Urban Foresight

Sheffield City Region Net Zero Work Programme

PREPARED FOR:

Sheffield City Region Mayoral Combined Authority

Urban Foresight® is a multidisciplinary innovation practice that is dedicated to advancing the next generation of technologies, services and policy frameworks for cities. From our offices in Newcastle and Dundee we work with ambitious organisations from government, business, academia and the third sector around the world on projects that improve lives, protect the environment and boost local economies.

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Executive summary

This report introduces the first 18 potential projects which start off an ongoing and evolving work programme to achieve net zero carbon emissions in South Yorkshire by 2040.

In November 2019 the Mayoral Combined Authority (MCA) declared a Climate and Environmental Emergency and committed to become net zero carbon by 2040. Achieving this needs concerted and joined-up effort by the MCA and the South Yorkshire Net Zero Partnership. The Net Zero Partnership, South Yorkshire businesses, and third sector organisations have all been engaged to create this work programme.

The 18 projects (Table 1) in this programme are just the start of the journey to net zero. They are designed to enable swift action and to mobilise businesses and citizens to reduce their emissions. Actions to develop the groundwork for infrastructure developments, and to test these before a wider regional roll-out are also included alongside recommendations on key deliver partners and their roles. Over the next five to ten years, accelerating the implementation of large-scale infrastructure will be needed to make further progress towards net zero.

Table 1: Net Zero Programme 2021-2023

Action	2021 H1	2021 H2	2022 H1	2022 H2	2023 H1	2023 H2
Action 1: Joint local authority working groups	P	D	D	D	D	D
Action 2: South Yorkshire Net Zero project bundles	P	P	P	D	D	
Action 3: National Leadership: showcasing the whole of South Yorkshire via UK100 Cities		P	D			
Action 4: South Yorkshire Net Zero Programme Data	P	D	D	D	D	D
Action 5: South Yorkshire Net Zero Communications Strategy	P	D	D	D	D	D
Action 6: Using the UN Sustainable Development Goals (SDGs) Reporting Framework	P	P	P		D	
Action 7: South Yorkshire Retrofit Programme (SYPR)	P	D	D	D	D	D
Action 8: Shared procurement for low carbon social housing	P	P	D	D	D	D
Action 9: Hydrogen and electric buses		P	P	P	P	P
Action 10: Residential on street electric vehicle charging	P	D	D	D	D	D
Action 11: South Yorkshire Active Travel	P	D	D	D	D	D
Action 12: Minewater heating		P	P	P	P	P
Action 13: Industrial waste heat capture for district heat networks		P	P	P	P	D
Action 14: Low carbon sustainable agriculture & food	P	D	D	D	D	D
Action 15: Grey to Green South Yorkshire	P	D	D	D	D	D
Action 16: Tree Planting & Northern Forest	P	P	D	D	D	D
Action 17: South Yorkshire business decarbonisation programme	P	P	D	D	D	D
Action 18: Low carbon fuel & power cluster organisation	P	P	D	D	D	D

P	Planning, scoping, feasibility, design and implementation
D	Ongoing delivery and management

Therefore, whilst the immediate actions for the MCA to deliver and coordinate projects, there is a need for parallel activity to keep progressing larger and more long-term

projects. This will mean these projects are delivered such that carbon reduction between now and 2040 is front-loaded or balanced, rather than pushing the problem closer to 2040.

This also requires work to overcome the financial and capability barriers facing individual organisations, as well as wider strategic challenges including a lack of region-wide systems analysis and evidence, and a defragmented approach to tackling climate change.

As such, the 18 projects are designed to build and add value to existing activities and plans (at all levels), by providing evidence, filling gaps in delivery or joining-up action across the whole of South Yorkshire.

The actions also reflect areas which were identified by stakeholders as requiring strategic co-ordination from the MCA; where collaboration or aggregation of procurement and delivery were considered to be important.

Alongside the programme of actions is a methodology for screening net zero capital projects prior to them entering the MCA's capital programme pipeline. This has been developed to align with the MCA's Capital Programme pipeline and Scheme Development Funnel. Our screening ensures that as the net zero programme evolves over time net zero capital projects are given due consideration alongside other investments being considered by the MCA.

Contents

Introduction

This report presents the Sheffield City Region Net Zero Programme. Actions have been set out to deliver the commitments set out in the Mayor's Climate Emergency Response Framework.

Climate Emergency Response Framework

In November 2019, the Mayoral Combined Authority (MCA) declared a Climate and Environmental Emergency and committed to become net zero carbon by 2040. This recognised that the need for urgent action to tackle the causes and effects of climate change. Fundamental change and strong leadership is required from the whole of the region.

The target date was combined with a carbon budget for South Yorkshire of 44.7MtCO$_2$ for the period of 2020-2100. This would, at 2017 emission levels, be consumed in under seven years highlighting that immediate action is required.

The Mayor's Climate Emergency Response Framework ('the Framework') was developed to help the MCA to work towards deliverable solutions. The Framework sets out commitments in five categories:

Leadership	Carbon reduction	Carbon capture	Climate adaptation	Climate economy
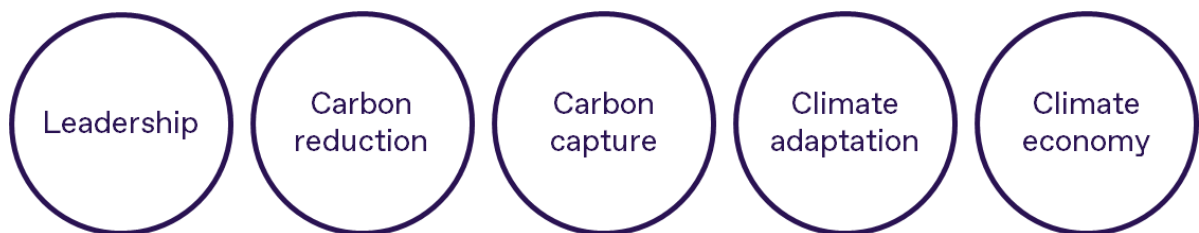
As part of the MCA's response, the Mayor convened the SCR Net Zero Partnership made up of the heads of South Yorkshire's anchor institutions to provide high-level advice. The role of the NZ Partnership is to deliver against the Framework.

Net Zero Programme

The aim of the Net Zero work programme is to progress each of the five commitment areas in the Framework towards implementation.

Specifically, the actions will work towards delivering some of the key achievements and targets set out in the Framework(Table 2).

Actions for each commitment will be in the context of the evidence base, project planning and interventions made to date. For well-developed commitments actions include specific interventions. For less fleshed out commitments, actions indicate what the early next steps are to building understanding and momentum.

Bringing these actions together, the Net Zero Work Programme will outline what the MCA can do now to make demonstrable progress towards net zero, with a look ahead to what should be done in 5-10 and 10-20 years' time.

Table 2: Achievements and targets in the Mayor's Climate Emergency Response Framework

Transport	Housing	Businesses	Waste

• 25% reduction in total travel demand by 2030
 	
• Car miles reduced by 10% by 2030 and 25% by 2040
 	
• By 2035, all vehicles are 100% zero emissions (EV or hydrogen)
 	
• Railway (and freight) decarbonisation by 2040
 	
• Freight miles reduced by 30% by 2040
	• 60% of homes to be better insulated by 2040:
	   o 65,000 cavity walls
	   o 119,000 solid walls
	   o 512,000 draught-proofing & floor insulation
	   o 481,000 triple glazing
	
	• Domestic energy demand reduced by 60%
	
	• 570,00f homes with heat pumps & 15% other form of renewable heating
	
	• 101,000 homes with renewable heating
	
	• No fossil fuel heating in new homes from 2025.
	
	• All new homes to be built close to Passivhaus standard from 2030.
		• Heating energy demand reduced by 40%, hot water energy by 30% and cooling energy by 60% by 2040
		
		• 90% of lights to be high-efficiency LEDs
		
		• Heat pumps supply 80-90% of commercial heat, with the rest from forms of low carbon heating
		
		• 10-20% of homes with renewable heating
			• Household waste reduced by 20%
			
			• Commercial and industrial waste reduced by 11%
			
			• By 2035, 65% of waste needs to be recycled, 10% will go to landfill, 25% incinerated.

Barriers to overcome

Extensive stakeholder engagement has been undertaken to understand barriers to delivering against net zero targets to co-create solutions.

Barriers within partner organisations

Stakeholders from the public and private sector report facing different challenges, which can be grouped in the following themes:

Human Resource Capacity: There is a widespread reported shortage of staff resource to deliver climate change programmes. Communication and trust issues between organisations that could and should be delivery partners in the decarbonisation agenda also mean that work required to deliver a net zero carbon future is often not done with optimal efficiency. Local authority collaboration was observed to be piecemeal around green and low carbon initiatives.

Finance: Financial constraints were a material barrier before COVID-19, and stakeholder feedback strongly indicates that these challenges have become more acute. This relates not only to the quantum of funding available to pursue individual projects and initiatives but also to the investment and return models that local authorities can regard as acceptable. With many decarbonisation initiatives having a longer-term payback there may be a need for other financial interventions (e.g. leveraging funding from outside South Yorkshire or the specific local authority, private sector investment, green bonds, green finance) to move the investment metrics to a more favourable position.

Knowledge: There is a lack of technical data to inform decision making, and technical knowledge to deliver. Data collection is uneven across South Yorkshire and even when collected, mechanisms and platforms to share or interrogate that data are often outdated. To then turn that data into useable knowledge requires staff with the requisite technical, analytical and software skills. These do not exist evenly across the local authorities within South Yorkshire and coalesce more by chance than design meaning projects are developed in an ad hoc way. For example, one local authority stated they had been able to successfully bid for funding for energy infrastructure as one of the team had this expertise – even though they were not hired for this purpose. Additionally, costs for some projects and initiatives remain unclear. Areas such as housing retrofit were cited as an example of this.

Partner Capability: At the public facing small scale delivery end of public services there is not a clear line of sight as to larger scale solutions being pursued or considered by the MCA to address climate change. To date the MCA has an incomplete understanding of local priorities and initiatives – something which is addressed by this work programme. Key potential public and private sector partners are unaware of each other's capabilities since skills, resources and best practice is only being shared inconsistently. These barriers contribute to value added partnering resources being unexploited or at best only partially

realised. The collaboration activity and region-wide actions in this work programme are designed to overcome these barriers.

Institutional and Procedural: This report talks elsewhere about competing investment priorities and procedural lock-in. A common theme arising from stakeholder engagement is the importance of aligning procurement with desired outcomes. There is a recognition that solutions most beneficial to meeting the SCR NZ high level outcomes are often problematic to procure using existing procedures.

There is a clear and present need therefore for these to be revisited. Any such exercise needs to ensure a consistency of approach by involving all local authorities and to consider the views and concerns of critical elements of the SCR supply chain and business base. Concerns over the costs to business of scaling up low carbon processes must be listened to and acted upon.

Regional infrastructure

A key issue for efforts to reduce carbon emissions is that local authority boundaries do not constrain the movement of people, goods, data and emissions. Essential infrastructure and services for citizens and businesses also typically exist beyond the political boundaries of a local authority.

A systems approach is needed

A further challenge is the number of systems operating in South Yorkshire and the range of actors that deliver and interface with the services that they support. Understanding how these systems interrelate and the feedback loops they create is fundamental when identifying where to invest.

It is evident that South Yorkshire consists of a complex arrangement of interconnected infrastructures and legacy interdependencies. Stakeholders have stated that continuing to make investments without a detailed systems analysis risks locking-in emissions if infrastructure is not delivered in the right place. Similarly, a systems analysis can identify the most effective enabling infrastructure for the region.

Enabling infrastructure

At present the areas of greatest weakness in transport and energy infrastructure terms act as a brake against ambitious decarbonisation initiatives. This is particularly evident in transport, energy and housing, acting as a barrier to change.

In energy, businesses are keen to capture and re-use waste heat where heat networks are accessible, but this is limited across South Yorkshire and supply and demand are not aligned. Legacy energy infrastructure is outdated, and grid capacity issues are yet to be addressed.

In transport there is a spatial and structural imbalance across the region. An example is a perception by stakeholders that as one local authority gets a new electric bus stock to meet climate commitments its older fleet is passed on to another which has longer term targets. This delays the transition to low carbon public transport across the whole region.

Reducing public transport demand through more remote/ home working requires universal high-speed broadband which is not currently in place.

High-energy industry and energy inefficient homes are the biggest challenges across the region as a whole. There is a pressing need for new housing, but current procurement approaches do not align with net zero. There is a tendency to lock-in around existing practices with only a gradual evolution to lower carbon solutions (such as Modern Methods of Construction using Design for Manufacture and Assembly), lower embedded carbon materials and circular economy approaches to buildings as materials banks.

Strategic

Line of sight and fragmented approaches

SCR itself, the four constituent Local Authorities of the SCR, and the business community all have different starting points in terms of their carbon baseline and their strategic understanding of the size and dimension of the challenge. This coupled with communication issues and silo-based work practices makes finding consensus on purpose, ambition and project prioritisation harder to achieve.

Evidence gathered for this report suggests that across public, private and third sectors there is much good work being done. Local authorities are working towards their own targets with planned activity focussed on the strengths and priorities in their area. Local authorities are also engaging more with local universities thanks to effort from all parties. There is however a clear message that there is considerable duplication of effort, inconsistent and confusing approaches, and sub-scale responses.

Under-utilisation of local assets and expertise

There are key strategic assets within the MCA. These include low carbon infrastructure opportunities such as district heat networks and minewater heat reserves, academic and business expertise, and highly skilled, sophisticated and diverse supply chain capabilities. At present these manifest unevenly across the region.

Some local authorities report minimal dialogue with the region's leading Universities, whilst sharing of academic and commercial best practice in the low carbon arena appears sporadic and unstructured. Similarly, University willingness to fund decarbonisation activities has not always aligned with MCA priorities with the result that funding and academic opportunities from within South Yorkshire have, on occasion, been deployed in other regions.

Evidence & data

There is no complete and consistent detailed understanding of the carbon emissions baseline at regional, local authority or individual site level. This has historically been due to gaps in data collection, and differing data collection requirements across public services and their outsourced supply chain. For example, one South Yorkshire local authority has explored working with the online resources for calculating emissions profiles, the Tyndall Carbon Targeter and has been investigating SCATTER, but has not found a preferred way forward. This is a common struggle across South Yorkshire's local authorities.

SCR MCA

Mixed messaging/ roles and responsibilities

The MCA has published the Climate Emergency Response Framework, however there is a material issue around coordination with the constituent LAs' own responses which needs addressing. This issue also extends to the wider business community where, with the exception of isolated strong relationships, there is a feeling that current region-wide approaches are not adequately aligned with the approaches and needs of business.

A notable area of confusion is the mismatch between agreed Local Authority plans and objectives and those published by the MCA. These strategic disconnects impede effective collaborative working but also cause confusion among prospective business and community partners. To whose agenda should they be working, and how can these stakeholders align competing and inconsistent public sector decarbonisation targets and priorities with those of their own organisation?

Scalar mismatches and delegated powers

Transport decarbonisation is a huge challenge but policy and delivery levers are often out of both the MCA and local authority control (resting with highways authorities, rail networks, and commercial airports). There is a desire at local authority level to facilitate a shift to low carbon transport, but this needs to be coordinated and aligned with wider transport decision making policies and powers across the region.

Capacity

The path to net zero carbon has multi-billion-pound consequences for SCR. Multiple individual projects ranging from thousands to millions of pounds in scale require coordinating across local and regional stakeholders. Some will require additional national government support but will also need to be responsive and sensitive to local needs.

Delivering against these multiple facets will require the crowding in of stakeholder and partner resource. But it will also need significant institutional and financial resource to be approved and ring-fenced at an MCA level.

Overcoming barriers

This work programme of actions is designed to overcome these barriers. The actions include feasible recommendations to join-up and coordinate net zero project delivery and to fill gaps in evidence and data. These foundations underpin a series of system-wide projects which capitalise on South Yorkshire's assets and expertise.

Project assessment

Reaching net zero will require a broader and wider range of actions and interventions between now and 2040 than identified in this initial workplan. As project opportunities from across the Net Zero Partnership are identified a consistent and robust mechanism for assessing these is needed. It is key that this mechanism works seamlessly with existing processes for assessing and progressing capital and non-capital projects.

A Net Zero Screening Assessment Tool has been developed to prioritise net Zero Programme projects based on a range of criteria. The Screening Assessment Tool will identify which Net Zero capital projects will be put forward for consideration the MCA's Capital Programme. Non-capital projects will be assessed using the same tool, so that these can be prioritised and taken forward for funding and implementation outside of the MCA's Capital Programme.

The MCA's Capital Programme Pipeline

Before any schemes being considered by the MCA are included in the Capital Programme pipeline, they first must go through a triage process. This triage process is the entry point to the Scheme development funnel (Figure 1).

The triage stage consists of the SY Capital Programme Gateway Form which is used to make a high-level assessment of a proposed project. Structured in-line with the HMT's Green Book 5-Stage business case approach the Gateway Form asks a series of questions to judge the Strategic, Economic, Commercial, Financial, and Management case for each proposed project.
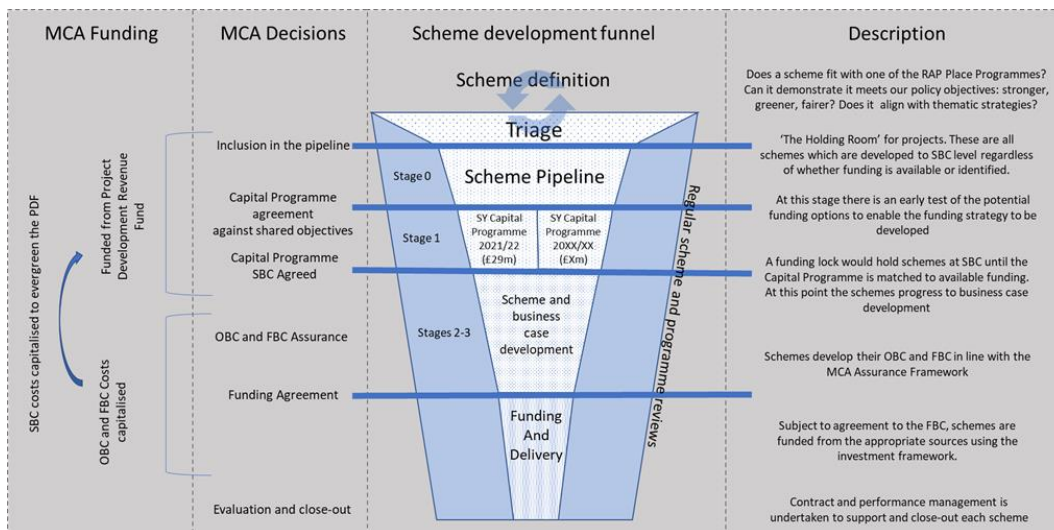

Figure 1: MCA Capital Programme Scheme development funnel

Net Zero Programme project assessment

The Net Zero Screening Tool will be used by the MCA staff responsible for developing and promoting net zero projects as part of the Net Zero Programme.

The assessment will take place before the SY Capital Programme Gateway Form is used as part of the Capital Programme project triage. This will ensure that net zero projects submitted to capital programme have already been assessed, streamlining the Gateway Form process.

Therefore, to be consistent and to make sure that net zero projects also contribute to the wider socio-economic priorities of the MCA, the assessment is aligned with key elements of the Gateway Form so that net zero projects taken forward will deliver the best outcomes and impacts for South Yorkshire as a whole.

The user of the tool gives a score for a project against a set of 16 criteria (see next section). To turn these 16 individual scores into recommendations, the tool calculates two combined scores:

- Impact score: 14 impact criteria scores added together.
- Deliverability score: two deliverability criteria scores added together.

These two scores can then be plotted on two-by-two matrix which will recommend whether projects should be prioritised. For example, projects which have a high impact score and high deliverability score are prioritised as 'must do', as shown below (Figure 2).

This will produce clear recommendations on whether to advance with a project. Capital projects will be submitted to the MCA's Capital Programme. Non-capital projects will be taken on by the responsible MCA officer or partner organisation who will seek funding to develop the project.
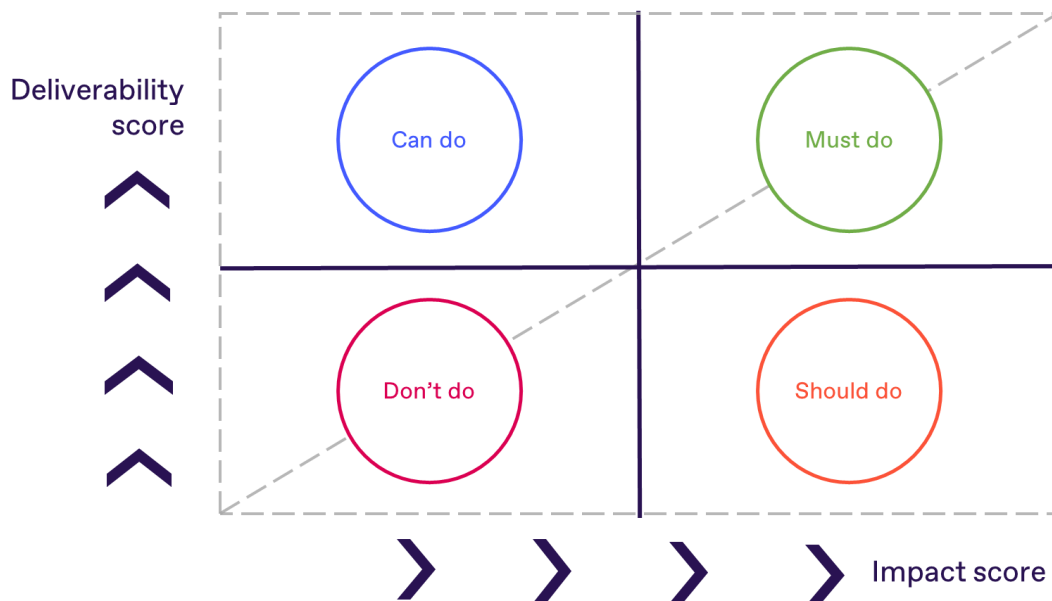

Figure 2: Prioritisation matrix

Prioritised net zero projects should be taken forwards as followed:

Project rating	Next steps: capital projects	Next steps: non-capital projects
Must do	Enter into the MCA's Capital Programme Scheme Development funnel.	Proactively source funding from within the MCA and the Net Zero Partnership or bid into the funding sources.
Should do	Enter into the MCA's Capital Programme Scheme Development funnel, and /or engage Net Zero Partnership to explore external funding sources.	Proactively source funding from the Net Zero Partnership or bid into the funding sources.
Can do	Enter into the MCA's Capital Programme Scheme Development funnel as the SY Capital Programme Gateway Form will assess the project against wider criteria at triage stage.	'Shelve' in preparation for a relevant funding opportunity, or in case a partner wants to take on.

The Net Zero Programme assessment criteria

Outcomes and impacts which net zero projects work towards are not just focussed on carbon reduction. Investment in reducing carbon creates opportunities to deliver the ambitions of the MCA's Strategic Economic Plan and help South Yorkshire pursue a green recovery from Covid-19.

Potential impacts and benefits have to be balanced against current and ongoing costs, as well as capacity and capability to deliver.

To ensure this holistic range of outcomes and impacts represents the priorities of South Yorkshire, the following 16 criteria have been designed in collaboration with the Net Zero Partnership.

The 16 criteria are subdivided into 'impact' and 'deliverability' categories (Figure 3) with the impact criteria made up of three groups.
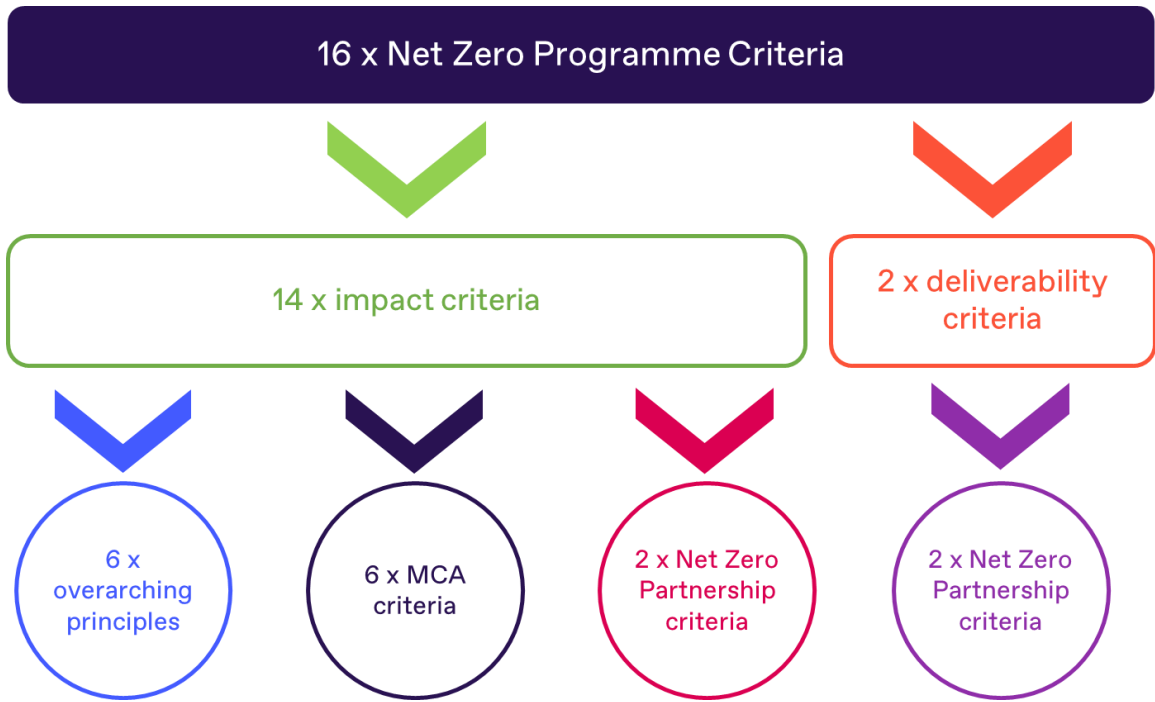
Figure 3: overview of the prioritisation framework

Impact Criteria

The 14 impact criteria have been informed by detailed and extensive engagement with the NZ Partnership to understand their own challenges and strategic barriers. Similarly, alignment with other SCR MCA strategies is important.

6 x overarching principles

Designed to focus on tackling the main barriers identified by the NZ Partnership & stakeholders.

Informed by Urban Foresight's 'design principles' for smart city and low carbon projects. these have been developed over extensive strategy and project working with national, devolved, regional and local government's around the low carbon agenda

6 x MCA criteria

Aligned with the SCR MCA's Strategic Economic Plan (SEP) and Covid Recovery Plan.

Informed through engagement with different teams within SCR MCA.

2 x Net Zero Partnership criteria

Informed through engagement with the Net Zero Partnership & stakeholders.

These are additional to the strategic criteria.

The strategic criteria are:

NZ1	Problem-led	Is the project tackling the most urgent sectors or emissions sources to address
		Is the project in a sector / theme which is a major source of carbon emissions, air pollution or waste?
NZ2	Cohesion	Connecting Local Authorities and stakeholders
		Joined-up working, utilising local assets, aligned with stakeholder plans
NZ3	Open	Open standards and supply chain
		Does the project embrace open standards (data, procurement) and share data where possible, to share learning between 'silos' such as energy, transport and buildings
NZ4	Outcomes-led	People see and feel the benefits of SCR net zero programme
		Achieving multiple positive outcomes for people including accessibility, improved quality of life/health and creating a liveable environment
NZ5	Scaleable	Is the project scaleable across the whole region, if required.
		If the project is a pilot, or at a single location, is it scaleable and ready for implementation across the wider South Yorkshire region or in different sectors?
NZ6	Intelligent	Using unique regional strengths and assets
		Make the best possible use of local assets, key developments, expertise and resources. Utilising emerging technology and being prepared to integrate with future technologies

The SCR criteria are:

		SEP objectives	SEP indicators
NZ7	(SEP) Business Growth	Support a more productive economy	GVA per head; GVA per capita
		Accelerate innovation activity	Higher R&D investment; Business innovation
		Fostering enterprise and growing our business base	Enterprise birth rate; Scale ups
NZ8	(SEP) Transport and Infrastructure	Transport and accessibility	Internal connectivity; Access to services; Sustainable mode share
		Digital competitiveness	Digital connectivity; Digital skills; Digital sector employment
		Land and housing	Housing affordability; Urban housing density
NZ9	(SEP) Skills and Employment	Raise aspirations, career knowledge and skills	School leavers; Education; Unemployment; Careers
		Address intergenerational worklessness	NEETS
		Address skills mismatches and support shift to high wage, high value economy	Higher-level occupations & wage levels; Reduced skills shortage vacancies & skills gaps
NZ10	(SEP) Sustainability and Places	Attractive urban areas	Cultural participation; Strength of centres;
		Energy efficiency	Fuel poverty; Renewable energy; Housing stock
		Climate and environment	Air quality; Living environment
		Cross-cutting	Deprivation

NZ11	Covid Recovery	Objectives of the Renewal Action Plan:
		Employers - flexible investment and recapitalisation to incentivise and advance support for Net Zero transition
		Places – sustainable travel; 'COVID lockdown' active travel levels; increase public transport use
		Places – shovel-ready decarbonisation investment
NZ12	Reputation and perception	Does the project create a positive reputation for the region?
		Corporate Social Responsibility / positive brand image for SCR and stakeholders. South Yorkshire viewed positively and regarded as a vanguard

The NZP criteria are:

NZ13	Carbon impact	Scale of carbon reduction
		What is the absolute volume of reduced carbon emissions; what is the percentage reduction of the emissions source targeted
NZ14	Added value	Is the project adding value to stakeholder / partner activity rather than duplicating or competing?
		Is value by unlocking opportunities for citizens, business and local authorities to act?

Deliverability Criteria

The two delivery criteria have been informed by engagement with the NZ Partnership and stakeholders. This is to ensure the different funding mechanisms available to different partners are considered alongside financial factors and speed of implementation.

2 x Net Zero Partnership criteria

> Informed by the financial considerations of the Net Zero Partnership and funding requirements.
>
> Reflects the ability of the MCA and Net Zero Partnership to realise significant benefits quickly..

The delivery criteria are:

NZ15	Deliverability & Readiness	Ability to deliver and realise benefits in the short term?
		Does SCR have sufficient policy levers, influence or remit to deliver?
		How close is the project to implementation; will investment today make a significant impact in the next three years?
NZ16	Investment	Affordability and financial sustainability
		How high is the initial cost and can this level of capital investment be sourced within the required timeline?
		What is the potential for a return to the project owner / investor sufficient to be financially sustainable and cover ongoing revenue costs?
		Is the project well aligned with priorities of UK government research funding and/ or relevant private social impact and other investment funding?

Criteria weightings

Weightings are applied to the different criteria. These weightings reflect the importance of each criteria in the decision-making process, based on achieving optimal outcomes for South Yorkshire.

The five commitment areas of the Climate Emergency Response Framework each have a subtly different focus. Therefore, criteria weightings can be changed depending which commitment area a project is responding to.

The weightings are shown in the accompanying Excel tool.

Work programme & actions

Eighteen priority actions have been identified across each commitment of the Climate Emergency Response Framework.

These actions have been informed by collaboration with the NZP and stakeholders combined with learning from best practice elsewhere. Actions also align with the themes of the SCR Energy Strategy.

The actions do not conflict or supersede any Local Authority's own current activity or plans. Instead, they are designed to build and add value to existing activities and plans (at all levels), by providing evidence, filling gaps in delivery or joining-up action across the whole of South Yorkshire. A summary of the plans of each Local Authority is shown in Appendix I.

The actions reflect areas which were identified by stakeholders as requiring strategic co-ordination from SCR MCA; where collaboration or aggregation of procurement and delivery were considered to be important. These areas are:

- Local plan updates and coordination
- Electric vehicle charging
- Public transport
- Electricity generation
- Housing: new build standards and retrofit

Equally, there are a number of enabling or supporting activities which are not just applicable to low carbon projects and from which stakeholders would benefit.

Enabling activities include technical support for financial, legal and procurement elements of project design and development.

One example raised by stakeholders is a need for help to understand the capabilities and role of smart city technology and the Internet of Things (IoT) in local authority service delivery and operations.

This has become more relevant to responding to climate change with activities increasingly deploying technology to monitor the environment to better plan policy, or climate mitigation activity. Similarly, Covid-19 has demonstrated the impact that remote working can have on transport and energy demand in different locations. Research to better understand this effect, filling gaps in high-speed broadband provision, and improving digital inclusion, are all activities stakeholders would welcome to be undertaken at a regional level.

Work Programme Summary

There are 18 actions cross the five commitment areas of the MCA's Climate Emergency Response Framework (Figure 4).

The focus of this work programme is to reduce carbon emissions. However, it is important that South Yorkshire continues to adapt to the threats posed by climate change, especially flooding. Therefore, the commitments for carbon capture and climate adaptation have been combined into one commitment for the purpose of this work programme.
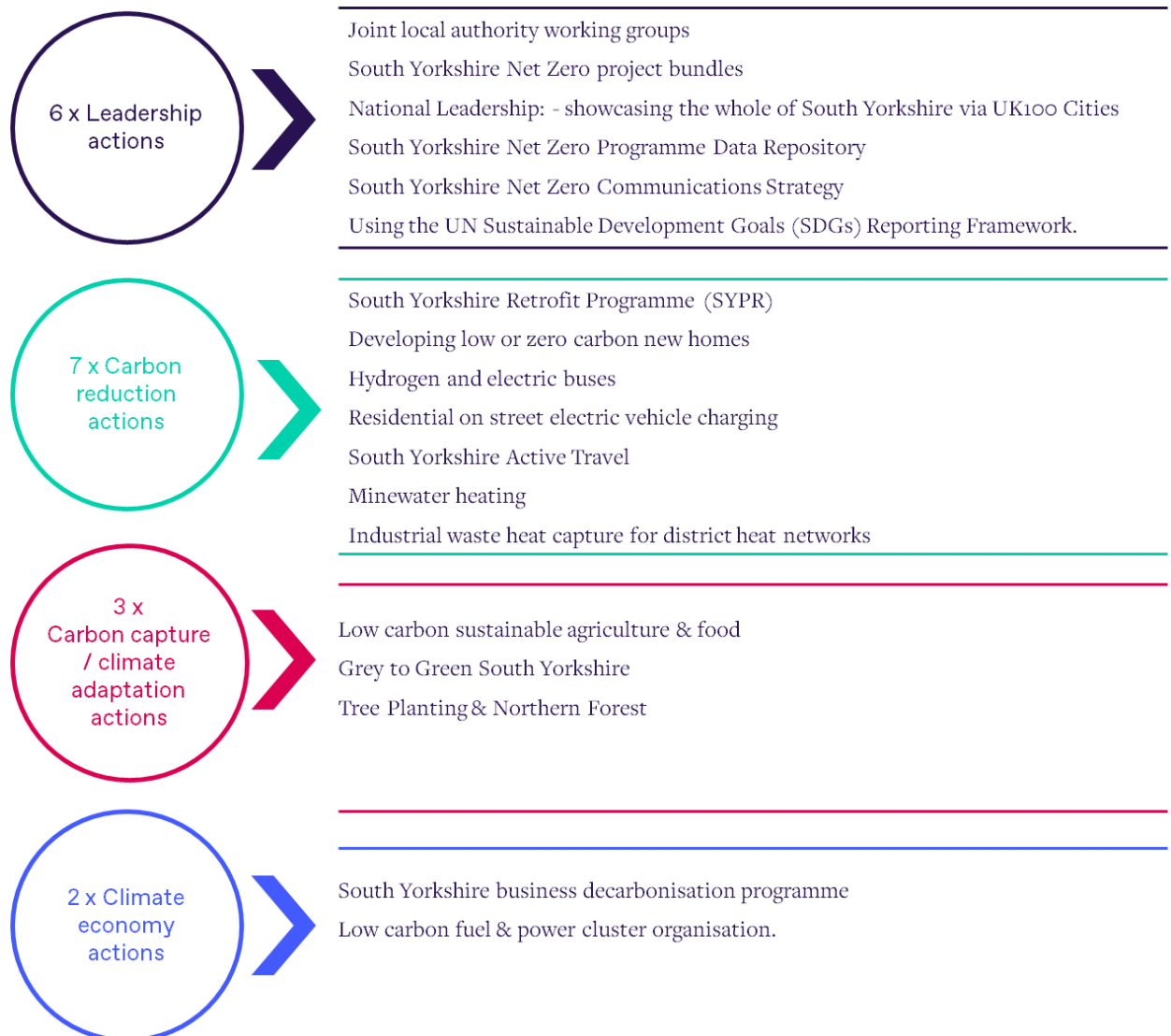
6 x Leadership actions

- Joint local authority working groups
- South Yorkshire Net Zero project bundles
- National Leadership: - showcasing the whole of South Yorkshire via UK100 Cities
- South Yorkshire Net Zero Programme Data Repository
- South Yorkshire Net Zero Communications Strategy
- Using the UN Sustainable Development Goals (SDGs) Reporting Framework.

7 x Carbon reduction actions

- South Yorkshire Retrofit Programme (SYPR)
- Developing low or zero carbon new homes
- Hydrogen and electric buses
- Residential on street electric vehicle charging
- South Yorkshire Active Travel
- Minewater heating
- Industrial waste heat capture for district heat networks

3 x Carbon capture / climate adaptation actions

- Low carbon sustainable agriculture & food
- Grey to Green South Yorkshire
- Tree Planting & Northern Forest

2 x Climate economy actions

- South Yorkshire business decarbonisation programme
- Low carbon fuel & power cluster organisation.

Figure 4: Summary of actions grouped by commitment theme

Creating co-benefits

The Net Zero Programme is not happening in isolation and reducing carbon emissions is not the only urgent issue the MCA and local authorities need to address. Therefore, investment in carbon reduction is competing with investment in social and economic policy actions and delivery at a time where local government budgets are constrained.

This means it is important that investment in carbon reduction projects also creates co-benefits, such as business growth and job creation, inclusive growth, and improved well-being.

This work programme's actions relating to Climate Emergency Response Framework commitments 2 to 4 deliver these co-benefits. This includes an emphasis on addressing social and economic inequalities.

Table 3: Carbon reduction actions.

Action		Social and economic co-benefits
Action 7	South Yorkshire Retrofit Programme (SYPR)	• Training and job creation, building on kick-start and bringing long-term economically inactive people into the labour market. • Reducing fuel poverty in the most deprived areas. • Improved health from warmer and less damp homes.
Action 8	Shared procurement for low carbon social housing	• Stimulates the Modern Methods of Construction (MMC) supply chain in South Yorkshire, rather than importing from other regions. • Job creation in new MMC roles and providing skills for private sector MMC developments. • On-going maintenance and energy cost savings.
Action 9	Hydrogen and electric buses	• Health benefits from reduced PM2.5, PM10 and NOx emissions, resulting in fewer early deaths and lower NHS costs.
Action 10	Residential on street electric vehicle charging	• Supports equality of access to charging infrastructure for homes without dedicated off-street parking. • Health benefits from reduced PM2.5, PM10 and NOx emissions, resulting in fewer early deaths and lower NHS costs.
Action 11	South Yorkshire Active Travel	• Health & wellbeing benefits from increased physical activity, and from reduced PM2.5, PM10 and NOx emissions.

Action		Social and economic co-benefits
		• Addresses transport poverty by providing an affordable alternative way to access employment, shops, services and community facilities.
Action 12	Minewater heating	• Creates supply chain skills and job creation. • Tackles fuel poverty. • Brings an unused local asset back in to economic use.
Action 13	Industrial waste heat capture for district heat networks	• Tackles fuel poverty. • Creates an additional revenue stream for businesses.
Action 14:	Low carbon sustainable agriculture & food	• Provides more affordable access to more healthy food, supporting efforts to address health inequalities. • Creates opportunities for social prescribing and well-being benefits.
Action 15	Grey to Green South Yorkshire	• Positive impacts on quality of place.
Action 16	Tree Planting & Northern Forest	• Creates opportunities for social prescribing and well-being benefits.
Action 17	South Yorkshire business decarbonisation programme	• Reduces energy bills for businesses. • Creates demand for the low-carbon technology supply chain. • Provides skills and job creation opportunities.
Action 18	Low carbon fuel & power cluster organisation	• Government and innovation funding to develop internationally significant new products. • Potential to attract inward investment. • Provides skills and job creation opportunities.

Leadership (Framework commitment 1)

There are six leadership actions in the proposed action plan, which act as a launch for the rest of the Net Zero Programme. This section presents a summary of these projects, outlining why they are important, the role of partners and the resource required.

Several of these actions underpin delivery of the actions in different commitment areas (Table 4). These should be set-up and initiated, in collaboration with the Sheffield City Region Net Zero Partnership, from the start of 2021 onwards. This is shown in the proposed delivery timeline between now and 2030 (Table 5).

Table 4: Leadership actions.

Action No.	Action Name	Interdependencies with other projects
Action 1	Joint local authority working groups	This action underpins the rest of the work programme. It is the most important action to start off the programme, ensuring the next ten years of delivery are joined-up and delivered collaboratively at a regional scale.
Action 2	South Yorkshire Net Zero project bundles	Establishing and implementing the process for this action provides a framework for ongoing use. As infrastructure projects are designed and brought forward, they will then contribute to this action.
Action 3	National Leadership: - showcasing the whole of South Yorkshire via UK100 Cities	This action cannot start until Action 1 has been implemented.
Action 4	South Yorkshire Net Zero Programme Data	This action cannot start until Action 1 has been implemented and the process agreed. It will be integrated with MCA's data and intelligence hub being developed with Urban Flows.
Action 5	South Yorkshire Net Zero Communications Strategy	This action should be developed in parallel with Action 1 and should be launched at the same time as the first on-the-ground actions are launched.
Action 6	Using the UN Sustainable Development Goals (SDGs) Reporting Framework	This action will come after Action 4 has been established. It is not critical to delivering future projects.

Table 5: Leadership actions timeline.

South Yorkshire Net Zero Campaign launch

Legend:
- Scoping / planning by MCA
- Working with partners to design and implement
- Post launch delivery, management & monitoring

Action	2021 H1 (April)	2021 H2	2022 H1	2022 H2	2023 H1	2023 H2	2024	2025	2026	2027	2028	2029	2030
Action 1:	Working with partners	Post launch	Post launch	Post launch	Post launch	Post launch	Post launch	Post launch	Post launch	Post launch	Post launch	Post launch	Post launch
Action 2:	Scoping	Scoping	Working with partners	Post launch	Post launch		Post launch		Post launch		Post launch		Post launch
Action 3		Working with partners	Post launch										
Action 4	Working with partners	Post launch	Post launch	Post launch	Post launch	Post launch	Post launch	Post launch	Post launch	Post launch	Post launch	Post launch	Post launch
Action 5	Working with partners	Post launch	Post launch	Post launch	Post launch	Post launch	Post launch	Post launch	Post launch	Post launch	Post launch	Post launch	Post launch
Action 6:	Scoping	Scoping	Working with partners		Post launch		Post launch		Post launch		Post launch		Post launch

Action 1: Joint local authority working groups

Why:	A formal approach to cross-council working is important to efficiently and effectively tackle climate change across South Yorkshire. The four local authorities all believe that the current ad hoc way they engage with each other results in duplication of effort, inconsistent approaches, and gaps in what they do. These inefficiencies could be 'locked in' if local authorities develop baselines and evidence bases using different methods and begin commissioning similar projects from different suppliers using different technologies. Formal working groups of local authority officers to create a shared vision and coordinated approach can lock in efficiencies instead. By acting as the delivery partners of the MCA these groups would reduce the need for dedicated resource within the MCA itself.
What	The MCA will host an organised working group, or groups, of local authority staff to exchange knowledge, solve common challenges, create standard approaches, and deliver Net Zero actions. Working groups will be thematic; for example, 'retrofit', 'electric vehicles', 'low carbon energy' and made up of the relevant staff from each local authority. An online knowledge hub for sharing best practice & case studies or asking for information and ideas can be established For example, Sheffield CC and Doncaster MBC both have internal 'commissions' or 'champions groups' from senior management who are responsible for leading on different themes of the climate emergency and driving action in different service areas. These individuals would sit on the South Yorkshire working groups for their themes, alongside representatives from other local authorities. Working groups can be coordinated by, and provide delivery support to, the MCA – an idea the local authorities have raised independently – to act as the delivery team for specific projects. The MCA will coordinate expert input to the working groups from South Yorkshire's universities and businesses so that all local authorities have access to this and so that two-way dialogue between local authorities takes place when needed. Community organisations, housing associations, NHS action groups and local food action groups should also be part of working groups when needed, to help with delivery and knowledge sharing.
Who	Lead role: MCA as coordinator of input from universities, business, and NHS action groups. Stakeholder & partner roles: Local authorities to run working groups, and work with community organisations to deliver activity. Interdependencies: Establishing local authority working groups increases the effectiveness and efficiency of all actions in this programme.

Action 2: South Yorkshire Net Zero project bundles

Why:	A South Yorkshire prospectus of project bundles is a way of attracting private investment in infrastructure to finance the Net Zero Programme (NZP). Raising investment at scale means more projects can be delivered more quickly, delivering the progress needed to reach the 2040 net zero target.
	Funding NZP projects is a challenge to the MCA and local authorities. Existing funding mechanisms such as the Public Works Loan Board are designed for individual projects, with an individual local authority taking on debt. Private investment in a bundle of projects across South Yorkshire reduces this risk to individual local authorities. For example, funding could be via a publicly issued municipal bond underwritten by the 4 LAs

What

The MCA Energy Strategy outlines a series of targets and strategic opportunities across South Yorkshire. The Energy Strategy provides a clear evidence base and overview of potential across four themes: Energy; Built Environment; Transport; Industry & Commercial.

This thematic structure provides a good starting point for developing a project prospectus. The most developed theme is Energy, and it is recommended this is the initial focus for developing project bundles. Doing this requires:

- Selecting which of the 400+ disused mine water sites will be used for the 5 target projects and, after feasibility, presenting these as investment propositions.

- Working with local authorities to develop investment propositions at renewable energy generation sites identified in Local Plans.

- Packaging heat generation infrastructure opportunities into investment lots.

- Creating a suite of energy storage locations and smart grid sites. These will then link into future project bundles for electric vehicle infrastructure and building energy efficiency.

Case study: Bristol City Leap

Bristol City Council Launched the City Leap energy investment prospectus in 2018. This was launched as part of the Energy Service Bristol programme.

The ambition of the prospectus reflects the city's strong starting point. Bristol Energy is a municipal energy company employing 35 energy experts, and Energy Service Bristol already manages a community energy fund.

The prospectus seeks to raise £1billion and is now being taken to the investment market by a strategic partner, following procurement of a long term corporate joint venture in Autumn 2020.

City Leap Programme at a glance

Potential investment opportunity	Estimated investment opportunity over ten years
Heat networks	£300m
Smart energy system	£125m
Domestic energy efficiency	£300m
Commercial energy efficiency	£100m
Renewable energy	£40m
Monitoring, dissemination and evaluation	£10m
Transport	Additional
Hydrogen	Additional
Marine energy	Additional
Total	**£875m**

Who

Lead role: MCA to produce the prospectus and manage investor relations.

Stakeholder & partner roles: Work with local authorities, community energy partnerships, Distribution Network Operator (DNO) and industrial heat generators as part of site selection; universities to support project feasibility and proposal development.

Interdependencies: Actions 10, 12 & 13 will feed into the prospectus of project bundles along with other MCA or local authority led infrastructure projects.

Action 3. National Leadership: - showcasing the whole of South Yorkshire via UK100 Cities

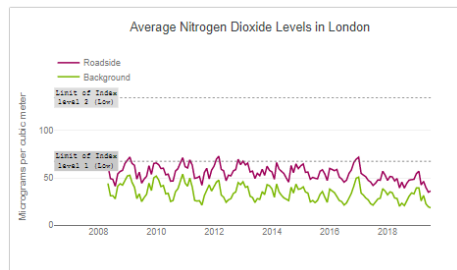|	
Why:	Supporting all four local authorities to be part of the UK100 initiative will help create a shared vision across South Yorkshire. Currently only Sheffield CC and Barnsley MBC are members. In July 2020 Sheffield CC and SCR were two of 24 local or combined authorities to sign the 5-point Resilient Recovery Declaration as part of the UK100 '5-point Resilient Recovery Taskforce', and other opportunities like this will be available to all four local authorities.
	If all four local authorities were to be members there would be more South Yorkshire engagement in different UK100 work programmes. This can build knowledge within the local authorities and demonstrate a united South Yorkshire ambition to tackle climate change to the rest of UK100's membership.
What	UK100 is a network for UK local authorities focused on climate and clean energy policy. Local leaders are connected to each other, to business and to national government, to showcase their achievements, learn, and speak collectively to accelerate the transition to clean energy.
	UK100 has financial support from the Children's Investment Fund Foundation, the European Climate Foundation, Siemens, Marks & Spencer and LandSec. UK100's partners include Community Energy England, UK Green Buildings Council, Carbon Disclosure Project (CDP), Leeds Climate Commission and the Department for Business, Energy and Industrial Strategy (BEIS).
	More can be done to showcase South Yorkshire and to raise national awareness of South Yorkshire's assets. The MCA should:
	• Encourage Rotherham and Doncaster councils to join UK100
	• Use expertise within South Yorkshire to provide evidence and innovation support to UK100 campaigns. Specifically, the University of Sheffield's Institute for Sustainable Food (ISF), Translational Energy Research Centre (TERC), and Sustainable Aviation Fuels Innovation Centre (SAFIC) can contribute expert support to the UK100 Countryside Climate Network and Zero Carbon Lab.
	• Showcase projects from South Yorkshire in UK100 news articles and blogs. These can be public sector or private sector projects which focus on the unique strengths of South Yorkshire. For example, the adoption of electric blast furnaces in the steel sector or the development of mine water heating schemes.
	• Ensure best practice or collaboration opportunities from the UK100 are shared amongst the four South Yorkshire councils and that they are supported to implement actions. Being part of Clean Energy Action Partnerships to access funding is a key example.
Who	Lead role: MCA to raise awareness amongst all local authorities and facilitate knowledge sharing on behalf of local innovation assets. This can be delivered through Action 1.
	Stakeholder & partner roles: Local authorities to engage with UK100 and two-way knowledge exchange with the initiative.
	Interdependencies: Formalising the local authority working groups (Action 1) will maximise the impact of engaging with UK100.

Action 4: South Yorkshire Net Zero Programme Data

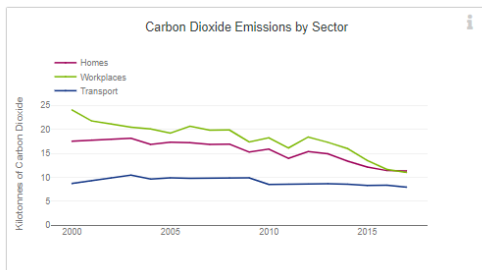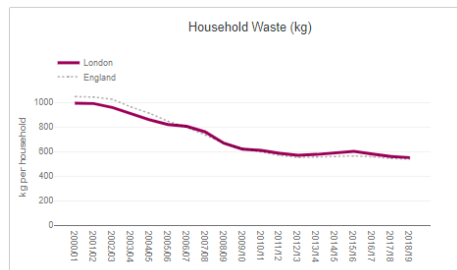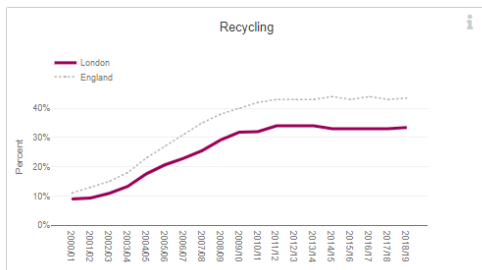|	
Why:	A central dataset and evidence base are essential to effectively delivery of Net Zero commitments, for five reasons: 1. Local authorities are struggling to measure their carbon baselines. A carbon inventory for South Yorkshire, for local authority and source, will fill this important knowledge gap and enable effective decision making. The need for a carbon baseline is one of the most important asks of the MCA by local authorities. 2. A carbon inventory can be updated annually to show progress over time towards the 2040 target. This means each local authority will be able to track their own progress in a consistent way, rather than using different methodologies or reporting at different times. 3. Project and site-specific datasets will optimise delivery by showing where interventions need to be focussed. For example; identifying properties in most urgent need of retrofit delivery can be planned in the most economically advantageous way. 4. Data toolkits can be used to calculate benefits of interventions, which the MCA and local authorities can use in project business cases. These toolkits can also show co-benefits of projects. For example, green infrastructure interventions will create benefits in terms of carbon capture, flood mitigation, climate adaptation and amenity values. 5. Open data can be used by businesses to develop innovative solutions
What	The MCA or a local authority will host the South Yorkshire Net Zero Programme Data Repository. Contributions to the repository will come from MCA research, local authority data collection and research, and the Universities' research. This should form part of the data and intelligence hub once the prototype being has been tested and approved. The repository should be an expansion of local authority work for the whole of South Yorkshire. For example, the UoS has begun conversations with Sheffield CC on an 'office of data analytics' to create a co-designed collaboratively owned data platform. This could and should become a regional resource. Priority areas for action are: • Working with the UoS Urban Flows to add transport and buildings emissions data to the data and intelligence hub. • A carbon inventory for each local authority • Natural capital accounting framework and benefits calculator. • A database of 'costs and benefits' for different types of low carbon projects to be used by the NZP in business case development. Demonstrating co-benefits is important. For example, a green infrastructure and tree planting evidence base can learn from tools such as the GI-Val tool which can be used to calculate the carbon, air quality, flood mitigation impact of tree planting and the economic impacts of a higher quality public realm.
Who	Lead role: MCA to coordinate or host the repository. Stakeholder & partner roles: Local authorities, universities and other public bodies to share data Interdependencies: The repository acts as a resource to provide an evidence base and reporting tool for all actions, notably Action 6, 7, 9 and 10 – 16.

Case Study: London Datastore

Datastore is an award-winning free and open data-sharing portal where anyone can access data relating to London. There are 700 datasets available to local authorities, citizens, businesses, researchers, and developers. Some datasets are updated annnually and relate to the whole of London, whereas others are from a specific point in time or location.

Within the environment category there are currently 167 datasets available from a range of publishers across different spatial geographies, and tagged by theme. The front page of the Datastore also has a dashboard of charts, which in the environment strategy align with a number of themes in the SCR MCA's Climate Emergency Response Framework.

One longstanding dataset is the London Energy and Greenhouse Gas Inventory (LEGGI) showing greenhouse gas emissions and energy consumption from homes, workplaces, and transport in each London Borough for every year from January 2011 to December 2017.

Action 5: South Yorkshire Net Zero Communications Strategy

Why:	Communicating the benefits of tackling climate change and showcasing success is important to inspire action by businesses and citizens. A consistent programme-wide brand and campaign provides a strong, trusted and recognisable message to use when promoting individual project campaigns.
	Mixed and inconsistent messaging has been raised as a challenge by multiple stakeholders from local authorities, business and community organisations. Stakeholders are keen to play a role in achieving the Net Zero target and a coordinated communications strategy will ensure the energy of stakeholders is harnessed and deployed effectively and efficiently.
What	Stakeholders from across the region are the best placed organisations to disseminate the key messages to their individual audiences and communities.
	To do this successfully the MCA should collaborate with different organisations on designing the communications messaging, including those in the Climate Alliance and business membership bodies. This is especially the case for engaging different businesses and communities, particularly hard to reach demographics who can be engaged by small and hyper-local community groups. Local authorities will have an important part to play in communicating with their communities and promoting their own activities and programmes. However, these should relate to and align with the MCA programme campaigns and can be coordinated through councillor and officer briefings.
	A marketing and communications programme can be coordinated in-house by the MCA's communications team. Alternative approaches used by some combined authorities and local authorities include commissioning a marketing agency, designing logos, and managing social and local media.
	There are two key steps to designing and launching a communications plan. Firstly, key audiences should be established based on the corporate plan and net zero programme priorities. A timetable of communications activity and milestones such as events held, or number of social media followers is needed to provide focus and stretch. The MCA's communications and marketing team will play a key role in shaping the plan to
	Secondly, the net zero programme will need to be integrated with the current communication strategy, with clear roles for the Mayor, LEP and MCA. Elements of the programme should be tailored to different digital platforms, printed materials and audiences. As new initiatives are launched, these will need their own branding and design. For example, while both need to be clearly part of the overall South Yorkshire Net Zero brand, an active travel campaign will have different objectives and need a different look and feel to a business energy efficiency campaign.
	Delivering small but exciting demonstration projects or events which provide a touchpoint for engagement could be part of the communications strategy. Communicating the benefits and showcasing success is important as the programme progresses. Initiatives could include a Mayor's award programme for businesses who reduce carbon emissions the most and recruiting champions to showcase success through case studies and digital content.
Who	Lead role: MCA communications team to lead.
	Stakeholder & partner roles: Local authorities, third sector organisations, community groups and business bodies to support design and dissemination.
	Interdependencies: To avoid locking in mixed messaging, this action should align with Action 1 and should begin before Actions 7, 10, 11, 14, 15, 16 & 17.

Action 6: Using the UN Sustainable Development Goals (SDGs) Reporting Framework

Why:	The UN SDGs are a recognisable framework. The role of SDGs is to enable different and diverse groups to work towards common goals in a way which is relevant to them. With the use of SDGs ranging from featuring on the classroom walls of South Yorkshire to the key indicators used by the World Steel Association, adopting SDGs as a policy tool means the MCA will speaking the language of communities, organisations, business and funders alike.

What	As part of Agenda 2030, all 193 UN member states are required to produce at least one Voluntary National Review, a report in which they assess and present progress they have made towards achieving the SDGs. Cities around the world are increasingly adopting the SDG framework to design and measure the impact of policy, to engage with communities and business, to benchmark themselves globally and to be part of global best practice. In the UK, much of this work is being led by universities. For example, Newcastle University built the SDG indicator set and reporting framework for London, and Bristol University those for its home city. In South Yorkshire, UoS are producing their own SDG indicator set and reporting framework for internal use. Using this local expertise, the MCA can build a South Yorkshire SDG indicator and reporting framework. This can be used to monitor the impact of the Net Zero Programme, not just in terms of reducing carbon, but also in terms of climate adaptation and biodiversity, food security and sustainability, waste and resource use, fuel and transport poverty, and health and wellbeing from improved air quality and better access to nature. Establishing this framework will help ensure the MCA will be able to show leadership and ensure consistency as more organisations adopt the SDGs for their own use..	Case study: SDGs as a key tool used by global cities Bristol and London report against the SDGs, gaining international recognition alongside cities like New York and Madrid. In London, the SDGs are also used as a way to engage and inspire young people and the London Sustainable Development Commission is using the SDGs as part of a just net zero transition and Covid-19 recovery. Bristol uses an online dashboard to report to show how it's One City sustainability plan is delivering against the SDGs. Bristol also feature in a handbook for using SDGs published by the EU.

Who	Lead role: MCA as host and coordinator, linked to Action 4. Stakeholder & partner roles: Universities and local third sector organisations to lead on designing the indicator set Interdependencies: This should be integrated with or provide structure for Action 4 (data repository) to avoid duplication or mixed messaging.

Carbon Reduction (Framework commitment 2)

There are seven carbon reduction actions in the proposed action plan These drive the early progress towards net zero and put in place activity for longer-term reductions.

Some of the actions provide an opportunity to act quickly across South Yorkshire These should be planned in collaboration with the Sheffield City Region Net Zero Partnership and be ready to launch in 2021 as soon as the key enabling activities (Actions 1 & 5) are in place (Table 6). This is shown in the proposed delivery timeline between now and 2030 (Table 7Table 5).

Table 6: Carbon reduction actions.

Action No.	Action Name	Interdependencies with other projects
Action 7	South Yorkshire Retrofit Programme (SYPR)	Evidence to inform the SYPR comes from Action 4. Marketing and communications will be part of Action 5. Interventions should be designed to benefit from future opportunities from Actions 8, 12 & 13.
Action 8	Shared procurement for low carbon social housing	Action 1 will be required to provide the link to the MCA's Housing Board with local authorities and housing associations. Elements of Action 15 should be included in this action to embed wider social benefits and climate adaptation.
Action 9	Hydrogen and electric buses	Evidence from Actions 1 & 4 will inform the bus routes to trial, and infrastructure requirements for a full roll-out will form part of Action 2.
Action 10	Residential on street electric vehicle charging	The collaboration with partners and evidence base established in Actions 1 & 4 will be important to deliver this action effectively.
Action 11	South Yorkshire Active Travel	It is vital that the communications strategy (Action 5) is in place and supporting the active travel campaign. The collaboration and evidence established in Actions 1 & 4 will also be important.
Action 12	Minewater heating	The collaboration established in Actions 1, 8 & 13 will be important to capture the benefits of minewater heating. This project will also be included in the investment prospectus (Action 2).
Action 13	Industrial waste heat capture for district heat networks	The collaboration established in Actions 1 & 8 will be important to design and deliver this project. This project will also be included in the investment prospectus (Action 2).

Table 7: Carbon reduction actions timeline.

Action	2021 H1 (April)	2021 H2	2022 H1	2022 H2	2023 H1	2023 H2	2024	2025	2026	2027	2028	2029	2030
Action 7:	Scoping	Delivery	Delivery	Delivery	Delivery	Delivery	Delivery	Delivery	Delivery	Delivery	Delivery	Delivery	Delivery
Action 8:	Scoping	Scoping	Working	Delivery	Delivery	Delivery	Delivery	Delivery	Delivery	Delivery	Delivery	Delivery	Delivery
Action 9:		Scoping	Scoping	Working	Working	Working	Delivery	Delivery	Delivery	Delivery	Delivery	Delivery	Delivery
Action 10:	Scoping	Working	Delivery	Delivery	Delivery	Delivery				Scoping	Working	Delivery	Delivery
Action 11:	Working	Delivery	Delivery	Delivery	Delivery	Delivery	Delivery	Delivery	Delivery	Delivery	Delivery		
Action 12:		Scoping	Scoping	Working	Working	Working	Delivery	Delivery	Delivery	Delivery	Delivery		Working
Action 13:		Scoping	Working	Working	Working	Delivery	Delivery	Delivery	Delivery			Scoping	Working

Legend:
- Scoping / planning by MCA and local authority working groups
- Working with delivery & industry partners to design, trial and implement
- Post launch delivery, management & monitoring

Actions 10, 12 & 13 to be revisited again to plan for further intervention. This will take in to account new technologies, or the fact that current solutions may become more cost effective.

Action 7: South Yorkshire Retrofit Programme (SYPR)

Why:	Improving the energy performance of South Yorkshire's homes is an urgent but huge task, in terms of scale and cost. In South Yorkshire, 34% of carbon emissions come from domestic homes and 10.6% of households experience fuel poverty.
	The MCA's Energy Strategy sets out the scale of the challenge, with up to 570,000 homes targeted for at least one carbon reduction measure. The national Green Homes Grant (GHG) provides vouchers to households and funding via the Local Authority Delivery (LAD) scheme. Phase 1 of the GHG provided an average of £1.3m to each LAD.
	If the four South Yorkshire local authorities had this amount, it would mean less than £10 available to spend on each of the 570,000 homes. This clearly demonstrates the funding gap between available money and the scale of the challenge, even with the ability of households to apply for GHG grants.
What	Under the overarching branding of the Net Zero Programme, this is a regional initiative, to fill the funding gap between GHG and LAD funding and the investment needed for housing retrofit. Local authorities in South Yorkshire have raised the idea of a retrofit City Deal, which could provide one source of funding. There are four key components of this action which are needed to meet the targets set out in the MCA energy strategy.
	Firstly, use expertise from UoS and Sheffield Hallam University (SHU) to identify priority homes, streets or neighbourhoods for maximum impact and cost efficiency. Barnsley MBC's potential demonstrator work with Urban Flows is one example of this.
	Secondly, there is a need to identify the best way to engage residents to encourage take-up of GHG as part of the direct investment by the SYPR. Touch points with communities include local authorities, community and third sector organisations, energy companies, and public services such as the NHS.
	Thirdly, the MCA should develop an 'approved vendor' register for local. This includes supply chain events for SMEs. This can be delivered in partnership with energy providers to be more attractive to SMEs. For example, Newcastle City Council is running a series of events hosted by E.ON to provide guidance accreditation and support to entering the retrofit supply chain.
	Fourthly, interventions must be designed with the future in mind. For example, using insulation with a longer lifetime than standard insulation and ensuring new boilers are hydrogen ready.
Who	Lead role: MCA to coordinate input from stakeholders and partners, develop the supplier programme and lead on bids for funding, and ensure alignment with the Net Zero Communications Plan.
	Stakeholder & partner roles: Universities to lead on providing evidence base and monitoring & evaluation. Local authorities and social housing providers to lead delivery, in partnership with community & third sector organisations. National Energy Action have expressed a desire to be involved in design and delivery.
	Interdependencies: Evidence to inform the SYPR comes from Action 4. Marketing and communications will be part of Action 5. Interventions should be designed to enable future opportunities from Actions 8, 12 & 13.

Action 8: Shared procurement for low carbon social housing

Why	New homes need to be carbon neutral, or carbon neutral ready, to avoid locking in carbon emissions for the long-term and to minimise the amount of future retrofitting required. Local authorities and housing associations in South Yorkshire have extensive housing delivery plans over the coming years and can lead the way in developing zero carbon homes. Demonstrating viability for zero carbon home options is important to encourage private developers to adopt these approaches and for local authorities to justify specifying their use in local plan updates.
	A lack of pipeline demand is one of the biggest barriers to mass MMC adoption in England. Creating this pipeline with shared social housing procurement can stimulate the supply chain and drive investment in the sector. South Yorkshire's advanced manufacturers can apply their Design for Manufacture and Assembly and Industry 4.0 approaches to become leaders in the sector before other regions.
	Homes built with MMC can create net carbon savings by acting as a carbon sink, with cross-laminated timber storing 1 tonne of CO_2 per m^3. One case study shows that one MMC development had a net carbon footprint of -2,600 tCO_2 compared to +2,000 tCO_2 using traditional methods (see case study). Similarly, moving towards Passivhaus standards yields significant cost savings for residents helping to tackle fuel poverty.
What	This action consists of agreeing a shared procurement approach across South Yorkshire's social housing developers, including local authorities, local authority housing companies, and housing associations. Local authorities and their social housing providers working together in this way allows for more standardisation of passive house components and MMC panels, modules and pods, which can be assembled in different layouts and sizes, driving down costs and creating demand for the local supply chain.
	This overcomes three barriers, clearly demonstrated by Barnsley MBC/Bernslai Homes when opting against MMC for the Billingley View development, planned to meet the Barnsley Low Carbon Standard. These barriers were: A higher up-front cost; Lack of flexibility in design and poor options for maintenance; and no local MMC manufacturing capabilities, meaning importing units from outside the region and nor contributing to local job creation.
	Shared procurement across South Yorkshire would create a local supply chain, create more certainty of pipeline to drive investment, and create jobs. This aligns with the Kickstart 25+ initiative, in which the MCA identifies MMC as an opportunity for long-term employment. A skills programme in parallel with this project will provide the required training.
Who	Lead role: MCA to facilitate collaboration between local authorities and housing associations who will lead delivery. MCA to coordinate with the sector and education providers for supply chain and skills development.
	Stakeholder & partner roles: SHU will be a key partner for skills & construction innovation. The Advance Manufacturing Research Centre (AMRC) play a national role in innovation of off-site manufacturing and will be a key partner in developing supply chain capabilities. Local authorities and housing associations will lead delivery.
	Interdependencies: Action 1 will be required to link the MCA's Housing Board with local authorities and housing associations. Once established, MMC options may become apparent for housing retrofit (Action 7). Elements of Action 15 should be included in this action.

Case study: MMC developments in social housing

Building a demand pipeline and skills base: Swan Housing Association's Beechwood Village, Basildon

Swan Housing Association's development arm 'NU living' developed this scheme using Cross Laminated Timber (CLT) panels and modular units manufactured using in its own modular housing factory.

The business case for investment in the factory requires building 100 homes per year for the factory to break even over six years.

NU living estimates manufacturing offsite saves 50% of construction time from start to finish. The total project value of Beechwood Development was £100 million with investment in the factory set-up being £3 million

Modern Methods of Construction in Sheffield

South Yorkshire Housing Association built 20 panelised units using the Accord LoCal system, and have innovated further with a trial of two WikiHouses made from plywood frames, which were constructed locally and assembled on site. Ongoing testing and evaluation will provide useful evidence to local aothoreities and other housing associations.

Elsehwere, the Little Kelham development used a super-low-energy airtight design, BIM and MMC. Triple glazing and glass wool insulation resuilt in high heat retention meaning gas heating is not required. Solar PV provides power whilst Mechanical Ventilation Heat Recovery System and passive cooling control the environment. The timber frames used store 1 tonne of CO_2 per m^2.

Faster and more sustainable builds: B&K Structures, Dalston Lane

Dalston Lane in Hackney was developed on brownfield land and built by B&K Structures using CLT. Key benefits were:

The use of CLT allowed the developers to plan 35% more homes within loading permissions (maximum capacity of 141 units instead of 106 and a saving of 8,000 tonnes in weight).

The project took 12 months to complete, compared to around 2 years for a traditional building.

The project had 60% fewer operatives on site and received 589 fewer deliveries than an equivalent building using traditional methods would require

The building achieved 3,576 tonnes of sequestered CO_2 and 976 tonnes of embodied CO_2, delivering a net carbon footprint of -2,600 tonnes CO_2 . This compares to over 2,000 tonnes on average for an equivalent structure with a concrete frame.

MMC testbed: Gateshead Innovation Village

This live research project conducted by the Home Group in partnership with Newcastle University, Northumbria University, Gateshead Council, Homes England, Engie and the Building Research Establishment will see 41 homes built in the borough of Gateshead, delivered to the original Code for Sustainable Homes (CfSH) Level 6 for zero carbon.

Ilke homes was responsible for delivering 40 homes using a mixture of light gauge steel, timber frame, concrete panels and traditional methods. 2-bedroom homes were created using three, factory-fitted volumetric modules, manufactured in offsite and delivered on-site complete with solar panels, concrete roof covering, and weatherboarding.

Initial evidence shows many of the homes were manufactured over a six-week period and assembled on-site in a day and that installation was undertaken without any recorded health and safety incidents, or the need for scaffolding .

Case study: Low, zero and negative carbon developments

Saffron Acres, Leicester: the largest Passivhaus-accredited development in the UK

In 2018, Leicester City Council worked with a social housing provider, developer and archiects with experise in BIM to convert a disused 13 acre site back in to use, with a mixed development of 68 affordable houses and appartments.

The buildings were built using Westframe PassiPlus, the developer's bespoke, sustainable timber frames and panels. It 70 weeks for the whole development to be completed at a cost of £7million or just over £100,000 per house, including landscaping work.

Passivhaus pricniples include having all homes facing south, Mechanical Ventilation Heat Recovery (MHVR) units and low U-values – the measure of how much head a building loses.. The timber framing has an estimated U-values as low as 0.1W/m²K and the windows achieve 0.5 W/m²K. Gas boilers are installed to heat just the bathrooms, resulting in an expected ongoing annual energy costs of just £13 per house. The development is being monitored by De Montfort University, which will provide future evidence on best practice.

Saffron Acres also incorporates green infrastructure and sustainable food production. Whilst the site was previoulsy an unused allomtent, the new development brings land back in to use with a community garden. Residents are able to grow fruit and vegetables, and the Neighbourhood Council even sells some produce in local Co-Op stores.

Action 9: Hydrogen and electric buses

Why	Transport, including public transport, makes up 32% of South Yorkshire's carbon emissions and needs to be addressed with the same urgency as buildings and industry. Electricity and hydrogen are the two main options for decarbonising transport, with the latter increasingly being seen as the best option for HGVs and buses. Hydrogen buses will also capitalise on South Yorkshire's growing hydrogen economy, England's most northerly hydrogen vehicle fuelling station, and several producers including the UK's largest electrolyser.
	Through the South Yorkshire Passenger Transport Executive (SYPTE) the MCA can work directly with bus operators to accelerate the adoption of zero carbon options. This contrasts with the private vehicle market where the ultimate decision on switching to zero carbon still lies with the consumer,
	In 2019/20 local buses in South Yorkshire travelled 55 million kilometres. Of these, 6% (3.45 million km) were by local authority supported routes. Using average Department for Transport (DfT) Emission Factors for local buses outside of London, the total carbon emissions of bus trips made in 2019/20 was an estimated 557tCO$_2$e. Replacing 10% of these journeys with hydrogen buses would save up to 55.7tCO$_2$e per year in tailpipe emissions, with total net savings dependent on the carbon intensity of electricity used to produce the hydrogen.
What	A hydrogen and / or electric bus trial and roll out should be delivered by the MCA working with SYPTE, operators and other members of the South Yorkshire Hydrogen Network. This project will align with the MCA and Local Authority Plans for electric vehicle charging hubs.
	Experience within the South Yorkshire Hydrogen Network includes supporting hydrogen bus initiatives elsewhere in the UK and internationally. This includes Liverpool City Region, where in May 2020 the Combined Authority and Arcola Energy, working with bus-makers Alexander Dennis and industrial gases company BOC, formed a partnership to trial hydrogen-powered buses with Arriva and Stagecoach (members of the city region's Bus Alliance.)
	Manufacturers are increasingly supplying hydrogen and electric buses, providing a growing number of options for deployment in South Yorkshire. Wrightbus announced plans in April 2020 to produce 3,000 hydrogen-powered buses over the next four years, and MAN Truck & Bus launched its electric and hydrogen roadmap in October 2020. For both buses and HGVs, MAN will be seeking to partner with cities and universities over the next three years to launch trials in 2023/24. Meanwhile, in November 2020 the bus operator Go-Ahead has launched nice electric buses, made my Voltra, in the North East which will cover 300,000 miles in Newcastle and Gateshead.
	This action can also learn from the Joint Initiative for hydrogen Vehicles across Europe (JIVE) Horizon 2020 project, operating in 22 cities in seven countries including Birmingham, Aberdeen and Dundee.
Who	Lead role: MCA including SYPTE coordinating partners and funding bids, and the MCA electric vehicle charging project team.
	Stakeholder & partner roles: Bus operators, the South Yorkshire Hydrogen Network, and The Advanced Manufacturing Park (AMP) where the current refuelling station is) will all play an important role in putting together the business case for the trial, choosing and installing the required technology and infrastructure, and monitoring the trial's financial performance and impact on carbon emissions.
	Interdependencies: Evidence from Actions 1 & 4 will inform the bus routes to trial, and infrastructure for a full roll-out could be part of Action 2.

Action 10: Residential on-street electric vehicle charging

Why	Decarbonising private transport is essential to achieving net zero. Waiting until 2030 and national legislation banning the purchase of petrol and diesel cars will be too late to act to reach the 2040 target for net zero in South Yorkshire. Action to enable and encourage consumers to make the switch to electric vehicles is needed.
	One of the main barriers to electric vehicle use is access to home charging for households who do not have private or off-street parking. This challenge is faced by all four local authorities in South Yorkshire, and action to provide solutions should be delivered at a regional level. Applying average tCO_2e emissions to average mileage driven by cars in South Yorkshire means estimated emissions in 2019 from car journeys were 2,065,300 tCO_2e, with an average of 3.8 tCO_2e per car licenced per year.
	The impact of residential chargers will depend on the number of charge points installed, and the number of households switching to EVs as a result. Each EV would see around 3-4 tCO_2e of tailpipe emissions saved. The overall net carbon reduction depends on the carbon intensity of the electricity used.
What	The MCA should work with each Council to prepare a single On-street Residential Chargepoint Scheme application to the Office for Low Emission Vehicles (OLEV). The purpose of the scheme would be to increase the availability of on-street charging points in residential streets where off-street parking is not available. The funding available is for 75% of the capital costs of procuring and installing the chargepoint and an associated dedicated parking bay. Applicants will have to demonstrate commitment to meeting on-street residential charging need and will need to secure a minimum of 25% of capital funds via sources other than OLEV funding.
	Government guidance indicates a cap of £100,000 per local authority project. However, Urban Foresight have successfully worked with other local authorities to secure funding in the region of £142,000. Therefore, we would expect SCR to be able to secure up to £450,000 across the whole of South Yorkshire. This would require £150,000 of capital investment from SCR and/or the local authorities as match funding, bringing the total up to £600,000. Estimated costs per charge point are up to £6,500 although this will vary depending on the level of engineering required and costs of installing grid connection or energy storage.
	Across South Yorkshire, there are local authority owned residential garage blocks and parking areas. These garages are unused in a number of instances, and along with parking areas would make good locations for residential charging mini hubs. With funding of £600,000 it is anticipated that around 25-30 mini hubs could be installed, providing 80-100 charging points based on using 22kW dual-post fast chargers. Rapid chargers would be more expensive. The precise number of hubs will be subject to budget availability, technology used and cost of civil engineering works.
	Business model options include Own and operate; Contracted third-party operator; Concession model or lease ownership; and private investment and ownership. These each have a different balance of upfront cost, revenue retention, and SCR control over location and technology and should be subject to a more detailed feasibility study. Individual on street chargepoints will be cheaper to install than residential hubs and provide a number of options (see case study).
Who	Lead role: MCA to coordinate the branding and communications, and work with local authorities to identify locations and support in conversations with third-party landowners, Northern Powergrid and chargepoint suppliers.
	Particularly important will be ensuring that this initiative complements, adds value and fills gaps in the network being installed as part of the MCA's £3 million electric vehicle chargepoint project.
	Stakeholder & partner roles: Local authorities to identify sites, oversee installation and manage resident engagement.
	Interdependencies: The collaboration established in Actions 1 & 4 will be important to deliver this action effectively.

Case study: innovative on street charging solutions.:

Towns and cities around the UK are experimenting with different options for providing charge points in residential streets. Plymouth and Dundee are sharing £3 million of InnovateUK funding to trial pop-up charge points which recede underground when not being used to avoid street clutter using the same technology which has also been trialled by Oxford City Council.

Different types of lamppost chargers have been used around the country, tapping into the lighting column electricity supply. Brighton has installed 200 lamppost chargers in 2020 supported by a £300,000 OLEV grant and a further £100,000 investment from the technology supplier. Lamppost charging technology has also been widely deployed in multiple London Boroughs.

Other kerbside technology includes small 5G connected charge points that attach to existing street furniture which doesn't have a power supply, or ground level chargers installed on the kerb, also to avoid adding street clutter or taking away space from the pavement.

A pop-up charger when recessed, and when in use.

Different kerbside charging technology.

Action 11: South Yorkshire Active Travel

|	
Why	Providing safe routes to connect people from where they live to sites of employment and leisure is a vital enabler to encourage people to walk and cycle more. This is one of the core strands of the ambitious Active Travel Implementation Plan published by the MCA.
	Switching from car to active travel for short journeys plays an important role reducing carbon emissions, as well as reducing congestion, improving air quality, tackling transport poverty and creating health and wellbeing benefits for individuals, health services and employers.
	Research and evidence from city-wide cycling and walking schemes suggests city-wide active travel could save an additional 5% of CO_2e emissions from car travel – or 100,000 tCO_2e in South Yorkshire based on average vehicle mileage.
What	The Active Travel Implementation Plan (ATIP) is supported by Dame Sarah Storey who is the appointed Active Travel Commissioner, and already has £5.46 million allocated and ready to spend, with a live funding bid for over £200 million to deliver the ATIP yet to be confirmed. Now is the time to work with local authorities and the Active Travel Advisory Board to engage the public and identify quick but impactful wins.
	These quick but impactful wins should not be viewed in isolation but should be fully aligned with the opportunities and strategic priorities set out in the ATIP. For example, Doncaster MBC have raised the potential of a 'Dutch Style' roundabout in the town, which fully aligns with the statement in the Plan to develop better walking and cycling routes through Doncaster town centre along with the same ambition across all four local authorities.
	Complimenting the ATIP are options to decarbonise last and first mile journeys and urban commercial deliveries.
	For example, Dundee City Council are in the process of trialling and rolling out 400 electric bikes around the city partly funded by corporate sponsorship from a large local employer. This has particular relevance to parts of South Yorkshire, with electric bikes having been chosen in Dundee to overcome the challenge of the hilly topography between the waterfront and the town centre.
	Similarly, North Tyneside Council received £76,000 DfT funding towards an £84,000 investment in electric cargo bikes which are available for use by businesses and voluntary organisations across multiple town centres and business parks in the Borough.
	As the ATIP starts to be delivered, the branding and communication surrounding this should be part of the wider South Yorkshire Net Zero Communications Strategy.
Who	Lead role: MCA to coordinate the branding and communications alongside the Active Travel Commissioner, and to work with local authorities and the Advisory Board to design interventions to best practice standards.
	Stakeholder & partner roles: Local authorities and Advisory Board to oversee installation and manage workplace and community engagement.
	Interdependencies: It is vital that the communications strategy (Action 5) is in place and supporting the active travel campaign. The collaboration and evidence established in Actions 1 & 4 will also be important.

Action 12: Minewater heating

Why	Minewater is an unused local asset which can be utilised to overcome one of the most urgent challenges across South Yorkshire - decarbonising domestic and commercial heating. Moving South Yorkshire's buildings to net zero will need a combination of all the actions in this work programme. Minewater is part of this package and provides an opportunity to develop an industry around a local resource. A national white paper on the feasibility and impact of using minewater for heating is currently in development. As well as the environmental benefit, this white paper will explore economic benefits, recognising that many of the communities in the UK located above mines are amongst the country's most deprived. In fact, research by SHU found the employment rate amongst communities on former coalfields is more than two percentage points behind the national average. Re-using the industrial resources around which these communities grew up creates opportunities for inclusive growth and job creation. Assuming the minewater energy is used in a low temperature district heat network and 'upgraded' at the destination, the Coefficient of Performance of the heat pump would likely range between 4-6 creating considerable carbon savings compared to gas heating reducing emissions by around 55%. This would mean around 0.6 tCO_2 to 2.4 tCO_2 saved per home depending on the gas use of the homes benefitting.
What	The MCA's Energy Strategy sets out the target to develop five minewater heating schemes, from across the 400+ mines in South Yorkshire. The strategy also states the aim to be a front runner in this technology to ensure South Yorkshire benefits from supply chain and economic growth opportunities. Adoption is currently limited in the UK to a small number of operational and pipeline projects, but the scale of this opportunity is emphasised by the fact that is estimated that shallow mines could provide 1,500MW of geothermal energy to coalfield communities across UK. Coinciding with the publication of the national white paper, and learning from existing minewater schemes the MCA, working with partners across South Yorkshire and beyond should progress the feasibility work to assess: • Potential generation capacity - sites likely to feature a unique set of variables in terms of depth, ambient water temperature, and flow rate • Carbon impact -this may vary across Open and Closed looped systems as well as Column systems • Resilience benefits- the scope to act as an inter-seasonal energy store • Social and economic benefits. Industry stakeholders recommend that minewater heating is more easily utilised in new build developments rather than retrofitted. Integrating minewater developments into new home and commercial developments, preferably those which have heat networks, should be the initial focus.
Who	Lead role: MCA to work the Coal Authority to coordinate collaboration, evidence building and feasibility study. Stakeholder & partner roles: Mine Energy Taskforce (including universities and the North East, Yorkshire and Humber, and the Midlands BEIS Energy Hubs) and local authorities to be closely involved in feasibility and design and ensuring minewater projects are planned to align with other developments. Interdependencies: The collaboration established in Actions 1, 8 & 13 will be important to capture the benefits of minewater heating. This project will also be included in the investment prospectus (Action 2).

Case study: Commercial and domestic minewater heating schemes in the North East of England

Lanchester Wines, Gateshead

Lanchester Wines' facility in Gateshead has the UK's first and biggest commercial minewater heating scheme. It supplies two warehouses' heating needs, keeping millions of bottles of wine at temperate levels, and also heats a neighbouring distribution depot.

The warehouses have been installed with a 4m watt open loop water source heat pump system – the largest of its type in Europe. These take geothermal heat from water in disused coal mines to provide warmth for the buildings
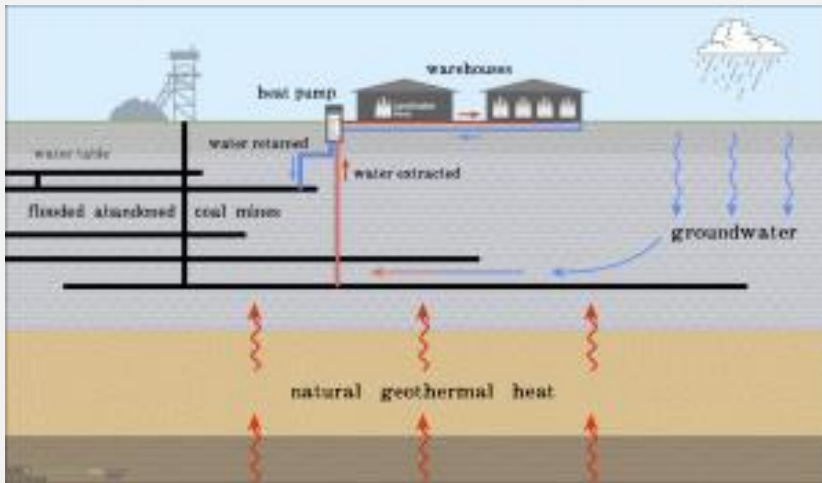
Copyright: Lanchester Wines

Elsewhere in Gateshead, a 6MW heat pump is due to be installed to extract heat from the water in underground mine workings 150 metres beneath Gateshead town centre. The minewater heat will provide heat to a mix of commercial, residential and public sector buildings, incluidng Gateshead International Stadium. £6million funding from the Heat Networks Investment Project has been granted to the Gateshead Energy Comnpany.

Coal Authority collaboration in South Tyneside and County Duham

In Spring 2020 work started on the Seaham Garden Village (Durham) development which will consist of 750 affordable homes, 750 private homes, a school, shops, and medical and innovation centres.

The new development will be supplied with geothermal heat from the Coal Authority's nearby Dawdon mine water treatment scheme, which treats water taken from an extensive network of flooded abandoned coal mines in the area. An estimated 6MW of energy will be supplied from the mines.

The scheme, which is a collaboration between the Coal Authority, Tolent Construction and Durham County Council does not use metal pipes, due to the lower temperatures involved, resulting in a cheaper delivery method compared to district heating schemes using higher temperatures. This also results in less temperature loss, further enhancing viability.

Elsewhere, working with the Coal Authority, Durham County Council commissioned a borehole drilling and viability assessment for using minewater heat for a leisure centre in Stanley.

Meanwhile geothermal energy from flooded mines in the former Hebburn Colliery, will be used to heat council-owned buildings in the South Tyneside town, including a residential tower block.

This project has been a collaboration between the Coal Authority, South Tyneside Council and Durham University and has preliminary approval for ERDF funding of £3.5 million, half of the total £7 million cost.

At this scheme, water is extracted by drilling boreholes 300-400m into flooded mines underground, A water source heat pump then extracts heat from the mine water before it is boosted to a higher temperature and distributed to the heat network. The scheme is expected to deliver a reduction of 319 tonnes of carbon emissions a year

Action 13: Industrial waste heat capture for district heat networks

Why	Waste heat from some of South Yorkshire's large industrial sites is currently lost to the atmosphere, increasing the region's carbon footprint. As with minewater, this industrial heat is a local resource which can be captured to provide a low carbon source of heat for existing and future networks across the region. Enabling investment is needed to unlock this untapped resource. Large heat generators have a desire to provide their heat to the network, as this would enable them to reduce their own carbon footprint and create an additional resource. However, the network infrastructure needs to be in place and connected to these sites in order for businesses to be able to plan the investments they need to make to supply the heat. As it stands, without the network infrastructure in place businesses cannot factor heat capture into their forward plans, meaning the opportunity is lost.
What	The latest BEIS data on heat networks, from 2018, indicates there are 292 heat networks across the four local authorities in South Yorkshire. This number has grown since, with new town centre-wide district heat networks planned in Barnsley and Rotherham for example. Ensuring local sources of industrial waste heat are captured adds to the mix of heat sources, helping to decarbonise heat networks which are fuelled by gas or burning waste and biomass. Similarly, heat networks can be made more cost effective and efficient by using lower temperatures, thus reducing heat loss. Using existing heat rather than generating new heat can also make the cost of using district heat networks cheaper for consumers. This is an important consideration given the aim to reduce fuel poverty and in the face of negative press articles about the costs facing social housing tenants in different parts of South Yorkshire. As well as benefitting from selling heat, different heat generators can also benefit from using ambient heat loops for cooling, including the three hospitals in South Yorkshire which currently haver heat installations.
Who	Lead role: MCA to work in tandem with waste heat generators, existing heat network operators, landowners to generate propositions for potential investors. Stakeholder & partner roles: Local authorities and industry experts to play a key role in design and feasibility, and to coordinate with end users such as social housing providers. Interdependencies: The collaboration established in Actions 1 & 8 will be important to design and deliver this project. This project will also be included in the investment prospectus (Action 2).

Carbon Capture & Climate Adaptation (Framework commitments 3 & 4)

There are three actions relating to carbon capture and climate adaptation. These two Framework commitments have been grouped due to their co-benefits. Nature-based solutions which capture carbon also support climate change adaptation.

These actions can start quickly and need marginal extra resource from the MCA. Partners across South Yorkshire have the expertise and track record in these areas and will lead on planning and delivery. The MCA's role will be the key enabling activity already established in Actions 1 & 5 (Table 8Table 6).

Where these actions relate to land use and the built environment, they will inform other parts of the work programme, especially those relating to home building. This is shown in the proposed delivery timeline between now and 2030 (Table 9).

Table 8: Carbon Capture & Climate Adaptation actions.

Action No.	Action Name	Interdependencies with other projects
Action 14:	Low carbon sustainable agriculture & food	The collaboration established in Action 1 will be the link between the food forum and the wider Net Zero Programme. Action 5, the communications plan will be in place to support this initiative. Action 11 and the Active Travel Implementation Plan will enable region-wide use of electric cargo bikes for transport of locally grown produce and collecting commercial food waste.
Action 15	Grey to Green South Yorkshire	Action 1 will provide the forum for region-wide delivery. Action 4 will provide the evidence and data as well as tools such as the GI-Val tool which can be used to calculate the environmental, economic and social benefits of green infrastructure. Opportunities should be taken to embed green infrastructure in new low carbon home developments (Action 8) and urban farming (Action 14).
Action 16	Tree Planting & Northern Forest	Actions 1 & Actions 5 will provide the regional collaboration and communications needed. Tree planting initiatives must be planned alongside sustainable food production and urban farming (Action 14) to ensure land is used for the most effective purpose. This will ensure large scale tree planting takes place in the areas where the co-benefits of carbon sequestration, health & wellbeing, and environmental management are maximised.

Table 9: Carbon Capture & Climate Adaptation actions timeline.

Action	2021 H1 (April)	2021 H2	2022 H1	2022 H2	2023 H1	2023 H2	2024	2025	2026	2027	2028	2029	2030
Action 14:													
Action 15													
Action 16													

Delivery partners working to design and implement

Ongoing delivery, management & monitoring by delivery partners

Continue to implement elements of green infrastructure in future built developments.

Action 14: Low carbon sustainable agriculture & food

Why	Agriculture is estimated to be responsible for 9% of the UK's greenhouse gas emissions, whilst the World Wide Fund for Nature (WWF) in 2018 estimated that food makes up 14.5% of the average UK daily carbon footprint. This is an area in which local evidence is lacking and analysis of the impact of food production and consumption on the carbon footprint of South Yorkshire is needed. The rural and agricultural land in South Yorkshire can act as a carbon store but more detailed research and analysis of the best locations and ecosystem conditions for this is needed. There is strong local expertise which, whilst influential at a national level, is not being utilised for the benefit of South Yorkshire. The UoS has a track record of working with government in this space and can leverage funding for projects delivered in partnership in South Yorkshire. Current potential funding includes a £2 million strategic priority funding for indoor and urban food and a live £6 million application to UK Research and Innovation (UKRI) for rolling out micro-unit and urban farming demonstrators to measure the carbon impact.

What	This is a multi-strand and collaborative intervention to reduce carbon emissions from rural land-use and food. As well as building the evidence base, a number of rural and urban-focussed projects will be delivered to produce sustainable food and sequester soil.
	
	There is a strong network of food partnerships across South Yorkshire who have a good working relationship with the UoS. Together they would quickly bring momentum to this project, although co-ordination is needed to join together the activity of the network of local organisations.
	
	The adoption of smart technologies (sensors, automation and data) is already making farming more productive and will bring carbon savings, so this is not specifically included in the following five multiple strands of delivery in this project:
	
	  1. Establishing a regional 'food forum' which engages with the MCA and stakeholders. This should include the different food action partnerships in the four local authorities and the universities.
	
	  2. Providing unused land in urban and peri-urban settings for urban food production at low cost to incentivise private sector or community interest companies. Urban food production sites can be used to capture and use water to reduce flooding, install solar PV installations, or provide a use for captured excess heat.
		3. Urban composting using high-speed and high-temperature composter technology. This should begin by using commercial food waste from the hospitality sector collected by the operator. Compost is then sold to food producers in the region, reducing the carbon footprint of agricultural inputs. This is not recommended for household food and garden waste, due to contractual agreements with the Energy from Waste plant which uses domestic waste to generate power.
		
		Hospitality businesses participating in either sourcing local food or supplying waste to local compost facilities can be part of a "grown in South Yorkshire" initiative, helping to raise their profile and that of the whole programme.
		
		4. Carbon sequestration in soil in rural areas, which are most abundant in Doncaster. This already takes place to an extent on set-aside land or windfarm locations. Building an evidence base to fully understand the carbon impacts will inform a more targeted approach to soil and plant management in areas set aside by farmers or managed by windfarm operators.
		
		5. A mini 'food AMRC' in South Yorkshire, using UoS expertise, to act as the catalyst and home of developing capabilities, skills and innovation in the above strands. There is potential to secure research funding to deliver this.

Who	Lead role: UoS to lead on design and research and delivery projects, working with the new food forum and local authorities to deliver activities. Negligible role for MCA in delivery aside from integrating into communications plan (Action 5) or supporting funding bids.

Stakeholder & partner roles: Industry partners and organisations like District Eating will be needed to work with UoS on the food AMRC. Farmers, producers, landowners and agencies like Natural England will be engaged for low carbon agriculture and carbon sequestration activity. Food partnerships including Regather, the Barnsley and Doncaster Food Network, will support community engagement.

Interdependencies: The collaboration established in Action 1 will be the link between the food forum and the wider Net Zero Programme. Action 5, the communications plan will be in place to support this initiative. Action 11 and the Active Travel Implementation Plan will enable region-wide use of electric cargo bikes for transporting locally grown produce and collecting commercial food waste.

Case study: Turning Paris' commercial food waste into compost in six weeks

Les Alchimistes started as a social enterprise in 2017, collecting commercial food and plant waste using electric cargo bikes and plant waste and turning it into compost. Today they have multiple locations around the country in Lyon, Aix-en-Provence, Marseille, Toulon andToulouse.

At the Paris location 700 tonnes of organic waste a year is collected from restaurants, hotels, shops, workplace canteens and supermarkets. From this, 150 to 200 tonnes of compost is made, most of which is supplied to urban farms, food producers or sold to consumers in the same supermarket chains the waste is orginally collected from. Nationally, Les Alchimistes collect waste from over 200 commercial customers including global food and hotel brands.

The technology the company uses can generate compost from waste in six to eight weeks. The equipment is supplied by a supplier based in Macclesfield, however should South Yorkshire see a similar initiative with the same ambition for growth there is no reason why South Yorkshire companies cannot manufacture the equipment.

Copyright: Les Alchemistes

Action 15: Grey to Green South Yorkshire

Why	Sheffield City Centre has been benefitting from the Grey to Green programme which invested £3.4 million in sustainable urban drainage systems (SuDS) across a 1-hectare site in West Bar in Phase 1 of the project. The £5.8m Phase 2 is now being developed providing the ideal moment to expand the programme to the whole of South Yorkshire, compounding benefits and ensuring the combined impact of each green infrastructure intervention is greater than the sum of its parts. The benefits of green infrastructure and ecosystem services are enhanced when a whole systems approach is taken. Flood risk and the effects of climate change do not stop at local authority borders and the benefits of Phase 1 may be enhanced by green infrastructure developments elsewhere.
	A review of Grey to Green Phase 1 shows that water flows should be diverted away from sewers utilising the landscape rather than contributing to river flows in intense storms through uncontrolled discharge. The review also suggests that urban heat island effects are being positively addressed. As well improving the public realm and helping create economic vibrancy the project has also changed peoples' behaviour. UoS research showed that up to 20% of people walking or cycling through the new development have changed their route to work to go through the Grey to Green corridor. Soils and plants have also effectively filtered out pollution before it reaches the River Don.
	One of the most extensive studies of the impact of green infrastructure from across 35 cities in China suggest that annual carbon sequestration of 2.16 tCO2e/hectare of green infrastructure can be achieved.
What	Green infrastructure is used to replace hard surfaces with SuDS and greenery including meadows, rain gardens and other vegetation in locations shown by flood modelling to play an important part in how rainwater flows around the city region. This acts as a natural 'sponge' to manage flood risk, reducing the volume of surface run off in urban areas, easing pressure on the sewer network, and preventing surface water flooding.
	Taking a system analysis approach across the whole of South Yorkshire means that green infrastructure can be planned to be upstream of areas which suffer from surface flooding, as well as in and downstream from these areas to slow water flows. In turn this allows for a wider range of green infrastructure to be used with a wider range of biodiversity. Greater Manchester is an example of where green infrastructure has been planned as part of regional strategic planning, with green infrastructure included alongside energy, transport and digital in the Greater Manchester Infrastructure Framework 2040.
	There is local expertise in this area, with the UoS being a lead author of the Guidance to assess the benefits of blue and green infrastructure using B£ST, published by CIRIA and playing a key role in the evidenced-based planning and design of the scheme.
Who	Lead role: Sheffield CC were lead designer for Phase 1 and should work with the other local authorities to share best practice and support the programme. MCA as part of Action 1 activity.
	Stakeholder & partner roles: UoS provided technical advice on design and planting, alongside a number of private sector agencies and contractors. The Canal & Rivers Trust contributed funding to Phase 1.
	Interdependencies: Action 1 will provide the forum for region-wide delivery. Action 4 will provide the evidence and data as well as tools such as the GI-Val tool which can be used to calculate the environmental, economic and social benefits of green infrastructure. Opportunities should be taken to embed green infrastructure in new low carbon home developments (Action 8) and urban farming (Action 14).

## Action 16: Tree Planting & Northern Forest

Why	Planting trees increases South Yorkshire's ability to absorb carbon dioxide from the atmosphere and move towards net zero. Based on DEFRA estimates, the impact of planting 100,000 trees is 35 tCO_2e in the first year rising to 61 $tCO2e$ per year as the trees mature. Using the iTree tool. Treeconomics, a social enterprise which specialises in valuing green infrastructure and tree planting estimates that London's urban forest of 8.4 million trees generates economic benefits (including the value of carbon and amenity benefits) of £132.7 million per year.
	Importantly, this is a highly visible project which can help the MCA engage the community and demonstrate leadership. This type of activity is important in mobilising different communities across South Yorkshire, helping the communications campaign for the wider Net Zero Programme.
What	South Yorkshire Community Forest was first established in 1991, and through the MCA's collaboration with the Local Nature Partnership there is momentum to establish a South Yorkshire Community Forest Trust.
	The project should include urban and rural tree planting, capitalising on the enthusiasm of community groups and schools to be involved in these projects. A Trees Commissioner could be the public face of the tree planting programme to visit and engage the schools and community groups. Digital tools can also be used to engage communities in the monitoring of trees around South Yorkshire, as well as learning more about the benefits of tree planting.
	A shared plan for tree planting between the local authorities and stakeholders will need to be evidence-led to identify sites for large scale tree planting. These will identify locations and tree varieties which provide the greatest benefits for carbon sequestration without damaging existing biodiversity and natural habitats.
	Tree planting across South Yorkshire will also contribute to the Northern Forest, an initiative bought together by the current SCR Mayor with an ambition to develop a new forest across the North linking Liverpool, Manchester, Lancaster, Sheffield, Leeds and Hull. A South Yorkshire Community Forest Trust would then join four other forestry charities, The Mersey Forest, City of Trees, White Rose Forest and Heywoods in receiving support from the UK Community Forest Trust which is facilitating the Northern Forest.
Who	Lead role: MCA and the Local Nature Partnership to establish the South Yorkshire Community Forest Trust and integrate promotion of the actions into the communications and marketing activity.
	Stakeholder & partner roles: Local authorities will play a key role in delivering in their areas and supporting engagement with schools and community groups. National partners such as Natural England, Forestry Commission/Forestry England, the Environment Agency, the Community Forest Trust and Trees for Cities will all play a key role in designing and planning the programme, including undertaking Environmental Screening Reports / Impact Assessments as well as supporting ongoing forestry management and relationships with landowners.
	Interdependencies: Actions 1 & Actions 5 will provide the regional collaboration and communications needed. Tree planting initiatives must be planned alongside sustainable food production and urban farming (Action 14) to ensure land is used for the most effective purpose. This will ensure largescale tree planting takes place in the areas where the co-benefits of carbon sequestration, health and wellbeing, and environmental management are maximised.

Case study: Digitalising Melbourne's Urban Forest

The City of Melbourne uses an interactive platform, the 'Urban Forest Visual' to engage the public. Each of the 70,000 trees managed by the City authorties is mapped enabling people to look up an individual tree to learn about it, as well as reporting any problems. All data is available as open source, so analysts and developers can use it.

The platform also provides information and educational resources. This includes explaining the importance of tree age diversity and tree health and the importance of maintaining a tree canopy. A visual roadmap of tree planting plans over the enxt ten years across the city is shown, with downloadable precinct plans, urban planting guides and information about green roofs and walls.

The website also serves as a tool for inviting people to sign up as a citizen urban forester or to register for updates from the Urban Forest Team.
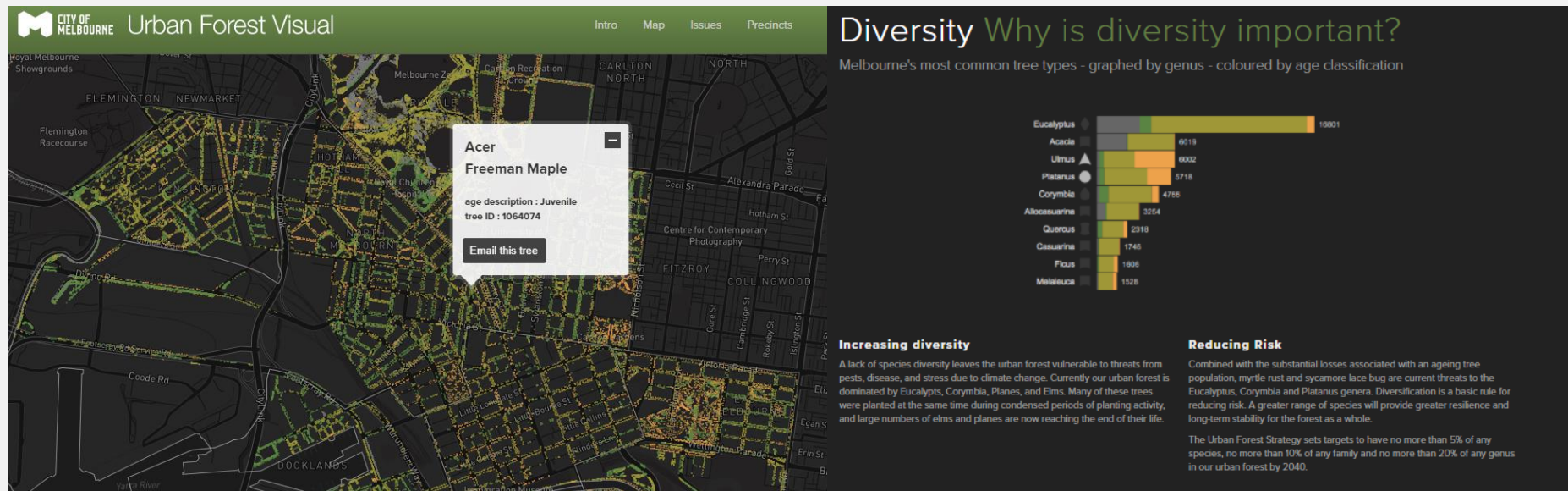
Copyright: City of Melbourne

Climate Economy (Framework commitment 5)

There are two climate economy actions in the work programme. Combined, these work to support local businesses to reduce their carbon emissions, create jobs and drive innovation in globally important sectors.

These actions (Table 10Table 8Table 6) tackle two challenges. Firstly, Action 17 will reduce emissions from industry and business operations. Secondly, Action 18 will capitalise on South Yorkshire's industrial and research expertise to place the region at the centre of low carbon economic.

Decarbonising businesses, like housing retrofit can start relatively quickly and will continue for several years. Action 18 is a longer-term and more strategic economic development activity, for which then planning needs to start in the near-term to begin operating in the medium-term (Table 11Table 9: Carbon Capture & Climate Adaptation actions timeline.Table 7Table 5).

Table 10: Carbon Capture & Climate Adaptation actions.

Action No.	Action Name	Interdependencies with other projects
Action 17	South Yorkshire business decarbonisation programme	A working group for joint local authority working groups (Action 1) will be a key mechanism for managing this programme. The evidence repository (Action 4) will be a valuable resource to inform interventions and share results. The programme will be supported by dedicated communications and marketing activity as part of the wider Net Zero Programme communications campaign (Action 5).
Action 18	Low carbon fuel & power cluster organisation	The evidence repository (Action 4) will be a valuable resource to inform interventions and share results. The cluster will have its own branding and design.

Table 11: Climate Economy actions timeline.

Action	2021 H1 (April)	2021 H2	2022 H1	2022 H2	2023 H1	2023 H2	2024	2025	2026	2027	2028	2029	2030
Action 17:													
Action 18													

	MCA planning and sourcing funding
	MCA and delivery partners working to design and implement
	Ongoing delivery, management & monitoring by MCA and delivery partners
	Industry partners to take on management and design own work programme

Delivery beyond 2025 dependent on evaluation of 2022-2025 delivery.

Action 17: South Yorkshire business decarbonisation programme

Why

Businesses account for 34% of South Yorkshire's energy consumption and over a third of the region's carbon emissions. Net zero will not be achieved without reducing and decarbonising this energy consumption, and businesses need help to do this.

Supporting businesses will not just reduce their carbon emissions. Reducing energy use saves them money creating financial stability or freeing up resource for investment or job creation whilst also demonstrating Corporate Social Responsibility Credentials. Implementing energy efficiency measures creates opportunities for local suppliers, both existing and innovative start-ups, in a similar way to housing retrofit programmes. For example, a large pipeline of energy efficient projects undertaken by SMEs creates further intermediate labour market job creation potential for the Kickstart 25+ initiative.

Combined evidence from other SME energy efficiency programmes run by local authorities shows:
- 8.5 tCO$_2$e saved on average by each SME, installing a range of measures from LED lights to new boilers or heat pumps/
- 1.6 tCO$_2$e saved per £1,000 of grant funding.
- For manufacturing SMEs average savings are 10.9 tCO$_2$e
- SMEs installing new furnaces have average savings of 26.5 tCO$_2$e

Similarly, the Fleet Revolution programme in North East England has helped five SME's switch to EVs, saving 32 tCO$_2$e per year.

For South Yorkshire's largest energy users, the challenge is much greater. One large South Yorkshire business indicated that the required investments to reach net zero and produce renewable energy across its multiple sites would be at least £100 million. This shows the importance of acting in the short-term to spread the cost between now and 2040, rather than risk being left with an unaffordable task closer to the deadline.

What

Businesses are keen to decarbonise when the opportunity arises, however knowledge and awareness of opportunities is a barrier, as well as time and finances. A business support programme for SMEs can help by providing audits, information/guidance on low carbon options, business models for investment, and match funding. This activity would have three broad areas of focus:

1. Decarbonising operations:
   - Modernising heavy plant, including electric blast furnaces and electric glass blowing technology.
   - Business fleet electrification support.
   - Reduce demand for gas heating though heat recovery with heat pumps, and using solutions like small-scale hospitality kitchen heat recovery or being connected to district heat networks.

2. Reduce overall demand for power:
   - Providing free business audits and match funding.

   - Energy efficiency measures such as more efficient machinery, new boilers, and lower energy lighting.

3. Co-investment in renewable electricity generation:
   - Rooftop solar PV and vertical turbines.
   - Private wire networks for larger industrial sites and business parks.
   - Energy storage at an industrial level, capitalising on South Yorkshire's capabilities in recycling EV batteries for storage.

Projects can be large in scale or target a high volume of quick wins across a large number of SMEs to create a high aggregate impact. To do this means using commercially proven solutions to enable quick action, creating opportunities for supply chain growth. Experience of how to best engage SMEs and evidence of the most effective interventions from Sheffield CC's ERDF programme can be used to inform the design and delivery of a South Yorkshire-wide initiative.

Who	Lead role: MCA leading on programme set-up including coordinating delivery partners and leading funding bids. Communications and marketing to be part of Action 5, but ongoing programme management will be required.
	Stakeholder & partner roles: On-the-ground delivery to be led by local authorities including engaging and signing-up businesses and co-ordinating expert support. Working with the Sheffield Innovation Programme, the Translational Energy Research Centre, AMRC, Federation of Small Businesses, the three Chambers of Commerce, and the Manufacturers Forum will be important.
	Interdependencies: A working group for local authority working groups (Action 1) will be a key mechanism for managing this programme. The evidence repository (Action 4) will be a valuable resource to inform interventions and share results. The programme will be supported by dedicated communications and marketing activity as part of the wider Net Zero Programme communications campaign (Action 5).

Case study: County Durham's Business Energy Efficiency Project (BEEP) and Derby & Derbyshire's D2EE programme.

Combined, these two programmes have now supported over 500 businesses to reduce their energy use and carbon emissions. In 2018 County Durham commissioned an exploratory piece of work to demonstrate the wider benefits of both the BEEP and D2EE programmes and to show how impacts were spread across different industrial sectors and interventions. The below shows extracts from a dashboard which used available data for SMEs engaged during 2018 delivery.

tC02e Savings
1,598,656
0   3,465

Average tC02e Saved per SME:
8,549

tC02e Saved per £ of Grant:
309.81

Use the drop down to view results by industrial sector, programme or type of energy efficiency intervention:
SIC Industry — All
Energy Efficiency Measure — All
Programme — All

Equivalent of UK Daily Wind Generation:
2.87%

Equivalent output to UK Wind Turbines:
287

Equivalent of UK Carbon Business Credits:
£21,022

Grant Awarded:
£1,043,125

Savings to SME's through energy reduction so far:
£550,901

FTE Jobs safeguarded:
20.67

Average FTE Jobs Safeguarded:
0.11

Use the drop down to view results by industrial sector, programme or type of energy efficiency intervention:
SIC Industry — All
Energy Efficiency Measure — All
Programme — All

£ saved on energy bills by industry

Action 18: Low carbon fuel & power cluster organisation

Why	Cluster organisations have been established in different sectors across the UK, with a focus on increasing growth and competitiveness of their sectors. Cluster organisations have been successful in attracting inward investment, collaborating to solve innovation challenges, creating more jobs and growing the economy of their host regions.
	Businesses engaged in the creation of this work programme feel opportunities have been missed through not having an industry cluster organisation, and that establishing one will mean future opportunities will be capitalised on.
	Cluster organisations can position regions to be at the forefront of the Government's strategy to ensure investment in the technologies of tomorrow are designed, developed and manufactured in their region. For example, the CSconnected compound semiconductor cluster in South Wales received £25million Strength in Places Funding to drive innovation in product development and growth of the sector. The North East Automotive Alliance has been integral in securing Government investment in innovation facilities in the North East region.
	The most recent Industrial Strategy Challenge Fund (ISCF) Decarbonisation of Industrial Clusters funding wave closed in 2020. Notable beneficiaries of wave 1 funding included the Zero Carbon Humber cluster which has since submitted a £75 million bid to wave 2 of the funds, aiming to be the first net zero cluster by 2040 with a focus on carbon capture and storage, and hydrogen.
	Creating a cluster organisation for South Yorkshire's unique industrial strengths means the region can benefit from future funding for clusters. This could be a strategically important project for the MCA, building on these significant research and commercial capabilities around this sector.
What	Learning from cluster organisations around the UK and the-ERDF Cluster Builder projects in Scotland, a low carbon fuel & power cluster organisation can be developed. This body will:
	- support companies to develop new products and services; - provide easier access to state-of-the-art knowledge and facilities; - capitalise on major economic opportunities - stimulate innovation to help solve significant societal challenge
	The aim of this cluster is to raise awareness of opportunities in low carbon fuel and power amongst SMEs and enable these organisations to take advantage of new opportunities to grow and diversify their work and to boost innovation.
	The low carbon fuel & power cluster will ensure better collaboration between local policy makers, academic and innovation expertise, large companies, and SMEs. The key focus of this cluster will be to capitalise on the industrial and research expertise in the region, creating economic growth driven by South Yorkshire's strengths and assets. Stakeholders have identified fuel & power sub-sectors which would benefit from being part of a single cluster organisation:
	- Mine water and heat network: including a skills and capability building at a new 'heat academy'. One company engaged runs a heat academy elsewhere in the UK, whilst another has started discussions with the UoS about establishing one. A single entity should be formed in South Yorkshire. - Offshore wind manufacturing and support to enter the UK supply chain. - Hydrogen for road travel and accompanying vehicle and fuelling supply chain building.

- Skills and supply chain development based around Small Nuclear Reactors.

- Sustainable aviation fuel cluster development.

Creating formal umbrella around our low carbon fuel sector, with a single representative body speaking with one voice will unlock funding opportunities. A single regional voice applying for central government funding will carry more chance of success than many different voices each with a different ask. Building a formal cluster requires specific actions which the MCA should coordinate or commission support to deliver. These are:

- Engage with existing industry bodies to identify cluster leads from industry

- Map the size of the sector, in terms of firms, jobs and turnover

- Map the relevant research and innovation capabilities in the region

- Engage with the sector, beyond the 'usual suspects' to really understand the innovation and business challenges facing businesses of all sizes

- Work with the sector to co-design an effective cluster operational model and governance structure

- Define the initial focus of business support, innovation partnerships, and funding bids.

Who	Lead role: MCA and universities to play a key role as many funding opportunities need to be led by a public sector organisation.
	Stakeholder & partner roles: Sector organisations such as the Manufacturing Forum, the Hydrogen Network, large businesses, and specific institutions like AMRC and SAFIC will lead on managing the cluster, driving innovation and representing South Yorkshire on a national and global stage.
	Interdependencies: The evidence repository (Action 4) will be a valuable resource to inform interventions and share results. The cluster will have its own branding, in the theme of the Net Zero Programme communications campaign (Action 5).

Full programme timeline

Action	2021 H1 (April)	2021 H2	2022 H1	2022 H2	2023 H1	2023 H2	2024	2025	2026	2027	2028	2029	2030
Action 1:													
Action 2:													
Action 3													
Action 4													
Action 5													
Action 6:													
Action 7:													
Action 8:													
Action 9:													
Action 10:													
Action 11:													
Action 12:													
Action 13:													
Action 14:													
Action 15													
Action 16													
Action 17:													
Action 18													

Legend:
- Scoping / planning by MCA, local authority working groups, and delivery partners
- Working with delivery partners to design and implement
- Post launch delivery, management & monitoring by MCA or delivery partners

Next steps

The actions in this work programme include enabling activities, projects which can start in 2021, and preparatory work for longer-term infrastructure developments. Progressing these is needed to make inroads into the 2040 target and to set in place measures to deliver further carbon reductions up to and beyond 2030.

Accelerating momentum

Sequencing activity over the next three years is key to ensuring the net zero project is a success. It is therefore an imperative that the enabling actions to overcome strategic barriers are delivered first.

Specifically, this means ensuring the following are established and operation during 2021:

- The joint local authority working groups and subgroups are established, with roles agreed and operating procedures in place (Action 1).

- Building the evidence base to provide a shared understanding of the baseline across South Yorkshire and to pinpoint the most effective areas to target project delivery (Action 4).

- Integrating the communications of the net zero programme into the wider MCA communications work, and involving partners in disseminating consistent messaging to communities and businesses (Action 5).

Delivering these actions first means they will be in place to support current delivery of the MCA's activity such as the Active Travel Implementation Framework, and align the work being delivered by local authorities (Appendix I).

This is especially important when regional coordination and planning is needed to combine or add value to local authority projects, or to collaboratively plan projects to start in 2021. For example, Actions 7, 10, 11, 14, 15, 16, 17, & 18.

Whilst the immediate actions for the MCA to deliver and coordinate projects, there is a need for parallel activity to keep progressing larger and more long-term projects. This will mean these projects are delivered such that carbon reduction between now and 2040 is front-loaded or balanced, rather than pushing the problem closer to 2040.

The emissions profile across South Yorkshire is broadly split equally between transport, domestic and business. Therefore, it is important to tackle each of these equally in the first three years of the programme (Table 12).

Reducing demand for energy and fossil fuels through efficiency and behaviour change is the first step, however replacing gas as a source for heating and cooling is going to have the biggest impact on domestic and business carbon emissions.

Actions 1, 11 and 17 are designed to make fast progress at scale to reduce energy demand and replace gas use across South Yorkshire. Meanwhile, Actions 8 and 10 are in place to enable and encourage citizens and social housing providers to switch to low carbon options as soon as possible rather than locking in emissions for the long-term. Actions 9, 12 and 13 are medium to long-term.

Table 12: Net Zero Programme 2021-2023

Action	2021 H1	2021 H2	2022 H1	2022 H2	2023 H1	2023 H2
Action 1:	Planning	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing
Action 2:	Planning	Planning	Planning	Ongoing	Ongoing	
Action 3		Planning	Ongoing			
Action 4	Planning	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing
Action 5	Planning	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing
Action 6:	Planning	Planning	Planning		Ongoing	
Action 7:	Planning	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing
Action 8:	Planning	Planning	Planning	Ongoing	Ongoing	Ongoing
Action 9:		Planning	Planning	Planning	Planning	Planning
Action 10:	Planning	Planning	Ongoing	Ongoing	Ongoing	Ongoing
Action 11:	Planning	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing
Action 12:		Planning	Planning	Planning	Planning	Planning
Action 13:		Planning	Planning	Planning	Planning	Ongoing
Action 14:	Planning	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing
Action 15	Planning	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing
Action 16	Planning	Planning	Ongoing	Ongoing	Ongoing	Ongoing
Action 17:	Planning	Planning	Ongoing	Ongoing	Ongoing	Ongoing
Action 18	Planning	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing

(light green)	Planning, scoping, feasibility, design and implementation
(dark green)	Ongoing delivery and management

Delivery

The proposed work programme splits the timeline into a set-up phase (plan, design and undertake feasibility of projects) and an ongoing delivery phase post launch. The proposed delivery structure is that the MCA plays an important and hands-on role during the set-up of projects and the launch of the programme. This is essential to galvanise partners and stakeholders, and to ensure delivery is planned in coordinated way.

The resource required for each phase of the work programme will be identified during ongoing business planning being undertaken by the MCA.

Appendix I: Existing Local Authority Plans & Priorities

Barnsley Metropolitan Borough Council (BMBC)

In September 2019, The BMBC cabinet declared a climate emergency and to reduce its carbon emissions. There were two overall aims set:

1. Zero 40 - BMBC will become carbon zero by 2040, or earlier if possible

2. Zero 45 - The Borough of Barnsley will become zero carbon by 2045

Both Zero 40 and Zero 45 will be underpinned by a series of four evidence-based Sustainable Energy Action Plans (SEAPs) running every five years leading up to 2040. These are 2020-2025, 2025-2030, 2030-2035 and 2035-2040.

The Zero 40, Zero 45 and SEAPs sit alongside the Barnsley Energy Strategy (2015-2025).

Strategies and plans

Sustainable Energy Action Plans

The first draft of the Barnsley Zero Carbon SEAP (2020-2025) identifies four Zero Carbon Community Goals to meet the Zero 40/45 aims:

- For the Borough to stay within a local emissions 'budget' of 7.7 million tonnes (Mt) of CO_2 between 2020-2100 and to reach 'net zero' pollution as early as possible before 2045.

- To reduce health inequalities across the borough, ensuring that the Borough is cleaner and greener bringing measurable benefits to its residents.

- To ensure a climate resilient Barnsley adapted to cope with exiting change and further unavoidable disruption this century.

- To ensure that the transition to a low carbon economy is positive, just and all residents and business can fully participate.

These four Zero Carbon Community Goals will be achieved by delivering carbon reduction projects currently focused on the following five themes (likely to develop and change over time):

1. Improve Energy Efficiency: To reduce the overall demand for energy in Barnsley across residential, commercial, and industrial sectors and improve public health outcomes.

2. Renewable energy: To generate and/or source all our local energy needs from zero carbon and renewable sources by around 2045

3. Sustainable Transport: A complete transition to fossil fuel free local travel by

around 2030

4. Resource Efficiency: Use resources, materials, land and food in a sustainable way.

5. Decentralised Heating: To heat our homes via zero or low carbon measures away from traditional sources of heat.

Barnsley Energy Strategy (2015-2025)

This has the following 5 strategic objectives and associated key projects: -

1. Create a green economy

   - Use of low-carbon building materials in construction of new-build affordable housing development, in conjunction with manufacturer of low-carbon building components, basing operations in Barnsley.

   - Installation of solar PV arrays on underused BMBC land / industrial unit roofs to provide energy infrastructure required to service business parks – potential scheme at Rockingham Business Park, Dearne Valley Parkway

2. Improve energy efficiency

   - Better Homes Barnsley (Green Deal/ECO): a private sector home energy efficiency scheme – ongoing.

   - Barnsley Homes Standard capital investment programme (and other schemes) for 18,500 Council owned homes – ongoing.

   - Promotion of Carbon Trust's SME Carbon Network – planned.

   - Development of energy advice service for SMEs – aspirational.

   - Green Doctor Service (to provide energy advice to vulnerable households and carry out installations of low-level efficiency measures) – ongoing.

   - Energise Barnsley in partnership with Gen Community and British Gas – implementation ongoing

3. More low-carbon energy

   - Hydro-power scheme at Worsbrough Reservoir – initial feasibility study undertaken.

   - Energise Barnsley – in partnership Gen Community and British Gas – implementation ongoing.

   - Solar PV farms on under-used BMBC land to provide power to meet local demand for power from commercial and residential customers – audit of BMBC land assets completed.

   - Wind turbines to provide power to meet local demand for power from commercial and residential customers – landscape capacity study completed.

   - Installation of solar PV canopies to BMBC car parks – audit of BMBC carparks underway.

- Creation of a partnership with private sector delivery partner to boost no. of solar PV roof installations in private sector housing – aspirational.

- Combined heat and power district heating network for Barnsley Town centre – master planning ongoing.

- Bio-fuel production from crops/anaerobic digestion – aspirational.

- Installation of gas CHP boilers at Metrodome Leisure Centre – final business case in preparation.

4. A cleaner lower carbon environment

- Carbon Management Programme (Phase 2) – final planning.

- Street lighting – ongoing.

- Continuation of Eco Stars Recognition Scheme – ongoing.

- Expansion in use of electric vehicles by Barnsley MBC and Berneslai Homes – aspirational.

- Increase the number of electric vehicles charging points – aspirational.

- Promote electric bike leasing scheme within BMBC and encourage widespread adoption by local businesses – aspirational.

- Increase use of biofuel in Barnsley MBC/ Berneslai Homes vehicle fleet – planned.

- Energise Barnsley in partnership with Gen Community and British Gas – implementation ongoing

5. Sustainable Communities

- No projects yet identified

To assess the impact of new procurements and investments a 'Climate Change Rating Tool' has been developed. The intention is to embed this across departments, so that each considers its climate change implications. All project appraisal forms, cabinet reports and budget proposals require a climate change rating using this tool.

Doncaster Metropolitan Borough Council (DMBC)

In September 2019, DMBC declared a climate emergency and to reduce its carbon emissions, setting itself the following aim:

"Doncaster, all of its public institutions, businesses and communities, should keep within its carbon budget, deliver an 85% reduction in net greenhouse gas emissions by 2030 and net-zero emissions by 2040."[1]

Strategies and plans

Carbon Roadmap

Doncaster's Commission on the Climate and Biodiversity Emergency has identified activities/projects grouped in the following themes. Each are indicated by its as being an area for significant contribution to climate mitigation and adaptation: -

1. Energy production and consumption - renewable energy generation and energy saving

    *   56kW of solar PV panels installed at Herten Triangle Leisure Park – energy generated sold to a local restaurant.

    *   75kw of solar PV panels installed on Savoy Cinema – with 50kw supplying the cinema and 25kw supplying a restaurant in Unit 1.

    *   112kw of solar PV panels installed on Danum Library. Solar PV panels providing 91kw are proposed for a Civic Office carport

    *   Replacement of 25 Doncaster Council diesel pool cars and a selection of light commercial vans with electric vehicles (EV) in 2020.

    *   Development of a dedicated EV-only fleet car park at the Council's Civic Office and the redevelopment of Scarborough House car park with 39 EV charge points (subject to planning).

    *   Contract with energy company ENGIE for an Energy Masterplan to make a comprehensive inventory of current and future energy consumption, and identify energy projects to put Doncaster on a path towards carbon neutrality.

    *   Planning permission has been granted for large solar panel installations at Amazon, Doncaster Airport, and Austerfield.

2. Land use and biodiversity – trees, grassland, peatland, green spaces, agriculture

    *   Doncaster Nature Alliance established to promote the biodiversity agenda - regular meeting as a network of around 12 different groups and services, with

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[1] Responding to the climate emergency: Creating a fairer, more prosperous Doncaster An Interim Position Statement July 2020

discussions underway regarding feasibility of more formalised structure as an independent organisation. Public event 'Your Wilder Doncaster' was held on 3 rd March 2020 at Doncaster College.

- Publication of a free magazine Doncaster Wild Times to highlight local natural assets and attractions, widely distributed throughout the borough.

- Partnership arrangements for the commissioning of a Natural Capital Assessment for Doncaster.

- Surveys of Doncaster Council land assets for tree planting opportunities and other re-wilding opportunities for example wildflowers on road verges and public green space corners.

3. Food – production and food security

- Doncaster has achieved Sustainable Food City status as part of the Sustainable Food Cities Network, 'working across all aspects of the food system to solve some of today's most pressing social, environmental and economic issues.'

- Local food issues and awareness website Good Food Doncaster website goodfooddoncaster.org/

- Doncaster Schools Catering Service has policies around responsible and local provisioning and food education

4. Waste – recycling, land fill

- Waste awareness campaigns through the BDR Waste Partnership including Love Food Hate Waste21, Recycle Week22, and Love Your Clothes23.

- Local community groups active in the Great British Spring Clean campaign24 .

- Active local market for collection and processing of commercial and industrial waste, skip hire, recycling, etc.

5. Transport – low emissions vehicles, active transport, public transport, freight, aviation

- The Department for Transport's Transforming Cities Fund will deliver a range of public transport and active travel schemes by 2022-23 and includes £166 million for Sheffield City Region (South Yorkshire). Phase 1 of the Transforming Cities Fund has enabled the early delivery of five active travel schemes in Doncaster:

  o Doncaster South East Active Travel Package
  o Y Routes: Orbital Routes
  o Thorne to Moorends Cycling Connectivity
  o Ten Pound Walk to Doncaster Train Station Pedestrian Improvements
  o A18 Corridor Improvements

- Active travel infrastructure has been incorporated into the recent Quality Streets projects on Hall Gate and Silver Street, and is central to the current

redevelopment of Doncaster Station and its forecourt, which includes a new station Cycle Hub.

6. Business, economy and green technology

    - Success of the Green Growth and Productivity Conference (16th January 2020) demonstrates that Doncaster already has a vibrant sustainability business sector on which to build. This provides significant opportunity to marry our competitive advantages with low carbon opportunities, diversify our economy and create better jobs.

7. Buildings – domestic, public, commercial, and industrial

    - The Doncaster Local Plan (planning regulations for building and development) includes policy 58 – flood risk management, policy 59 - low carbon and renewable energy, and policy 60 - wind energy developments.

    - Planning Policy 31 - Valuing Biodiversity and geodiversity, introduces the Biodiversity Net-Gain principle. Proposals that may harm designated wildlife or geological Sites, Priority Habitats, Priority Species, protected species or non-designated sites or features of biodiversity interest, will need to provide or fund a minimum 10% net gain for biodiversity.

    - The use of micro-renewable energy technologies and decentralised heat and power systems are promoted within new developments.

8. Climate adaptation, including one-catchment and natural solutions to flood management

    - A Flood investigation Report (S19) into recent local events is identifying learning will help inform future flood risk planning options and also learning on community vulnerability and resilience.

    - Local community resilience schemes and property flood resilience schemes are increasing community awareness of flood risk and action residents can take to keep themselves, their families and their communities safe during flood events.

    - Work with asset owners including water companies, drainage boards, Environment Agency, landowners, and other strategic partners will review the causes of flooding and develop plans for short medium and longer-term repairs and sustainable flood mitigation and resilience.

9. COVID 19 pandemic and other emergencies – risk, resilience, recovery and renewal

    - No projects specified

10. Behaviour change and social influence

    - No projects specified

Rotherham Metropolitan Borough Council

In October 2019, RMBC declared a climate emergency and to reduce its carbon emissions.

Strategies and plans

As part of the climate emergency declaration the following actions were set, but there is not yet a more detailed strategy available.

Actions:

1. Propose an informed target for the Council's carbon reduction by 2025
2. Develop a "Carbon Action Plan" towards these goals
3. Promote the strategy and engage with community, public and business
4. Lobby government for additional resources to support this strategy
5. Produce an annual Rotherham Climate Emergency progress report
6. Enlist support from partner organisations across Rotherham
7. Require all future cabinet reports to include climate change Impact assessments.

Sheffield City Council

In January 2019, Sheffield CC declared a climate emergency and committed to bring forward the city's carbon neutral target from 2050 to a minimum of 2030.

Strategies and plans

Under this commitment, £43 million worth of projects are already are underway to address climate issues in the city. These are shown below. It most be noted that Sheffield CC are currently developing a further net zero strategy, which is due for publication in late 2020.

Existing projects are:

1. City wide planning and action

   - £100,000 is to be invested for wider stakeholder engagement.

   - A Citizens Assembly is being commissioned to consider the necessary actions in the city to implement this change. It will be drawn to represent all parts of the city, including young people.

   - A specialist partner is also being commissioned to work with the Council to inform a Zero Carbon Sheffield Plan and develop the evidence base for the Climate Citizens Assembly.

   - The development of this work will be supported by Sheffield's Green City Partnership Board and will include a detailed analysis of the city's current performance across all sectors of the city. It will provide the details on the specific options and actions that are required as city to achieve net zero emissions within a decade, as well as the further actions for the Council to

completely decarbonise its own activities, including our council homes, offices and transport fleet.

2. Flood Resilience

- Flood resilience work to protect the Lower Don Valley completed in 2017 and during the recent flood event in November 2019 these defences prevented significant damage and disruption.

- Plans are now moving forward for the £9 million Upper Don Valley flood protection scheme phase 1 (Lower Loxley defences) which is scheduled to start construction in July. This scheme will protect parts of Hillsborough and Owlerton that flooded in November.

- A £3m citywide culvert scheme is being developed to improve water flow throughout the city, diverting excess water away from the city's roads and highways.

- Sheffield's award winning Grey to Green scheme is the UKs largest retrofit SuDS project and also one of the UKs largest inner city green streets. Grey to Green aims to increase urban biodiversity, create a green corridor, protect people from air pollution, achieve city cooling (bringing down temperatures with vegetation), treat contaminated water and promote health and wellbeing.

  o Phase 1 completed in 2016, transforming the city's former inner ring road into a green corridor.

  o Over a five year period £5.8m is being invested in to Phase 2. The Castlegate to Victoria Quays section is now under construction.

3. Sustainable Travel

- Promoting active travel with more walking routes, segregated cycle lanes and bus lanes.

- Investing £1.5m from DfT to deliver high quality cycle networks linking the city centre to Broomhall and providing segregated and direct links across the Inner Ring Road.

- The Council has recently prepared an £85m programme of cycling, walking and bus corridor improvements as part of a further SCR Transforming Cities Fund bid, announcements on which are expected soon.

- The Council has delivered: cycle loans, invested in a fleet of bikes and ebikes that people can loan for free; provided cycle training to people and Bikeability training to school pupils in Sheffield.

- Working with Bus companies and government £4.9 million will be invested in to Cleaner Bus Technology Fund to retrofit up to 277 buses to the Euro VI standard.

- Investing £1.25m to increase access to rapid-charge points for electric cars, with many more charging points planned for the city.

- Investing £3.4m in to highway changes at Broadfield Road to improve public transport and bus times along the route.

4. Renewable and Sustainable Energy

- The Council now purchases electricity generated from 100% renewable sources. This is an increase of 81% since last year.

- Energy Surgeries have been established to provide advice on sustainable energy in the home and Smart Energy Meters have been installed for Council tenants – creating a 40% saving for tenants as well as a substantial reduction in wasted energy.

- Looking to expand heating networks across the city to bring low cost, sustainable heating to many more homes.

- Spending £5.7m replacing more than 3,000 obsolete boilers and heating systems in council housing, to more efficient system.

5. Improving air quality

- In Summer 2019 the Council consulted on its proposals to introduce a Clean Air Zone to improve emissions from the 19% of vehicles that are responsible for 50% of the Nitrogen Dioxide (NO2) emissions from transport.

  - The planned CAZ C would result in significant improvements in air quality across the city and the consultation showed that 80% of the over 12,000 people in Sheffield responding to the consultation feel the Council should make improving Air Quality a priority.

  - A range of support packages are being developed for drivers of older more polluting vehicles to assist them in upgrading their vehicles instead of paying a daily charge and the council is seeking funding to deliver these from Government.

  - The council is currently awaiting confirmation from Government on its CAZ C proposals and following this the Full Business Case will be finalised and submitted to Government setting out the full proposals.

- Anti-idling zones are now active outside of all primary and secondary schools, and other notable places such as hospitals and health centres.

- Pilot schemes are taking place to close targeted roads to traffic for set periods of time to create a better, less polluted and congested environment, targeted at benefiting children. Pilots being developed include:-

  - School Streets - where roads outside schools are closed at drop-off and pick-up

  - Play Streets - a resident led scheme where a road is closed to traffic for a set period of time, occurring at a designated time

  - Living Streets - where a road is closed to traffic completely

- The schemes have been trialled in other areas to improve air quality and make roads safer. They also encourage more children to play out or to walk to school.

- The Council is making its own vehicle fleet cleaner and greener. The Streets Ahead team will run another 15 electric vehicles to replace its current diesel vehicles. It is also taking a major eco-friendly step by trialling two vans that use a hydrogen fuel cell to extend the range of power the battery gives to approximately 200 miles. The Council also runs an extra five hydrogen vehicles.

- More than 20 ultra-low taxi charge points are to be installed in the city centre, with the installation programme due to start in March 2020

- Working with three other local authorities in the city region to develop a project to support small to medium sized enterprises (SME's) to implement low carbon improvements within the business. If successful project activities are due to start in September 2020.

6. Waste, recycling and energy recovery

- Improved kerbside waste collection with a new 'Twin Bin' recycling service, replacing the blue box with a brown bin for Metals, Glass and Plastics, and relaunched the Green Bin service.

- Developing a Trade Waste Recycling Facility to encourage recycling by businesses.
  Improved recycling facilities for shared properties such as flats, high density housing, and student accommodation.

- Less than 0.5% of black bin waste sent to landfill.

- Sheffield is trailing electric bin lorries powered by the very waste they have collected. The re-powered lorries have zero carbon emissions and produce no air pollution.

- Working with the city's schools to see a reduction in plastic, including huge reductions in the amount of single use plastics used at school meal times.

- General household waste is taken to the city's Energy Recovery Facility (ERF), which generates electricity for the National Grid and heat for the city's award winning District Energy Network.

7. Trees, Woodlands and Green Spaces

- Over the next 10 years the Council will plant 100,000 trees as part of its Trees and Woodland Strategy. Commitment to protecting trees and woodlands and enhancing green spaces across the city.

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