ENTERPRISE PARTNERSHIP
York / North Yorkshire / East Riding
Business Inspired Growth

York, North Yorkshire & East Riding's

Local Energy Strategy

Towards a low carbon economy

ENTERPRISE PARTNERSHIP
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Foreword

What a wonderful opportunity the writing of our Local Energy Strategy provides for the Local Enterprise Partnership to demonstrate our understanding of the role of our region, and the associated challenges and opportunities in the energy agenda.

The south of our area used to be dominated by totems of the fossil fuel era: giant chimneys and cooling towers of power-stations, alongside the pit head winding gear and slag heaps of coal mining. This history of energy generation leaves a significant legacy that frames our present and future, it places us at the heart of the national power grid, provides our workforce with core engineering competencies and leaves flooded mine shafts which could become new sources of renewable heat.

The old 'think global, act local' mantra has never been more appropriate than now, as we consider the contribution our area will make to the challenge of carbon reduction commitments and limiting global warming to just 1.5 degrees.

We are already leading the way. Drax Power have recently completed Europe's largest decarbonisation project, by modifying coal fired boilers to burn wood. Change is happening, and much of it is being driven by businesses responding to consumer demand and regulation. This strategy seeks to harness existing industrial ambition, whilst stimulating new business activity in clean growth. It purposefully sets out to understand and optimise the local economic benefits of the shift to a low carbon economy, as well as generating carbon reductions.

The public sector has an important role to play too. The strategy aims to amplify their contribution by providing a catalyst for action and a mechanism for coordinating efforts. In a largely rural area like York, North Yorkshire and the East Riding, this agglomeration role is vital to overcome the challenges of dispersed rural settlements and fragmented Local Government structures.

Our Local Energy Strategy is not merely a prioritised list of projects. It articulates how the energy agenda is constrained within the wider systems in which it operates. This strategic thinking will yield greater results in the long term as part of a broader systemic shift. As such, it needs to be seen as part of the suite of strategies which will comprise our new Local Industrial Strategy.

The publication of this Strategy heralds some of the most important work that has taken place in our region. As we look to the future, we are confident that it will allow us to tell our grandchildren that we made our best start in ensuring a sustainable future for everyone.

David A Kerfoot MBE DL

Chairman of York, North Yorkshire & East Riding Local Enterprise Partnership

Executive Summary

This strategy is intended to provide a clear pathway towards a low carbon economy, ensuring that the area is well-positioned to realise the economic, environmental and social benefits from the transition.

Why do we need to move towards a low carbon economy?

With a growing evidence base around the impacts from climate change, there is increasing urgency to transition towards a low carbon economy. The 2015 Paris Agreement set a global precedent for reducing carbon emissions, with 195 countries committing to keep the global temperature rise below two degrees. The recent IPCC Special Report on Global Warming of 1.5^{o}C evidences the increased climate related risks to health, livelihoods, food security, water supply, human security, and economic growth associated with an increase in global warming of 1.5^{o}C and beyond. [1] With 12 years to ensure that we keep temperature increase within 1.5^{o}C before climate catastrophe, we need a global response, pooling collective local effort to achieve the scale of action required.

Our ambition

The UK has been an international leader in climate change policy, passing the Climate Change Act in 2008 which commits the UK to an 80% reduction in greenhouse gas emissions below 1990 levels by 2050. As the UK government seeks to decouple economic growth from carbon emissions, creating a thriving low carbon economy within York, North Yorkshire and East Riding presents an immense economic opportunity. With nationally significant energy assets, growing low carbon technology sectors and a strong scientific innovation base, the low carbon energy transition has the potential to deliver substantial economic growth, job creation and export opportunities across the area.

Our vision:
A resilient low carbon economy, where solutions to address the climate crisis are implemented to make our area a better place to live and create a more competitive economy.

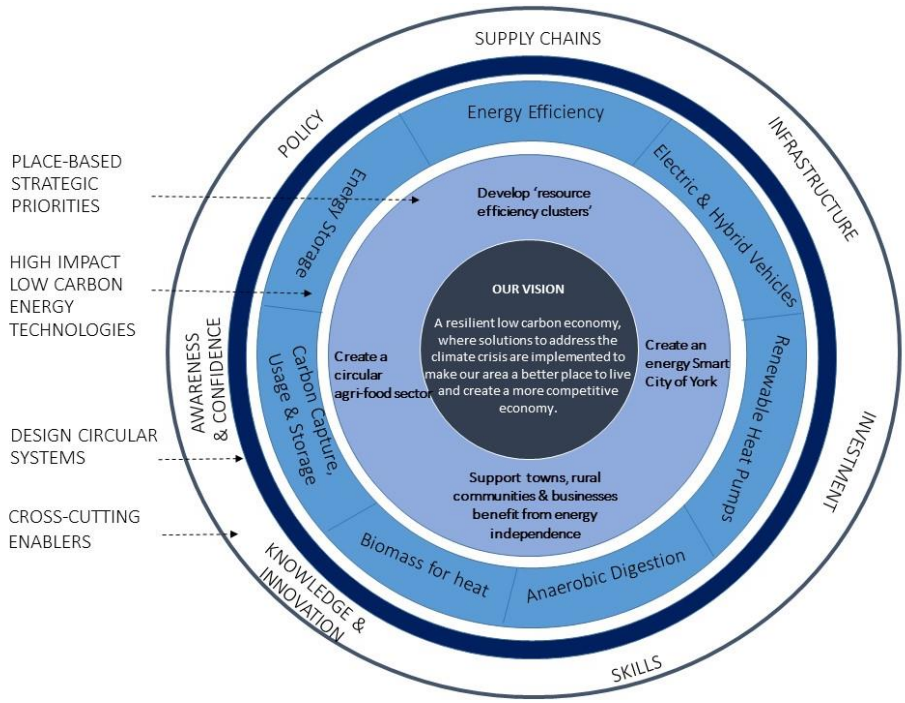
To achieve this, the strategy is designed to guide the decision making and stimulate the actions of the LEP and our partners, delivering the following strategic outcomes:

1. Attract and secure investment for the low carbon transition.
2. Enable organisations, communities and businesses to maximise their contribution to, and realise the benefits from, a low carbon economy.
3. Provide the strategic drive and economic rationale to shape the development of our Local Industrial Strategy.
4. Support increasing collaboration and joint working at a Yorkshire and Northern Powerhouse level.

[1] IPCC (2018) Special Report on Global Warming of 1.5^{o}C (SR15)

Our Strategic Framework

Working with local partners and using the findings from research commissioned, we have developed a robust strategic framework to achieve our low carbon vision. This is built upon four key elements: (1) place-based strategic priorities; (2) high-impact low carbon energy technologies; (3) designing circular systems; and (4) cross-cutting strategic enablers.



Strategic Framework for a Resilient Low Carbon Economy

Place-based strategic priorities

We want to capitalise on our unique strengths, ensuring the strategy is the right fit for the area and reflects our distinctiveness. This includes building on our historic legacy in the energy sector and resource intensive industries, our strength in the bioeconomy and the rurality of the region.

High-impact low carbon energy technologies

We've prioritised low carbon energy technologies that can provide maximum impact in terms of deliverable carbon savings and economic benefits. These include energy efficiency, electric and hybrid vehicles, renewable heat pumps, anaerobic digestion and biomass for heat.

Circular systems

Substantial reductions in carbon emissions and meeting the UK's carbon targets will not be realised by 'technology fixes' alone. We are committed to applying circular economy principles to bridge this gap. In practical terms, this means reducing use of finite virgin materials, reducing waste, and designing products to last longer.

Cross-cutting strategic enablers

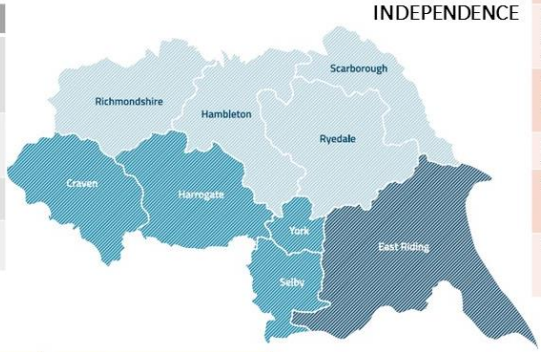
The successful implementation of low carbon solutions requires systems change. We need to strengthen local supply chains, develop skills, build infrastructure, secure investment and drive policy changes to enable the transition to a low carbon economy.

Our Plan

Collaboration is key to moving our strategy from ambition to action. We will achieve far more by working together; local authorities, communities, businesses and other organisations all have a role to play. We've worked with partners to identify a series of projects to achieve our strategic place-based priorities. These range from district heat networks to sustainably powering agricultural vehicles to community energy projects. In addition, we have also identified a series of actions to enable these projects and other low carbon opportunities to be realised. We need to strengthen local supply chains, develop infrastructure, secure investment, grow the skills base, develop knowledge and innovation, build awareness and change behaviour, and influence policy to achieve substantial carbon savings and economic benefits. Considering these elements ensures a truly systemic approach to moving towards a low carbon economy, taking into account the necessary requirements to both enable and catalyse systems change.

ESTABLISHING 'RESOURCE EFFICIENCY CLUSTERS'

Project	Description
Circular Economy & Resource Efficiency Support (CERES) Programme for SMEs	Consultancy and grants to support SMES become more resource efficient and adopt circular operating models
Resource efficient industrial site pilot	Overcoming energy capacity issues and exploring opportunities for industrial symbiosis at Dalton Industrial Site
Opportunities from Drax's BECCS activities	Use of captured carbon in surrounding industries
Heat capture from industrial processes, sewage, rivers.	Exploring potential to capture heat from industrial processes, sewage and rivers



SUPPORTING TOWNS, RURAL COMMUNITIES & BUSINESSES REALISE ENERGY INDEPENDENCE

Project	Description
Harrogate Borough Council's Garden Community: community circular energy system	Energy efficiency & other low carbon solutions e.g., using surplus heat from Allerton Waste Recovery Facility
Northallerton District Heat Network (North Yorkshire County & Hambleton District County Council)	District heat network for public buildings
Retrofitting of housing in market towns and remote rural areas	Aggregating demand to install energy efficiency measures, renewable heat pumps & biomass boilers
Electric vehicle charging infrastructure for rural areas	Coordinated roll-out of an extensive EV charging network
Community energy projects	Development of community-owned and community-led renewable energy generation in rural areas.
Biomass biodiversity project.	Developing and growing AD facilities and feedstock pathways in town and rural communities.

CREATING AN ENERGY SMART CITY OF YORK

Project	Description
York smart transport system	Smart transport system across the city, including EV charging points, traffic light sensors
Lowfield Green: community renewable energy	19 low cost, sustainable, community focused homes powered by shared renewable energy (incl. solar PV, EV charging points)
Retrofitting existing housing stock	Installing domestic energy efficiency measures to upgrade existing housing stock

CREATING A CIRCULAR AGRI-FOOD SECTOR

Project	Description
Sustainably powered agricultural vehicles	Exploring opportunities to power agricultural vehicles using bio-fuels and hydrogen
Small scale AD on farms	Using agricultural wastes & developing additional feedstocks for small scale AD plants

Summary of key projects to achieve our place-based strategic objectives

Key Next Steps

1. **Co-creating work plans**: To ensure the effective delivery of our strategy, we will be working collaboratively with stakeholders to develop detailed work plans for the outlined pipeline of projects and actions associated with our strategic cross-cutting enablers. Whilst the implementation of the strategy will be led by the LEP, we intend to provide the necessary support to empower partners to lead on ambitious projects and scale their impact.
2. **Co-designing a performance monitoring framework**: We will develop a series of environmental, economic and social metrics and indicators to measure the impact of projects and activities. This will form part of a performance monitoring framework to measure our overall progress in moving towards a low carbon economy, including strengthening of our enabling capabilities (e.g., skills, infrastructure and investment).
   Ensuring low carbon is a cross-cutting priority: We will ensure that the strategic priorities appropriately feed into our Local Industrial Strategy and other relevant policy documents to ensure that accelerating the shift towards a low carbon economy is a cross-cutting priority across LEP activities and our influence.

1.0 Introduction

1.1 Our Ambition

As the UK government seeks to decouple economic growth from carbon emissions, creating a thriving low carbon economy within York, North Yorkshire and East Riding presents an immense economic opportunity. With nationally significant energy assets, growing low carbon technology sectors and a strong scientific innovation base, the low carbon energy transition has the potential to deliver substantial economic growth, job creation and export opportunities across the area.

Our Vision:

A resilient low carbon economy, where solutions to address the climate crisis are implemented to make our area a better place to live and create a more competitive economy.

In more practical terms, this means:

- Local authorities, communities, businesses and other organisations all working towards a low carbon future, co-creating solutions to reduce energy demand and carbon emissions
- A clean, competitive and resilient energy generation and distribution network
- Affordable and clean energy for all
- More competitive businesses through improvements in energy and resource efficiency
- Air quality, health and connectivity is improved through designing-out waste and pollution
- A low carbon innovation ecosystem that builds on our rich energy legacy
- A carbon neutral economy, where any carbon emissions are balanced by carbon sequestration.

1.2 Strategy Purpose

The York, North Yorkshire and East Riding Local Energy Strategy is intended to provide a clear pathway towards a low carbon economy, ensuring that the area is well-positioned to realise the economic, environmental and social benefits from the transition.

To achieve this, the strategy is designed to guide the decision making and stimulate the actions of the LEP and our partners, delivering the following strategic outcomes:

1. Attract and secure investment for the low carbon transition.
2. Enable organisations, communities and businesses to maximise their contribution to, and realise the benefits from, a low carbon economy.
3. Provide the strategic drive and economic rationale to shape the development of our Local Industrial Strategy.
4. Support increasing collaboration and joint working at a Yorkshire and Northern Powerhouse level.

Using the comprehensive evidence base captured, the strategy provides a locally-specific, systemic approach to achieve our low carbon ambitions. We have worked with partners to develop a number of place-based strategic priorities that reflect the unique opportunities and challenges in our area. This approach prioritises low carbon energy technologies that can provide maximum impact in terms of delivering carbon savings and economic benefits. To ensure the effective deployment of such energy technologies and other low carbon solutions, we have also identified a number of cross-cutting enablers, such as developing skills, strengthening supply chains and securing investment. This provides a robust framework to enable and accelerate the transition towards a resilient low carbon economy across York, North Yorkshire and East Riding.

2.0 Background & Strategic Context

2.1 The importance of moving towards a low carbon economy: global and national context

With a growing evidence base around the impacts from climate change, there is increasing urgency to transition towards a low carbon economy. The 2015 Paris Agreement set a global precedent for reducing carbon emissions, with 195 countries committing to keep the global temperature rise below two degrees. The recent IPCC Special Report on Global Warming of 1.5°C evidences the increased climate related risks to health, livelihoods, food security, water supply, human security, and economic growth associated with an increase in global warming of 1.5°C and beyond. [2] With 12 years to ensure that we keep temperature increase within 1.5°C before climate catastrophe, the report concludes a global response is needed, pooling collective effort to achieve the scale of action required.

With $13.5 trillion of public and private investment in the global energy sector alone estimated to be required for the countries signed up to the Paris Agreement to achieve their national targets[3], there are a proliferation of economic opportunities associated with decarbonisation. The UK has been an international leader in climate change policy and is determined to build on its position of strength, seizing the economic opportunities from the transition to a low carbon economy. In 2008, the government passed the Climate Change Act which commits the UK to an 80% reduction in greenhouse gas emissions below 1990 levels by 2050. [4] As part of the Act, the UK government set a number of legally-binding carbon budgets:

- 1st Carbon Budget (2008 – 2012) – 25% by 2012
- 2nd Carbon Budget (2013 – 2017) – 31% by 2017
- 3rd Carbon Budget (2018 – 2022) – 37% by 2020
- 4th Carbon Budget (2023 – 2027) – 51% by 2025
- 5th Carbon Budget (228 – 2032) – 57% by 2030

The most recent research shows emissions in the UK have been reduced by 42% from 1990 levels. The UK government's Clean Growth Strategy[5] sets out a number of policies and proposals towards meetings the carbon budgets and harnessing the economic opportunities of clean growth. The strategy includes a number of priorities, including accelerating clean growth; improving business and industry efficiency; improving our homes; accelerating the shift to low carbon transport; delivering clean, smart, flexible power; enhancing the benefits and value of our natural resources; leading in the public sector; and government leadership in driving clean growth.

However, the UK is currently not on track to meet the 4th and 5th carbon budgets, with current estimations forecasting that the UK could achieve 97% and 95% of required performance respectively. Following this, the UK government's department of Business, Energy and Industrial Strategy (BEIS), commissioned Local Enterprise Partnerships (LEPs) to develop their own Local Energy Strategies,

[2] IPCC (2018) Special Report on Global Warming of 1.5°C (SR15)
[3] International Energy Agency (2015) Climate Pledges for COP21 slow energy sector emissions growth dramatically https://www.iea.org/newsroom/news/2015/october/climate-pledges-for-cop21-slow-energy-sector-emissions-growth-dramatically.html
[4] UK Climate Change Act 2008 http://www.legislation.gov.uk/ukpga/2008/27
[5] BEIS (2017) The Clean Growth Strategy: Leading the way to a low carbon future https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/700496/clean-growth-strategy-correction-april-2018.pdf

providing a strategic framework to guide the actions which LEPs and their partners take on energy. Energy underpins local economic growth and hence there is a need for energy and the transition to a low carbon economy to be a priority at a local level, as well as a national level.

To develop our Local Energy Strategy, we have commissioned a series of studies to develop a robust evidence base to understand: (1) the strategic importance of energy to the local economy; (2) what it means locally to meet the UK's carbon budgets; and (3) the opportunities and challenges associated with the low carbon energy transition. Key findings of the research are outlined below, with further details summarised in Appendix 1.

2.2 The strategic case for action in York, North Yorkshire & East Riding

2.2.1 Energy & the Economy: the strategic importance of energy to the local economy

York, North Yorkshire and East Riding has a population exceeding 1.1 million and is home to over 60,000 businesses, covering the largest geographic area of any LEP. The economy is worth £24.6 billion, with the energy sector contributing to 1.9% of total GVA. This is above the national contribution of the energy sector (1.7%) to the UK's economy[6]. In terms of employment, the energy sector is a relatively small component of total employment within the local area and nationally, reflecting the highly productive nature of the sector.

Table 1. Estimated output (GVA) and employment of the energy sector at local and national levels

Geography	**Estimated Output (GVA) of the energy sector in 2015 (£m)**		**Estimated employment in the energy sector in 2015 (jobs)**	
	Energy sector	Energy as % of total economy	Energy sector	Energy as % of total employment
York, N. Yorkshire & East Riding	449	1.9	2,000	0.3
UK	28300	1.7	150,000	0.4

Energy underpins economic growth. The research has found a strong economic and environmental rationale for local action, achieving substantial returns from investment, whilst reducing our energy bill and carbon emissions. A summary of this research is included in Box 1. Compared to the rest of the UK, energy demand is disproportionately high in the North, estimated to be 31,150GWh in York, North Yorkshire and East Riding in 2015.[7] This is due to the presence of energy intensive commercial and industrial sectors. Since the productivity and success of energy intensive industries is inextricably linked to provision of energy, ensuring a low carbon energy supply is a strategic priority.

[6] Energy Baseline Report: Leeds City Region LEP; Sheffield City Region LEP; York, North Yorkshire and East Riding LEP (2017)
[7] Carbon Trust (2017) LCR and YNYER LEP Energy Strategy: Energy Technology Appraisal

The local energy bill for consumers, businesses and other organisations in York, North Yorkshire and East Riding is currently estimated at £2.7 billion per year, which is equivalent to approximately 10% of the area's GVA.[8] Further real increases are forecast under a 'business as usual' scenario, with the total energy bill predicted to reach £3 billion per year by 2035. It would therefore be prudent to take steps to reduce this energy bill, regardless of the carbon implications.

Why should we move towards a low carbon economy?

The Energy Case

Using three different scenarios, we can see the impact of future levels of investment on energy use in our area:

- The 'Cost-Effective' scenario includes only those options that would more than pay for themselves through the energy savings that they generate over their lifetime.
- The 'Cost Neutral' scenario incudes all options that could be adopted at no net cost or at a breakeven level of investment.
- The 'Realistic Potential' scenario includes all options that have been identified, regardless of their costs and benefits.

- *Cost effective scenario:* Energy bills could be reduced 30.8%, equivalent to £949 million by 2035, with cost effective actions.
- *Cost neutral scenario:* With cost neutral actions £1.2 billion could be saved, equivalent to 39.8%.
- *Realistic potential scenario*: Achieving the realistic potential of action, energy bills could be reduced £1.3 billion, equating to a reduction of 42.3%.

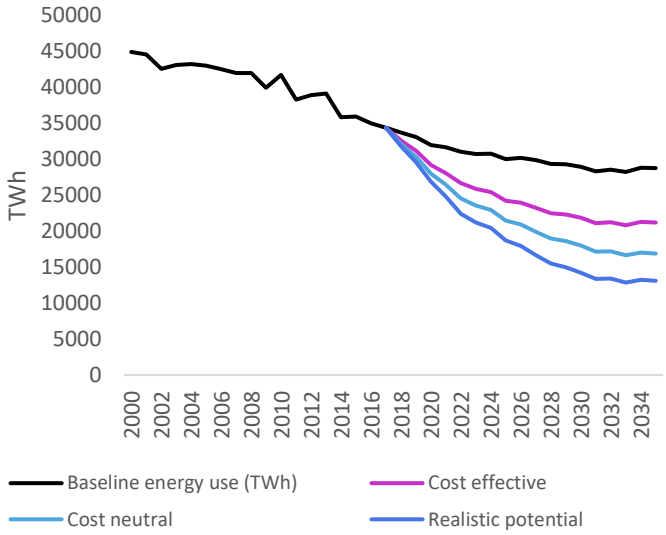


Figure 1. Forecast energy use under different scenarios 2000

The majority (75%) of energy bill saving potential, is found in the transport sector, where hybrid vehicles in the immediate future, and electric vehicles over the period from 2025 – 2035, present a massive opportunity for reduced energy expenditure. Significant savings are also found in the domestic sector where a range of retrofit options could provide paybacks of less than 10 years on investments with 30+ year lifetimes.

Box 1. Extract from Energy and Low Carbon Development Opportunities in York, North Yorkshire and East Riding and Kingston-upon-Hull: An Economic Analysis

[8] University of Leeds (2018) Energy and Low Carbon Development Opportunities in York, North Yorkshire and East Riding and Kingston-upon-Hull: An Economic Analysis

2.2.2 The Carbon Challenge: what it means locally to meet the UK's carbon budgets

For the UK as a whole to meet its 2032 carbon target, emissions must fall by 33% from 2018 levels. If carbon emissions from York, North Yorkshire and the East Riding follow their baseline trajectory and fall by only 19% between 2018 and 2035, an additional 1.5 $MtCO_2$ will need to be mitigated by the rest of the UK in order for the country as a whole to meet its carbon targets.[9] Further carbon reduction solutions are therefore needed if the area is to deliver national targets. These trends are shown in Figure 2.

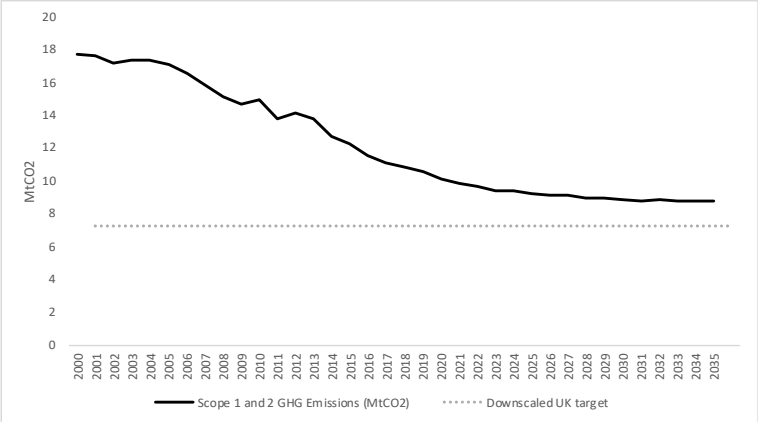


Figure 2. GHG emissions and a national downscaled GHG emissions target for York, North Yorkshire and East Riding and Kingston-upon-Hull, 2000-2035

The transport sector is currently the largest single source of greenhouse gas (GHG) emissions in the area, producing 31% of all emissions in 2018. As shown in Figure 3, towards 2034 all sources of GHG emissions are forecast to decline, with the exception of domestic fuel use which is anticipated to grow by 8%. Particularly large declines in emissions from electricity use are anticipated due to reductions in the emissions intensity of the grid and improvements in the efficiency of electric appliances. With among the highest end user emissions in the UK, measures to decarbonise energy and resource intensive industries will be crucial to reducing carbon emissions further and supporting economic growth.

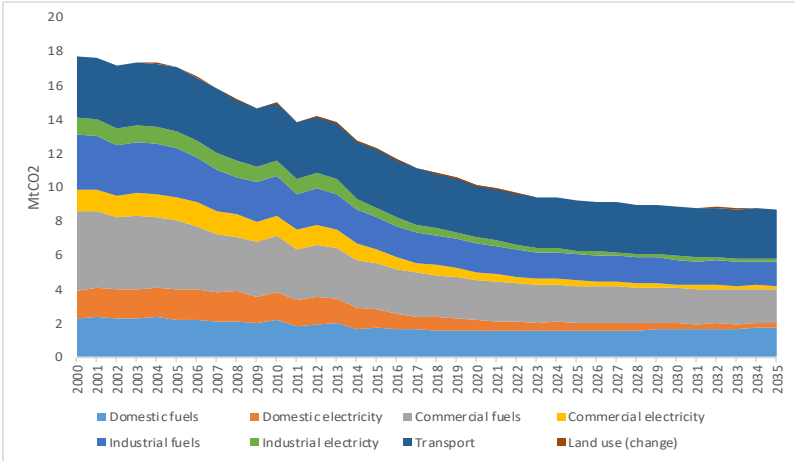


Figure 3. GHG emissions by source for York, North Yorkshire & East Riding and Kingston-upon-Hull, 2000-2035

[9] University of Leeds (2018) Energy and Low Carbon Development Opportunities in York, North Yorkshire and East Riding and Kingston-upon-Hull: An Economic Analysis

Research has shown that there are a number of cost effective pathways to reducing emissions in our area. The required investments and forecast energy savings are detailed in Box 2 below.

Why should we move towards a low carbon economy?

The Carbon Case

Between 2018 and 2035, baseline GHG emissions could be reduced by:

- Cost effective pathway: 39% relative to 2018 levels with cost effective actions. This would require cumulative investment over the period of £5.9 billion and provide energy savings in 2030 of £0.9 billion, paying back the original investment in approximately 6 years.
- Cost neutral pathway: 50% relative to 2018 levels with cost neutral options. This would require cumulative investment of £25 billion, providing energy savings in 2030 of £1.1 billion, paying back the original investment in 22 years.
- Realistic potential pathway: 55% relative to 2018 levels with further actions. This pathway is forecast as the maximum realistic potential, requiring cumulative investment of £39 billion and providing energy savings in 2030 of £1.2 billion. The original investment would be returned in 32 years.

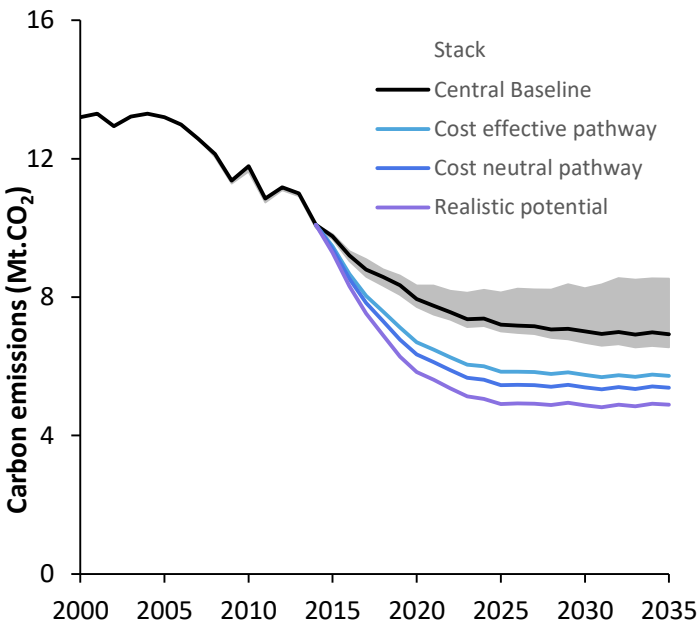


Figure 4. Carbon reduction implications of different scenarios for energy use

Box 2. Extract from Energy and Low Carbon Development Opportunities in York, North Yorkshire and East Riding and Kingston-upon-Hull: An Economic Analysis

2.2.3 Beyond Energy & Carbon: opportunities & challenges associated with the low carbon energy transition

Developing the low carbon economy in York, North Yorkshire and East Riding is expected to have additional benefits beyond positive environmental impacts through reducing emissions and finite resource use. Prioritising investment and intervention in the low carbon economy will deliver substantial economic benefits to the area, particularly as low carbon sectors are forecast to grow at a faster pace than traditional economic sectors, and there is the potential for strong export opportunities.[10] Research has shown a thriving low carbon economy will create jobs and generate economic growth in York, North Yorkshire and East Riding, and as such has the potential to close productivity gaps between the region and other parts of the UK. A summary of the economic benefits of investing in the low carbon transition can be found in Box 3.

Why should we move towards a low carbon economy?

The Investment Case

- £5.9 billion could be profitably invested in small scale renewables and in energy and fuel efficiency. This investment would generate annual savings of £0.96 billion, paying back the investment in 6 years, reducing energy bills by 41%, creating 32,000 jobs and reducing carbon emissions by 39% relative to 2018 level.
- Investment of £1.4 billion in the domestic sector could save households £200 per year on their energy bills and generate nearly 20,000 jobs in the construction sector
- Investments in low carbon and non-motorized transport options could reduce annual energy expenditure per person by £250 while also reducing air pollution.
- Investments in schools, hospitals, offices, and retail stores could save more than £50 million in energy bills, providing money that can be reinvested in the local economy.

Box 3. Extract from Energy and Low Carbon Development Opportunities in York, North Yorkshire and East Riding and Kingston-upon-Hull: An Economic Analysis

A number of challenges are associated with securing these additional benefits. Some of these challenges are barriers at a national level, such as skills shortages in engineering, whilst others are specific to our local area. For example, the rural nature of a large proportion of our geography means that developments, such as housing retrofits, heat networks and EV charging infrastructure are less commercially attractive than in urban areas. Further details of the opportunities and challenges related to deploying low carbon energy technologies in York, North Yorkshire and East Riding are detailed in Section 5. To ensure that we realise the strategic benefits and successfully overcome challenges inherent in the energy transition, we have developed a framework to provide a clear pathway to achieving our low carbon ambitions, which is described in the following section.

[10] Cambridge Econometrics & Element Energy (2018) A study on Low Carbon Value Chains and Economic Growth for York, North Yorkshire & East Riding

3.0 A Strategic Framework for a Resilient Low Carbon Economy

Based upon the research commissioned and engagement with local partners, we have developed a strategic framework to achieve our low carbon vision. This is built upon four key elements: (1) place-based strategic priorities; (2) high-impact low carbon energy technologies; (3) designing circular systems; and (4) cross-cutting strategic enablers.

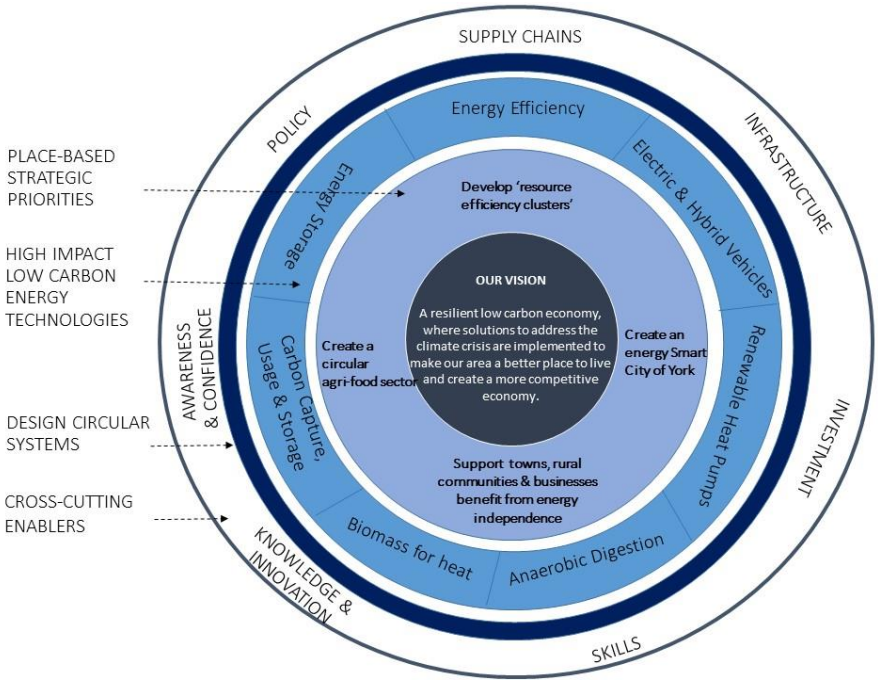


Diagram 1. Strategic Framework for a Resilient Low Carbon Economy

3.1 Place-based strategic priorities: Building on the region's unique assets to ensure an equitable & ambitious transition

We want to capitalise on our unique strengths, ensuring the strategy is the right fit for the area and reflects our distinctiveness. This includes building on our historic legacy in the energy sector and resource intensive industries, our strength in the bioeconomy and the rurality of the region. As a result, we've developed the following key strategic priorities:

- Support towns, rural communities and businesses benefit from energy independence
- Create an energy smart City of York
- Develop 'resource efficiency clusters'
- Create a circular agri-food sector

Further details of these priorities can be found in Section 4.

3.2 High-impact low carbon energy technologies: Seeking economic, environmental & social benefits

To realise the full economic opportunities from the low carbon transition, we have commissioned research to identify low carbon energy technologies that can provide maximum impact in terms of deliverable carbon savings and economic benefits. These include:

- energy efficiency
- electric and hybrid vehicles
- heat pumps
- anaerobic digestion
- biomass for heat.

The strategy has prioritised technologies which also deliver economic growth across their value chains. An overview of the key findings of this research is included in Section 5.

Engagement with partners has also highlighted a local appetite for community energy solutions. Community energy provides the potential to create local jobs, improve access to cheaper forms of finance, tackle local fuel poverty and create benefits for local communities from local tariffs.[11] Consequently, we intend to ensure the transition to a low carbon economy delivers social, as well as economic, benefits.

3.3 Circular solutions: Using circular economy principles to deliver business and environmental benefits

We recognise that substantial reductions in carbon emissions and meeting the UK's carbon targets will not be realised by 'technology fixes' alone. Recent research suggests that reducing resource consumption through applying circular economy principles could bridge the gap and enable the UK to meet its fourth and fifth carbon budgets.[12] The research indicates optimising material and resource use in the management of supply chains can reduce carbon emissions to 361MtCO_2e by 2032, 55% below 1990 levels. With regional strengths in resource and energy intensive sectors, such as agriculture, manufacturing and construction, implementing a decarbonisation approach underpinned by circular economy principles presents a powerful framework to reduce carbon emissions in our area.

In practical terms, this means reducing use of finite virgin materials, reducing waste, and designing products to last longer. We are currently developing a Circular Economy Strategy and Action Plan for York and North Yorkshire, which will be aligned with our Energy Strategy and ensure we seize the opportunities of moving towards a circular economy.

[11] Cambridge Econometrics & Element Energy (2018) A study on Low Carbon Value Chains and Economic Growth for York, North Yorkshire & East Riding

[12] CIEMAP (2018) Less in, more out: using resource efficiency to cut carbon and benefit the economy https://www.green-alliance.org.uk/resources/Less_in_more_out.pdf

3.4 Cross-cutting strategic enablers: Creating the enabling environment for a low carbon economy

The successful deployment of low carbon energy technologies and the implementation of other low carbon solutions requires systems change. To enable the transition we need to:

- strengthen local supply chains;
- develop skills;
- build infrastructure;
- secure investment;
- develop our knowledge and innovation capacity;
- build awareness and change behaviour; and
- drive policy changes.

For example, the deployment of low carbon energy technologies will be dependent upon knowledge and innovation, and shaped by demand, which in turn will be determined by awareness and confidence. We need to build these enabling capabilities locally to develop a competitive, low carbon economy. Further details of these interdependent, cross-cutting strategic enablers can be in Section 6.

4.0 Place-based Strategic Priorities

The unique assets, industries and geography of our area provides a number of distinct opportunities and challenges. Working collaboratively with partners, we have identified four strategic priorities that are important in fully realising the economic, social and environmental benefits of the low carbon transition:

- Support towns, rural communities and businesses benefit from energy independence
- **Develop 'resource efficiency clusters'**
- Create an energy smart City of York
- Create a circular agri-food sector

These priorities build on our region's economic strengths, particularly agriculture and manufacturing. They capture our environmental strengths and the importance of protecting our natural capital assets. The approach also puts people at the heart of the energy transition, seeking to implement solutions that make our area a better place to live for rural and urban communities alike.

Taking such a targeted, spatial approach will allow us to focus interventions to achieve substantial impact. Working with partners we have already identified a pipeline of projects that support these place-based strategic priorities. We will continue to work with partners to support these through the strategic enablers identified, whilst also stimulating additional projects that realise specific opportunities.

4.1 Support towns, rural communities and businesses to benefit from energy independence

The rural nature of North Yorkshire and East Riding brings a number of challenges associated with moving towards a low carbon economy in rural communities, from converting off-gas grid homes to installing electric vehicle charging points in remote locations. Yet the natural capital within such areas, also provides us with the opportunity to develop 'energy landscapes' where renewable energy is sourced from the surrounding environment, creating value for rural businesses and communities. Supporting communities to produce and consume their own energy, would enable rural communities to be energy self-sufficient or net-energy producing. Such an approach focused on the function of landscapes will also involve considering the valuable role of rural landscapes as carbon sinks, where emissions can be stored.

There are a number of growth opportunities within our towns and we want to make sure these contribute to and benefit from the low carbon transition. For example, we want to ensure that new housing developments are designed with low carbon and circular economy principles in mind, and that there is a coordinated network of EV charging infrastructure across the area to connect towns. Local planning systems need to support the building of such energy efficient homes and transport infrastructure.

We will work closely with local authorities, communities and businesses to ensure growth is decoupled from GHG emissions, improving quality of life and creating quality jobs.

4.2 Create an energy smart City of York

It is estimated that CO_2 levels will grow more strongly in York than any other area within our geography [13], and therefore reducing energy demand is critically important. Consequently, developing an efficient and people-centred energy system in York is a key priority to ensure we make our full contribution to the UK's Carbon Budgets. Developing a smart transport system, building on the substantial network of EV charging points, and retrofitting existing housing stock with energy efficiency measures will be an important part of this. To deliver social benefits to residents, we will work with partners to explore the opportunity of community energy in an urban context. We will also explore the potential for energy savings through other innovations, such as smart street lighting.

4.3 Develop 'resource efficiency clusters'

The high importance of producing sectors to the local economy, including manufacturing, construction, agriculture and energy sectors, means that increasing the resource efficiency of businesses can generate substantial cost savings in our area.

The UK government outline in their Resources and Waste Strategy for England a commitment to working with businesses to create 'resource efficiency clusters' [14]. Research suggests that UK businesses could save £3 billion annually through short-term investments to make their processes more resource efficient.[15] This means cutting resource use and designing-out waste.

Creating resource efficiency clusters is particularly opportune for local industrial sites, where the close proximity of businesses creates the opportunity for the sharing of resources and waste between business through industrial symbiosis. We will also seek opportunities to develop sector-specific clusters where businesses can benefit from sharing knowledge and best practice.

4.4 Create a circular agri-food sector

Yorkshire and the Humber has the highest concentration of food and drink businesses in the UK. There are 8,916 farms in the area covering 841,404 hectares, which accounts for 12% of the UK's farmland. The prevalence of agri-food businesses and their strategic importance to the local economy means that there is a substantial opportunity to design restorative, circular systems that provide costs savings, income generating opportunities and reduce emissions. From developing small scale AD on farms to sustainably powering vehicles using agri-waste, there are a number of economic opportunities that can be harnessed in the process of decarbonising the sector.

[13] Energy Baseline Report: Leeds City Region LEP; Sheffield City Region LEP; York, North Yorkshire and East Riding LEP (2017)

5.0 Priority Low Carbon Energy Technologies: Opportunities & Challenges

5.1 Realising the economic opportunities from the low carbon transition: prioritised low carbon energy technologies

In addition to carbon savings, there are significant economic opportunities for local value accrual from the low carbon energy transition. Exploiting cost-effective options would require nearly £6 billion investment, whilst generating annual reductions in the energy bill of nearly £1 billion.[16] Making these investments could additionally create 32,000 years of extra employment and contribute to making the local economy more efficient and resilient.

Analysis of a long-list of low carbon energy technologies based on impact and deliverability has prioritised five technologies with the potential to provide both substantial economic benefits and carbon savings within York, North Yorkshire and East Riding:

- Energy efficiency (insulation & fabric measures)
- Electric and plug-in hybrid vehicles
- Heat pumps
- Anaerobic digestion
- Biomass for heat

Focusing policy efforts, whether that involves monetary or non-monetary intervention, in these technologies with the highest potential will aid York, North Yorkshire and East Riding in gaining value for money and maximising the economic impact of deploying low-carbon technologies in the region.

Research has also identified emerging technologies that have the potential to have a game changing impact in the future. These have a longer timescale in relation to deployment and are likely to require national level policy support, however, have the potential for high impact:

- Carbon capture, usage & storage
- Energy storage from offshore wind.

A summary of the forecast carbon savings and economic benefits associated with these technologies is detailed in Table 2.

[14] DEFRA (2018) Our Waste, Our Resources: A Strategy for England https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/765914/resources-waste-strategy-dec-2018.pdf

[15] Oakdene Hollins for DEFRA (2017) Business Resource Efficiency Quantification of the no cost/low cost resource efficiency opportunities in the UK economy in 2014

[16] University of Leeds (2018) Energy and Low Carbon Development Opportunities in York, North Yorkshire and East Riding and Kingston-upon-Hull: An Economic Analysis

Table 2. Low Carbon Energy Technologies Shortlist (Source: Element Energy & Cambridge Econometrics)

	Low Carbon Energy Technology (Category)	Carbon Reduction (Mt/year CO_2)	Economic Benefits & Local Value Accrual
Prioritised technologies	Energy efficiency – insulation & fabric efficiency (Electricity, Heat)	0.3	Installation of energy efficiency methods is employment intensive Aggressive promotion of energy efficiency measure is predicted to generate 1400 jobs in the region[17] Measures to improve energy efficiency are pre-cursors to wider implementation of renewable energy generation.
	Electric & plug-in hybrid vehicles (Transport)	1.2	EV charging is already more affordable than fossil fuel purchase, and TCO parity with petrol ICE vehicles may be reached by 2020[18] Although vehicles are manufactured outside of the area, installation and maintenance of charging points will involve local skilled labour (incl. electricians and construction workers)
	Heat pump (Heat)	0.4/1.0	RHI designed to lead to the same or lower lifetime costs of heating than fossil fuels Installation of heat pumps is completed by local skilled tradesmen; value of installing HPs in all 30,000 off-gas houses in YNYER expected to be in the range £60-240 million, of which the majority is expected to accrue to local installers
	Anaerobic digestion (Electricity, Heat)	0.2	AD plants have a typical payback time between 8 and 12 years, making plants commercially viable[19] The majority of the relevant businesses are small and locally owned[20] Use of 300 kt/yr municipal and commercial/industrial waste for AD has the potential to mitigate waste disposal costs in the region of £3-14 million/yr; the digestate resulting from AD can also be used or sold as fertiliser Prior studies have estimated that an AD plant can create 14 FTE jobs per MWe[21]
	Biomass (Heat)	0.3/1.5	There is a positive return of investment for end users with RHI support Development of a local supply chain for biomass would increase the local value accrual Domestic and commercial biomass installations are installed by local tradesmen, of which 293 MCS-certified biomass installers are within Yorkshire and the Humber[22]
'Game changer' technologies	Carbon Capture & Storage (Electricity, Heat)	6/19	Long term infrastructure and consumer costs are likely to be comparable to other solutions[23] The installation and operation of carbon capture equipment and onshore pipelines through the region would bring value locally
	Energy Storage – Offshore Wind (Smart grid)	0.5	The Clean Growth Strategy commits the government to spending £70 million before 2022 to promote DSR and energy storage, including £20 million for vehicle-to-grid products and services. Potential in the YNYER area for battery storage and power-to-gas technologies to be used e.g., producing hydrogen from renewable power using electrolysis

[17] Building the Future: The economic and fiscal impacts of making homes energy efficient, Energy Bill Revolution, 2014.
[18] Element Energy for BEUC (2016) Low carbon cars in the 2020s: Consumer impacts and EU policy implications
[19] National Energy Foundation (2013) Energy farms – anaerobic digestion
[20] Anthesis for BioVale & York University (2018) Mapping food processing waste in Yorkshire & the Humber,
[21] NNFCC for DECC (Apr 2012) UK jobs in the bioeconomy sectors
[22] https://www.microgenerationcertification.org/
[23] https://hynet.co.uk/

5.2 Developing the value chains of low carbon energy technologies: Opportunities & Challenges

The roll-out of these technologies and developing their value chains presents distinctive economic opportunities to the local area. These opportunities include increasing productivity, strengthening economic competitiveness and job creation. Research has also shown that there are a number of challenges associated with these technologies, which our implementation plan will address in order to realise the full economic benefits and carbon saving potential. A summary of these opportunities and challenges is outlined below.

5.2.1 Energy efficiency (insulation & fabric measures)

The value chain of energy efficiency insulation contributed £60 million to the York, North Yorkshire and East Riding economy as of 2017, and this figure is forecast to increase 50% by 2030. An estimated 400,000 dwellings are currently below EPC level C in our area, increasing the efficiency of these dwelling to level C is forecast to eliminate 0.3 MCO_2/year[24]. Research shows that lower cost domestic energy efficiency measures (e.g., double glazing) have largely been taken up, but the remaining high impact measures (e.g., cavity insulation and solid wall insulation) have long payback times and consumers are slow to adopt these without external support.

Opportunities:

- The retrofitting of energy efficiency measures to a large number of off-gas grid properties in North Yorkshire and East Riding presents major opportunities for insulation manufacturers in the region and local installers.
- Developing the local value chain of materials for traditional and bio-based insulation and fabric measures will provide further opportunities for local value accrual.
- Additional central government support for retrofitting is expected in the future, providing further opportunities for local growth.
- Successfully implementing energy efficiency improvements is a pre-requisite to enable the roll out of renewable energy technologies, such as heat pumps.
- Cost pressures on public bodies supporting long-term cost saving solutions.

Challenges:

- Reduced demand for energy efficiency measures has led to a number of local installers going out of business recently. Activities to encourage the uptake of energy efficiency measures through existing organisations and new mechanisms is necessary.
- While GVA is expected to increase in all stages of the energy efficiency value chain for insulation and fabric measures, the number of jobs is projected to decline in the future due to productivity improvements. Appropriate measures will need to be taken to manage such changes in availability of employment.
- The remote and dispersed nature of many rural homes in our area means there are challenges in ensuring commercial viability of housing retrofits. There is therefore a need to effectively aggregate demand to address this challenge.

[24] Cambridge Econometrics & Element Energy (2018) A study on Low Carbon Value Chains and Economic Growth for York, North Yorkshire & East Riding

5.2.2 Electric & plug-in hybrid vehicles

GVA associated with EVs is expected to grow rapidly, and become around 12 times its current size by 2030. 40,400 new vehicles are purchased each year in York, North Yorkshire and East Riding, and with the UK government's commitment to banning non-hybrid vehicles by 2040, there is substantial deployment potential for electric and hybrid vehicles. There are currently 500,000 vehicles in our area and conversion of all personal vehicles to electric would prevent 1.2 Mt CO_2/year. Although vehicles are not produced within the region, installation of home, industrial and public charging points will involve local skilled labour, including electricians and construction workers.

Opportunities:

- Increased demand for EVs and plug-in hybrids following national-level policy, incentives and support for the EV industry creates opportunities for increased jobs and output across the EV value chain.
- While no EV manufacturing currently takes place locally, there is the potential for increased manufacturing of components used within the EV supply chain in the future.
- The installation and maintenance of charging infrastructure is expected to provide the most substantial opportunity for job creation and increased economic output in the EV value chain going forward.
- There is planned local authority support for electric charging infrastructure in off-street car parks.
- Central government support is available to support the deployment of charging infrastructure via OLEV grants.

Challenges:

- The high proportion of remote rural areas limits the attractiveness of EVs and discourages uptake in York, North Yorkshire and East Riding.
- There is currently insufficient power supply grid infrastructure to support the required charging infrastructure in some areas.
- There is insufficient mobile network coverage to support charge-point payment systems in some areas.
- The high costs of installing rapid charge points creates a substantial barrier to investment.
- Other regions of the UK already specialise in vehicle production or the production of batteries and therefore have a competitive advantage, meaning that York, North Yorkshire and East Riding may lose out (in relative terms) to regions with a more developed incumbent industry.

5.2.3 Heat pumps

The UK's Clean Growth Strategy aims to phase out high carbon fossil heating for off-gas grid properties in the 2020s[25]. 0.4 $MtCO_2$/year would be prevented if all off-gas households switched to heat pumps, and 1 Mt CO_2/year would be prevented if 70% of all homes switched to heat pumps. The value of installing heat pumps in all 30,000 off-gas houses in York, North Yorkshire and East Riding is expected to total between £60-240 million, of which the majority is expected to accrue to local installers.

Opportunities:

- There are a relatively high proportion of off-gas-grid properties in York, North Yorkshire and East Riding compared to the UK average, therefore future deployment rates of new heating technologies, including heat pumps, in the region are likely to be higher than the UK average.
- Although there are currently no known heat pump manufacturers operating in the region, other manufacturing firms in the region may operate further down the heat pump supply chain.
- The expected increased uptake of heat pumps in the local area will create substantial opportunities for increased economic activity and jobs in all stages of the heat pump value chain, particularly in the commissioning and installation of heat pumps.
- Cost pressures on public bodies driving investment in long term cost saving.
- Central government policy and initiatives are supporting the uptake of heat pumps, and this is expected to increase in the future.

Challenges:

- The high up-front cost, and the lack of awareness about the potential benefits of heat pump technology, currently present substantial barriers to uptake.
- The existing low energy efficiency of rural housing prevents the wider rollout of domestic heat pump technology.

5.2.4 Anaerobic digestion

There is substantial existing deployment of anaerobic digestion (AD) within York, North Yorkshire and East Riding, with 28 AD facilities contributing 8% electricity and 6% biomethane to the UK's total capacity. Currently 0.09 MCO_2/year are prevented through AD, and it is forecast this could be increased to approximately 0.2 MCO_2/year with further deployment. [26] Research has also shown there is significant opportunity for local value accrual, with prior studies estimating that an AD plant can create 14 FTE jobs per MWe[27].

[25] BEIS (2017) The Clean Growth Strategy: Leading the way to a low carbon future https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/700496/clean-growth-strategy-correction-april-2018.pdf

[26] Cambridge Econometrics & Element Energy (2018) A study on Low Carbon Value Chains and Economic Growth for York, North Yorkshire & East Riding

[27] NNFCC for DECC (Apr 2012) UK jobs in the bioeconomy sectors

AD also provides the potential to reduce waste management costs for local authorities, with the use of 300 kt/yr of waste for AD estimated to have the potential to mitigate waste disposal costs in the region of £3-14 million/yr.[28]

Opportunities:

- York, North Yorkshire and East Riding currently has a competitive edge in AD technology, with a high proportion of AD capacity compared to the rest of the UK, plus a state-of-the-art household waste AD facility, and various bioeconomy research assets and innovation clusters.
- The regional AD network convened by BioVale is a major opportunity and a nationally unique capability to share best practice, increase innovation and attract inward investment.
- Growing crops that support AD is considered less risky by local farmers than cultivating bio-energy crops.

Challenges:

- Large AD plants have experienced falling subsidies, leading to a consolidation of firms into a relatively small pool of larger operators. This has led to higher gate fees as larger operators can exert market power over local feedstock suppliers.
- Local feedstock volumes are not keeping pace with the development of new AD facilities, additional feedstock pathways are needed.
- Local farmers participating in the market for AD feedstock are concerned about the future impact of AD on their farming practices and the longevity of feedstock contracts. There are also concerns among local farmers surrounding increasing regulation around the spreading of AD digestate on land.

5.2.5 Biomass for heat

Research has shown that there is substantial potential for further deployment of biomass boilers in the York, North Yorkshire and East Riding. 8% of the Yorkshire and Humber housing stock is heated by oil or solid fuel, which is higher than the national average of 5% for England. It is estimated that there are more than 100,000 dwellings off the gas-grid in York, North Yorkshire and East Riding. The UK's Clean Growth Strategy aims to phase out high carbon fossil heating for off-gas grid properties in the 2020s. The conversion of all off-gas grid homes to biomass would prevent 0.3MtCO_2/year.

Opportunities:

- A high proportion of off-gas-grid properties exist in the region, with biomass boilers being a like-for-like replacement for most existing boilers, presenting a substantial opportunity for biomass for heat uptake locally.
- There is a positive return of investment for end users with RHI support.
- The vast majority of the increased employment and economic activity within the value chain is likely to occur in the production, collection and distribution of feedstock stage.

[28] Cambridge Econometrics & Element Energy (2018) A study on Low Carbon Value Chains and Economic Growth for York, North Yorkshire & East Riding

The development of the local supply chain for biomass would increase potential for local value accrual.

- The region currently has high employment in manufacturing sectors that contribute to the manufacture of biomass boilers and is well-placed to increase activity in this stage of the value chain.

Challenges:

- At a European level, there has been some controversy around the sustainability and carbon footprint of wood-based fuels.
- To achieve the forecast carbon savings for biomass, production needs to be sustainable in line with best practice environmental management.

5.2.6 Carbon capture, utilisation & storage (CCUS)

The 2017 Clean Growth Strategy recognises that CCUS has an important role to play in reducing the UK's carbon emissions[29]. CCUS offers a decarbonisation route for sectors with few other options (e.g., cement, chemicals, and steel production). The UK will need to sequester between 60 and 180 $MtCO_2$ annually by 2050[30]. The Clean Growth Strategy dedicates £100 million from the BEIS Energy Innovation Programme to support CCUS innovation and deployment in the UK, including £20 million for a CCUS demonstration project.

Drax Power Station is currently running a £400,000 bioenergy carbon capture and storage (BECCS) trial in collaboration with Leeds-based CCUS start up C-Capture. The CCUS system was commissioned in November 2018 and will operate for six months with the target of capturing 1 tonne of CO_2 each day. If this system was deployed across one of Drax's biomass power production, 4 Mt CO_2 would be abated each year. This rises to 16 Mt CO_2 if 100% of Drax's power output was produced using BECCS. The Committee on Climate Change has recommended that 10 $MtCO_2$ should be sequestered each year by 2030, rising to 20 $MtCO_2$ by 2035. A large scale BECCS project at Drax would make a significant contribution to these targets.

Opportunities:

- Economic opportunities to catalyse inward investment based on local use of carbon captured from Drax's BECCS activities. Captured carbon can be used as a valuable resource for businesses in other industries, such as being used by breweries and other drinks manufacturers to carbonate their drinks.
- There are a number of saline aquifers and depleted hydrocarbon fields off the coast of East Yorkshire that may be suitable for long term carbon storage. Although the benefits of offshore storage are likely to accrue in the areas hosting larger ports, the installation and operation of carbon capture equipment and onshore pipelines through the region would bring value locally.

[29] BEIS (2017) The Clean Growth Strategy: Leading the way to a low carbon future https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/700496/clean-growth-strategy-correction-april-2018.pdf

[30] Committee on Climate Change (2018) Reducing UK emissions – 2018 Progress Report to Parliament

- North Yorkshire and East Riding are well-placed to host CCUS projects within the next decades.

Challenges:

- CCUS projects are dependant on the decisions of national policy-makers.
- Technology to store CO_2 are unproven at scale.

5.2.7 Energy storage from offshore wind

The potential value of energy storage to the UK energy system is widely recognised. The Government's Clean Growth Strategy commits to spending £70 million before 2022 to promote demand side response and energy storage[32]. There is a wide range of potential uses for energy storage. One important application is supporting the deployment of intermittent renewable generation, such as offshore wind, using battery storage to maximise the value of power sales and reduce curtailment, while generating further revenue by providing additional services to the grid. The region is nationally significant for its generation of renewable energy, particularly energy from offshore wind; 6 GW of offshore wind is installed, under construction or planned off the coast of East Riding, and at least 400 MW of power comes ashore and is connected to the electricity grid in East Riding.

Opportunities:

- In the near-term, energy storage deployed to support offshore wind deployment is most likely to take the form of battery technology. A 50 MW battery project has already been approved near Cottingham, East Yorkshire. There is potential for similar projects in North Yorkshire and East Riding.
- In the future, there is potential for power-to-gas technologies to be used, for example, to produce hydrogen from renewable power using electrolysis. The hydrogen could then be stored, acting as another form of energy storage. Salt caverns in East Riding are already used for natural gas storage and could be used to store hydrogen, as proposed in the Leeds H21 project[33]. This option would be most relevant in the case that hydrogen is used for heating on a wide scale in the future, perhaps replacing natural gas in the gas grid.

Challenges:

- Existing lack of understanding of the potential for energy storage projects in the York, North Yorkshire and East Riding. Further studies should be undertaken to consider this opportunity.
- Limited local influence over large scale projects.
- Development of effective energy storage technology.

[32] BEIS (2017) The Clean Growth Strategy: Leading the way to a low carbon future https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/700496/clean-growth-strategy-correction-april-2018.pdf

[33] NGN, Kiwa Gastec and AMEX. (2016). Leeds City Gate H21 Project.

5.2.8 Further low carbon energy opportunities

The sections above describe the findings from an evidence-based approach that was used to derive a shortlist of low carbon energy technologies deemed to have a strong potential to generate significant value to York, North Yorkshire and East Riding. The selection of these technologies does not mean, however, that other technologies and projects do not have the potential to generate substantial value in the region and deliver environmental and economic benefits.

6.0 Enabling Capabilities for a Low Carbon Economy

To fully realise the opportunities identified and overcome the structural challenges associated with moving towards a low carbon economy, a number of interdependent, cross-cutting enabling capabilities have been identified:

- Supply chains
- Infrastructure
- Investment
- Skills
- Awareness & behaviour
- Knowledge & innovation
- Policy

Considering these factors provides a framework to deliver the wider system change necessary to achieve substantial carbon reductions and secure opportunities for local economic growth. They provide the building blocks for a low carbon economy and ensure that we recognise and address key challenges from the outset.

6.1 Supply chains: Strengthen local supply chains for low carbon energy technologies

To ensure that we can achieve the forecast deployment of the prioritised low carbon energy technologies and maximise local value accrual, we need to support and strengthen the local value chains associated with the technologies, including:

- Energy efficiency: we will develop local value chains in the manufacture of traditional and bio-based insulation and fabric materials. Working with relevant partners to stimulate markets for these materials, we will ensure the development of such value chains also creates value in the local construction sector.
- Electric vehicles: to maintain competitiveness in component manufacturing, there is a need to consolidate and strengthen domestic supply chains, locally and nationally. Whilst there are currently no Tier 1 manufacturers of electric vehicles in our area, there are opportunities around the provision of components further down the supply chain.
- Heat pumps: to support the development of local value chains for heat pumps, we will explore the potential to establish the development of a technology 'hub' for heat pumps in the region, creating a cluster of specialists in heat pump technology. This would position the region well for increases in local and national deployment.
- Anaerobic digestion: our region already benefits from significant research assets in anaerobic digestion, which is beginning to stimulate the development of companies exploiting the value of local Intellectual Property, which we will look to enhance and establish as a nationally regarded cluster. We will also work to develop additional feedstock pathways and stimulate the further development of regional AD supply chains through collaborating with local farmers, foresters, local authorities and renewable energy sector.
- Biomass: we will support the development of a local fuel supply industry for biomass, including waste and virgin feedstock sources, and connect suppliers with customers to strengthen local supply chains. To further increase the potential for local value accrual for

biomass, there is also an opportunity to boost activity in the manufacture of biomass boilers and related equipment.

6.2 Infrastructure: Develop the infrastructure for a low carbon economy

Investment in infrastructure is needed to enable the deployment of a number of the prioritised low carbon energy technologies. This is particularly the case for technologies associated with smart transport and decentralised energy systems.

Smart transport systems

Local authorities within York, North Yorkshire and East Riding and the surrounding LEP areas share a common interest in the roll-out of charging infrastructure for electric vehicles. Due to the rurality of North Yorkshire and East Riding, the cost for installation of the necessary charging infrastructure is expected to be high, alongside the required improvements in electricity supply and mobile network coverage.[34] We will enable a more coordinated approach and convene the necessary financial and policy support to take a prioritised approach to achieving a comprehensive network of charging and payment infrastructure.

Decentralised energy systems

Infrastructure requirements are important in enhancing the feasibility of decentralised energy systems, such as for anaerobic digestion, heat networks and community energy schemes. Decentralised energy refers to energy generated off the main grid. Decentralised energy systems have the potential to provide more affordable, democratised energy for households through community energy projects and also present industrial opportunities. For example, small scale anaerobic digestion and biomass plants have the potential to use feedstock from farms and food processors to power rural businesses and communities. In addition, local industrial sites are currently facing challenges surrounding grid energy capacity. Self-generation on such sites via decentralised energy systems has the potential to overcome such challenges.

We will commission further research on the feasibility of low carbon energy technologies in our area, such as 'heat maps' to identify sources of heat, and commercial viability studies. We will then seek to support the development of the associated infrastructure to enable such opportunities to be exploited.

6.3 Investment: Support the development of innovative funding and business models to finance the low carbon transition

Unlocking clean growth opportunities requires substantial investments across all sectors of the economy and society. We will undertake a review of LEP funding and investments, alongside potential public and private sector investment available, to better understand how the necessary investment for projects can be secured. With a strong legacy in nationally significant energy assets, high quality research institutions and ambitious businesses located in our area, we have the exciting potential to become a testbed for emerging innovative technologies and demonstrate low carbon approaches. Hence we will work with partners to attract and secure inward investment to the area.

[34] Cambridge Econometrics & Element Energy (2018) A study on Low Carbon Value Chains and Economic Growth for York, North Yorkshire & East Riding

For the prioritised low carbon energy technologies, a substantial barrier to uptake is likely to be high upfront costs and difficulty in securing finance from investors. [35] To help overcome this challenge we will convene partners, stimulating public-private collaborations, to enable project development and a pipeline of investable projects. We will also seek to develop mechanisms to aggregate smaller projects, e.g., housing retrofits and EV charging points, to deliver the scale necessary to ensure commercial viability and significant carbon savings.

In addition, we will explore new, innovative approaches for investment and business models, such as, green bonds and energy as a service. Green bonds have been successfully applied to capitalise significant low carbon funds in a growing number of contexts. For example, households can divert investments in ISAs to local energy companies to earn a higher return whilst also benefitting the local economy and the environment.

6.4 Skills: Grow the skills base for the low carbon economy & address skills shortages

Skills, particularly in energy and construction sectors, underpin growth of the low carbon economy and hence growing the skills base is a critical enabler for decarbonisation. The roll-out of the prioritised low carbon energy technologies is highly dependent on labour, with the installation of energy efficiency measures being particularly labour intensive. Working with stakeholders, specific interventions will be designed to grow the local skills base to enable the development of a thriving low carbon economy.

As York, North Yorkshire and East Riding transitions to a low carbon economy, and focuses efforts on developing local low carbon value chains, we will work with partners to ensure that workers can easily migrate between declining and emerging sectors. This will mean that workers have sufficient opportunities for employment in growing low carbon sectors, particularly those workers who may be displaced by declining high-GHG-emitting sectors. To enable migration between sectors it is vital that workers are equipped with the right mix of skills and qualifications to carry out new and changing jobs. Through close collaboration with local employers, job centres and learning providers, we will anticipate the skills implications of growing low-carbon sectors (and declining high-emitting sectors) and identify potential skills shortages and gaps in the workforce. Ensuring that appropriate training and education programmes are in place will mean that local workers are equipped with the necessary skills to fully realise new job opportunities.

We will also seek to ensure that the labour market and skills issues related to the focus on developing low carbon opportunities are recognised in any other policy aimed at the local labour market, leading to a coordinated approach to increase employment in the region.

In addition, to ensure the environmental benefits of biomass, measures to encourage sustainable production and environmental management for biomass is needed. This should be complemented with raising awareness and encouraging households and firms to purchase local, sustainably sourced fuel.

[35] Cambridge Econometrics & Element Energy (2018) A study on Low Carbon Value Chains and Economic Growth for York, North Yorkshire & East Riding

6.5 Knowledge & Innovation: Build the knowledge base & innovation capacity for the low carbon energy transition

We will continue to build our local knowledge of technology performance and commercial viability in specific areas (e.g., heat networks, anaerobic digestion) and use these learnings to adapt our approach. We will also continue to develop our knowledge of the economic opportunities associated with low carbon technologies and their value chains. For example, developing heat maps to identify opportunities to exploit heat and feedstock maps to show availability of additional feedstock pathways for anaerobic digestion and biomass. Our strategy is intended to be a living document to reflect our growing knowledge and understanding of the low carbon energy transition and the opportunities it provides.

Coordination and collaboration is required to catalyse action at the scale needed to address the challenges and opportunities associated with climate change[36]. Strengthening mechanisms for connecting partners and developing new projects is important in developing a low carbon investment pipeline.

Fostering partnerships and greater collaboration between public, private and third sector organisations presents exciting opportunities to build innovation capacity and test new low carbon technologies and approaches. This includes stimulating knowledge transfer between universities and businesses. Strengthening of our low carbon energy knowledge base and innovation capacity will unlock opportunities to export knowledge, technologies and approaches, supporting economic growth and competitiveness.

In addition to local knowledge sharing, we will have a pro-active role in knowledge sharing with other local authorities and LEPs, such as through the North East, Yorkshire & Humber Energy Hub. Although all regions are different in terms of local assets and characteristics, lessons learnt or methods of best practice can still be transferred to York, North Yorkshire and East Riding.

6.6 Awareness & Behaviour: Raise awareness & influence behaviour change for the low carbon transition

To achieve the strategic outcomes of our Local Energy Strategy, we will promote the strategy and work closely with stakeholders to secure confidence in our strategic approach and gather further input to develop the implementation plan. In particular, to achieve the desired step change in deploying low carbon energy technologies, we recognise the importance of raising confidence and sharing best practice among local planning decision makers, such as, around new construction methods.

To secure the projected uptake of low carbon energy technologies, we need to raise awareness of the benefits of these technologies, particularly heat pumps, biomass boilers and electric vehicles. Targeted campaigns aimed at households and businesses will be required. For electric vehicles, there is a specific need to promote the availability of charging points in order to address range anxiety.

[36] University of Leeds (2018) Energy and Low Carbon Development Opportunities in York, North Yorkshire and East Riding and Kingston-upon-Hull: An Economic Analysis

We also need to learn how we can incentivise and enable behaviour change. This relates to both the adoption and use of low carbon energy technologies, as well as a shift towards more sustainable consumption patterns to reduce energy demand and carbon emissions.

6.7 Policy: Review and influence both local and national policy to support the shift towards a low carbon economy

Roles and responsibilities in the transition towards a low carbon economy falls across different layers and functions of government, as well as across businesses and households in the area.[37] National and local government hold significant policy levers to stimulate investment and action, of which a coordinated approach is needed to maximise impact. At a local level, we will comprehensively map the policy levers that are under the control of different departments in local government to inform the development of new policy initiatives that can stimulate the low carbon transition. For example, policy relating to clean air zones, cycle lanes and fabric efficiency of new housing developments.

Where possible, we will also seek to influence national policy where barriers currently exist. Representing the needs and concerns of local businesses and local authorities, we will work with the national government to shape policy in such a way that the climate and economic goals of York, North Yorkshire and East Riding are better realised.

[37] University of Leeds (2018) Energy and Low Carbon Development Opportunities in York, North Yorkshire and East Riding and Kingston-upon-Hull: An Economic Analysis

7.0 Implementation Plan

7.1 Governance & delivery

The York, North Yorkshire and East Riding LEP's Business Board will initially be responsible for providing strategic direction to the implementation of the Local Energy Strategy. In the context of the merger with Leeds City Region, governance arrangements will be agreed to ensure the effective alignment and delivery of our respective energy strategies.

The York, North Yorkshire and East Riding LEP will be responsible for the delivery of our Local Energy Strategy alongside key local partners. We will work with local stakeholders and the Leeds City Region LEP to collaboratively develop detailed work plans for projects and activities. This will include clear roles and responsibilities to ensure effective delivery.

We recognise the existing limited resource we have and scale of the climate change challenge we face. To build capacity and achieve the scale of action required we will:

- ensure that moving towards a low carbon economy is a cross-cutting priority across everything the LEP does,
- develop a network of key stakeholders collaborating effectively to influence decision making and deliver change, including leading by example, sharing best practice and peer reviews; and
- drive collaboration and action across the wider geography of the North East, Yorkshire and Humber Energy Hub and at the Northern Powerhouse level.

7.2 Project Pipeline

We have been working with local stakeholders to establish a pipeline of low carbon energy projects to achieve our strategic priorities. A summary of these projects can be found in Table 2. These include projects which partners are already underway with, and projects that require significant further development.

We will continue to work collaboratively with stakeholders to develop and implement these projects and identify additional projects that can help achieve our place-based strategic priorities.

Table 3. Summary of low carbon energy projects pipeline

Partner activity underway	**Requires development**

Project Summary	Next Steps
1. Support towns, rural communities and businesses to benefit from energy independence	
Community circular energy system *Harrogate Borough Council* New housing development designed with energy efficiency & circular low carbon solutions.	• In partnership with Harrogate Borough Council, convene relevant stakeholders to co-design a circular energy system for the new housing development. • Explore feasibility of using surplus heat from Allerton Waste Recovery Facility.
Northallerton District Heat Network *North Yorkshire County Council & Hambleton District Council* District heat network for public sector buildings	• Heat mapping has already been completed, and techno-economic assessments are underway. • Partners to evaluate preliminary findings and establish business case for progressing to detailed techno-economic feasibility study.
Scarborough/Filey District Heat Network *HNDU* Heat mapping study to assess potential to develop a heat network	• Heat mapping for Scarborough/Filey is already underway. • HNDU to assess viability of project prior to progressing to detailed techno-economic feasibility study.
Housing retrofits in remote rural areas Installation of domestic fabric efficiency, renewable heat pumps & biomass boilers.	• Identify areas of social housing in need of retrofitting and start aggregating demand. • Convene relevant partners to develop commercially viable housing retrofits. • Work with stakeholders and learn from best practice to better understand how to retrofit privately owned homes at scale.
Electric vehicle charging infrastructure for rural areas Coordinated roll-out of an extensive EV charging network.	• Convene local authorities, and other relevant stakeholders (e.g., Northern Powergrid) via a workshop to start mapping out a network of charging points across the geography. • Identify relevant funding streams to support the installation of charging points. • Convene local policy makers to discuss how local planning guidance and other policy can support installation of charging infrastructure in new developments.
Community energy Development of community-owned and community-led renewable energy generation in rural areas.	• Map existing community energy projects in our area, identifying benefits and challenges; review in the context of wider best practice and research. • Work with local policy makers to understand how Local Plans and planning guidance can support community-owned energy generation. • Identify potential sites for community energy and support community stakeholders to develop projects (e.g., securing investment from Northern Powergrid's community energy seed fund).
Biomass biodiversity project	• Work with existing AD operators and farms to realise opportunities to grow capacity.

	Developing and growing AD facilities and feedstock pathways in town and rural communities.	• Work with farmers to ensure that they are growing the most efficient feedstock (e.g., if greater farms efficiencies and profitability could be realised through using grass based vegetation from their farm instead of growing energy crops for AD, i.e. greater farm efficiency and profitability). • Work with local authorities to identify and realise opportunities to use food waste, verge cuttings and other grass cuttings to either feed into existing AD operators, or setting up new AD units on local authority land to produce heat, electricity, fuel for fleet vehicles and compost.
	Energy storage from offshore wind Develop opportunities for battery storage and, potentially, hydrogen storage.	• Explore potential and feasibility of battery storage and other storage options. • Identify suitable areas and stakeholders to develop projects.
	Supply chain opportunities from wind Develop opportunities to grow supply chains.	• Review existing supply chain mapping and activities (e.g., events) to support local manufacturing of parts for wind farms. • Identify gaps in support and additional opportunities, and work with businesses to address/realise these.
2.	*Create an energy Smart City of York*	
	York Smart Transport System *City of York Council* A smart transport system across the city, including EV charging points, traffic light sensors.	• Work with the City of York Council to understand existing challenges and demand for coverage of EV charging infrastructure (e.g., on street parking). • Work with the City of York Council and other relevant organisations to encourage active travel.
	Lowfield Green: community owned renewable energy *YorSpace* 19 low cost, sustainable, community focused homes powered by shared renewable energy (incl. solar PV, EV charging points).	• Support YorSpace to secure the remaining necessary investment for the project. • Draw in relevant internal and external expertise to support project development.
	Retrofitting existing housing stock Installation of domestic fabric efficiency measures to upgrade existing housing stock.	• Using heat detection technology, map houses in York with the highest need for the installation of domestic fabric efficiency measures. • Identify areas of housing in need of retrofitting and start aggregating demand. • Convene relevant partners to develop commercially viable housing retrofits.
3.	*Establish 'resource efficiency clusters'*	
	Circular Economy & Resource Efficiency Support (CERES) Programme for SMEs *West Yorkshire Combined Authority* Consultancy and grants to support SMEs become more	• Collate best practice from existing circular economy SME support programmes. • Engage local businesses to understand the challenges they face and support required. • Work with existing business support programmes to ensure complementarity. • Design a package of 2 day and 25 day support programmes.

	resource efficient and adopt circular operating models.	
	Opportunities from Drax's BECCS activities Use of captured carbon in surrounding industries.	• Work with Drax to understand how we can support the development of a cluster of businesses in Selby and the nearby area that can make use of the carbon captured through their processes. • Explore the potential for nearby breweries and other drinks manufacturers to use the captured carbon to carbonate their drinks.
	Resource efficient industrial site pilot Overcome energy capacity issues through resource efficiency and exploring opportunities for industrial symbiosis at Dalton Industrial Site.	• Work with businesses on Dalton Industrial Site to identify opportunities to improve resource efficiency and for industrial symbiosis. • Continue to work with these businesses to secure the necessary investment to realise opportunities identified.
	Heat capture from industrial processes, sewage, rivers Develop commercially viable opportunities to capture heat from industrial processes, sewage and rivers.	• Building on existing studies, develop a heat map to understand the opportunities to exploit heat at industrial sites, sewage, canals, rivers, mine water. • Convene relevant partners to develop pilot projects, such as use of surplus heat from Allerton Waste Recovery Park.
	Bio-based construction materials hub Develop local supply chains for sustainable building materials.	• Convene relevant stakeholders to develop local supply chains for sustainable building materials. • Explore potential to develop a local 'hub' for bio-based construction materials. • Support YorSpace and other local construction projects to secure funding to develop the market for such materials.
4.	*Create a circular agri-food sector*	
	Sustainably powered agricultural vehicles Explore opportunities to power agricultural vehicles using bio-fuels and hydrogen.	• Identify and convene partner organisations and industry to advance work in this area (e.g., University of York).
	Small scale AD on farms Using agricultural wastes and developing additional feedstocks for small scale AD plants.	• Engage with local farm businesses, via Grow Yorkshire, to identify opportunities to install small scale AD plants. • Work with BioVale's AD special interest group to understand how the LEP and partners can support increased AD across the area.
	Closed loop farm systems Develop opportunities on farms and the supply chain to reduce energy demand and emissions.	• Work with the University of York, BioVale, Biorenewables Development Centre and other relevant partners to better understand fossil fuel inputs and emissions produced on farms.

7.3 A systemic approach to moving towards a low carbon economy

In addition to identifying a number of projects to support the low carbon energy transition, we have also identified a series of actions to enable these projects and other low carbon opportunities to be realised. As outlined in the previous section, we need to strengthen local supply chains, develop infrastructure, secure investment, grow the skills base, develop knowledge and innovation, build awareness and change behaviour, and influence policy to achieve substantial carbon savings and economic benefits. Considering these elements ensures a truly systemic approach to moving towards a low carbon economy, taking into account the necessary requirements to both enable and catalyse systems change. Table 4 outlines a summary of actions associated with developing these enabling capabilities.

Table 4. Summary of action required to develop the enabling capabilities for a low carbon economy

Prioritisation of actions:

Immediate actions (next 6 months)	Short term actions (6 – 18 months)	Medium term actions (12 - 24months)	Long term actions (18 months+)

Cross-cutting enabler / Objectives	Specific Actions	
Supply chains: Strengthen local supply chains for low carbon energy technologies		
Support the development of the value chains for the prioritised low carbon energy technologies	• Building on existing local research such as Bio Vale's food waste mapping and the Local Nature Partnership's biomass biodiversity project, identify and map additional feedstock pathways for anaerobic digestion • Work with the Local Nature Partnership (LNP), local farmers, foresters, local authorities, renewable energy sector and local institutions to stimulate development of regional AD supply chains • Map forestry biomass assets and existing supply chains, and seek opportunities to connect suppliers with customers to support the development of a local fuel supply industry for biomass • Convene relevant stakeholders to understand how the local value chain for energy efficiency insulation and fabric measures (including materials and installers) can be developed • Convene relevant stakeholders to develop local supply chains for sustainable building materials • Convene stakeholders to identify opportunities to support increasing local activity in the manufacture of biomass boilers	
Explore the potential to develop regional specialisms in specific low carbon energy value chain activities	• Facilitate the development of local networks for EV component manufacturing & identify relevant export opportunities as they arise • Explore the potential to promote the development of a technology 'hub' for heat pumps in the region, creating a community specialising in heat pump technology • Explore the benefits of declaring the area as a 'renewable heat zone'; a region where manufacturers, installers, and district network operators can work together, learning how to address individual barriers to uptake, to penetrate the market and increase uptake of heat pump technology	

Infrastructure: Develop the infrastructure for a low carbon economy		
Support the development of a network of EV charging infrastructure, particularly in remote rural areas	• Convene local authorities to develop a coordinated approach to the roll-out of EV charging infrastructure and seek funding opportunities • Identify areas of high demand to prioritise the roll-out of charging infrastructure • Support the development of business case for an EV solution for rural areas by aggregating demand • Map energy supply & mobile coverage issues	
Following further research & engagement with local stakeholders around the potential application of low carbon energy technologies locally (e.g., heat maps, resource intensives study), support the development of the required infrastructure that underpins roll-out	• Building one existing research, develop a heat map to understand the opportunities to exploit heat at industrial sites, sewage, canals, rivers, mine water • Commission a Clean Growth Audit to better understand energy, carbon and resource intensives in our area • Work with stakeholders to identify further infrastructure requirements for low carbon energy technologies • As infrastructure requirements are identified, work with partners to develop a process to support projects	
Investment: Support the development of innovative funding and business models to finance the low carbon transition		
Undertake a review of LEP, public and private sector investment available	• Undertake a comprehensive review of funding and other resourcing mechanisms to deliver low carbon energy projects • Work with partners to exploit opportunities identified in the funding and investment review	
Secure and promote funding opportunities	• Signpost businesses to existing relevant local and national funding support via the Growth Hub • Explore establishing a fund to provide financial assistance for AD projects in the area • Explore options to establish local funding and grants for households in the YNYER region seeking to install a biomass heating system	
Convene partners & aggregate demand for small projects	• Map out demand for smaller low carbon projects and seek opportunities to aggregate demand (e.g., retrofitting off-gas grid properties, EV charging areas), particularly in rural areas • Support access to heat pumps at a low cost by connecting households and firms with financial institutions willing to provide the necessary funds to install new systems, at favourable rates	
Develop new project development mechanisms	• Work with partners to review innovative approaches to project development and low carbon investment that could secure funding for the area	
Develop new investment mechanisms, models and approaches	• Explore potential for community energy, including: learn from best practice (e.g., in Cornwall); bring together representatives from community energy groups to understand the challenges they face in making things happen • Explore feasibility and potential impact of creating a forum to connect local businesses operating in the low carbon value chains to appropriate investors • Explore the potential for new investment mechanisms to finance low carbon technology development and infrastructure (e.g., green bonds) • Explore potential for new consolidated, sector-facing programmes where new financing support (e.g. EIB or ELENA funding) and business models (e.g. area specific revolving funds) could enable investment at scale over time	
Skills: Grow the skills base for the low carbon economy & address skills shortages		
Produce comprehensive maps to show skills shortages in growing		

sectors & expertise in declining sectors	• Map out declining high emitting sectors and the skills associated with these sectors • Map out existing and anticipated specific skills shortages in growing low carbon sector	
Co-design interventions with partners to address skills shortages and developing specialist skills (e.g., training and skills development programmes, best practice workshops)	• Work with partners to develop workshop specialist skills in installation and manufacture of EV charging points and vehicle components • Invest in training and best practice workshop programmes, in collaboration with local education providers to ensure necessary skills base within local labour market for insulation* • Support the increased need for trained heat pump installers in the area through working with local education providers and existing local heat pump installers to promote apprenticeships within these firms • Facilitate workshops to share best practice techniques for sustainable production and environmental management for biomass	
Knowledge & Innovation: Build the knowledge base & innovation capacity for the low carbon energy transition		
Continue to improve our understanding of the opportunities to roll-out low carbon energy technologies locally	• In collaboration with surrounding LEPs, via the Energy Hub, develop a framework of experts for specific low carbon energy technologies and projects (in order to develop our understanding of the application of technologies locally) • Develop a heat map to understand the opportunities to exploit heat at industrial sites, sewage, canals, rivers, mine water • Map forestry biomass assets and existing local supply chains • Build on existing research and map AD streams that biomass streams could be exploited • Explore potential and feasibility of battery storage and other storage options, particularly in rural communities	
Convene partners and networks to build the research & development (R&D) capabilities of the area in relation to low carbon energy technologies	• Identify local opportunities for low carbon innovation in the built environment, including the design of new homes, R & D in materials and manufacturing • Convene relevant partners and explore opportunities for research focused on increasing the efficiency of anaerobic digestion • Establish a baseline of existing R & D for electric vehicles, and seek opportunities to increase/improve activities • Identify and convene partner organisations to advance research & trials in the area of sustainably powered agricultural vehicles • Work with the University of York and other relevant partners to better understand fossil fuel inputs and emissions produced on local farms	
Enable and incentivise local knowledge sharing	• Establish mechanism for sharing best practice, lessons learnt and opportunities for collaboration in the roll out of low carbon technologies locally • Review alignment of industry and academic research with strategic priorities and identify opportunities for collaboration and knowledge sharing (e.g., via Bio York) • Support knowledge transfer between local universities and businesses • Build capacity and sharing of best practice among local planning decision makers, particularly around new construction methods	
Share & learn from best practice beyond the local area	• Share best practice, lessons learnt and opportunities for collaboration with surrounding LEPs via the North East, Yorkshire & Humber Energy Hub • Share knowledge and opportunities for projects at scale at the Northern Powerhouse level • Inspire local stakeholders with global best practice	

Awareness & Behaviour: Raising awareness of the benefits of the low carbon energy transition		
Build a 'smart network' of key stakeholders to promote awareness of the strategy and build capacity for delivery	• Establish a sub-group of board members and external key influencers to support the development of the delivery plan and prioritisation of activities • Work with partners to map key stakeholders including those already involved and those who need to be involved • Establish a network of these stakeholders and appropriate communication mechanisms • Work with these core stakeholders to develop simplified, targeted messages and visual assets to promote the strategy to different stakeholder groups	
Promote the uptake of low carbon energy technologies through raising awareness with communities, local authorities and businesses of the application, practicalities and benefits (both environmental and monetary)	• Work with partners to develop information campaigns to promote the benefits of energy efficiency measures, renewable heat pumps and biomass boilers to households • Work with partners to understand the public education needed to communicate why we need to move towards a low carbon economy and the behavior change required. • Work with stakeholders to determine the need and feasibility of establishing a 'one stop shop' scheme to bring together customers, suppliers, installers, finance and external funding for vulnerable groups in one place • Encourage households and firms to purchase their biomass fuel from local, sustainable sources • Work with partners to develop information campaigns aimed at highlighting the benefits of EVs and available infrastructure to address range anxiety • Convene and engage with businesses to better understand their challenges installing low carbon energy technologies and support the development of projects	
Develop commitment from local authorities (and other relevant organisations) to support the delivery of the Local Energy Strategy	• Work with local authorities to co-create a set of high level commitments in specific areas such as housing, transport and procurement to support the implementation of the strategy	
Policy: Review and influence both local and national policy to support the shift towards a low carbon economy		
Map local policy levers available with Local Authorities and other relevant partners	• Work with North Yorkshire County Council to understand how North Yorkshire's Spatial Framework can be used as a strategic enabler to achieve our low carbon place-based priorities • Work with local authorities to map local policy levers available to support uptake of low carbon energy technologies, including: – policy levers to support retrofitting of existing housing stock – policy incentives (in building regulations / new developments/ planning regulations) to address the additional costs of sustainability measures in new housing developments – policy to support AD digestate processing and create a fully-functioning market for this product – policy to facilitate R & D and to create incentives for private investors to support innovation and/or increase uptake of low carbon technologies (incl. Funding of local R & D, subsidies and grants, demonstrations of technology applications)	

	• Following the mapping exercise, work with local partners to develop the necessary local policy to accelerate the low carbon transition	
Influence national policy where relevant	• Following the mapping of local policy levers, identify gaps in local influence where national policy changes are needed • Work with relevant partners to influence national policy (e.g., working with the NFU to lobby national government to extend funding for AD and further incentives deployment)	

* Specifically need to address skills gaps in the construction sector (overcome quality issues around site builders installing insulation & other low carbon measures properly). We will learn and build on existing good practice in the area, such as Scarborough Skills Village.

7.4 Performance Monitoring

Our energy priorities and implementation plan will continue to be adapted as necessary and a full review will be undertaken every 2 years. Projects and their performance will be tracked using the BEIS project tracker. We will develop a series of environmental, economic and social metrics and indicators to measure the impact of projects and activities.

We will also work with stakeholders to develop quantifiable targets to reflect our vision statement, including specific targets for reducing carbon emissions, improving quality of life and increasing economic competitiveness. This will form part of a performance monitoring framework to measure our overall progress in moving towards a zero carbon economy, including strengthening of our enabling capabilities (e.g., skills, infrastructure and investment). As part of this, we will explore measurement approaches to include the important role of natural landscapes as carbon sinks.

8.0 Next Steps

Key next steps for translating the strategy into action include:

1. **Co-creating work plans**: To ensure the effective delivery of our strategy, we will be working collaboratively with stakeholders to develop detailed work plans for the outlined pipeline of projects and actions associated with our strategic cross-cutting enablers. Whilst there will be some activities that the LEP will directly lead, we intend to provide the necessary support to empower partners to lead on ambitious projects and scale their impact.
2. **Co-designing a performance monitoring framework**: We will develop a series of environmental, economic and social metrics and indicators to measure the impact of projects and activities. This will form part of a performance monitoring framework to measure our overall progress in moving towards a low carbon economy, including strengthening of our enabling capabilities (e.g., skills, infrastructure and investment).
3. **Ensuring low carbon is a cross-cutting priority:** We will ensure that the strategic priorities appropriately feed into our Local Industrial Strategy and other relevant policy documents to ensure that accelerating the shift towards a low carbon economy is a cross-cutting priority across LEP activities and our influence.

Beyond local action, to achieve the desired uptake of low carbon energy technologies in York, North Yorkshire and East Riding, research commissioned to develop our strategy has proposed the following national policy recommendations:

- Ensure the continuation of national energy efficiency support schemes, such as the Green Deal and Warm Homes Fund, and that the design of any new or replacement version of energy efficiency funds are open to as many households as possible.
- Explore policy interventions that incentivise or regulates improvements in insulation and other energy efficiency measures for new and existing building stock.
- Extend initiatives to support AD, such as RHI biomethane for the gas grid, Renewable Transport Fuel Obligation (RFTO) for biomethane for transport and Feed in Tariffs (FiT) for electricity produced from AD, and further incentivise the deployment of AD.
- Deliver a large-scale national information campaigns to raise awareness and understanding of the benefits of heat pumps to both households and businesses.
- Develop more stringent carbon emissions standards on new builds or heating system replacements.
- Introduce performance and labelling standards for heat pump technology (in order to increase confidence about choosing and installing a system).
- Develop installer certification standards specific to heat pump systems to make choosing an installer more transparent.
- Introduce better quality standards for biomass boilers to raise efficiency and the attractiveness of biomass for heat.

Appendix 1 – Outline of research commissioned

	WP1. Energy Baseline Report	**WP2. Energy Technology Appraisal**	**WP3. Low Carbon Energy Value Chains Study**	**WP4. Energy & Low Carbon Development Opportunities**
Geographic Scope	York, North Yorkshire & East Riding; Leeds City Region; Sheffield City Region	York, North Yorkshire & East Riding; Leeds City Region	York, North Yorkshire and East Riding	York, North Yorkshire, East Riding and Kingston-upon-Hull
Purpose/Description	The report aims to provide a robust evidence base for the current and future energy demand, whilst also considering the economic contribution and skills requirement of the energy sector.	The energy technology appraisal aims to provide an overview of the different technologies that could play a role in a future energy system, assessing the extent to which each technology could deliver against a range of criteria.	The study aims, firstly, to provide a robust shortlist of low carbon energy technologies that can deliver substantial carbon savings and economic impacts, and, secondly, to map out their associated value chains.	The study analyses baseline trends in energy use, energy bills and carbon emissions; evaluates the different energy and low carbon options that could be adopted; and identifies the most cost and carbon effective pathways for energy and low carbon development.
Key Outputs for York, North Yorkshire & East Riding	• Current energy consumption patterns • Profile of industrial emissions • Profile of energy demand • Economic output of the energy sector • Current employment/skills profile of the energy sector • Current skills deficiencies in the energy sector • Future prospects for output and employment • Skills supply-demand analysis	• Literature review & stakeholder interviews: national, regional & local context • Ranked list of energy technologies for heat, electricity, smart grids & transport (assessment based on current maturity, roll out potential, barriers and constraints, value for money, affordability for end users, job creation potential, carbon reduction potential, GVA, economic growth)	• Shortlist of five low carbon energy technologies (rationale based on environmental & economic impacts) • Value chain assessment: identification of supply chain opportunities, potential economic impacts	• Energy trends from 2000 to 2018 and forecasts towards 2035 • Scenario modelling & forecasts for adoption of energy and low carbon opportunities • Investment, energy and carbon case for action • Energy and low carbon opportunities by sectors