SHEFFIELD CITY REGION

DRAFT ENERGY STRATEGY: Clean Growth & Our Low Carbon Future

The Green Heart of Great Britain

Sheffield City Region

CONTENTS

FOREWORD

To insert text.

Mayor Dan Jarvis MBE MP
James Muir – Chair of the Sheffield City Region LEP

EXECUTIVE SUMMARY

OUR VISION

For Sheffield City Region to be recognised as the 'The Green Heart of Great Britain' with:

A clean, efficient and resilient energy system, which supports a healthier environment for people to live, work and visit, and which drives our transition to a low carbon economy.

This Sheffield City Region (SCR) Energy Strategy sets out the energy priorities for our City Region up to 2040 in support of the refreshed Strategic Economic Plan (SEP) and Local Industrial Strategy (LIS). It sets out tangible targets and strategic direction to give confidence to businesses looking to invest in low carbon energy generation, energy infrastructure, and energy efficiency within our City Region. Doing so will help create jobs, secure new investment, and grow our economy. It will also seek to address social deprivation, improve health and well-being, and tackle the causes of anthropogenic climate change.

There are many energy challenges across our City Region that need to be addressed including:

- energy resilience, reliance on fossil fuels and the need to import electricity from outside our City Region;
- the number of our households living in fuel poverty; and
- the poor air quality that blights many areas affecting health and worsening respiratory problems.

Our Vision will be achieved by meeting the following Goals:

1. Drive clean growth in our local businesses
2. Promote investment in low carbon energy generation, distribution and storage.
3. Improve the energy efficiency and sustainability of our neighbourhoods and built environment
4. Accelerate the transition to ultra-low emission vehicles (ULEVs) and transport systems

Energy Resilience and Reliance on Fossil Fuels

In 2015, 1.4TWh of electricity (18%) was imported from outside of our City Region meaning that we are reliant on other generators from around the UK. The electricity generated within our City Region is primarily from using natural gas as the fuel, and whilst this is a cleaner fuel than coal, the transition towards a greater proportion of low carbon electricity generation needs to happen with greater haste, if this Vision is to be achieved.

Our City Region is in a strong position to develop and implement solutions that will place clean growth and energy efficiency at the heart of our high-value manufacturing industry. There is an opportunity to build on our local supply chains and strengths in logistics to become forerunners in this quickly accelerating market. The energy intensive sectors within our City Region present a significant opportunity for transformational energy projects and innovative technologies, which will deliver increased productivity and significant cost savings that benefit the bottom-line of businesses.

The successes of the Sheffield district heat network places Sheffield City Region in a strong position nationally to lead the way in developing a City Regional portfolio of low carbon district heat networks that deliver significant local benefit, including alleviating fuel poverty, improving air quality, reducing energy costs and supporting job creation.

Fuel Poverty

It is estimated that over 93,000 households – particularly the elderly and less affluent – are experiencing fuel poverty, living in cold and damp housing conditions which are detrimental to their health and wellbeing, and quality of life. There is an opportunity to target these vulnerable households and provide support to improve the energy efficiency of their homes and help bring them out of fuel poverty and reduce excess winter deaths.

Poor Air Quality

In terms of poor air quality, there are twenty-eight Air Quality Management Areas (AQMAs) identified within our City Region; these are primarily caused by road traffic which produces nitrogen oxides (NO_x) and particulate matter (PM) emissions, as well as domestic boilers which produce NO_x emissions. By accelerating the transition towards ULEVs and moving away from fossil fuel heating within our dwellings, our air quality will improve which will have a positive effect on the health of all residents.

OVERVIEW OF POLICIES

GOAL 1 - Business	**Clean Growth in Businesses** Encourage and support businesses to grow and prosper from the low carbon energy sector.	**Promote Industrial Cluster Schemes** Reduce the environmental impact of industrial clusters and driving inward investment.	**Business Support for Energy Efficiency** Supporting our businesses to become more energy efficient, reduce cost and increase competitiveness.	**Divestment from Fossil Fuels** Work with organisations with the aim of total divestment from fossil fuels within their portfolios.
GOAL 2 – Infrastructure & Skills	**Utilise Current Infrastructure** Make better use of our infrastructure for energy efficiency, low carbon energy generation, or sustainability.	**Improve Energy Resilience** Enable the addition of further generation capacity, storage and balancing technology to support the national grid.	**Drive Investment in Heat Networks** Move towards 4th and 5th Generation heat networks with more varied low carbon heat sources.	**Training and Upskilling the Energy Workforce** Giving people the skills to design, install and maintain our future energy systems.
GOAL 3 – People & Buildings	**Enable Community Energy Schemes** Work closely with community groups to develop and support community schemes.	**Improve Efficiency of Existing Dwellings** Help the most vulnerable in our society reduce the impact of energy costs by improving their homes.	**Public Sector Leading by Example** Reduce the impact that the public sector has on carbon emissions within our City Region.	**Improve the Standard of New Build Dwellings** Move towards all new-build dwellings being of zero carbon standard with EV charging points and smart technology.
GOAL 4 - Transport	**Support the SCR Transport Strategy** Ensure that the low carbon elements of the Transport and Energy Strategies are aligned and delivered jointly.	**Improve Air Quality and Eliminate AQMAs** Completely eliminate Air Quality Management Areas in our City Region and meet all legal requirements.	**Accelerate the Uptake of ULEVs** Tackle poor air quality by transitioning to ultra-low emission vehicles.	**Deliver a Clean Transport Network** Work with partners to ensure our City Region has a zero-carbon transport network.

OVERVIEW OF TARGETS – All TBC FOLLOWING COMPLETION OF TARGETS COMMISSION

XX%

increase in GVA per $MtCO_2$ by 2040

Exporter

of electricity into the national grid

XXXX jobs

created in our City Region's low carbon economy

Increasing the number of community energy schemes in our City Region to

X per million residents

Reducing

excess winter deaths of the elderly and vulnerable

XX%

reduction in public sector emissions

Maintain at least a

1-in-10 ratio

of EV charging points to EVs.

Eliminate AQMAs and meet all legal air quality requirements as soon as possible

The refreshed Strategic Economic Plan (SEP) is aiming for an increase in GVA of £Xbn by 20XX. Combined with the overall emissions target that has been set by SCR (XXXX by 2040) this means that our City Region is seeking to increase our GVA to £Xm per $MtCO_2$ by 2040.

Currently our City Region imports around 1.4TWh of electricity per year from other regions. A key policy of this Energy Strategy is to become a net contributor to the national electricity network and ensure that the supply of our City Region is as robust, resilient and low carbon as possible for all residents.

The ambitious targets and policies given in this Energy Strategy will help to drive job creation. Nationally, over 50,000 new jobs are estimated to be established in the low carbon sector over the next 15 years; however, only 400 are expected within our City Region without greater ambition and investment. Our strategy therefore is to aim beyond this expectation and instead create XXXX jobs in this high-growth sector.

Activity in local communities will also be required. The number of community energy projects within our City Region is far lower than other areas of the UK and communities will be key in bringing forward schemes that will increase the speed of decarbonisation and allow residents to invest in the new infrastructure.

In our City Region in 2015/16 there were 940 excess winter deaths, many of which could have been prevented by having better insulated dwellings. It is a key target of this Energy Strategy to reduce the number of excess winter deaths of the most vulnerable in our society.

The public sector in our City Region must lead by example and the Sheffield City Region LEP and MCA will pledge to reduce operating emissions in our assets portfolio by XX% by 2030, and advocate for all buildings to become net zero carbon by 20XX. All local authority and other public sector partners will be given the opportunity to commit to this goal.

The number of electric vehicles (EVs) has increased 60x in the last seven years and is set to continue due to the Government's commitment to ban the sale of fossil fuel cars by 2040. This means that the infrastructure within our City Region to support EVs and other ULEVs must grow from the current 1 charging point per 150 EVs to 1-in-10 including charging points in every neighbourhood.

Poor air quality has been proven to be a direct cause of health issues, particularly by worsening respiratory diseases. Eliminating Air Quality Management Areas (AQMAs) and meeting legal obligations is therefore essential for the well-being of the residents of our City Region and the basis of helping everyone become more active, fit and healthy.

WHAT WILL THE IMPACT BE?

Residents, workers and visitors in the Sheffield City Region will:

- Be able to enjoy the outdoors both in rural and urban areas without worrying about air pollution worsening asthma and other respiratory conditions.
- Be able to live in sufficiently warm homes, where fuel bills are affordable and their health and wellbeing is not adversely affected by being in fuel poverty.
- Be safe in the knowledge that a new build house is built to excellent energy efficiency standards with low carbon heating to keep running costs to a minimum.
- Have ample opportunities to train and upskill in order to work in the growing low carbon energy sector.
- Know that the public sector across our City Region leads by example with regards to promoting energy efficiency, sustainability and tackling the Climate Emergency.
- Recognise that local Universities are at the forefront of low carbon research and development, helping drive innovation in the economy.
- See that local businesses are innovating to reduce their carbon emissions; thereby reducing their costs, improving their productivity, and creating new jobs and business growth opportunities.
- Have safe and plentiful cycle and walking routes which enable them to move around the City Region without the need for a car.
- Be able to charge their ultra-low emission vehicles at multiple convenient places around the City Region, to remove ‘range anxiety’ and encourage their use.

1.0 INTRODUCTION

1.1 PURPOSE OF OUR ENERGY STRATEGY

The aim of this document is to provide a coherent, evidenced strategy to enable our City Region to become a leader in clean growth, low carbon and affordable energy which will take advantage of the significant economic growth in this area by attracting in new companies and through associated local supply chains. This Energy Strategy also highlights what will need to be targeted in terms of investment and innovation in our City Region and how to accelerate the transition from fossil fuels to renewable and low carbon energy generation alongside reduced energy use.

The publication of the Industrial Strategy saw the UK Government request that all Local Enterprise Partnerships (LEPs), produce Local Industrial Strategies (LIS) to translate the ambitions and activities of this national strategy into local economies and activities.

Additionally, the Department for Business, Energy, and Industrial Strategy (BEIS) are delivering a Local Energy Programme, which intends to enhance the levels of support that LEPs will receive when delivering energy projects. The first phase of this programme provided funding to all LEPs in England to support them in developing an energy strategy, with an emphasis on identifying investable projects which enhance energy opportunities across a region.

The SCR LEP and MCA are targeting the development of a single, bold SCR strategy; a long-term, strategic policy framework which bolsters local economic growth and establishes our City Region as '**The Green Heart of Great Britain**'. This Energy Strategy will help inform both the LIS and the refreshed Strategic Economic Plan (SEP), detailing actions required to meet local and national ambitions.

This Energy Strategy sets out the energy targets, goals, policies and interventions for our City Region up to 2040 and has been developed in collaboration with The Carbon Trust, Local Authority partners, and stakeholders from across our City Region. Delivery of the Energy Strategy will involve central government, local authorities, public and private organisations and businesses, community groups and Universities, as well as the SCR LEP and MCA.

Figure X: Marr Wind Farm in Doncaster (Watermarked)

1.2 THE SCOPE OF THE ENERGY STRATEGY

This Energy Strategy sets out a series of goals, policies and interventions, some of which the MCA will lead, some of which the MCA will contribute to, and some of which the MCA will seek to influence. It is therefore important that this Strategy is not seen as an end-point – it is much more of a starting point to develop the energy network that needs to be supported to meet the economic and decarbonisation aspirations of our City Region. This will require working together with our local, regional and national partners in a co-ordinated way to seek opportunities to strengthen linkages and to jointly invest in the future of energy in our City Region.

1.3 NATIONAL CONTEXT

The UK's Industrial Strategy was published in 2018 and sets out the Government's plan to create an economy that boosts productivity and earning power throughout the UK. It sets Four Grand Challenges where Britain can lead the global technological revolution:

- **Artificial Intelligence (AI) and Data Economy**: putting the UK at the forefront of AI and data revolution.
- **Clean Growth**: maximising advantages for UK industry from the global shift to clean growth.
- **Future of Mobility**: being a world lead in shaping the future of mobility.
- **Ageing Society**: harnessing the power of innovation to help meet needs of an ageing society.

These challenges each have strong links with the energy and low carbon sectors and with economic growth. The UK Industrial Strategy highlights several ways in which we will need to consider low carbon energy and energy efficiency to build an economy that works for everyone. These include:

- Upgrading energy infrastructure to enable growth

and support new technologies;
- Delivering affordable energy and keeping energy costs down for businesses;
- Delivering clean growth and securing the economic benefits of the transition to a low carbon economy;
- Investing in science, research and innovation, including energy storage and grid technologies; and
- Supporting businesses to start and grow.

The Industrial Strategy recognises that LEPs will play an important part in supporting local growth, and emphasises the importance of collaboration between LEPs, alongside the need for policy flexibility at the regional level. In terms of funding, Government recognises that LEPs require financial support to be effective. Additional financial resources will be made available to LEPs that demonstrate ambitious levels of reform.

The Clean Growth Strategy (CGS) published in 2017 provides an ambitious blueprint for Britain's low carbon future, outlining how investment in green energy goes together with economic growth and placing clean growth at the centre of the Industrial Strategy. Core to the CGS are:

- **Accelerating Clean Growth:** developing world leading 'Green Finance' capabilities.
- **Improving Business and Industry Efficiency**: improving energy productivity and commercial building standards; delivering industrial energy efficiency; investing in industrial innovation.
- **Improving our Homes**; upgrading energy efficiency; strengthening building standards; rolling out heat networks; phasing out of high carbon heating.
- **Accelerating the Shift to Low Carbon Transport**: supporting the uptake of ULEVs; developing an EV charging network; shifting freight from road to rail; and battery technology.
- **Delivering Clean, Smart, Flexible Power**: phasing-out of coal, developing new ways of grid balancing through storage and demand response.
- **Enhancing the Benefits and Value of Our Natural Resources**: a new network of forests; zero avoidable waste by 2050.
- **Leading in the Public Sector**: setting a voluntary public sector carbon reduction target; funding energy efficiency improvements in England.

2.0 OUR VISION AND GOALS

2.1 OUR ENERGY VISION

Our Vision is:

For Sheffield City Region to be recognised as the 'The Green Heart of Great Britain' with:

A clean, efficient and resilient energy system, which supports a healthier environment for people to live, work and visit, and which drives our transition to a low carbon economy.

2.2 OUR ENERGY GOALS

As stated in Section 1.3, supporting this Vision are four goals:

1. Drive clean growth in our local businesses
2. Promote investment in low carbon energy generation, distribution and storage.
3. Improve the energy efficiency and sustainability of our neighbourhoods and built environment
4. Accelerate the transition to ultra-low emission vehicles (ULEVs) and transport systems

All of these will be led by the principle that our energy supply in whatever form is undergoing a transition from high carbon to low carbon (see Figure X below). The focus of this Strategy is to promote and seek to accelerate this transition to renewables and to also reducing energy demand where possible; but recognising that natural gas may have a role to play at least in the short-to-medium term.

Figure X: The SCR energy transition

GOAL 1: Drive Clean Growth in our Local Businesses

The low carbon economy is projected to grow 11% per year until 2030; four times faster than the growth of the UK economy as whole[1]. Providing the platform for clean growth amongst business will help to transform our City Region's economy, and in doing so help to further drive both productivity and skills.

Research from BEIS[2] indicates that SMEs across the UK could save £0.5 billion a year through the implementation of energy efficiency measures. Despite this, there remains a large proportion of the 52,000 SMEs in our City Region who are not actively improving their energy efficiency. Action is therefore required to improve levels of SME engagement, helping to reduce overall business costs, improve productivity, enhance competitiveness and contribute towards the development greener business practices.

The SCR Growth Hub helps businesses across our City Region access a variety of support, including advice on innovation, exports, accessing finance and training. The goal will be to expand this role, build on its success and identify ways in which local businesses can be supported to reduce their energy and other resource costs, helping to improve productivity and growth. To incentivise long-term, sustainable success the use of loan-to-grant mechanisms will also serve to draw additional businesses to our City Region in turn attracting greater inward investment.

[1] REF – SoS for BEIS (find Hansard)
[2] REF

GOAL 2: Promote Investment in Low Carbon Energy Generation, Distribution and Storage

Smart technologies are increasingly important in alleviating strain on the electricity network and meeting the demands of new patterns and types of energy consumption. They do this through increasing flexibility by shifting some of the demand to off-peak times, matching demand with generation, and digitising energy. This will reduce the extent to which large scale replacement and upgrading works will need to be carried out on the electricity network thus keeping costs down for consumers.

Figure 1.1 — Solar PV Farm in Bolsover

Given the worldwide movement towards decentralised energy generation and use (typically through more localised wind and solar generation, batteries and smart technologies), this is a good time for SCR to develop forward-facing, proactive investment to create a 'smart grid' for our City Region alongside the development of skills, apprenticeships and jobs that this will create.

The natural geography of our City Region and the expertise of our businesses, community enterprises and world-class universities provide a strong basis for us all to do much more; to generate the additional heat and power needed for the future from renewable sources. As part of this, it is essential that all new energy generation opportunities are capitalised on, removing the barriers to scheme development and identifying new forms of investment needed.

Our City Region is already leading the way on heat networks with Sheffield being home to one of the most developed heat networks in operation in the UK. Given the existing industrial activity in our City Region, there is also significant potential to capture waste heat and feed this into local heat networks to distribute to nearby towns and cities. Efforts now need to be focussed on introducing suitable investment delivery mechanisms which will allow other projects of this type to succeed.

Building on the history of our City Region's mining heritage, the use of geothermal energy from abandoned mines could be a key form of low carbon energy production in the future. These legacy subterranean structures can also be used to store thermal energy (from waste heat or purposefully generated solar heat) generated during summer months for use during the winter. It is essential that these assets are exploited such that our City Region becomes a front runner in developing former coalmines for use in energy schemes and thereafter benefitting from a variety of first-mover advantages in the market.

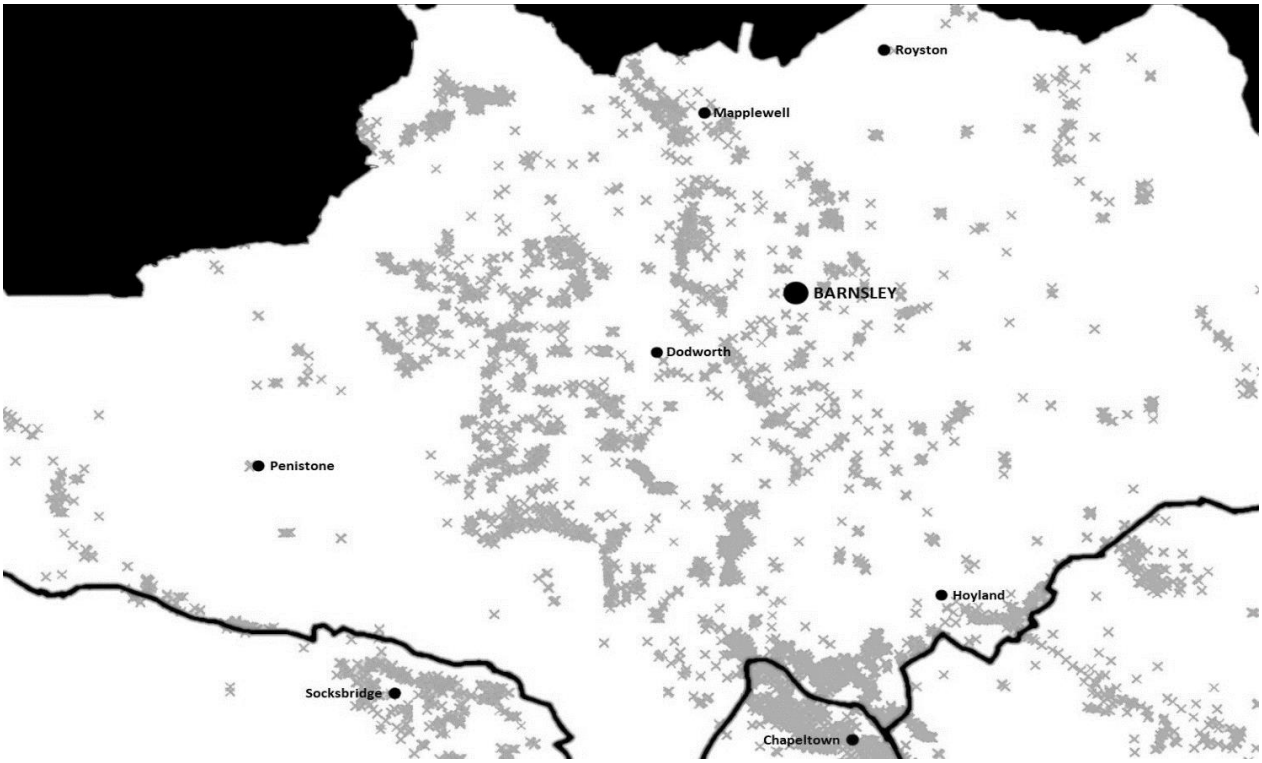


Figure X: Mine entry points across Barnsley (shown as ×) MAY NEED TO INSERT A BROADER SY/SCR MAP

GOAL 3: Improve the Energy Efficiency and Sustainability of our Neighbourhoods and Built Environment

Better energy efficiency can significantly reduce fuel bills for residents within our City Region, protecting them against rising energy prices. Energy efficiency brings the most significant benefits to houses that are often occupied by those who are 'fuel poor'. It is of crucial importance to reduce the proportion of fuel poor households across our City Region since there are proven connections between fuel poverty and health issues. To aid this, a strategic approach will be taken to tackling fuel poverty and improving inefficient dwellings, maximising the benefits of the scope of the Mayoral Combined Authority and the financial efficiencies that arise as a result.

IMAGE TO BE INSERTED?

It is important to focus on both the need to retrofit homes and build quality new homes which meet the expectations of reduced running costs of the occupants and take account of the movement away from fossil fuels for heating[3]. New build dwellings will be addressed by raising the standards required of new housing schemes beyond building regulations across our City Region. The public sector will also lead by example by improving its building stock and embedding ethical and low carbon criteria into procurement and investment decision processes.

Community energy projects are a perfect way to accelerate the deployment of distributed energy, putting individuals at the heart of energy systems. These schemes can deliver an array of benefits resulting in improved resilience, education, and empowerment for local communities; a great example of this in action is Energise Barnsley, the largest local authority and community energy solar PV and battery storage project in the UK[4].

But overall, research indicates that our City Region has a relatively low number of community energy projects per resident compared to the South West or London. By working with local authorities, the wider public and the voluntary sector, the development of more community energy schemes will be encouraged.

GOAL 4: Accelerate the Transition to Ultra-Low Emission Vehicles and Transport Systems

Complementing the SCR Transport Strategy[5], the Energy Strategy sets an ambition to deliver an innovative, cleaner public transport networks and kick-start further ambitious projects for active travel. Projects of this type will lower carbon emissions and have a significant positive impact on both air quality and health.

With 85% of our City Region's residents commuting to work within SCR, decarbonisation of transport can make a significant contribution to our overall emission reduction ambition. Across the UK, the low carbon transport sector has made reasonable progress in decarbonisation, particularly in the electrification of railways, buses and cars and it will be important for our City Region to avoid falling behind. The outcomes of the Tram-Train pilot project will be drawn upon to shape future strategies focused on electrifying rail networks. High Speed Rail 2 (HS2) presents major economic and regeneration opportunities; both businesses and the workforce need to be ready to realise the low carbon and economic benefits associated with HS2.

Where journeys cannot be made via Active Travel or using public transport it needs to be ensured that there is a coherent city-wide network of refuelling infrastructure, helping to increase the uptake of electric and other ultra-low emission vehicles (ULEVs). Companies within our City Region are already at the forefront of hydrogen refuelling this provides an opportunity to build on this knowledge and widen access to hydrogen as a transport fuel source.

Figure X: Hydrogen refuelling in Rotherham

[3] The UK Government have pledged to introduce a future homes standard, mandating the end of fossil-fuel heating systems in all new houses from 2025. (HC (13 March 2019) Vol 656, Col 351. Available at: https://hansard.parliament.uk/commons/2019-03-13/debates/5B9C772E-1769-437A-A4F0-06DEAC55D676/SpringStatement (Accessed: 02 June 2019))

[4] REF

[5] SCR Transport Strategy (2019)

3.0 OUR EVIDENCE

3.1 INTRODUCTION

This Energy Strategy is shaped by a robust evidence base most of which was gathered and analysed independently by The Carbon Trust and which seeks to cut through the many uncertainties we face and provide an objective analysis. It seeks to focus discussions and identify the interventions or actions that have the maximum impact across our City Region. As such, the strategy provides a sound understanding of the external factors affecting our City Region and all of the strengths, weaknesses, opportunities and threats associated with the energy economy.

3.2. STRENGTHS OF OUR CITY REGION

In order to maximise the local economic benefit associated with the energy transition, areas of competitive advantage have been identified that can be utilised, including those brought by existing businesses, educational institutions and communities, and those affected by the physical locality and infrastructure. The Sheffield City Region has a unique opportunity to stimulate innovative investment opportunities in the low carbon energy sector to develop and decarbonise its economy further.

The SCR Independent Economic Review[6] in 2013 noted that SCR's "technology, manufacturing and engineering offer is as good as anywhere in Western Europe with a world-leading cluster of research institutes and innovative businesses centred around the Advanced Manufacturing Park". While the Science and Innovation Audit[7] carried out by the Department for Business, Energy and Industrial Strategy in 2016 identified energy as a key sector that provides the potential for economic growth based on its science base.

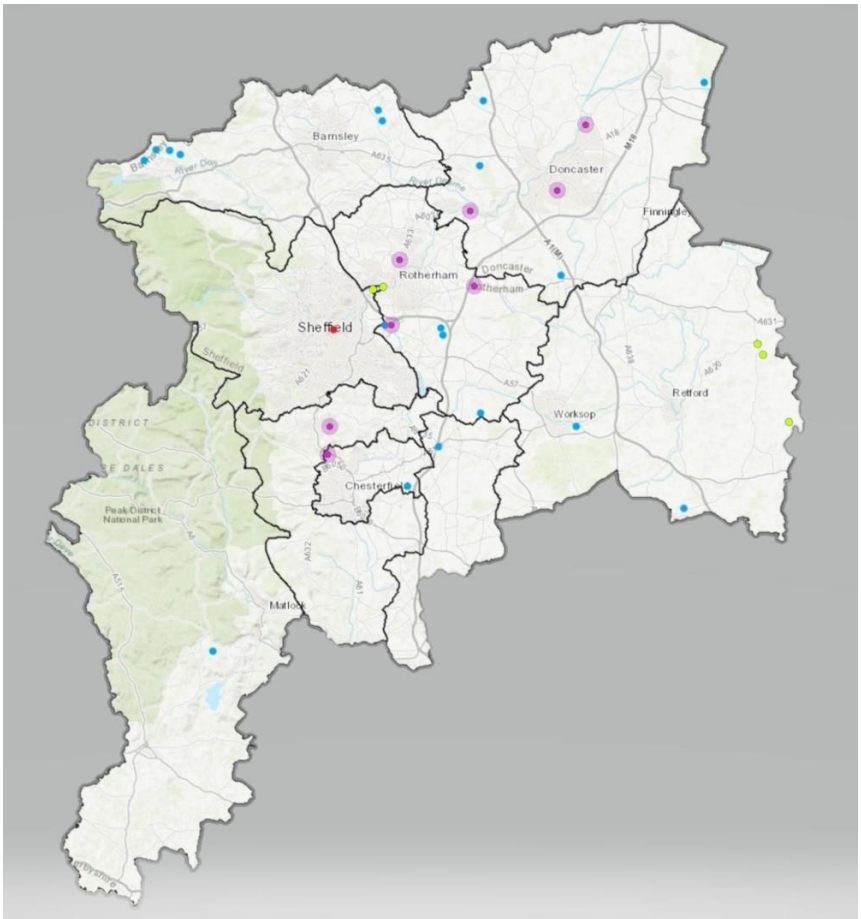


Figure X: Selected energy assets within Sheffield City Region (**blue** = wind farm, **yellow** = power station, **red** = EfW plant). Areas where investment has been curtailed due to energy issues highlighted in purple. THIS WILL BE REPLACED ONCE MAPPING CAPABILITY IS AVAILABLE

[6] Sheffield City Region – Independent Economic Review (2013)
[7] REF

BARNSLEY

Energise Barnsley is the largest local authority and community energy rooftop solar PV and battery storage project in the UK (Figure X). Barnsley also has a 13-turbine wind farm at Royd Moor which has a power rating of 6.5MW.

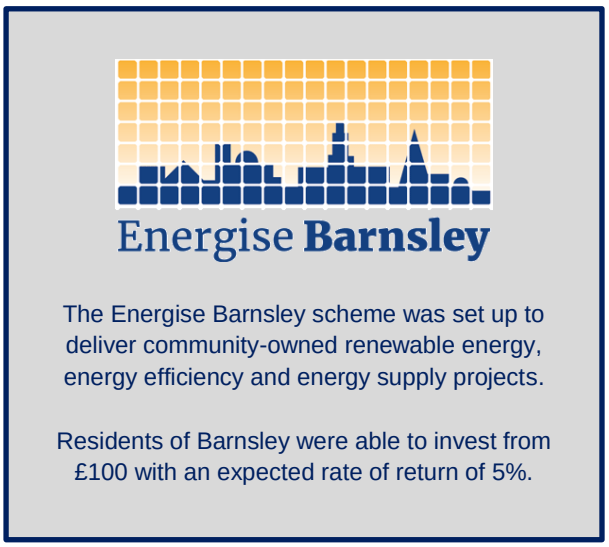


Figure X: Energise Barnsley

DONCASTER

Doncaster has a significant wind resource capitalised by two onshore windfarms: an 8.2MW farm at Marr and a further 8.2MW farm at Hampole, each consisting of 4 turbines. In July 2019, Doncaster Sheffield Airport announced plans for a £2m, 1.7 MW solar PV farm to offset 220 tonnes of CO_2 from the site.

The Doncaster Infrastructure Strategy and Green Infrastructure Strategy outline the council's plans to install a total of 1MW of solar panels on 6,000 council houses, and the generation of the Low Carbon & Energy Development Corridor extending from Thorne and Hatfield Moors to Thorpe Marsh Nature Reserve the Low Carbon and Energy Development Corridor with the aim of attracting a range of green businesses and renewable technologies within a high-quality living and working environment by 2035.

ROTHERHAM

Rotherham has significant renewable energy generation capacity including a 20.4MW onshore wind farm at Penny Hill Lane and Blackburn Meadows Power Station: a $29MW_e$ and $25MW_{th}$ capacity biomass-CHP power station operated by E.On.

The Advanced Manufacturing Innovation District (AMID) is in Rotherham and is a network of world-leading research and innovation centres working with advanced manufacturing companies of any size around the globe. This includes the Advanced Manufacturing Research Centre (AMRC) the winner of the 2007 Queen's Anniversary Prize for Higher and Further Education, and Factory 2050.

Figure X: Nuclear AMRC

Rotherham is also home of the UK's largest Hydrogen Mini Grid System – a 225kW wind turbine coupled directly to an electrolyser, 200kg of hydrogen storage, a hydrogen dispensing unit and a 30kW fuel cell system capable of providing backup power generation for nearby buildings.

SHEFFIELD

Sheffield is known as being a 'green city' due to having the highest number of trees per capita in Europe due largely to it being the only city in the UK with a national park within its boundary.

The University of Sheffield is a world-class University ranked 12th overall in the UK, and part of the prestigious Russell Group. Boasting no fewer than eight energy related research centres as part of the Research Institute for Energy: one of the UK's largest energy research institutes with over 120 academics and 250 PhD students undertaking energy research and innovation.

The Translational Energy Research Centre (TERC) is a state-of-the-art testing facility for low carbon energy technologies which ensures that Sheffield and the UK retains research and development leadership in clean

energy. The UK Government awarded the TERC a grant of £7m in June 2017 to further research into carbon capture, use and storage (CCUS) with a further £10m awarded via ERDF funding.

URBAN FLOWS OBSERVATORY

The Urban Flows Observatory seeks to understand how the physical (energy and material resources) metabolism of cities can be effectively measured, understood and utilised. To do this, mobile and fixed sensors will be deployed around Sheffield to improve our understanding of the city.

The aim is to provide the methodologies and tools to manage and analyse urban data streams. From this, a robust evidence base will be developed to facilitate local and national decision making, supporting the creation of zero carbon, healthy, happy cities.

Figure X: Urban Flows Observatory

A further research institute is the Urban Flows Observatory which will aid the understanding of the city at a building-level ensuring that the best information is available to inform policy (Figure X).

The energy from waste plant in Sheffield and the district heating network which extends under much of the city centre shows that the city also has practical skills to offer in the transition to a low carbon future (Figure X).

VEOLIA

The Veolia managed Sheffield District Energy Network is the largest and most successful District Heat Network in the UK since its opening in 1988. The District Energy Network now provides over 140 buildings with low carbon energy from un-recyclable waste that would otherwise be sent to landfill.

Pipework currently extends 45km under Sheffield saving over 20,000 tonnes of carbon emissions and providing heat to Universities, hospitals, public and private businesses, and dwellings.

Figure X: Sheffield District Heat Network

WIDER SHEFFIELD CITY REGION

Beyond South Yorkshire there are a number of high profile energy assets including: Cottam 2GW Coal Fired Power Station (which will cease to generate from the 30th September 2019 after 51yrs of operation), West Burton A 2GW Coal Fired Power Station (which is likely to close in September 2021), and West Burton B 1.3GW CCGT Power Station. Also, a large solar PV farm in Oxcroft generates approximately 4,000 MWh of electricity per year – enough energy to power around 1,200 homes

3.3 JOBS AND PRODUCTIVITY

Our economy is not dominated by a single sector or type of industry. Instead there is a diverse base which includes advanced manufacturing, high performance materials, transport and logistics as well as significant business services; all benefitting from close links to two world class Universities and an enterprising public sector.

Between 2005 and 2015 the population across our City Region grew by 6% and is now home to over 1.8 million people with 68,000 businesses providing 847,000 jobs. Over the same period annual Gross Value Added (GVA) in our City Region increased by 29% to over £33bn, making up 30% of the Yorkshire and Humber economy and 2% of the UK's total economy. With world-class specialisms in advanced manufacturing, our City Region is at the forefront of innovation and a major driver of economic growth. Figure 3.2 shows that our City Region is performing well overall, with GVA growth ahead of the targets in our first SEP, although there is much further to go if we are to meet the ambition set out in the refreshed Strategic Economic Plan.

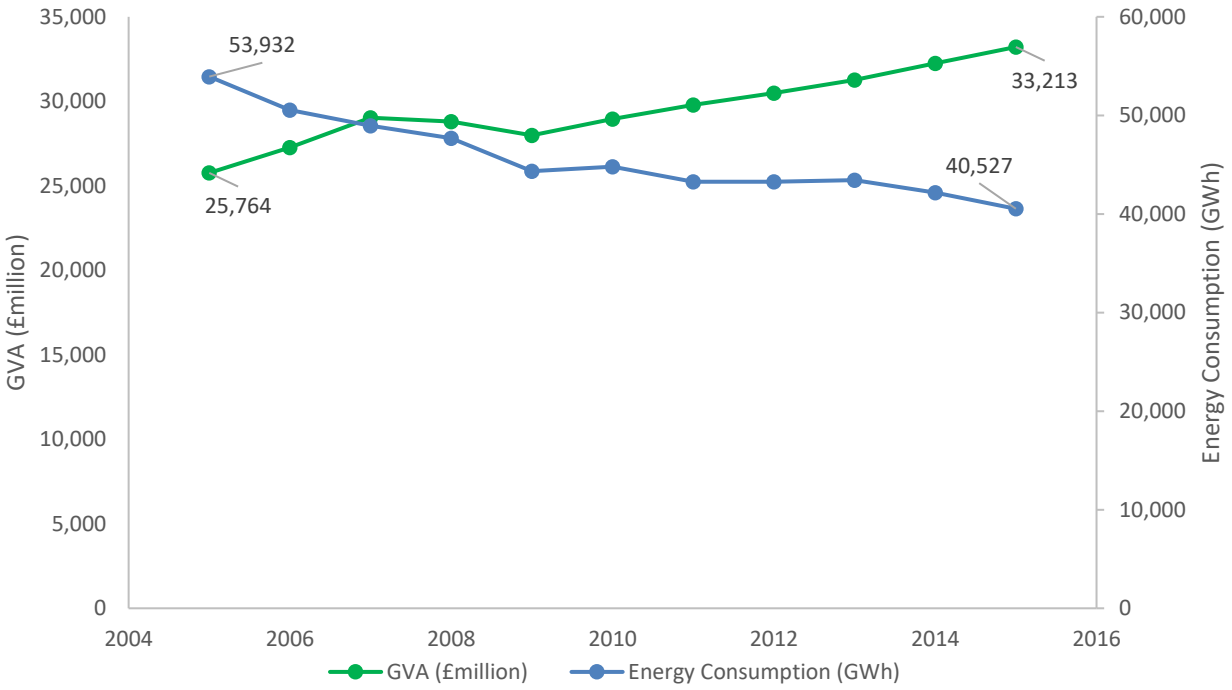


Figure X: Growth in GVA and reduction in energy consumption between 2005 and 2015

GVA per person remains low relative to our peers and the wider UK, and our City Region is ranked 36th out of 39 LEP areas in England for GVA per person[8].

Productivity has several drivers including quality of infrastructure, business growth and innovation expenditure. Furthermore, too many of our citizens are distant from the labour market, not in employment or training, are experiencing poor physical or mental health, and have low or no skills to help them get better jobs.

Addressing productivity, therefore, will require intelligent investments in high-quality and innovative sectors like the low carbon energy sector, which is highly productive, and can contribute to our City Region's productivity challenge.

The UK's low carbon and renewable energy (LCRE) economy grew by 6.8% to £44.5 billion in 2017. Once the indirect activity is also accounted for, the total turnover from the LCRE economy was £79.6 billion in 2017. This directly and indirectly supported almost 400,000 full-time equivalent jobs and is set to continue to grow by 11% per year by 2030[9].

In 2011, the Independent Economic Review for SCR noted that the low carbon sector had only 9,500 employees, much lower than other northern LEP economies. This shows the potential for growth in this sector within our City Region.

Sheffield City Region has the potential to realise this growth building on our current energy assets and further diversifying towards a greener more energy efficient economy.

3.4 ENERGY CONSUMPTION

In 2015, the Sheffield City Region consumed a total of 40,527 GWh of energy, representing a 25% decrease on 2005 levels. This means that a 42% decrease in energy consumed per unit of GVA has been observed. Such statistics point to an economy that has become increasingly energy efficient, although this is largely based on wider structural changes in the national economy as it moved to less intensive industries, rather than wholescale energy efficiency.

> *Gains in…efficiency are a key 'engine of economic growth', contributing 25% of the increases to gross domestic product (GDP) in the UK over the period of 1971–2013. This confirms an under-recognised role for energy in enabling economic growth.*
>
> Sakai et al. (2018) – "Thermodynamic Efficiency Gains and their Role as a Key 'Engine of Economic Growth'" (https://dx.doi.org/10.3390/en12010110).

[8] SEP Evidence Base 2019

[9] REF

Demand-side response (DSR) is a proven way in which to reduce the effect of electricity consumption on the network by shifting usage from periods of high consumption (peaks) to periods of low consumption (troughs). Typically, the consumer receives a financial incentive to reduce usage on non-essential items when there is high demand or reduced supply, or a financial incentive can even be given to use power when there is an excess of supply e.g. a windy day. This provides the suppliers with a more stable load, and consumers with the opportunity to reduce their bills. Currently, DSR is underutilised within our City Region but is becoming increasingly more accessible with the advent of smarter technologies.

Most of the energy consumed by our City Region is from fossil fuel sources, with the greatest proportion of energy consumed being natural gas and petroleum products. Consumption of coal and manufactured fuels is minimal and continually decreasing, particularly at a domestic-level. Bioenergy and wastes is an equally small proportion of overall energy consumption, but consumption of this fuel type has seen a 31% increase since 2005.

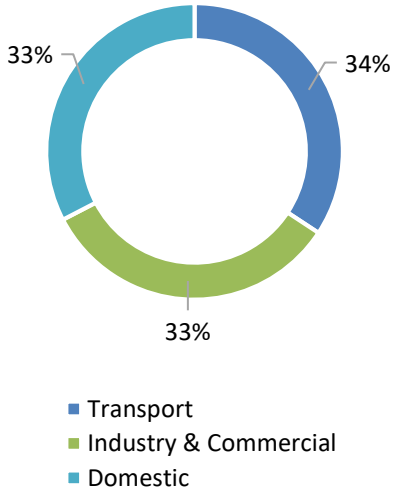


Figure 3.4 — Split of overall energy consumption in 2015 by end user

3.5 ELECTRICITY GENERATION

In 2015, our City Region generated 6.2TWh of electricity and consumed 7.6TWh. This means that our City Region is a net importer of electricity with a 1.4TWh deficit – equivalent to the amount of energy required to make every cup of tea consumed in the UK over the course of a year. This deficit is likely to get larger in the coming years as our two coal-fired power stations at Cotham and West Burton are due to be retired within the next two years in line with the national ambition to move away from coal.

Energy consumption is evenly shared between transport, the domestic sector, and industry and commerce (Figure 3.4). The transport sector consumes almost 100% petroleum products; the domestic sector consumes predominantly gas (76%) and electricity (20%); industry & commercial sector has a more varied energy mix comprising gas (40%), electricity (37%), petroleum products (11%), bioenergy (6%) and coal (4%) (Figure 3.5).

There are over 6,000 significant public-sector land and buildings assets in the SCR[10]. Many of these buildings are not energy efficient and by exploring opportunities, and using local expertise to address these inefficiencies, this could present a significant cost saving for the public purse.

Almost 80% of the generated electricity (4.8TWh) is from burning natural gas (Figure 3.9). Whilst this is an expected stepping stone on the way to zero carbon electricity it does make our City Region particularly reliant on fossil fuels.

For our City Region to become a net contributor to the national grid by 2040, the deployment of approximately 1GW of power generating capacity is required. However, according to all future energy scenarios developed by the National Grid[11], the electricity demand of SCR will have doubled by 2040. Therefore, maintaining a net positive contribution to the grid (accounting for the decommissioning of coal generation capacity in 2025) would require an additional 2-3 GW of capacity unless demand can be reduced at a significant scale.

[10] SCR Estates Transformation Strategy (2019)

[11] REF

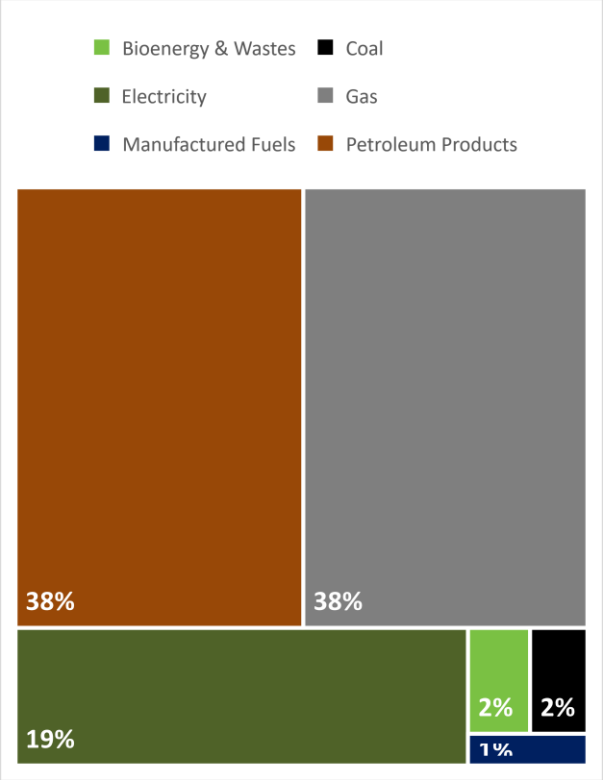


Figure 3.5 — Split of overall energy consumption in 2015 by fuel type across 'Transport', 'Industry & Commercial' and 'Domestic'

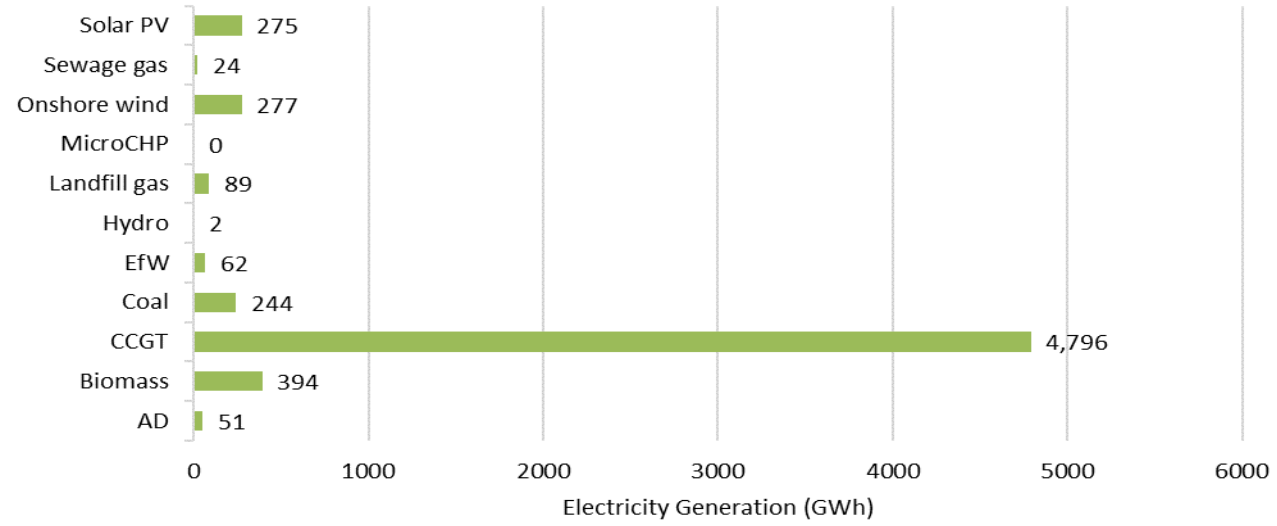


Figure 3.9 – Electricity generation in Sheffield City Region by source in 2015. (CCGT = Closed Cycle Gas Turbine)

Gas now accounts for 77% of electricity generation within our City Region and will likely continue to have a role to play in the energy mix as we transition towards a zero-carbon future. This Strategy seeks to continue the energy transition, this time from gas to renewable energy twinned with a significant energy demand reduction. Energy efficiency measures, onshore wind, biomass, etc. potentially have a bigger role to play in the future subject to planning, investment in technology and delivery challenges. Our City Region has some significant natural resources. For example, our City Region's significant wind resource is currently underexploited, and the increase in installation of onshore wind turbines would help our City Region to become a true leader in low carbon energy.

Figure X: The transition of electricity generation in the UK. The low carbon proportion of electricity generation increased to a record 50.1% in 2017 in contrast to coal whose share decreased to 6.7%.[12]

3.6 HEAT GENERATION

Heat is generated for a variety of reasons and across different sectors. Within the domestic sector, heat energy is used for hot water supply and space heating, within industry and commerce for process heating and drying processes amongst many other applications. Heat is also a common waste product across many industries. The easiest and thus most common way to produce heat is through burning combustible matter, typically fossil fuels, which is highly carbon intensive. Efforts to decarbonise heating have been made, although these are often not as known or understood by the public meaning uptake of technologies such as heat pumps has been low.

The Renewable Heat Incentive (RHI) is a scheme that has been developed to encourage domestic and commercial users to generate heat from renewable sources, these may include: solar thermal systems, heat pumps (air source, ground source or water source), and biomass/biogas boilers. Users of the scheme benefit from payments for every unit of heat energy they generate and use themselves.

Using data from the RHI, we can see that domestic and non-domestic sectors had installed 24MW and 99MW of renewable heating capacity respectively by 2017. Combined, this new capacity accounts for only 3% of the total capacity of installed measures taking advantage of the RHI scheme. The breakdown of technologies for domestic and non-domestic users can be seen below in Figure X. Typically, biomass systems are preferred by non-domestic users, covering 97% of all non-domestic capacity. For domestic users, the capacity spread for each technology is more balanced, biomass is still the most preferred (43%), but heat pumps (specifically air source, 39%) also provide a substantial share of capacity.

The idea of using hydrogen gas to replace natural gas for domestic heating is gaining traction in recent years. The UK government and the wider industry have several large-scale innovation projects investigating the potential including H21[13], and Hy4Heat[14]. Hydrogen used to make up 50-60% of the UK's 'town' gas supply in the 20th century, but now only 0.1% of hydrogen is allowed within the gas network. Research is currently ongoing at Keele University[15] to understand the impact of increasing the percentage of hydrogen in the gas network to 20%.

[12] Digest of UK Energy Statistics (DUKES) 2018 (https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/736148/DUKES_2018.pdf; Accessed 23/04/19)
[13] H21 (https://www.northerngasnetworks.co.uk/wp-content/uploads/2017/04/H21-Report-Interactive-PDF-July-2016.compressed.pdf)
[14] Hy4Heat (https://www.hy4heat.info/)
[15] HyDeploy (https://hydeploy.co.uk/)

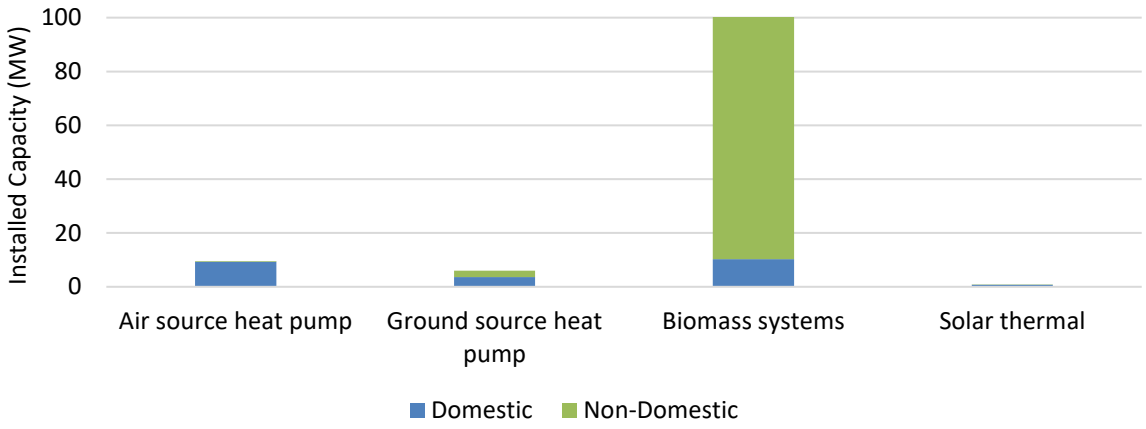


Figure 3.10 – Installed UK capacity of various technologies benefitting from the RHI (date – to be updated prior to publication)

3.7 PEOPLE, HOUSING AND FUEL POVERTY

Our population is forecast to grow by 9.3% between 2016 and 2041[16]. At the same time, predicted trends suggest that the average household size will reduce because of the increase in single person households. These trends put more pressure on our existing housing stock and we need more new houses to support economic and population growth as well as to meet the demands of an ageing population.

Overall, our City Region includes a significant proportion of older homes which are difficult to heat, and some, particularly in the private rented sector, are poorly maintained. In contrast, the majority of social housing and housing association stock is largely in a good condition due to significant public investment. However, these need ongoing maintenance and further investment can help to reduce the costs of heating for residents meaning they have more disposable income.

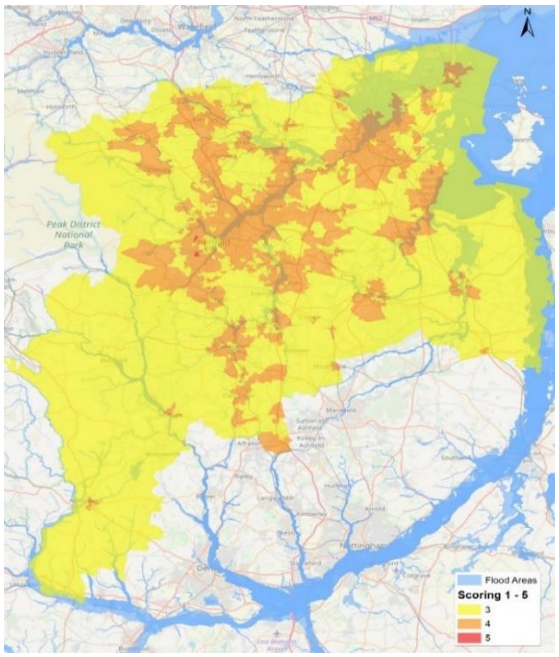


Figure X – Lower Super Output Areas within SCR that are considered 'areas of need' for domestic energy efficiency measures.

A wide range of people are vulnerable to the cold, often due to a medical condition, a disability or other personal circumstances, such as a low income. The focus will be on the 81,000 households in fuel poverty, especially as this contributes to around 1,000 people a year dying early due to excessive winter deaths in our City Region. Fitting existing homes with energy efficiency measures is proven to be the most effective way to tackle fuel poverty and raise living standards, by reducing energy use and helping keep energy prices affordable.

[16] REF

Fuel poverty needs to be tackled, as does the number of people living in poorly heated homes. This means more affordable heating as well as improving the efficiency of housing, helping to improve health and address the excessive winter deaths suffered in some communities. Through infrastructure investment, business support and other targeted interventions to key industries, small-medium sized enterprises and homeowners, this Strategy provides the framework for stimulating energy innovation, helping to drive economic growth and address social inequality.

> *"Ultra-high energy efficiency standards, installed alongside an air source heat pump, represent a 1.1-4.3% uplift on build costs relative to current standards, depending on the type of building."*
>
> Committee on Climate Change (2019) – "UK Housing: Fit for the future?" (https://www.theccc.org.uk/wp-content/uploads/2019/02/UK-housing-Fit-for-the-future-CCC-2019.pdf)

Several new housing schemes are being piloted in the SCR to test new housing product innovations such as Passivhaus, modular build, and other higher energy efficient building standards, that lower the energy use of new homes and ensure they are fit for the future. These include the Citu development at Little Kelham in Sheffield and a 'modern methods of construction' (MMC) pilot in Rotherham – both supported by the SCR Housing Fund. The challenge is to learn from these pilots to enable the roll-out of these innovations at greater scale, which would present additional opportunities for up-skilling, local job creation, and local supply chains. In a similar way, community heating networks can also be developed on new housing areas or introduced to existing residential neighbourhoods. For example, Sheffield City Council operates 135 community energy networks covering almost 6,000 council homes. They can enable residents to manage their energy use and costs much more effectively with high tech controls and smart meters as well as modern, efficient boilers or heating systems.

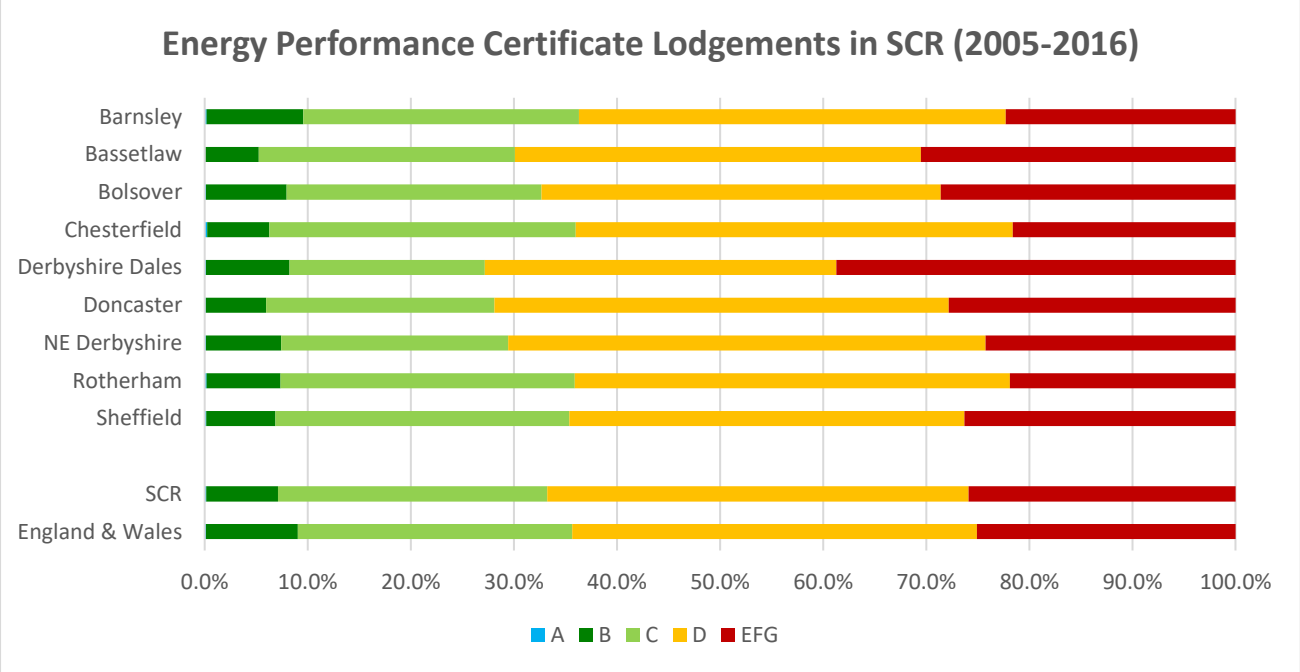


Figure X: EPC Lodgements in SCR (2005-2016)[17]

[17] Note: The data have not been adjusted to account for multiple EPCs of the same dwelling, yet, this provides an indication as to the likely EPC split within each local authority area.

3.8 EMISSIONS

In May 2019, the Committee on Climate Change recommended that the *"The UK should legislate as soon as possible to reach net-zero greenhouse gas emissions by 2050. The target can be legislated as a 100% reduction in greenhouse gases (GHGs) from 1990 and should cover all sectors of the economy, including international aviation and shipping."*[18]

On a local level, total emissions for our City Region stood at more than 11,000 $ktCO_{2e}$ in 2015; equivalent in weight to over 850,000 double decker buses. This is despite falling by nearly a third between 2005 and 2015.

Emissions from the industrial and commercial sector are a significant part of our City Region's overall emissions at just under 4,000 $ktCO_2$ per annum. This is largely due to our strong manufacturing base, which emits around 2,400 $ktCO_2$ per annum (60% of the sector's emissions); 5x as much as any other sector; shown in Figure 3.6 below.

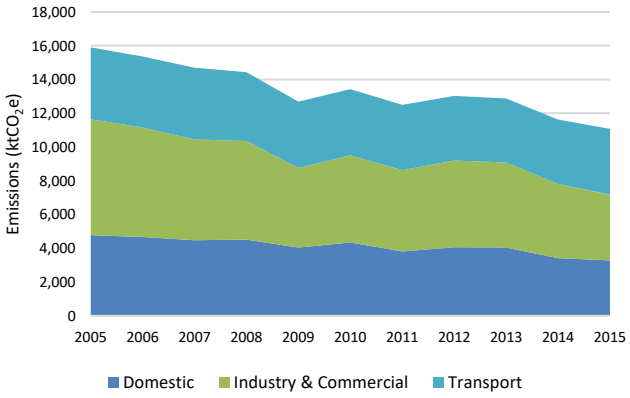


Figure X: The emissions in Sheffield City Region by sector between 2005 and 2015

Similarly, emissions from transport make up a similar proportion of our City Region's overall emissions as those from industry. The greatest emitters are petrol and diesel cars (29% and 27% respectively), which are predominantly privately-owned passenger vehicles. HGVs and diesel/petrol LGVs are likely commercial vehicles and these combined represent 38% of all transport emissions. Emissions from public transport contribute a total of 5% of emissions (buses and rail combined).

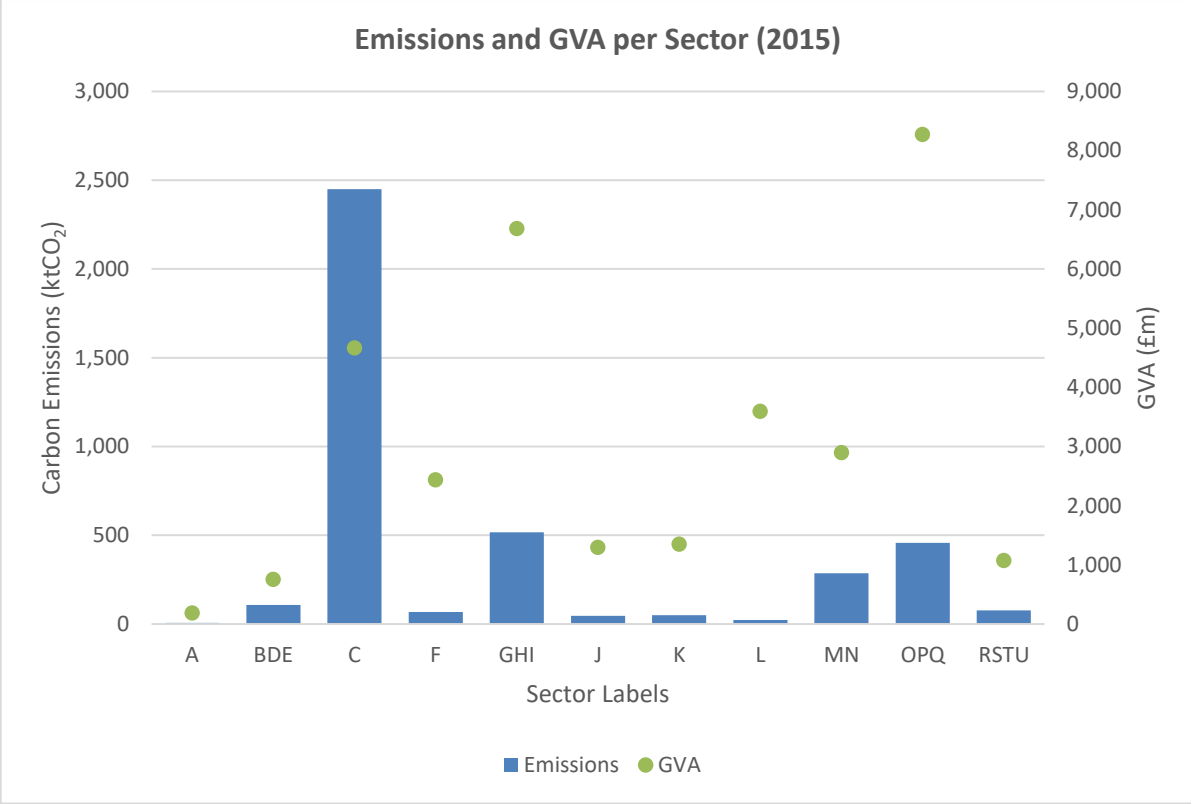
Electric vehicles currently have a minimal impact on the overall transport emissions in our City Region, yet there is a global trend towards the uptake of electric vehicles. Advances in battery and other storage technologies, further reductions in costs and improved efficiencies will mean that electrification is increasingly viable. Plans to make electric vehicle charge points more widely available and convenient for motorists were put forward by Government in October 2016 with all new diesel and petrol cars banned by 2040. In the UK the number of newly registered ultra-low emission vehicles (ULEVs) rose by 250% in just two years, and there has been a steady increase in ULEVs in SCR since 2014.

> *By 2050, we expect the shift to low-carbon options like electrification to cut the annual costs of UK transport by around £5 billion.*
>
> Committee on Climate Charge (CCC) (2019) – "Net-Zero: The UK's Contribution to Stopping Climate Change" (https://www.theccc.org.uk/wp-content/uploads/2019/05/Net-Zero-The-UKs-contribution-to-stopping-global-warming.pdf).

Currently, our City Region has only one charging point per 150 EVs; this ratio needs to change substantially to support the growth in this sector. The group 'Transport & Environment', which is funded by the European Commission, recommend that the ratio should be around 10 EVs to every 1 public charging point.

According to Zap-Map Statistics[19] there are 21,855 charging points in the UK, an increase from approximately 1,500 in 2011. But only 5% of these charging points are in the Yorkshire & the Humber region. With our City Region having a high reliance on private cars for commuting, an increasing proportion of diesel vehicles, and the slow adoption of electric charging points, a step-change in charging point availability needs to be seen alongside and supportive policy decisions to address poor air quality and tailpipe carbon emissions. The University of Sheffield, alongside seven other northern universities, are part of the DecarboN8 network which focusses on surface transport emissions and are leading the 'Digitisation, Demand and Infrastructure' theme.

[18] CCC – Net-Zero: The UK's Contribution to Stopping Global Warming (https://www.theccc.org.uk/wp-content/uploads/2019/05/Net-Zero-The-UKs-contribution-to-stopping-global-warming.pdf), May 2019
[19] Add web link, downloaded on 23rd April 2019



A Agriculture, forestry and fishing
B Mining and quarrying
C Manufacturing
D Electricity, gas, steam and air conditioning supply
E Water supply; sewerage, waste management and remediation activities
F Construction
G Wholesale and retail trade; repair of motor vehicles and motorcycles
H Transportation and storage
I Accommodation and food service activities
J Information and communication
K Financial and insurance activities
L Real estate activities
M Professional, scientific and technical activities
N Administrative and support service activities
O Public administration and defence; compulsory social security
P Education
Q Human health and social work activities
R Arts, entertainment and recreation
S Other service activities
T Activities of households as employers; undifferentiated goods-and services-producing activities of households for own use
U Activities of extraterritorial organisations and bodies

Figure 3.6 – Scope 1 and 2 emissions produced by main industry and commercial sectors in 2015 based on employment figures [20]

[20] Department for Transport (https://www.gov.uk/government/statistical-data-sets/all-vehicles-veh01#ultra-low-emissions-vehicles; Dataset VEH0132; accessed 23/04/19)

3.9 AIR QUALITY

Air quality is directly linked to emissions levels. Our City Region faces significant air quality issues with 28 Air Quality Management Areas (AQMAs) across SCR (Figure 3.10). Poor air quality is linked to a variety of health concerns ranging from short term illness to serious diseases and premature death. In South Yorkshire an average of 4.7% of all adult deaths can be attributed to PM2.5 air pollution[21] (Barnsley 4.5%, Rotherham 4.8%, Doncaster 5.0%, Sheffield 4.6%). The impact on health and life expectancy is more significant for some groups of people than others and there is an identified link with deprivation. Poor air quality also has an adverse impact on the environment.

Across Sheffield alone there are 51 locations where the European Union's annual average limit value for NO_2 (40µg/m^3) has been exceeded in one or more of the three-year periods (2010-2012), and a 30% reduction in NO_2 emissions would be needed in order to comply with the limit value. Analysis indicates that road transport is the single most significant contributor to Sheffield's NO_2 emissions at these locations.

Sheffield City Council and Rotherham Metropolitan Borough Council are undertaking a Clean Air Zone Feasibility Study, to ensure compliance with legal thresholds in the shortest possible time. To address the particular challenges in Sheffield, similarly to other significant cities across England, a Charging Clean Air Zone is proposed which would target the most polluting vehicles that do not meet required emissions standards. Current proposals that would see improvements to buses, coaches, taxis, HGVs and LGVs will be consulted upon in early 2019. This is an important challenge for Sheffield City Region and by meeting the requirements the health of people who live and work in our towns and cities will improve.

Mitigating the impact of the motorway network on air quality represents a significant challenge for our City Region and success will be dependent on collaboration with Highways England and national Government.

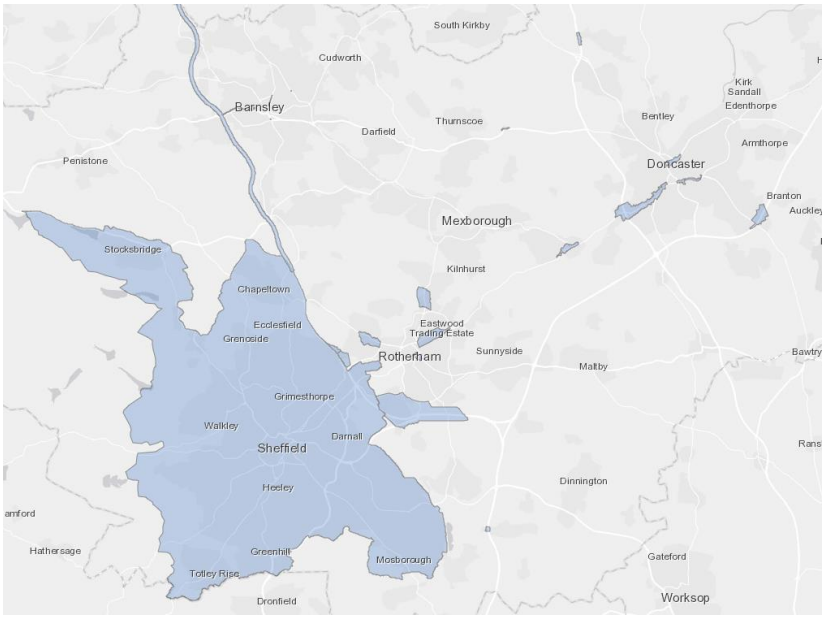


Figure 3.10 — Air Quality Management Areas (AQMAs) in South Yorkshire

Poor air quality has recently been estimated to account for up to 500 premature deaths per year in Sheffield, with health costs of around £160 million per year. Individuals who are particularly sensitive and exposed to the most elevated levels of pollution have an estimated reduction in life expectancy of as much as nine years.

In comparison, the Department of Health and Social Care reports that the impact of reducing fine particles has a bigger impact on life expectancy than eliminating passive smoking or traffic accidents, as shown in the table below.

	Reduction in fine particles PM2.5	Elimination of road traffic accidents	Elimination of passive smoking
Expected gain in life expectancy	7-8 months	1-3 months	2-3 months

[21] PM2.5 is particulate matter of 2.5µm in diameter

3.10 CARBON SEQUESTRATION AND STORAGE

Sheffield has a unique selling point as the only city in the UK with a National Park within its boundaries. Coupled with the city's 180 woodlands, 650 green spaces and its ratio of seven trees per resident[22], Sheffield is often noted as the greenest city in the UK.

The number of trees and plants, and the maintenance of peatland within our City Region is incredibly important in the fight against anthropogenic climate change. Trees remove and store carbon from the atmosphere which, alongside man-made methods such as carbon capture, use and storage (CCUS), reduce the net amount of carbon being emitted.

In May 2019, the 'Net Zero' report by the Committee on Climate Change recommended that across the UK, between 30,000 and 50,000 hectares of land should be given over to afforestation – the planting of new forest – each year until 2050. Proportionally, by land area, this would require between 4,350 and 7,250 hectares per year within our City Region, equating to between 4.4 and 18.1 million trees planted per year, depending upon density of plantation, in addition to the millions of trees already existing within City Region.

By 2050, this would create a carbon sink of between 2.4 and 4.0 $MtCO_{2e}$ per year thus 'netting off' up to one-third of the Region's emissions (at 2015 levels). This is in addition to the air pollution removal and natural flood management benefits. Yet, planting trees at this speed and scale would be unprecedented in the UK and initiatives like the Mayor's pledge to plant a million trees need wider support and uptake.

The Northern Forest is a Government backed initiative led by the Woodland Trust and the Community Forest Trust to link the east and west coasts of England with a forest of over 50 million trees. The Northern Forest would envelope South Yorkshire and help to increase the proportion of woodland in the North of England from 7.6% - which is far below both the UK (13%) and EU (44%) averages.

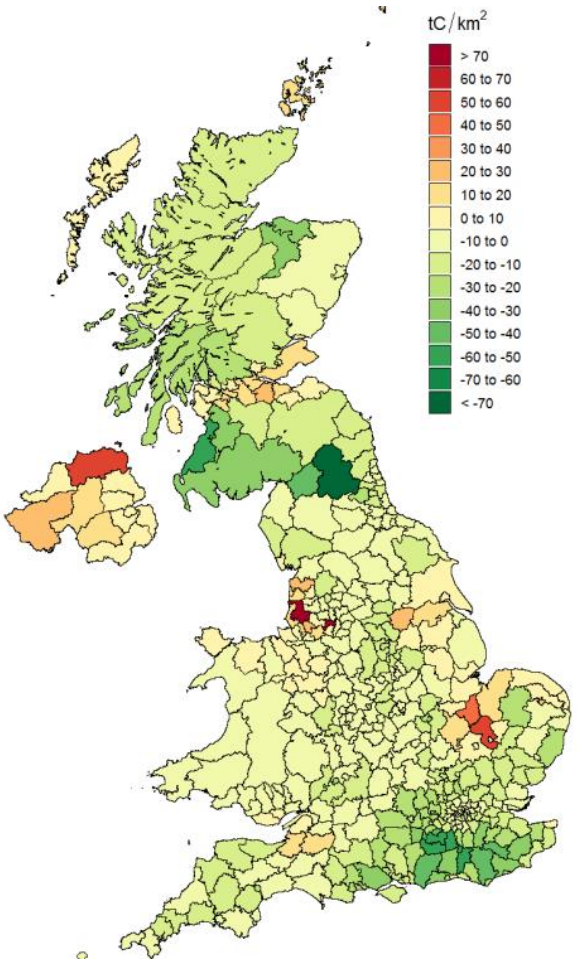


Figure X: The total carbon emissions for the LULUCF[23] sector

Natural England estimate[24] that English peatland contains carbon equivalent to 2.14 billion tonnes of CO_2 if it were released to atmosphere which can occur when the peat is eroded or mis-treated. Management of peatland therefore is a crucial aspect of the emissions challenge to ensure that this remains locked away. Restoration of peatland can deliver further carbon sequestration.

Thorne and Hatfield Moors are the two largest lowland raised mires in Britain, covering over 2,800 hectares and are designated sites of special scientific interest. The Moors are located to the north and east of Doncaster

Both afforestation and restoration of peatland have positive knock-on effects for the local areas. These include natural flood management since trees slow the flow of the run-off and increase infiltration, and some peat moss can absorb as much as 20-times its dry weight in water.

[22] Ref – The Sheffield City Council Woodland Strategy 2018
[23] LULUCF = Land use, land use change and forestry.
[24] Natural England – England's Peatlands: Carbon Storage and Greenhouse Gases (2017) (Available at: http://publications.naturalengland.org.uk/publication/30021) (Accessed: 02 June 2019)

3.11 Key Challenges

1. Far fewer people are employed in the low carbon sector in our City Region than other parts of the North of England.
2. Forecasts currently suggest the City Region will capture only a minimal amount of potential economic growth and new jobs in the low carbon sector.
3. Our City Region is a net importer of electricity with a deficit of 1.4TWh per annum.
4. Natural gas (a fossil fuel) is currently used to produce almost 80% of the electricity generated in our City Region.
5. Yorkshire and Humberside have only 5% of the UK's electric vehicle charging points and only one hydrogen fuelling point.
6. There are almost 1,000 Excess Winter Deaths each year in our City Region and 81,000 households are in fuel poverty.
7. Over 25% of houses in our City Region have an energy rating in the lowest bands (E, F or G).
8. Poor air quality blights parts of our City Region with 28 designated Air Quality Management Areas (AQMAs).
9. Manufacturing is the largest source of carbon emissions in our City Region, followed by transport and housing.
10. Our City Region has significantly fewer community energy schemes compared to other regions.

4.0 OUR POLICIES

Each of our energy goals is underpinned by four specific policies and each aligns to the Mayor's commitments and/or those made in the refreshed Strategic Economic Plan[25], providing a framework to guide all decision-making processes and investment strategies related to our energy system up to 2040. The policies have been developed through analysis of the evidence detailed in Section 3 and refined based on stakeholder input.

[25] REF – SEP 2019

Energy Strategy Goal	Mayoral Commitments	SCR Plans & Strategies	Energy Strategy Policies
1. Drive clean growth in our local businesses	• Make sure that we create good quality jobs with decent pay and opportunities for progression.	• TO BE ADDED AT A LATER DATE TO REFLECT THE REFRESHED STRATEGIC ECONOMIC PLAN AND THE LOCAL INDUSTRIAL STRATEGY.	**A.** Facilitate clean growth in our local businesses and increase the number of jobs in the low carbon energy sector. **B.** Promote cluster schemes to deliver energy and cost savings, and drive innovation in key growth areas. **C.** Provide support to businesses to help them: reduce the costs involved in initial connection to the energy grid and invest in energy efficiency measures and low carbon heat and power. **D.** Discuss routes to divestment from fossil fuels, in favour of more ethical investments, with public and private sector organisations in our City Region.
2. Promote investment in low carbon energy generation, distribution and storage	• Produce energy surpluses.	• TO BE ADDED AT A LATER DATE TO REFLECT THE REFRESHED STRATEGIC ECONOMIC PLAN AND THE LOCAL INDUSTRIAL STRATEGY.	**E.** Utilise and/or repurpose our City Region's current infrastructure and natural resources to decarbonise the energy supply including the use of energy from minewater. **F.** Improve the energy resilience of our City Region through the increased use of smart grids and storage and working with network providers to strategically plan future improvements. **G.** Drive investment in both new and existing heat networks to increase the overall capacity and bring new sources of low carbon and/or waste heat onto the network. **H.** Invest in the training and upskilling of those who will be designing, installing and maintaining our future energy systems.

3. Improve the efficiency and sustainability of our neighbourhoods and built environment	• Provide additional support for the elderly to insulate their homes and reduce their energy bills. • Boost community energy schemes that can reduce our region's environmental impact. • Ensure greater use of community energy is reflected in our approach to housing and spatial planning. • Create a Mayor's Community Energy Fund to support energy efficiency measures, community energy and micro-generation schemes. • Invest in new technologies to manage energy consumption. • Ensure that 1 million trees are planted in SCR.	• TO BE ADDED AT A LATER DATE TO REFLECT THE REFRESHED STRATEGIC ECONOMIC PLAN AND THE LOCAL INDUSTRIAL STRATEGY.	**I.** Enable communities to develop local energy schemes and provide opportunities for residents of the SCR to invest in our City Region's energy infrastructure. **J.** Support widespread energy efficiency improvements to existing dwellings across our City Region to reduce the number of excess winter deaths. **K.** The public sector leading by example by improving energy efficiency of their stock, supporting innovation, and building low carbon and sustainable principles into procurement and investment policies. **L.** Ensure that new housing within our City Region is of a high quality in terms of energy use and efficiency.

4. Accelerate the shift towards ultra-low emission transport systems	• Introduce an Air Quality Action Plan for the whole city region. • Explore every option to reduce emissions from vehicles and pressure the Highways Agency to tackle poor air quality caused by motorways in the region. • Fight for increased investment in electric and hydrogen buses to reduce pollution in urban areas. • Encourage the roll-out of electric vehicle charging points in every neighbourhood of our City Region. • Supporting the extension of the Supertram network via the connection into Rotherham and consider similar schemes elsewhere.	• TO BE ADDED AT A LATER DATE TO REFLECT THE REFRESHED STRATEGIC ECONOMIC PLAN AND THE LOCAL INDUSTRIAL STRATEGY.	**M.** Ensuring that the low carbon elements of the Transport Strategy are aligned and delivered jointly. **N.** Improve air quality across our City Region to meet legal thresholds especially in designated AQMAs and CAZs. **O.** Accelerate the deployment of ultra-low emission vehicles, autonomous vehicles and related infrastructure as well improve the performance and efficiency of other vehicle fleets operating in SCR. **P.** Lead the way towards a low carbon transport network, including a zero-carbon public transport network including increased Active Travel.

4.1 GOAL 1: Drive Clean Growth in our Local Businesses – check for repetition from A-P

Policy A:

Facilitate clean growth in our local businesses and increase the number of jobs in the low carbon energy sector.

Providing the platform for clean growth amongst local businesses will help to transform our City Region's economy, and in doing so help to further drive both productivity and skills improvements.

Achieving and maintaining levels of clean growth amongst businesses and industries will present an array of opportunities for our City Region, due to our sector specialisms in digital technologies, advanced manufacturing, engineering and materials production where the greatest reductions in emissions can be realised.

Policy B:

Promote cluster schemes to deliver energy and cost savings, and drive innovation in key growth areas.

The implementation of industrial clustering schemes will work to improve collective understanding of the actions and measures required to improve energy efficiency levels amongst the region's most energy intensive industries.

The benefits associated with this approach include: improvements to both firm and region visibility; the diffusion of knowledge and good practice amongst key industries; and the sharing of common resources.

An aim of the UK Government is to create a net-zero industrial cluster by 2040 as part of the Industrial Strategy.

Policy C:

Provide support to businesses to help them: reduce the costs involved in initial connection to the energy grid and invest in energy efficiency measures and low carbon heat and power.

Research from BEIS[26] indicates that SMEs across the UK could save £0.5 billion a year through the implementation of energy efficiency measures. Despite this, there remains a large proportion of SMEs who are not actively engaged in taking action to reduce their energy usage. Action is therefore required to improve levels of SME engagement in resource efficiency, in the knowledge that the installation of such measures can play a large role in reducing overall business costs (energy bills), improving productivity, enhancing competitiveness and contributing towards the development of an overall greener business (reducing carbon footprint).

Policy D:

Discuss routes to divestment from fossil fuels, in favour of more ethical investments, with public and private sector organisations in our City Region.

The two Sheffield-based universities agreed in 2015 to divest from organisations "linked to explicit environmental damage", and this has largely been achieved. Yet many other organisations in our City Region are still funding fossil fuel companies through their investment portfolios including South Yorkshire Pensions Authority.

Although this policy has no direct impact on the carbon emissions of our City Region it is seen as morally necessary to accompany the package of policies outlined in this Energy Strategy.

[26] REF

4.2 GOAL 2: Promote Investment in Low Carbon Energy Generation, Distribution and Storage

Policy E:

Utilise and/or repurpose our City Region's current infrastructure and natural resources to decarbonise the energy supply including the use energy from minewater.

Our City Region has a long and proud history of being at the forefront of energy production with over 100,000 coal miners working in this industry at its peak. In 2016, the UK became the first major industrial nation to close all deep coal mining; this left behind a legacy of subterranean infrastructure. Now, this infrastructure is flooded with water warmed from geothermal heat making it ideal for heating nearby properties.

Wind resource within our City Region is higher than many other onshore areas of the UK. A number of onshore wind turbines have been erected over the last 20 years to take advantage of this, but due to national planning policy this practice has ground to a halt. The

Policy F:

Improve the energy resilience of our City Region through the increased use of smart grids and storage, and working with network providers to strategically plan future improvements.

Smart technologies are increasingly important in alleviating grid strain and meeting the demands of new patterns and types of energy consumption. They can do this through increasing flexibility in a number of ways, shifting demand off-peak, matching demand with generation and digitising energy – such as with smart meters, allowing for better access to usage data and therefore to manage the energy system more efficiently.

Given the growth in decentralised energy generation and use, through domestic solar PV arrays, batteries and EVs, this is a crucial time for the UK's energy system. Forward-facing, proactive investment in creating a smart grid for our City Region will deliver skills, jobs and investment, whilst reducing potential constraints and high costs from grid reinforcement further down the line.

Policy G:

Drive investment in both new and existing heat networks to increase the overall capacity and bring new sources of low carbon and/or waste heat onto the network.

Our City Region is currently leading the way on evolving heat networks, and Sheffield is home to one of the most developed networks currently in operation across the UK. Given the existing industrial activity in the region, there is also significant potential to capture waste heat from industry and feed this to local heat networks or distribute to nearby towns and cities. In addition to new heat networks, there is an opportunity to further decarbonise existing networks through the adoption of 4th and 5th Generation district heating principles, including lowering operating temperatures.

It is estimated that heat networks contribute to £0.02bn GVA in the North of England currently. This could further contribute towards an additional £5.8bn GVA and 83,956 jobs in the North of England by 2050, according to KPMG analysis of a scenario which included a mix of heat networks, hydrogen, natural gas and electricity for heat and EVs for transport.

Policy H:

Invest in the training and upskilling of those who will be designing, installing and maintaining our future energy systems.

Our City Region has a workforce with the required skills for installation and maintenance of low carbon products and the momentum behind this progress has to be maintained. Skills investment should also be focussed on those who are wishing to move from traditional sectors of mining, manufacturing, etc. into the low carbon energy sector where new qualifications will allow them to take advantage of increasing opportunities. This will also provide a pool of high-quality local workers from which our businesses can recruit.

4.3 GOAL 3: Improve the Energy Efficiency and Sustainability of our Neighbourhoods and Built Environment

Policy I:

Enable communities to develop local energy schemes and provide opportunities for residents of the SCR to invest in our City Region's energy infrastructure.

Currently the Yorkshire and Humber region has 1.7 community energy projects per million residents compared to 10.4 projects per million for the South West, and 4.3 across the North West. Given the benefits that can be realised from community energy projects including increased resilience, education and empowerment for local communities, more focus should be given to developing community energy projects. It is also important that local communities can invest in the energy infrastructure of our City Region.

A Mayor's Community Energy Fund, will be used to support energy efficiency measures, community energy and micro-generation schemes. The Fund will also prioritise additional support mechanisms for the elderly, focusing on interventions which insulate homes and reduce energy bills. The Mayor has also committed to working closely with Community Energy England, who are based in Sheffield, to boost community energy schemes that can reduce our City Region's environmental impact.

Policy J:

Support and invest in widespread energy efficiency improvements to existing dwellings across our City Region to reduce the number of excess winter deaths.

As part of the English Housing Survey into stock condition, it was noted that in 2016, 20% of UK housing stock did not meet the Decent Homes Standard, which details that houses must: i) meet the statutory minimum standard for housing, ii) provide a reasonable degree of thermal comfort, iii) be in a reasonable state of repair, and iv) have reasonably modern facilities and services. In Sheffield City Region, 12% of households are deemed to be in fuel poverty, higher than the UK-average; it is therefore important that there is a focus of effort towards reducing the proportion of fuel poor households across our City Region.

Policy K:

The public sector leading by example.

The residents of Sheffield City Region will be looking for both clear guidance and leadership with regards to decarbonisation and clean growth. The natural leaders are those with the most influence and greatest reach: The Local Enterprise Partnership, the Mayoral Combined Authority, Local Authorities, and other public bodies.

Policy L:

Ensure that new housing within our City Region is of a high quality in terms of energy use and efficiency.

There is a crucial need to embed sustainability into new housing developments to meet upcoming regulations in 2025 regarding the banning of gas boilers, and actively pursuing Industrial Strategy Grand Challenges relating to halving energy usage from new buildings by 2030. These will present our City Region with an array of technological and industrial opportunities that complement transitions towards clean growth.

Through the SCR Housing Fund, opportunities will arise for the SCR Mayoral Combined Authority to implement mitigating actions that can be targeted at new developments which make use of the funding provided. Clear sustainability credentials for new builds can create new business opportunities for local homebuilders, as well as improve the attractiveness of new. Standards such as Passivhaus could be required as they aim to achieve thermal and occupant comfort with passive measures, including good levels of insulation, passive solar gain, internal heat sources, high levels of airtightness, and good indoor air quality.

4.4 GOAL 4: Accelerate the Transition to Ultra-Low Emission Vehicles and Transport Systems

Policy M:

Support the Sheffield City Region Transport Strategy.

This Energy Strategy sits alongside the Transport Strategy underneath the SCR Strategic Economic Plan; therefore, the Strategies will complement the work of the other. It will be a key priority of the SCR Executive Team to ensure that the low carbon elements of the Transport Strategy are aligned and delivered jointly.

Policy N:

Improve air quality across our City Region to meet legal thresholds especially in designated AQMAs and CAZs.

Deteriorating air quality in our City Region is a growing issue that threatens the quality of our outdoors, as well as our residents' health and quality of life. Analysis indicates that road transport is the single most significant contributor to harmful NO_2 emissions, therefore reducing tail pipe pollutants has an important part to play including the use of Clean Air Zones (CAZs).

At present, the SCR has 28 Air Quality Management Areas (AQMAs), where pollutants currently exceed European Union legal limits. The significant air quality issues across the SCR also emphasise the importance of delivering transport networks that encourage shifts to low carbon transport.

A move to alternative fuels could significantly reduce emissions from buses, HGVs and private cars. Freight consolidation is another way to reduce the emissions associated with freight vehicle movements in areas of known, poor air quality.

Policy O:

Accelerate the deployment of ultra-low emission vehicles, autonomous vehicles and related infrastructure as well improve the performance and efficiency of other vehicle fleets operating in SCR.

The low carbon transport sector has made reasonable progress in decarbonisation across the UK over the last decade however It is important that our City Region does not fall behind the national levels of progress. Baseline analysis shows that transport emissions within our City Region have only fallen by 9% over this period; far slower than other sectors.

The SCR Mayoral Combined Authority and South Yorkshire Passenger Transport Executive is in a strong position to deliver the pace of change required through the devolved power given by Government and the plans in the SCR Transport Strategy which include a faster and more strategic approach to the deployment of EV charging points.

Policy P:

Lead the way towards a low carbon transport network, including a zero-carbon public transport network including increased Active Travel.

Plans were put forward by Government in October 2016 to ban all diesel and petrol cars by 2040, although recommendations from the Committee on Climate, amongst others, are to bring this forward. In SCR there has been a steady increase in the number of registered electric vehicles, however there is going to need to be a significant step-change brought about from an improved and expanded supporting infrastructure.

Our City Region is also at the forefront of hydrogen refuelling developments, evident through the hydrogen refuelling station already in place at the AMRC in Rotherham, which electrolyses hydrogen from water using wind power. The ability to build on this knowledge and widen access to hydrogen as a fuel source therefore presents an important economic opportunity for our City Region.

Recognising the parallels between energy, transport and improvements to our air quality, reduced dependency on the private car is seen as a key part of the solution thereby changing the way people travel, and encouraging more active travel (cycling, running and walking).

5.0 INTERVENTIONS

5.1 INTRODUCTION

Beyond the adoption of this Strategy a range of projects will be developed, started, or accelerated depending upon their current position within the pipeline. Complementary projects will form programmes of work which will ultimately meet the overall goals and targets of this Strategy. Some of these projects/programmes will be led by Sheffield City Region (SCR), some of which SCR will contribute to and others which SCR will seek to influence. It is therefore important that this Strategy is not seen as an end-point – it is a starting point from which collectively we can work towards a cleaner, more efficient and affordable energy network for our City Region.

This section of the Strategy gives more information about the key strategic interventions that are currently known to SCR and how they will be brought forwards within the national and sub-national context.

5.2 CITY REGION INTERVENTIONS

Our local interventions need to build on those being developed nationally. Globally, there is an increasing focus on energy being generated locally in a decentralised way rather than being reliant on large-scale electricity generation. This provides a number of opportunities within our City Region for the development of schemes which generate renewable electricity. For heat, the national focus is in three areas: electrification, hydrogen, and heat networks. Since our City Region has a history of developing and running an efficient heat network this is an obvious area for expansion. However, it would be foolish to place all eggs in one basket. Fourth and fifth generation heat networks make use of low temperatures which then allows for the incorporation of electrically-driven heat pumps, either at the source and/or user-end. Our City Region also has a head-start with world-leading expertise in hydrogen generation technology via electrolysis. Hydrogen provides two key contributions: generating hydrogen for both heat and transport fuel, and it can be used as a storage medium to help balance the national electricity network by generating hydrogen when there is a surplus of renewable electricity being generated rather than paying generators to *not* produce electricity.

There will likely be a spatial element to any local interventions owing to the natural resources and current assets that already exist within our City Region. For example, the wind resource is far more plentiful in some areas than others making the case for onshore wind much more viable and cost-effective.

Sheffield City Region take a principled approach to any direct investment and would aim to prioritise those opportunities where it is possible to recover the investment to re-invest in further decarbonisation schemes or energy related infrastructure.

The remainder of this section provides an indication of some of the local interventions that could be implemented by public or private partners. Each of the interventions are guided by our policies and support the commitments set out in the Strategic Economic Plan and those made in the Mayoral manifesto.

To achieve Policy A (Clean Growth in Businesses), we will:

- Support SMEs to become aware of, and apply for, innovation funding provided from HMG and elsewhere.
- Provide an environment within our City Region that allows innovators to test and further develop their innovations.
- Work to develop an employment pool for those graduating through SCR's apprenticeship schemes and matching them to high-quality employers within the energy sector.
- Seek to create a Centre of Excellence for Low Carbon Business and Research Innovation as part of the Global Innovation Corridor.
- Establish our City Region as an innovation incubator where energy innovations can be taken from concept, to prototype, to trial, through to full-scale production.

To achieve Policy B (Cluster Schemes), we will:

- Work with organisations to implement cluster schemes within hubs of local economic activity which deliver collective energy and financial savings, and drive innovation in key growth areas.
- Seek opportunities where partnerships can be created between developers of energy efficient technologies and industrial companies willing to test innovative technologies on-site.

To achieve Policy C (Business Support for Energy Efficiency), we will:

- Aid SMEs to identify and implement energy/resource efficiency improvements.
- Support SMEs to reduce their energy consumption, remove barriers to the introduction of low carbon technologies, switch to 'green' suppliers, and improve productivity.
- Promote Energy Managers within organisations and the use of Energy Champions in our City Region.
- Aim to create regular networking and CPD opportunities for energy professionals within our SMEs to allow skills and knowledge transfer, and further learning.

To achieve Policy D (Divestment from Fossil Fuels), we will:

- Discuss routes to divestment from fossil fuels, in favour of more ethical and social investments, with public and private sector organisations in our City Region.

To achieve Policy E (Utilise Current Infrastructure), we will:

- Work in partnership with the Coal Authority to identify and implement minewater energy schemes that can both provide and store energy for use by the local community via a heat network.
- Consider 'meanwhile uses' of public land and buildings to generate further power from renewable sources for our City Region.
- Consider further opportunities for onshore wind as part of our City Region's renewable energy mix; subject to local planning, environmental constraints, and community engagement.

To achieve Policy F (Improve Energy Resilience), we will:

- Investigate energy storage for all Energy Intensive Industries (EIIs) within our City Region to lower the cost of electricity which would make them more competitive and helping to balance the load on the local distribution network.
- Work with the owners and operators of the large electricity generators within our City Region with the aim of securing a low carbon supply of energy for the foreseeable future.
- Seek to develop and deploy a zero-carbon smart microgrid within SCR; this could include working with Northern Powergrid as part of their Smart Grid Enablers project.

To achieve Policy G (Drive Investment in Heat Networks), we will:

- Consider the extent to which the heat networks throughout SCR can be extended and improved over the next 20-30 years, including the consideration of bringing new heat sources and sinks onto the network to allow for greater flexibility.
- Consider large-scale thermal storage for the heat networks within our City Region to reduce peak capacity demand and maximise the number of connections.
- Assess the potential benefits of linking heat networks throughout our City Region.

To achieve Policy H (Training and Upskilling the Energy Workforce), we will:

- Assist businesses and young people to develop the skills they need to take advantage of opportunities in the energy sectors.
- Encourage those working in sectors with similar skill sets to re-train and/or gain additional qualifications such that they can also operate in the low carbon sector.

To achieve Policy I (Support Community Energy Schemes), we will:

- Encourage community energy schemes in which residents can invest and benefit with low risk. Schemes could include solar farms, onshore wind farms, low carbon heat schemes and realise benefits such as cash dividend, vouchers for use within SCR, and re-investment.
- Work closely with Community Energy England to identify opportunities for community energy schemes within our City Region.
- Ensuring that income from community energy schemes is re-invested on a local scale to broaden the impact of chosen interventions.

To achieve Policy J (Invest in Domestic Energy Efficiency), we will:

- Identify 'priority' dwellings/households i.e. those with biggest need for improvement (e.g. solid walls, fuel poor, elderly, etc.).
- Use devolution funds to create a 'Mayor's Community Energy Fund' to help priority households with capital costs of installing low carbon heating/cooling and energy efficiency measures.

To achieve Policy K (Public Sector Leading by Example), we will:

- Reduce the embodied emissions associated with products and construction.
- Using procurement policy to ensure that sustainable materials are used where possible.
- Build sustainable practices into policy and investment decisions.
- Reduce the energy used by any building in operation and where possible any demand to be met through renewable energy.
- Promote innovation by undertaking pilot schemes.

To achieve Policy L (Improve the Standard of New Build Dwellings), we will:

- Seek to create an off-site, modular construction supply chain within the SCR which focusses on creating quality, low-carbon housing.
- Work with planners to strongly encourage higher energy efficiency standards, beyond those of Part L of the UK Building Regulations, towards the levels required for the Passivhaus standard.
- Use the SCR Housing Investment Fund to only fund housing developments with high energy efficiency standards and low carbon heating systems.

To achieve Policy M (Support the SCR Transport Strategy), we will:

- Work closely with public and private sector partners to deliver joint goals.

To achieve Policy N (Improve Air Quality and Eliminate AQMAs), we will:

- Develop a plan to address the higher level of pollutants resulting from freight and deliveries, including encouraging low emission vehicles and reducing the number of delivery vehicles in our town and city centres and/or for the first/last mile connections.
- Work with partners to introduce and enforce low emission and clean air zones, supporting them in delivering cuts in emissions though investing in encouraging sustainable modes and reducing the need to travel.
- Deliver a zero-carbon public transport network, which requires upgrading the bus and taxi fleet and supporting electrification programmes for our railways.

To achieve Policy O (Accelerate the Uptake of ULEVs), we will:

- Encourage the uptake of low and zero emission vehicles to improve our air quality.
- Invest in expanding the network of vehicle charging points across our City Region in a coordinated way to ensure full coverage.
- Encourage private vehicles using our roads to be ULEVs, and to be used primarily for trips that cannot be made by alternatives, such as public transport, walking and cycling;
- Encourage freight vehicles using our roads to be electric, hydrogen or hybrid.

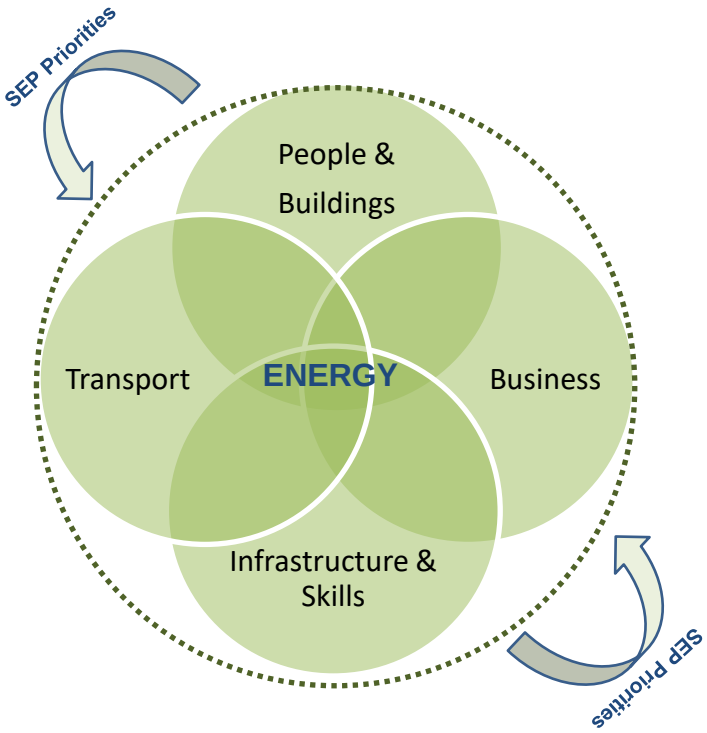
To achieve Policy P (Deliver a Clean Transport Network), we will:

- Consider the expansion of the ECO Stars Fleet Recognition Scheme to encourage HGV, Bus, Coach and Taxi operators to improve efficiency, reduce fuel consumption and cut their emissions.
- Encourage ‘Active Travel’ by sustained investment in high quality cycling and walking infrastructure.
- Support pan-Northern schemes to electrify railways and extend EV charging infrastructure along pan northern routes.

6.0 IMPLEMENTING THE STRATEGY

6.1 INTRODUCTION

Implementing this Energy Strategy will require joint working between the Sheffield City Region (SCR) Mayoral Combined Authority (MCA), Local Enterprise Partnership (LEP) local authorities, central government, private organisations, charitable/community bodies, and individual residents of our City Region. Some of the schemes that are implemented following publication of this strategy will be brought forward directly from private organisations who are looking to optimise their working procedures and become more efficient. Yet, there will be schemes that will need some funding or directional support by SCR MCA. These schemes will be assessed using the evaluation framework (Section 7.2) then, if accepted to proceed, scrutinised by the established MCA governance framework which is described in Section 7.3.



6.2 DEVELOPING FUTURE WORK PROGRAMMES

To ensure that the Goals, Policies and Targets of this ambitious Energy Strategy are achieved, an evaluation framework has been created by the Carbon Trust to ensure that ongoing and future projects around the City Region are aligned with SCR MCA's strategic priorities and key strengths. Any project requiring the input of the SCR MCA will be assessed using this evaluation framework (Figure X).

We are using this framework to develop a project pipeline based on all known projects taking place within our City Region and ongoing engagement with stakeholder organisations. By its very nature, this pipeline will be a fluid document which will adapt as the low carbon energy market grows and shifts and as technological changes take place. It will allow new projects and innovations to be considered and our low carbon principles to remain at the forefront.

Strategic fit	*The extent to which the project aligns to strategic priorities identified within the Sheffield City Region ESDP, SEP, and emerging Local Industrial Strategy*
Deliverability	*The ability to demonstrate that the project is deliverable, including the complexity, risks, planning permission and consents and adequacy of funding package*
Economic outcomes	*The economic impact, including the value and number of jobs created, the ability to drive economic growth and raise productivity, and the delivery of skills outcomes*
Environmental benefits	*The ability of the project to deliver environmental benefits, including in GHG emissions reduction, climate change mitigation air quality improvement*
Value for money	*The ability of the project to provide a competitive levelised cost of energy (LCOE), payback period and cost per tonne of carbon mitigated*

Figure X: Evaluation framework for potential energy schemes

6.3 GOVERNANCE STRUCTURE

This Energy Strategy has been developed by Sheffield City Region Mayoral Combined Authority following funding and direction from the Department for Business, Energy and Industrial Strategy, the evidence gathering and reporting of The Carbon Trust, and the input from a large number of stakeholders from our City Region. These stakeholders include: local authority partners, private sector organisations, charitable bodies, academic institutions, community groups, and individuals. It is these stakeholders and their projects that will ultimately drive forward the ambitions of this Energy Strategy with the assistance of the SCR Combined Authority where possible/appropriate.

Where the SCR MCA is taking a part, or leading, role within a project, particularly where there is financial assistance via a grant or loan, the project will be subject to the scrutiny of the established SCR governance structure.

This governance is in place to:

- Provide vision and leadership
- Monitor progress and give visibility to success
- Be accountable for progress against objectives
- Ensure adequate resourcing is available
- Provide an effective link to national bodies

The SCR Infrastructure Board will oversee and monitor progress in delivering the SCR Energy Strategy, reporting to the SCR Mayoral Combined Authority and Local Enterprise Partnership. However, the promotion, funding, project development, and implementation of projects and programmes will rely on a whole range of partners and stakeholders to deliver, including Central Government.

At an individual project level, a 'Project Steering Group' will be created to provide oversight and direction for the projects within the programme(s) as a whole. They will comprise of representatives of relevant projects and others who are able to advise, enable and support project and programme delivery. The Steering Group(s) will report regularly to the SCR Infrastructure Executive Board.

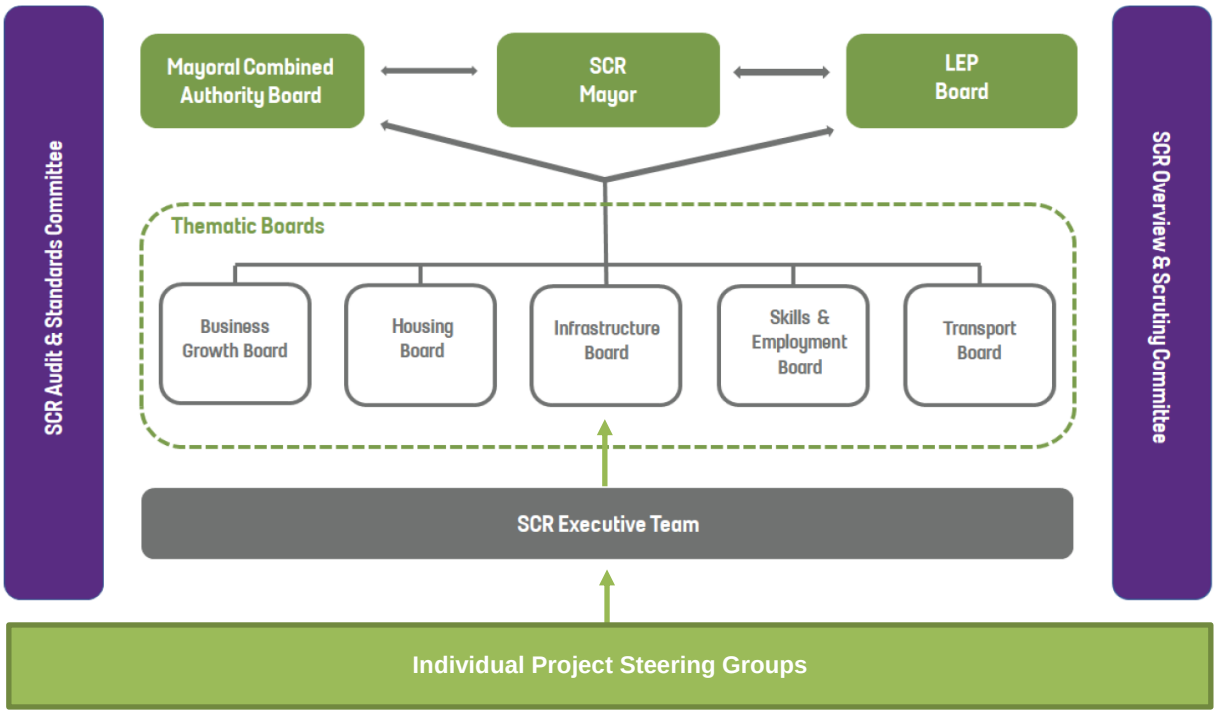


Figure X: Sheffield City Region decision making structure

6.4 OUR CLIMATE TARGETS

THIS SECTION WILL BE COMPLETED FOLLOWING THE ANALYSIS BEING CARRIED OUT FOR THE TARGETS COMMISSION. THIS WORK WILL RECOMMEND A CARBON TARGET FOR THE CITY REGION AS WELL AS UNDERLYING TANGIBLE TARGETS AND HOW THESE WILL AFFECT GVA, JOBS AND PRODUCTIVITY.

The Sheffield City Region (SCR) Local Enterprise Partnership (LEP) and Mayoral Combined Authority (MCA) are committed to setting science-based targets, with monitoring and data analysis against these throughout the lifetime of the Energy Strategy. Using the most rigorous methodologies, as provided by the international Science Based Targets initiative (SBTi), should give confidence to businesses looking to invest in low carbon energy generation, energy infrastructure, and energy efficiency within our City Region. Similarly, an environment is being created in which new innovators and multi-nationals alike can develop their products and businesses; this work has already begun and is being showcased at our world-leading Advanced Manufacturing Park in Rotherham.

The targets themselves have been developed by an independent organisation and who have also provided a route for achieving the headline target. The metrics have been chosen as they are measurable and will allow a regular assessment of progress towards deliver the goals of this Strategy to take place, and, if necessary, adjust the path to give us the best chance of success. The use of relative metrics, such as carbon emissions per capita (tCO_2/capita), carbon intensity (gCO_2/kWh) or the ratio of GVA to net carbon emissions (£m/$MtCO_2$), will also allow for changes in population or economic output to be accounted for and provide a benchmark to allow a like-for-like comparison with other regions or against the UK's national progress.

6.4.1 CLIMATE BUDGET

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6.4.2 POLICY TARGETS

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6.4.3 IMPACT ON GVA, JOBS AND PRODUCTIVITY

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6.5 MEASURING SUCCESS

These success criteria have been established following analysis by X into 'future scenarios'. See 'REPORT TITLE' for further details[27]. THIS IS TO BE UPDATED FOLLOWING THE REPORT BEING COMPLETED BY THE CONTRACTOR. May be incorporated into section 6.4.2.

Goal	Success Criteria			
	2025	2030	2035	2040
1. Drive Clean Growth in our Local Businesses	A) B) C) D)	A) B) C) D)	A) B) C) D)	A) B) C) D)
2. Promote Investment in Low Carbon Energy Generation, Distribution and Storage	E) F) G) H)	E) F) G) H)	E) F) G) H)	E) F) G) H)
3. Improve the Efficiency and Sustainability of our Neighbourhoods and Built Environment	I) J) K) L)	I) J) K) L)	I) J) K) L)	I) J) K) L)
4. Accelerate the Transition to Ultra-Low Emission Vehicles and Transport Systems	M) N) O) P)	M) N) O) P)	M) N) O) P)	M) N) O) P)

Table X — Our goals and success criteria

[27] X – Future Scenarios Report Title (2019)

6.6 REVIEWING THE ENERGY STRATEGY

The international Science Based Targets initiative (SBTi) recommend that targets should be reviewed and, where necessary, altered a maximum of every five years. Therefore, this Energy Strategy, its targets, and any associated Delivery/Implementation Plans will be reviewed and re-issued every five years (2025, 2030, and 2035). In 2040, when this Energy Strategy has come to the end of its expected life, a decision will be undertaken as to whether there will be further iterations.

Sheffield City Region does reserve the right to alter this review policy where social, technological, economic, environmental and political influences require action.

Sheffield City Region