circular food system would mean fewer inputs, less waste and more economic opportunities.

Challenges within Peterborough's Food, Drink & Agri Sector

During the innovation workshop, organisations were asked to identify challenges that they either generally faced or challenges that related to moving towards more sustainable or circular operating models.

The challenges identified were grouped into 4 main categories which were discussed in more detail during group break-out sessions:

1. Financing the Circular Economy – how do we access funding and subsidies for new projects?
2. Industrial Symbiosis – how can we stimulate and facilitate industrial symbiosis between businesses in Peterborough?
3. Plastics and Packaging – how we do we eliminate plastics and single use packaging from the value chain?
4. Food Waste and Food Poverty – how can food waste and food poverty co-exist?

Cross-cutting challenges:

- Education and awareness
- Connecting organisations so that they can work together to address specific challenges

Both of these challenges are addressed within our systems thinking framework, primarily through the circular culture and stakeholders components.

Quick Actions	Addresses Challenge	Milestones & State of Progress	Key Partners
Establish Food, Drink and Agri group on Share Peterborough	<ul style="list-style-type: none">• Connecting organisations• Supporting industrial symbiosis• Providing a platform to cut food waste and food poverty	<ul style="list-style-type: none">• Group created [April 2018]• Grow group and promote activity [April 2018 <]	<ul style="list-style-type: none">• Opportunity Peterborough• Peterborough City Council

Demonstration Projects

Demonstration Project	Challenge & Opportunity	Milestones & State of Progress	Key Partners
Farm of the future- demonstrating resource efficient farming systems	<ul style="list-style-type: none"> • Closed loop farming systems • Complimentary practices • Encouraging adoption • Communicating benefits 	<ul style="list-style-type: none"> • Advanced concept development • Identifying key partners [Sept 2018] • Identifying collaborators • Farm up and running [exp. 2021] 	<ul style="list-style-type: none"> • East of England Agricultural Society
Circular Coffee Chain – demonstrating how to transform a linear value chain, step-by-step	<ul style="list-style-type: none"> • Reducing plastic waste • Key transferable learnings – from changing consumer behaviour (e.g., reusable cups) to innovative waste collection methods. 	<ul style="list-style-type: none"> • Commitment obtained from key partners [April 2018] • Kick-off meeting [June 2018] • Incremental steps towards a circular coffee chain to be achieved e.g., city-wide coffee sack collection, infrastructure for reusable cups, coffee waste put to work (i.e., bio-bean operational in Peterborough). 	<ul style="list-style-type: none"> • Opportunity Peterborough • Peterborough Reuse • bio-bean • Allia
Bread to beer – making use of surplus bread in the city	<ul style="list-style-type: none"> • Putting food waste to work • Connecting businesses to forge symbiotic relationships • Lessons to be learnt from financing new investments 	<ul style="list-style-type: none"> • Interest confirmed from Baker's Dozen Brewing Co. [April 2018] • Suitable partners with surplus bread identified [exp. End of 2018] • Brewing process started [exp. 2019] 	<ul style="list-style-type: none"> • Baker's Dozen Brewing Co.



Circular Manufacturing

Peterborough Context

- Sector contributes 13.82% to overall GVA in Peterborough. It's one of Peterborough most productive sectors, contributing significantly to local output and has experienced relatively high productivity growth of 142.59% between 2010-2015. ¹⁷
- Manufacturing provides a large proportion of local jobs but this figure has been contracting over recent years.
- Perkins are an internationally renowned manufacturing company, with operations within Peterborough, who have been remanufacturing engines since the 1940s. More recently they've been experimenting with 3D printing to reduce waste and cut prototyping time down . This allows for faster set up time of manufacturing lines and unlocks an opportunity for raw material cost reduction. Perkins are one of our Circular City Champions and committed to both improving their circular performance and inspiring other local businesses to follow the same pathway.

Circular Opportunity

- Production systems are likely to be a key element of circular cities ¹⁸, and in Peterborough manufacturing will be an important part of this.
- For the manufacturing sector there is a substantial economic opportunity in terms of reducing the costs associated with raw materials, improving business resilience and exploiting additional revenue streams.



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Challenges within Peterborough's Manufacturing Sector

During the innovation workshop, organisations were asked to identify challenges that they either generally faced or challenges that related to moving towards more sustainable or circular operating models.

The challenges identified were grouped into 5 main categories which were discussed in more detail during group break-out sessions:

1. Engagement and Collaboration – how do you engage key decision makers and other critical stakeholders, and achieve the necessary collaboration for the circular economy?
2. Awareness, Knowledge and Skills – how do we raise the levels of awareness, knowledge and skills (such as expert engineers) for circular innovation?
3. Financing the Circular Economy – what support is available and where can we find it?
4. Surplus Assets – how do we identify and locate surplus capital assets to improve utilisation or repurpose/refurbish/remanufacture/recycle them?
5. Meeting Customer Needs – how do we make sure circular manufacturing is something that customers understand and that it meets customers' needs better than existing offerings?

Cross-cutting challenges:

- Making the circular economy real to local businesses and customers
- Changing business culture



Quick Actions	Challenge Addressed	Milestones & Progress	Key Partners
Establish Manufacturing 'group' on Share Peterborough	<ul style="list-style-type: none"> Engagement and collaboration - connecting organisations Supporting industrial symbiosis 	<ul style="list-style-type: none"> Group created [March 2018] Grow group and promote activity 	<ul style="list-style-type: none"> Opportunity Peterborough Peterborough City Council
Circular Policy - develop an adaptable template for businesses to use to create an equivalent 'Environmental policy' in the context of the circular economy	<ul style="list-style-type: none"> A further tool to stimulate engagement Awareness and knowledge – making the circular economy real, relevant and practical to business 	<ul style="list-style-type: none"> Circular Economy Policy template publicly available 	<ul style="list-style-type: none"> Opportunity Peterborough Perkins PECT
Business Champions - building on the success of our Circular City Champions scheme, develop a wider network of 'champions' within local businesses and provide them with tools to gain senior level buy-in	<ul style="list-style-type: none"> Promoting engagement and collaboration Building awareness, knowledge and skills 	<ul style="list-style-type: none"> Establish a concise circular economy engagement guide and make available to potential 'champions' 	<ul style="list-style-type: none"> Opportunity Peterborough



Demonstration Projects

Demonstration Project	Challenge & Opportunity	Milestones & State of Progress	Key Partners
Avoiding use of clean drinking water to dilute waste streams in a local manufacturer's processes	<ul style="list-style-type: none"> Connecting organisations Water scarcity Actions will address a specific resource challenge facing a local business and provide transferable learnings 	<ul style="list-style-type: none"> Commitment from obtained organisations [May 2018] Specific actions decided between partners and implemented swiftly [tbc] Lessons learnt to inform wider policy development and other relevant areas [tbc] 	<ul style="list-style-type: none"> Local manufacturer
Improving local skills in manufacturing for the circular economy	<ul style="list-style-type: none"> Change in business culture Addressing skills shortages Developing the circular innovators of the future 	[tbc]	[tbc]
[Further project tbc]			



Circular Construction

Peterborough Context

- The construction sector contributes 4.27% to overall GVA in Peterborough and has experienced relatively low productivity growth of 104.55% between 2010-2015. ¹⁹
- Peterborough City Council's highways maintenance provider, Skanska, is one of our Circular City Champions and provides some great examples of leading best practice. Within the first year of the contract, Skanska diverted 97% of their waste from landfill and are aiming to source 80% of their procurement from the Greater Cambridgeshire and Greater Peterborough LEP area by 2020. Skanska have also designed and implemented some innovative circular projects, such as using 950 bales containing recycled tyres to replace carriageway.

Circular Opportunity

- Construction and demolition one of the largest waste streams by volume in the EU ²⁰, with construction and the operation of the built environment accounting for 60% of UK material consumption. ²¹ There is an extensive range of opportunities to reuse and recycle such materials, which provides economic benefits, such as reducing the need for virgin materials and minimising waste disposal costs.
- There is also an opportunity within the construction sector to improve the performance of buildings and infrastructure over their lifetime, providing cost savings and reducing environmental impact.
- Since Peterborough's construction sector has experienced relatively low productivity growth in recent years, applying circular economy practices has the potential to boost productivity through using more resource efficient processes and driving innovation.
- There is a wide range of circular opportunities for the construction sector in Peterborough, from small scale refurbishment projects to large scale infrastructure and regeneration projects. There is also opportunities relating to using concepts such as modular design and material passports; closing the loop of resource flows for aggregates; and optimising the use of space within buildings.



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Opportunities within Peterborough's Construction Sector

We took a slightly different approach for developing demonstration projects in this sector, tapping into planned projects in the city and taking learnings from international best practice. We had also conducted some prior engagement with the sector to identify projects using the concept of Circular Buildings for a previous European funding proposal. For further details on the process please see below:

- Stakeholder engagement for European funding proposal – we worked with local businesses to understand how we could optimise the use of space in the city and also to identify opportunities to reuse demolition waste materials
- International best practice – we've forged a strong partnership with a European funded project, Buildings and Material Banks (BAMB), which is implementing a number of state-of-the-art circular buildings pilot projects and developing innovative design tools, which we hope to apply to our demonstration projects here in Peterborough
- Mini workshops – to follow up on ideas, we arranged a series of smaller workshops with relevant stakeholders (e.g., a highways focused workshop between Peterborough City Council, Opportunity Peterborough and Skanska) to further scope demonstration projects.

Demonstration Projects

Demonstration Project	Challenge & Opportunity	Milestones & State of Progress	Key Partners
Serpentine Green Renovation – the UK’s first circular shopping centre	<ul style="list-style-type: none"> Opportunity to showcase the art of the possible in circular design and reuse of demolition materials in new construction. 	<ul style="list-style-type: none"> Commitment to concept obtained from British Land [Sep 2017]. Planning permission for new development still to be obtained. Kick-off meeting with key partners, including mapping opportunities using BAMB tools. 	<ul style="list-style-type: none"> Serpentine Green British Land
Circular school buildings – part of a European funding proposal to implement circular school renovation projects.	<ul style="list-style-type: none"> Opportunity to create a circular living lab - educating students and raising awareness of the circular economy. The project will ensure cost savings and drastically reduce virgin materials used. 	<ul style="list-style-type: none"> Stage 1 call deadline: November 2018. Project expected to commence in 2019, with renovations starting at the beginning of 2020. 	<ul style="list-style-type: none"> Peterborough City Council City of Eindhoven
Asphalt trial	<ul style="list-style-type: none"> Opportunity to test state of the art road construction / surfacing materials. Opportunity to change processes to extend the life of infrastructure. 	<ul style="list-style-type: none"> Trial first surface dressing product in 2019/20 Identify further suitable trials and programme for 2020/21 	<ul style="list-style-type: none"> Skanska Peterborough City Council



Next Steps & Supporting Organisations

Next steps for our Roadmap

If you have any comments or suggestions regarding the Roadmap, please do let us know. The feedback process will run until **15th June 2018**.

It's also not too late to get involved, if you have an idea for a demonstration project or would like to be involved in delivering an existing planned milestone or project please let us know.

Once we've collated all of the feedback received, we'll revise and add to the Roadmap as necessary. We're then aiming to officially launch our Circular City Roadmap in September 2018.

To get in touch with us, please email:

circular@opportunitypeterborough.co.uk



With special thanks to all the organisations that have been involved in the development of Peterborough's Circular City Roadmap...

AB Agri
Ace Engineering
AECOM
Allia
Anglian Water
As and When
Bakers Dozen Brewing
Bellville Computers
Bexar County Brewery
Big Barn
bio-bean
Bruxelles Environnement
BSI
Business in the Community
City College Peterborough
City of Eindhoven
Connected Energy
Cracking Cheese
Cradle to Cradle Marketplace
Cranfield University
Crede Solutions
Cross Keys Homes
Delivery Management
Diverse Cultures
Earth Matters CIC
East of England Agricultural Society

Ellen MacArthur Foundation
EnerTherm Engineering
Exemplas
EXSTO Business Solutions
Ferry Meadows
Folk Labs
Food Cycle
Free Thinking Design
Greater Peterborough University Technical College
HMP Prison
ICSP
Javawocky
Kingsgate
Kingsley Beverage Limited
LWARB
Milk Media
NatWest
Oakdene Hollins
OAL Group
Omega Foundry Machinery
Peterborough City Council
PECT
Perkins
Personnel Matters
Peterborough Greyhounds

Peterborough Regional College
Peterborough Telegraph
Plextek
Produce World
Queensgate
Railworld Wildlife Haven
Rawlinsons
RECOUP
Riverford Organic Farmers
Royal College of Art
Rycraft Consulting
Scottish Institute of Remanufacture (SIR)
Serco
Serpentine Green Shopping Centre
Skanska
The Green Backyard
The Institution of Engineering & Technology
Toshiba
University Centre Peterborough
University College of London
Urban DNA
Viridor
Walters
WLP
WVGM
Zero Waste Scotland (ZWS)



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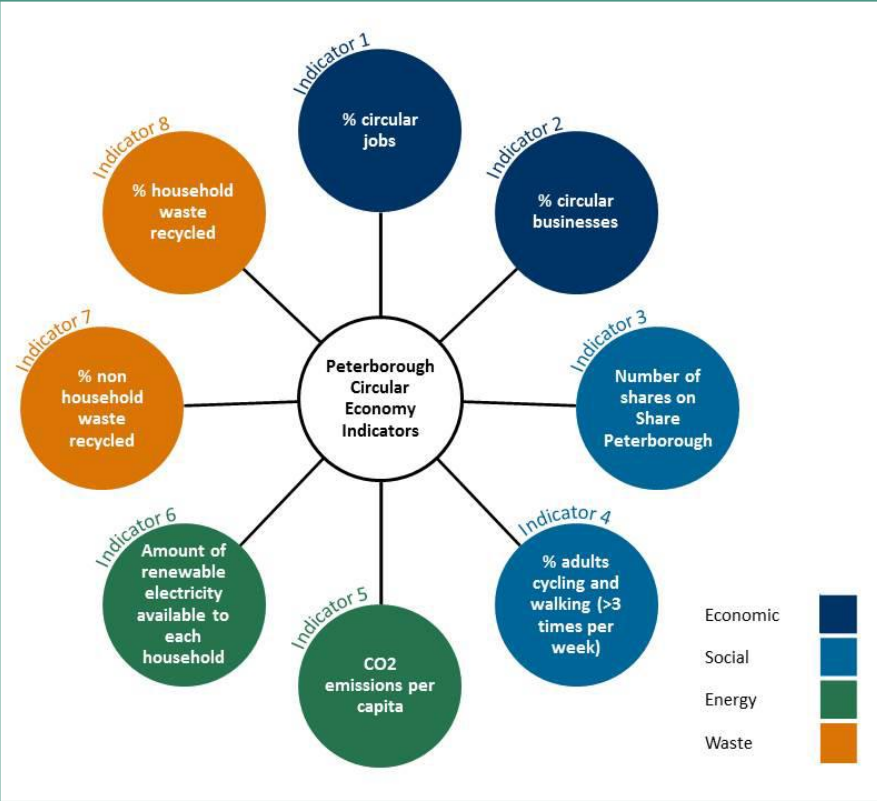
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Footnotes

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Appendix A. Measuring the Circular Economy: Developing an indicator set: Summary of findings (University College London)

- The purpose of the indicator set is to measure how the city is performing against circular economy objectives.
- Each indicator is designed to reflect different aspects of the circular economy: economic, social, energy and waste elements.



Circular Economy Indicators (2017)		Peterborough	England
1	% 'circular jobs' out of total employment	1.6%	1.6%
2	% 'circular businesses' out of total number of businesses	1.9%	1.9%
3	Number of shares on 'Share Peterborough' online portal	270	n/a
4	% adults cycling and walking >3 times per week	43%	46%
5	CO2 emissions per capita (tonnes)	5.3	5.9
6	Amount of renewable electricity available to each household (MWh)	1.6	2.0
7	% non household waste recycled (of total waste)	33%	36%
8	% household waste recycled (of total waste)	42%	44%

Performance Legend:

- Red: Performing worse than national average
- Yellow: Performing the same as the national average
- Green: Performing better than national average