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Lancashire Energy Strategy

Energy Strategy for the Lancashire Local Enterprise Partnership

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Contents

Executive summary

Lancashire Enterprise Partnership (LEP) has recognised that industry is at the forefront of delivering clean economic growth and that Lancashire has a big part to play in the new energy economy. The country as a whole is experiencing a rapid change in the delivery of energy services through innovative technologies and the opening up of new markets through deregulation. National government have recognised the need for this shift to achieve legally binding carbon reduction targets and have looked to support this further through recent publications such as the Clean Growth Strategy. This could offer significant opportunities for local business and communities to benefit. Lancashire has unique strengths within the energy space and the wider market which would allow it to capture the advantages that this transition will afford, and mitigate risks to existing industries. Strengths such as the large-scale renewables sector, nuclear, shale gas and other large energy supply industries are complimented by a flourishing engineering and technology sector supporting small scale renewable installations.

At the same time, Lancashire is an area with ambitious growth plans; it is set to create 50,000 new jobs, 40,000 new homes and £3 billion additional economic activity by 2025. Energy is a vital component in the realisation of these plans in terms of the availability and reliability of supply to be able to support this growth trajectory. Within the energy sector, there are also opportunities to expand high-value supply chains supporting technological innovation.

This energy strategy has been commissioned by the LEP with support from the Department of Business and Industrial Strategy (BEIS). Its objectives are to:

- Highlight opportunities for Lancashire to deliver its growth potential through innovative and low carbon related business opportunities.
- Identify barriers to growth from current energy infrastructure.
- Develop an achievable action plan required to mitigate risks and capture the opportunities for Lancashire that come with change in the national energy system.

The energy strategy will demonstrate that the development in clean technologies and low carbon supply chains is not mutually exclusive with other development streams and can provide a significant contribution to the overall economic aims of the LEP and wider stakeholders. Furthermore, it will set out a roadmap for how this could be delivered, who is responsible for ensuring the Lancashire meets its ambitious targets and when can this be achieved.

Assessing the local energy system

The strategy has been built on a review of the existing evidence base of data and documentation on all aspects of the local energy system. This included national datasets of energy consumption across the region by sector, fuel type and location. This data was benchmarked against national averages to be able to identify regional differences and examined to understand the strengths and weaknesses of Lancashire's

use of energy today, and the aspects of energy usage in the region that may be a threat or present an opportunity for growth.

Local datasets were also incorporated, the key to this exercise was understanding what had already been achieved. This was particularly important in areas such as energy efficiency and supply, strengthening opportunities in the low carbon supply chain and understanding what was still proving to be a barrier to development. There is a significant repository of data collated which will help to refine and target the strategy further.

Key findings included;

- There is a significant potential for wind power across the county which has resulted in the development of both offshore and onshore wind farms to exploit this. There is technically yet more potential to be exploited as even in the area with the most significant wind farm developments (Rossendale which includes Scout Moor at 65MW which is one of the largest installations in England) this only accounts for 22% of what could potentially be installed. However, it is noted that the planning environment has changed, with more barriers to this type of development, therefore it may be that focus on the offshore industry may be an easier path to take advantage of this resource.
- There is an established nuclear industry and associated supply chain, and a recently uncovered resource in shale gas. Despite increasing uncertainty about the long-term future of the nuclear sites, key businesses are finding new markets associated with decommissioning, new nuclear and the potential development of modular reactor technology.
- There is a flourishing but underreported technology sector providing high-value design and manufacturing skills to the small-scale renewable energy industry.
- Carbon emissions are dominated by large industries such as the production of cement. Carbon emissions per capita are generally in line with national averages until these industries are taken into account and then large spikes indicate the magnitude of the carbon impact.
- Generally, connections to both the gas and electricity network are currently not providing a barrier to development with good access to both infrastructures. However specific key development sites can lack the infrastructure to be developed quickly, whilst for regions such as the Forest of Bowland, lack of access to the gas grid is increasing instances of fuel poverty as residents are forced to pay higher prices for alternative fuels.

Looking to the future

2030 Vision Statement

Lancashire has well-developed industry in the low carbon sector, sustaining secure high skilled jobs and supporting further energy efficiency and decarbonisation improvements in wider homes and businesses

For the LEP and Local Authority partners six key indicators are proposed:

Insulate	Improving energy efficiency of hard to treat properties.
Heat	Delivery of a city centre heat network within a Lancashire urban area.
Jobs	Supporting the creation of jobs in the energy and low carbon sectors.
Low carbon	Carbon emissions reduced in line with UK targets, a 57% reduction on 1990 levels by 2032.
Active	Double journeys by bike and increase the number of people walking by 10% by 2027 in line with Lancashire's Cycling and Walking Strategy
Productivity	Improve energy productivity by 20% in commercial and industrial sectors

Forming the vision

The evidence base and the national context for transformational change in the national energy sector was considered alongside in-depth analysis of strengths, weaknesses, opportunities and threats relating to Lancashire's energy system. This work and consultation with stakeholders have informed the development of a vision for energy in Lancashire. In order to achieve this strategy, a number of key priorities were developed:

Key Priority 1: *Build the low carbon supply chain in areas of existing strength*

Key Priority 2: *Supporting businesses to improve energy productivity*

Key Priority 3: *Accelerating the shift to low carbon transport*

Key Priority 4: *Developing heat networks*

Key Priority 5: *Improving domestic energy efficiency*

Key Priority 6: *Decarbonisation*

Delivering the vision

The vision is an aspirational target for 2030 and achieving this will require a number of work streams by a range of stakeholders. This strategy aims to articulate the primary tasks by work stream and assign action owners in order to make it clear who needs to do what by when in order to drive towards the same outcomes. Some of the key actions to be undertaken are set out below, with associated timescales and action owners.

Action	Timescale	Owner
LEP spread recognition of North West low carbon technology focus	December 2018	Lancashire LEP
Establish high energy users group	December 2018	Steering Group
Update Lancashire transport plan	When up for renewal	Lancashire County Council
Disseminate information to industry on heat network opportunities	December 2018	Lancashire LEP
Develop exemplar energy efficiency retrofit demonstration project(s) to show best practice and normalise new or innovative technology	2019	Lancashire LEP
Creation of dashboard to monitor progress against carbon targets	December 2018	Steering Group

Ensure that best use is made of remaining ERDF budget and Shared Prosperity Fund to deliver on these actions	2020	Steering Group
Seek to harness support of the new North West Energy Hub to support these actions moving forward	2018	Steering Group
Reflect Lancashire's clean growth strengths and aspirations within the Local Industrial Strategy	2019	Lancashire LEP

The matrix below sets the priority areas against the targets and the key actions associated with this.

Priority area	Target measure	Key actions
Low carbon supply chain	Increase jobs in the sector	• Spread recognition of low carbon sector • Support local technology development • Establish low carbon project database
Business productivity	20% improvement in energy productivity	• Create high energy users group • Utilise Enterprise Zones to demonstrate best practice
Low carbon transport	Double journeys by bike	• Support active travel strategy • Explore street light EV charging • Update Lancashire Transport Plan
Heat networks	Deliver a City Centre heat network	• Develop database of opportunities • Share best practice case studies • Explore local authority appetite to investment
Domestic Energy Efficiency	Improve energy efficiency of hart to treat stock	• Work with local installers • Utilise ECO local flexibility provisions • Develop exemplar energy efficiency projects
Decarbonisation	57% reduction on 1990 emissions by 2032	• Commit to UK targets • Create dashboard to monitor progress • Demonstrate leadership in the public sector

1. Introduction

This scope of this strategy encompasses a review of current energy consumption, carbon emissions and constraints within the energy system, an assessment of energy strengths and weaknesses within Lancashire and projections of future energy consumption and carbon emissions in relation to future planned growth. This document also sets out the LEP's energy vision for the future and a plan of how to get there.

1.1 National

In recent years the government has been revising and updating its policies relating to the UK energy system. There has been renewed focus on the legally binding 2050 climate change targets with the signing of the Paris agreement, and an increased impetus looking at how these targets could be met. The government's approach to energy policy is driven by the trilemma of carbon reduction, energy security and low cost to consumers.

1.1.1 Industrial Strategy

The government's Industrial Strategy Green Paper of January 2017 (1) set out ten pillars to drive UK growth, including particular focus on science, research and innovation. The Green Paper also set out a number of ways in which investment in energy infrastructure and support for the low carbon economy would play an important role in delivering the country's growth ambitions.

This was followed up by the Industrial Strategy White Paper (2) in November 2017 which set out five foundations of productivity to transform the economy; ideas, people, infrastructure, business environment and places. This also set 'Grand Challenges' to put the UK at the forefront of the industries of the future in areas of:

- Clean Growth
- AI and Data Economy
- Future of Mobility
- Ageing Society

Government committed to £725m of funding for challenges within the second wave of the Industrial Strategy Challenge Fund, to capitalise on Britain's strengths in research and innovation, and help deliver the Grand Challenges, potentially investing in areas such as:

- Clean Growth
  - Transforming construction
  - Prospering from the energy revolution
  - Transforming food production

- AI and data
  - Audience of the future
  - Next generation services
- Ageing Society
  - Data to early diagnosis and precision medicine
  - Healthy ageing

1.1.2 Clean Growth Strategy

The Clean Growth Strategy sets out how the UK will grow the national income while cutting greenhouse gas emissions, in line with the target to reduce carbon emissions by 80% by 2050 and the five year carbon budgets leading up to that. The Clean Growth Strategy covers the period up to and including the fourth and fifth carbon budgets, leading up to 2032. Lancashire County Council responded to the strategy particularly welcoming the ambitions and proposals to improve energy efficiency of homes and accelerate the shift to low carbon transport.

There are a number of commitments made as part of this strategy, (3) in several key areas, including:

- Improving business and industry efficiency
- Improving homes
- Accelerating the shift to low carbon transport
- Delivering clean, smart, flexible power
- Public sector leadership

A few of the key commitments relevant to Lancashire are highlighted below.

Improving homes

- An extension of ECO out to 2028 including a review of the best way to do this beyond 2022
- Consulting on the regulations requiring minimum energy efficiency standards in the Private Rented Sector (PRS) from April 2018 and developing a long-term trajectory to improve energy performance of as many as possible to EPC Band C by 2030
- Phasing out the installation of high carbon fossil fuel heating in new and existing homes currently off the gas grid during the 2020s, starting with new homes
- Target of as many fuel poor homes as possible upgraded to energy efficiency band C by 2030 in England

Most areas of the UK, including Lancashire, have significant energy demands from domestic properties. The extension of ECO funding will enable more of the ‘hard to treat’ properties with poor energy efficiency to be targeted with retrofit measures to improve their energy consumption.

Across the national housing stock, the sector with the highest proportion of F and G SAP ratings is the private rental sector (PRS). Conversely, councils and housing associations have been very proactive in upgrading their worst performing stock, typically with internal targets to achieve a SAP C rating across their portfolio within the near future. Owner occupied properties are typically less likely to have undergone retrofit, but there has been more progress made here than in the private rental sector, where landlords have little to no incentive to improve the energy efficiency of their stock in a market where housing demand often exceeds supply. The minimum energy efficiency standards for the PRS have been signposted for some time and will make it illegal to rent out F and G rated properties, although whether this can be effectively enforced remains to be seen.

Plans to phase out installation of high carbon fossil fuel heating in homes off the gas grid could be important for Lancashire, given the rural nature of some of the area. Focus is initially on new homes, which are easier to tackle, but there will also be policies put in place to encourage retrofit of low carbon heating systems to existing properties using oil, LPG or solid fuels.

A contributing part of this will be the continuation of the Renewable Heat Incentive (RHI) to encourage take-up of technologies such as heat pumps, biomass boilers and biomethane. Beyond this government are considering a range of policy options and will involve consumers and industry in developing new policy.

Government are also consulting on ways to improve energy efficiency in owner-occupied housing stock amongst householders who are able to pay for retrofit. This consultation was the *Call for Evidence on Building a Market for Energy Efficiency,* which closed in January 2018. This may lead to future policy interventions designed to stimulate the retrofit market in this sector.

Low carbon transport

- To meet the 2050 targets, almost every car and van will need to be zero emission by 2050. The Government has announced an end to the sale of all new conventional petrol and diesel cars and vans by 2040
- The Government will set out further detail on a long-term strategy for the UK's transition to zero road vehicle emissions by March 2018.
- Commitment to spending £1 billion to drive the uptake of ULEVs

The end of petrol and diesel vehicle sales by 2040 will not mean an end to petrol and diesel vehicles on the roads immediately, however this policy means a decline in numbers of these vehicles is expected leading up to this date and an increase in alternatively fuelled vehicles, such as hydrogen and electric vehicles, is likely to be seen.

The major impacts of this are twofold, firstly the growth of electric vehicle numbers will need to be accompanied by a growth in charging points and associated infrastructure to ensure travel remains unimpeded. As electric vehicles are produced that can travel longer distances without recharging, the importance of rapid chargers increases. These are chargers such as the Tesla Supercharger that require over 50kW of power and can charge a battery to 80% in 30 minutes. Four fast electric vehicle charging points require the same network capacity as a large supermarket. The

distribution of these chargers will potentially be limited by the pre-existing grid constraints in Lancashire which could prevent the drawing of such significant amounts of power in certain areas, potentially requiring innovative solutions such as chargers co-located with generation and storage to make this viable.

Without careful management, this transport revolution could place regional power networks under strain, requiring reinforcement costs of between £200m and £350m by 2035. (4) Electricity North West intend to work closely with industry partners and customers to explore strategies (e.g. staggered charging times) to facilitate the roll out of electric vehicles without incurring such high costs.

Secondly, industry in Lancashire that is part of vehicle manufacturing supply chains could find that this has a significant effect if there is a decline in demand for traditional internal combustion engine (ICE) models. Almost all major car manufacturers have either already produced an electric vehicle or are working on their first model, which shows the direction of travel of the industry. While much of this was already underway, the government announcement has provided added impetus to manufacturers to manoeuvre themselves ahead of the competition. This represents both a problem and a potential opportunity, as new technology requires new supply chains to be put in place to deliver this. Suppliers could be well placed to use their existing relationships with manufacturers to diversify and fill newly emerging supply chain gaps.

Business and Industry

- Enable businesses and industry to improve energy efficiency by at least 20% by 2030.
- To achieve this Government will put in place a simpler, more ambitious and long-term regulatory framework to:
  - Make it easier for business to identify energy savings
  - Ensure improvements in the leasing sector and in new commercial and industrial buildings
  - Help to understand how the Government can encourage greater investment in energy efficiency measures and technologies
- Phase out the installation of high carbon forms of fossil fuel heating in new and existing businesses off the gas grid during the 2020s, starting with new build

These policy areas are focused on helping businesses cut energy consumption, and through this cut energy costs, making them more competitive. Businesses in Lancashire could benefit from energy efficiency support to become more competitive.

One of the options being considered is establishing a minimum energy performance standard for commercial buildings to incentivise landlords to invest in energy efficiency measures which could reduce energy consumption for their tenants.

Other than energy efficiency Government are particularly interested in phasing out high carbon forms of heating, such as oil. This will initially be targeted using the Renewable Heat Incentive (RHI) but a successor policy to this is likely to be put in place, potentially including stronger carbon pricing.

Smart, flexible power

- Around £900 million of public funds between 2015 and 2021 in research and innovation invested in the power sector including:
  - £460 million in nuclear to support work in areas including future nuclear fuels, new nuclear manufacturing techniques, recycling and reprocessing, and advanced reactor design
  - £265 million in smart systems to reduce the cost of electricity storage, advance innovative demand response technologies and develop new ways of balancing the grid
- Planned progression of discussions with developers to secure a competitive price for future nuclear projects in the pipeline
- Offshore wind support:
  - Funding worth up to £557 million for renewable energy auctions, with the next one planned for spring 2019
  - Developing a Sector Deal for offshore wind with industry, which could result in 10 gigawatts of new capacity
  - Innovation funding support for offshore wind turbine blade technology and foundations

Offshore wind support from the government offers a potential opportunity given the existing development off the Lancashire coast and the training to support this industry at Blackpool College. Potential support for the nuclear sector could be important given the existing strength in nuclear supply chain industries within Lancashire.

Grid constraints within Lancashire, as discussed in the following sections, mean that there are particular opportunities for smart grids and flexible power provision to alleviate some of these constraints.

The Distribution Network Operators (DNOs) that own and operate the electricity infrastructure within Lancashire is responsible for the network and is currently transitioning from DNO to Distribution System Operator (DSO) which will involve more active local management of network load, generation and constraints (4).

The government's investment in innovation includes £265 million in the area of smart systems aiming to reduce the cost of electricity storage, advance innovative demand response technologies and develop new ways of balancing the grid. These are technology areas that could prove beneficial to the Lancashire, and indeed it may be possible to identify sites within Lancashire that could operate as pilot sites for feasibility studies investigating these opportunities.

The Feed-In Tariff is due to be phased out in 2019, so the update promised is welcome as it will provide clarity on the likely development of small-scale renewable generation beyond this. Renewable energy auctions – through the Contracts for Difference (CfD) mechanism will continue, these are focused on large-scale renewables.

Public Sector Leadership

- A commitment to introduce a voluntary public sector target of 30% reduction in carbon emissions by 2020-21
- Provide £255 million of funding for energy efficiency improvements in England and help public bodies access sources of funding

This is something that should be monitored closely, as while the initial proposed target is only voluntary there is likely to be a consultation on plans to introduce a mandatory target by 2025. This will require local authorities to review their Carbon Management Plans and take steps to reduce carbon emissions in line with the targets put in place. Funding for energy efficiency improvements will enable these targets to be met, Salix funding has been leveraged successfully for these objectives nationally, supporting over 16,000 projects to date.

Local leadership

- Support for local energy strategy development
- Local Energy programme to support local areas to play a greater role in decarbonisation
- Support for LEPs and local authorities to access clean technology innovation funds

The Clean Growth Strategy recognises that moving to a productive low carbon economy cannot be achieved by central government alone; it is a shared responsibility across the country. Local areas are best placed to drive emission reductions through their unique position of managing policy on land, buildings, water, waste and transport. They can embed low carbon measures in strategic plans across areas such as health and social care, transport, and housing.

The Government have recognised the importance of local action on decarbonisation and so are putting in place resource to support LEPs and local authorities to take action.

1.1.3 Government support for local energy

BEIS local energy hubs

BEIS have identified that barriers to progression towards a low carbon economy at a local level include 'limited capacity and capability amongst Local Enterprise Partnerships (LEPs) and local authorities' to deliver local energy investment.

The BEIS Local Energy programme is designed to address the gap in the capacity and capability of LEPs and other local organisations. Part of this involves funding LEP Energy Strategies to understand the opportunities and challenges across each LEP area.

The overall aim of the BEIS proposal is to provide a series of local energy hubs across England (5) that, via staff and funding, will:

- Develop and prioritise a pipeline of local energy projects identified through LEP and partner energy strategies and take these projects from concept to business cases that attract investment and are then taken forwards to implementation by other partners.

- Help coordinate local action across several local LEP areas.
- Provide a local good practice link between local LEP activity, other local LEP areas, and national Government.

This will take the form of around five hubs established around the country that will provide regional support to LEPs and Local Authorities for energy. The North-West Hub is proposed to be led by Liverpool LEP, with the Liverpool City Region Combined Authority acting as the grant recipient, building on their strength in low carbon project development. The Hub will focus on supporting projects that are ubiquitous to all authorities in the North West, including:

- Energy Efficiency, generation and smart distribution across the public estate and social housing
- Building integrated clean and smart generation for larger sites and underused land, including heat and power networks and storage (electric/hydrogen)

There will also be capacity to enable better sharing of best practice in other areas between the local LEPS and local authorities.

Heat network support

One element of government support for local energy that is well established is the funding from the Heat Network Development Unit (HNDU). This has been running since 2013 and was set up to address the capacity and capability challenges which local authorities identified as barriers to heat network deployment in the UK.

Government are keen to support the development of heat networks because they can enable a transition to lower carbon heating sources, and can be effectively implemented using a variety of different heat supply technologies. Once the infrastructure is in place, even if carbon-emitting fuel sources such as gas boilers are used to supply the heat initially, it will be possible in future to replace the central plant used to supply the heat with lower carbon options without causing any disruption to the homes or businesses supplied, therefore enabling easier decarbonisation of heat supply.

HNDU provides support to local authorities in England and Wales through the early stages of heat network development:

- Heat mapping
- Energy masterplanning
- Techno-economic feasibility
- Detailed project development
- Early commercialisation

This funding enables local authorities to explore the potential opportunities for heat networks within their towns and cities, and move from there through feasibility to initial commercialisation to a point where a local heat network may become commercially viable.

Many of these studies have identified networks where the commercial returns are marginal and are unlikely to be taken forward by the private sector; this has led to capital funding being made available by government to support these in order to overcome initial economic barriers to investment. This funding is known as the Heat Networks Investment Project (HNIP), and is a £320m capital investment programme providing support for the capital costs of heat networks. So far £24m of support has been provided to a total of nine local authority projects.

Local context
Preston City Council have had a heat mapping and masterplanning study carried out focusing on North West Preston, which was completed in August 2017, this study concluded that:

"Whilst it would be technically possible to deliver a heat network to meet the needs of the housing developments, this analysis suggests it is not a strong candidate for progression because the financial case for it is very weak, and the carbon case not sufficiently strong to justify taking it forward."

This was due to the relatively low density of heat loads in the area, which meant that the financial costs of the infrastructure were too great compared with the potential revenue from the scheme. This does not necessarily mean that other schemes could not be taken forwards within Lancashire. A further study is being considered focused around the University of Central Lancashire and central Preston.

1.2 LEP policy and plans

1.2.1 Strategic Economic Plan

The Lancashire Strategic Economic plan dates from 2014 (6), the key areas of focus as part of this review are how energy use across Lancashire will be affected by economic growth and how this can fit in with potential decarbonisation pathways.

Lancashire's Growth Deal takes the vision, objectives and priorities of the SEP and sets out an integrated programme of interventions that the LEP believes are capable of generating the step change required to move the local economy forward to deliver the following from 2015 to 2025:

- 50,000 new jobs
- 40,000 new homes
- £3 billion additional economic activity

This level of development will obviously have a significant impact on energy consumption, and where existing energy infrastructure is not sufficient to enable this growth this will present a barrier to the LEP's ambitions.

The SEP identifies that the 'arc of prosperity' that runs from Lancaster down the coast and through Blackpool, Preston, Blackburn and Burnley generates around 75% of Lancashire's wealth, and is the primary focus of Lancashire's economic and housing growth plans. These need to be considered within their energy context to ensure that appropriate energy infrastructure is in place to facilitate this growth and that growth plans minimise associated carbon emissions.

Also identified by the LEP are business and industrial clusters in growth sectors across and within key locations in Lancashire that have significant potential. (7)

- Advanced Manufacturing: Aerospace and Automotive
- Energy
- Higher Education
- The Visitor Economy
- Professional and Business Services
- Logistics

Energy has been identified as a priority area here due to the physical, locational and research assets, particularly in the power generation sector. The energy expertise of Lancaster University and UCLAN can provide support to the sector, while there is a strong nuclear sector supporting the local nuclear power generation sites.

There is no identified priority around decarbonisation, although the SEP does identify the strength of current renewable and low carbon businesses and the strength of development of local offshore wind provision.

1.2.2 Transport

The government's July 2017 announcement that sales of new petrol and diesel cars would be banned from 2040 has made the direction of travel clearer on this, and an increased take-up of electric vehicles over time is expected in response to this. Almost all major car manufacturers have either already produced an electric vehicle or are currently developing one. In light of these facts and the expected increase in uptake of electric vehicles, there is associated infrastructure that will be required such as charging points.

Lancashire LEP's Strategic Transport prospectus doesn't set out any ambitions around electric vehicle use or other low carbon forms of transport. It is recommended that the strategic transport plan be reviewed and consideration given to an update to set out what the LEP's approach to low carbon vehicles and infrastructure provision is.

Lancashire County Council's 2011 Local Transport Plan does set out the ambition to:

"Complement regional initiatives for new electric vehicles charging points, through the infrastructure provided in new developments."

This support has led to a recent partnership with Chargemaster to provide significant numbers of electric vehicle charging points across Lancashire.

2. Evidence Base Review

This section collates available information about the Lancashire energy system. It covers energy consumption, heat demand, carbon emissions, renewable energy potential and deployment, fuel poverty and electrical grid capacity. A wide range of data sources have been reviewed, including national statistics and regional and local studies to produce the data in the following section, these have been referenced in Appendix III.

2.1 Existing documents and areas covered

This is covered in a separate spreadsheet appended to this report, and summarises the areas covered by differing existing reports, where the gaps are, and datasets that could be utilised to fill these. GAP analysis is summarised later in this report.

2.2 Renewable energy generation

2.2.1 Renewable energy generation potential

Table 1 sets out the maximum possible energy generation resource from different technologies that could be reached in the future. Different technologies have different generation characteristic, and so technologies with the same peak power output may not generate the same amount of energy due to the intermittency of some renewable generation technologies.

The 2011 Lancashire Sustainable Energy Study (8) provides an assessment of the maximum potential resource of a number of different renewable energy options across the local authority area. These studies follow a standard methodology that was published by the Department for Energy and Climate Change in 2010. This allows us to compare the current situation of renewable energy installations against this potential, and assess how much of this would need to be utilised to meet long term carbon reduction targets.

The methodology considers a number of factors to estimate the total generation potential including availability of natural resource, physical constraints and planning constraints. For example, calculation of sites suitable for large-scale wind generation assessed areas with wind speeds above 6m/s at 45m above ground level, and then removed from these areas any sites that may not be suitable such as urban areas, areas of outstanding natural beauty (AONB), areas with heritage designations and areas subject to aviation or military constraints.

The methodology used did not account for the deployment of solar farms, and considers solar installations on properties only, so there may be scope for further ground mounted PV which has not been captured in Table 1.

Table 1: Total renewables potential of each local authority area in MW by technology across Lancashire (8)

	Wind		Biomass			Hydro	Micro-generation		
	Commercial	Small Scale	Plant	Animal	Waste	Small	Solar	Heat Pumps	Total
Blackburn with Darwen	592	11	2	1	12	2	58	255	933
Blackpool	1	0	1	0.1	9	0	65	286	362
Burnley	200	1	1	1	7	2	35	161	408
Chorley	755	33	3	4	9	1	47	205	1,057
Fylde	371	8	2	5	9	0	39	170	604
Hyndburn	171	0	1	1	7	1	32	149	362
Lancaster	598	36	6	11	12	4	63	275	1,004
Pendle	446	4	1	2	5	1	36	165	661
Preston	285	27	2	5	12	1	61	268	661
Ribble Valley	361	12	6	9	4	5	31	129	557
Rossendale	516	0	1	1	5	3	30	135	691
South Ribble	257	11	3	3	9	1	44	200	529
West Lancashire	1,292	44	14	2	7	1	50	220	1,630
Wyre	828	29	3	8	11	1	51	225	1,155
Total	**6,674**	**215**	**46**	**54**	**117**	**21**	**642**	**2,844**	**10,613**

From Table 1 it can be seen that Lancashire has significant large-scale wind resource, as well as extensive potential heat generation from heat pumps. There are also identified waste and biomass resources and potential for solar generation. Due to the large wind resources potential electricity production is higher than that for heat.

Table 2 shows a summary of total electricity and heat generation potential by local authority area, summarising the split by technology that is given in Table 1.

Table 2: Total Energy generation potential (MW) (8)

	Electricity (MW)	Heat (MW)	Total (MW)	% of Lancashire total
Blackburn with Darwen	647	286	933	9
Blackpool	42	320	362	3
Burnley	228	180	408	4
Chorley	826	232	1057	10
Fylde	413	192	604	6
Hyndburn	196	166	362	3
Lancaster	694	312	1004	9
Pendle	477	184	661	6
Preston	361	301	661	6
Ribble Valley	407	151	557	5
Rossendale	540	151	691	7
South Ribble	306	225	529	5
West Lancashire	1375	257	1630	15
Wyre	903	253	1155	11
Lancashire total	**7416**	**3210**	**10613**	**100**

2.2.2 Large-scale renewable energy deployment

Large-scale (>1 MW) renewable deployment is set out below, as identified in the Renewable Energy Planning Database (REPD). This database covers all large-scale renewable development and is complied with reference to a number of data sources including feed-in tariff deployment and local authority planning data so should be comprehensive for large-scale projects.

From Figure 1 it can be seen that there are a wide range of renewable technology installations across Lancashire. Schemes identified are all greater than 1 MW generation capacity. The grey lines in Figure 1 show the local authority boundaries within Lancashire.

Figure 1: Lancashire large-scale renewable deployment – operational sites (9)

There has been wider deployment of large-scale solar PV schemes within Fylde, Preston and South Ribble, installation of which has been driven by the Government's Feed-In Tariff. There are also a number of onshore wind turbine developments, particularly around Lancaster, Burnley, Rossendale and Blackburn with Darwen, taking advantage of the significant wind resources in the county.

Other opportunities include Anaerobic Digestion, Biomass and Landfill gas generation developments, locations of which vary. There are some further projects that are either under construction or have secured planning permission and are awaiting construction that are summarised in the table below.

Table 3: Summary of large-scale technology installations by planning status and local authority area (9)

	Wyre	Fylde	Lancs	Hyndburn	Burnley	Chorley	Lancaster	Rossendale	W. Lancs	South Ribble	Blackburn with Darwen	Preston	Ribble Valley
Awaiting Construction	**12.5**	**6.3**	**1.5**	**8.2**	**7.1**		**9.9**			**2.2**			
EfW Incineration	10												
Solar Photovoltaics	2.5	6.3	1.5				9.9			2.2			
Wind Onshore				8.2	7.1								
Operational (MW)	**29.3**	**30.4**	**5.1**	**26.98**	**45.1**	**8.8**	**44.2**	**78.8**	**4.5**	**4.5**	**1.2**	**7.1**	**5**
Anaerobic Digestion		1	3.8										
Biomass (dedicated)	9										1.2		
Landfill Gas	4.26	3.3		2.98	7.52	6.586	6	3.6	4.5				
Solar Photovoltaics	10	26.13	1.32				11.2			4.5		7.1	5
Wind Onshore	6			24	37.6	2.25	27	75.2					
Grand Total (MW)	**41.8**	**36.7**	**6.6**	**35.2**	**52.2**	**8.8**	**54.2**	**78.8**	**4.5**	**6.7**	**1.2**	**7.1**	**5**

2.2.3 Total renewable energy generation

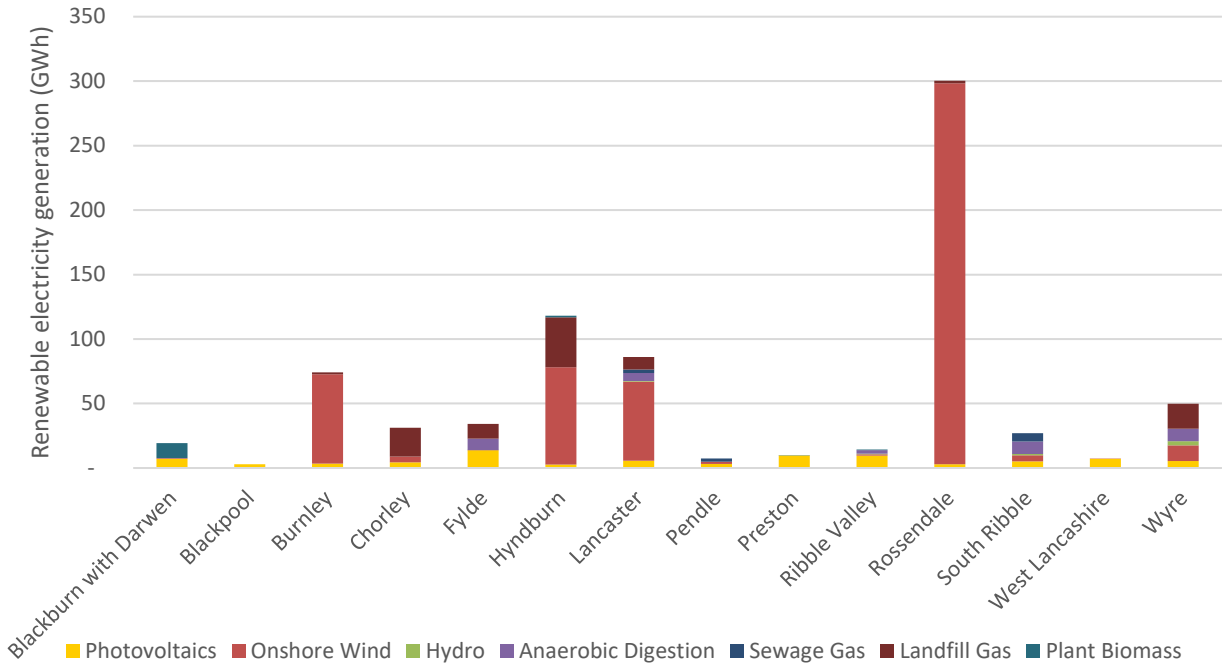

Figure 2: Renewable electricity generation by local authority area (10)

The total electricity generation across the area is dominated by wind, particularly some of the very large wind farms identified in the previous section. While total PV generation came to 82 GWh in 2016, onshore wind came to 526 GWh, there is also a significant contribution to local electricity generation using landfill gas.

There are also a number of offshore wind farms off the Lancashire coast that are connected to the Lancashire grid. This adds a further 3,319 GWh of generation to the Lancaster and West Lancashire local authority areas which is not shown in Figure 2 as it would dominate the graph.

2.2.4 Renewable energy generation against potential

Figure 3 shows the total generation capacity by technology set against the estimated generation potential set out in Table 1. From this it can be seen that the technologies utilising the greatest proportion of their estimated renewable potential are installed hydroelectric generation in Wyre and forms of biomass generation within Chorley and Hyndburn. Despite wind generation making up the majority of locally generated renewable electricity, the installed capacity of wind generation is less than 5% of the potential in all areas other than Rossendale, Hyndburn and Burnley.

This indicates that there is still significant potential for growth in renewable energy generation, particularly in the area of wind generation. Within Rossendale is one of the largest wind farms in England, Scout Moor at 65 MW installed capacity, however this installation and the others in the local authority area still only account for 22% of its potential for wind generation.

The total utilised potential of solar generation is likely to be overestimated as the methodology estimating this only considered rooftop solar potential and did not

model the potential contribution from solar farms to deliver large-scale solar generation.

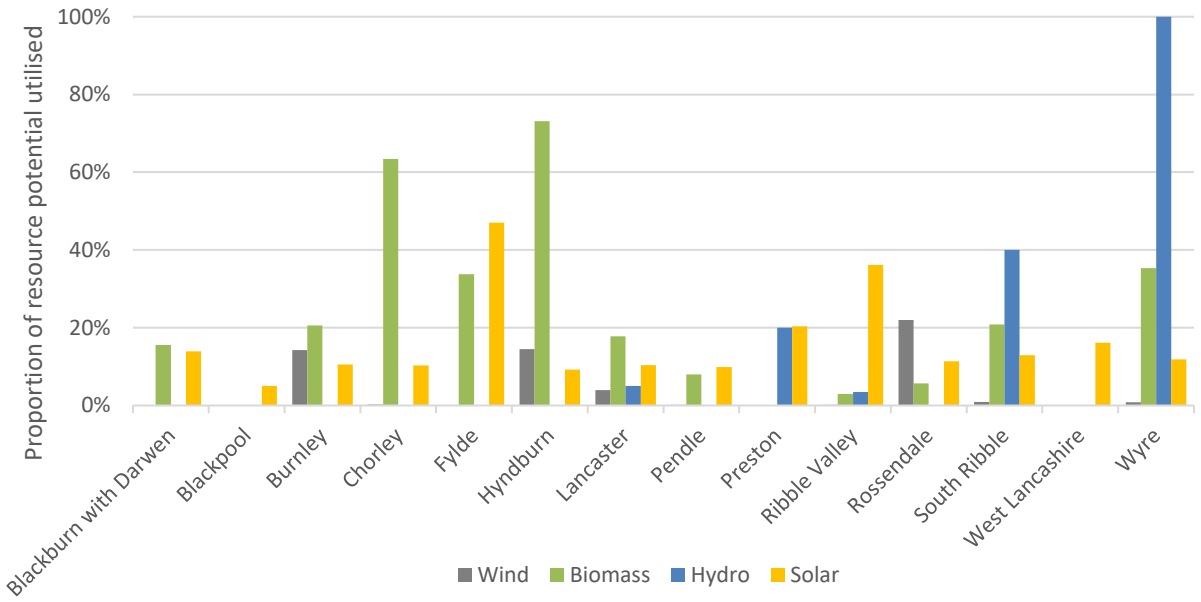

Figure 3: Proportion of renewable potential utilised by technology type and local authority area (8) (10)

2.3 Other energy resources

2.3.1 Nuclear generation

Lancashire is home to major nuclear generation plants as well as a significant portion of the UK's nuclear-related industry. The North West Nuclear Arc shown in Figure 4 of radius 100km, centred on Preston, encompasses the majority of the UK's existing nuclear research, development and operational capability and is a major area for new nuclear deployments.

Heysham, near Lancaster, is the site of two major nuclear power plants, Heysham 1 and Heysham 2, the only site in the UK with two active nuclear reactors. These are both Advanced Gas-cooled Reactors similar to the majority of operational nuclear plants in the UK. Heysham 1 consists of two reactors with a total electrical output of 1155 MW that started generating in 1983. Heysham 2 consists of two reactors with a total electrical output of 1230 MW that started generating in 1988. Heysham 1 is due to come to the end of its life in 2024, with Heysham 2 scheduled to close in 2030. Combined the two nuclear power plants at Heysham make up over a quarter of the UK's existing nuclear generation capacity.

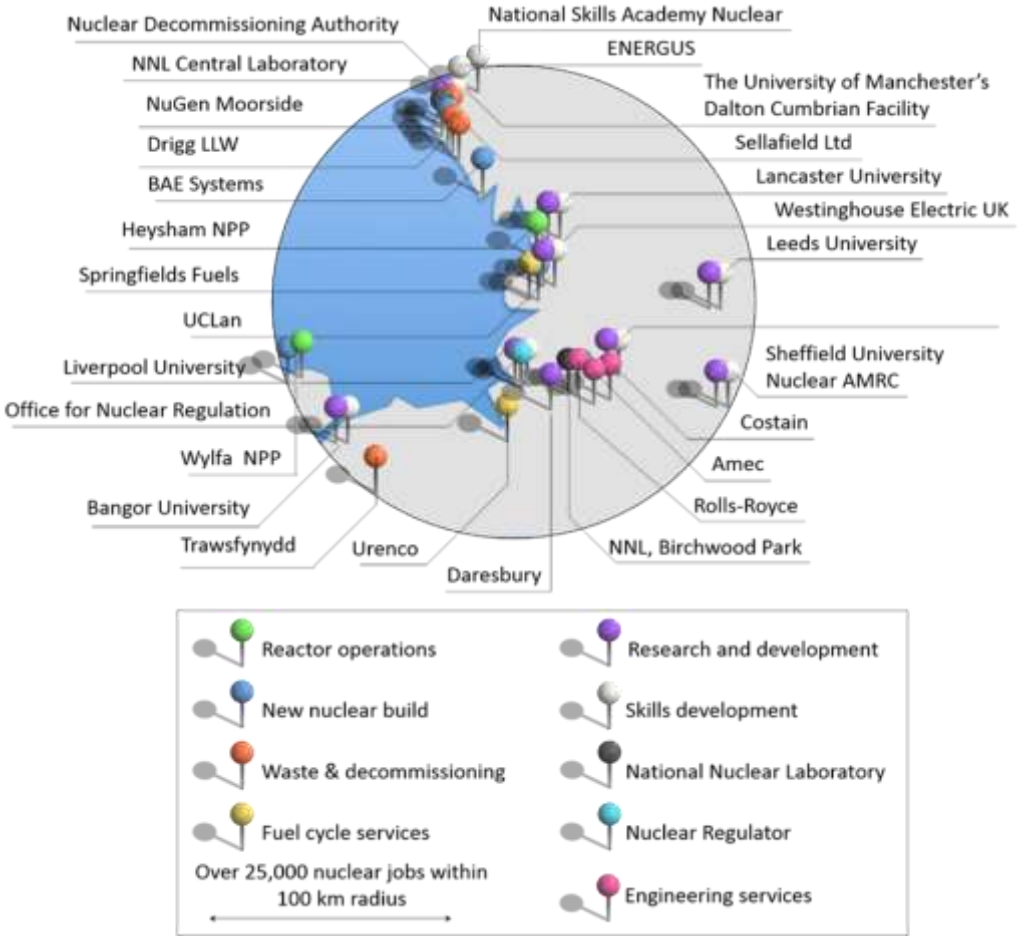

Figure 4: North West Nuclear Arc

2.3.2 Shale gas

In recent years work has been done to locate and quantify the UK's shale gas resource. Shale gas refers to natural gas that is trapped within sedimentary rocks that cannot be accessed using traditional gas drilling methods and is instead accessed using a process known as hydraulic fracturing or fracking. The UK uses significant quantities of gas for power generation, heating and industry, and as production from the UK's North Sea gas fields decreases it will be increasingly reliant on imported gas to meet demand; the UK government's 2017 guidance on fracking sets out that *'the government believes that shale gas has the potential to provide the UK with greater energy security, growth and jobs.'*

In 2013 the British Geological Survey (BGS) investigated the shale gas resource available within Lancashire and the surrounding area utilising seismic data, fault mapping, well data and historical and newly-commissioned laboratory studies to provide regional maps to show the extent of the upper and lower shale gas areas (11).

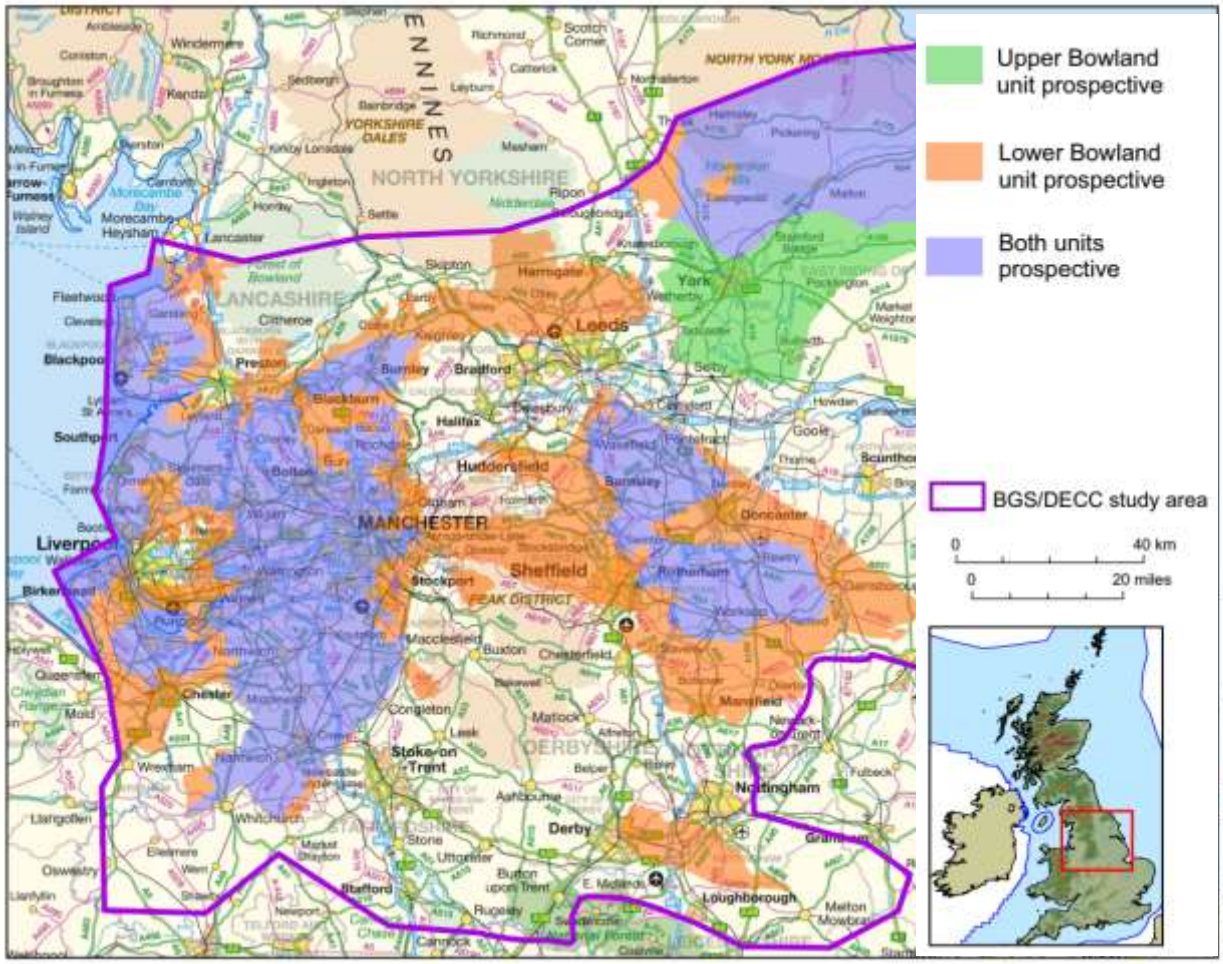

Figure 5: Shale gas opportunity areas (11)

Figure 5 shows the shale gas opportunity areas in the study area – the Bowland-Hodder basin. From this it can be seen that within Lancashire there is a substantial area that could potentially be exploited for shale gas production. The central estimate for the total gas trapped within shale in the study area suggests there could be 37.6 trillion cubic metres of gas contained within the area, however, it is likely that only a proportion of this will be technically and commercially possible to extract. The development of the shale gas resource within Lancashire is at an early stage, however, there are several sites within Lancashire that have been granted planning permission by the Secretary of State for Communities and Local Government where exploratory drilling has been carried out to further quantify the available resource. The further development of this resource may require additional input to ameliorate planning issues around the potential sites for areas such as road access to sites.

2.4 Energy use in Lancashire

The graphs below summarise overall energy use across Lancashire.

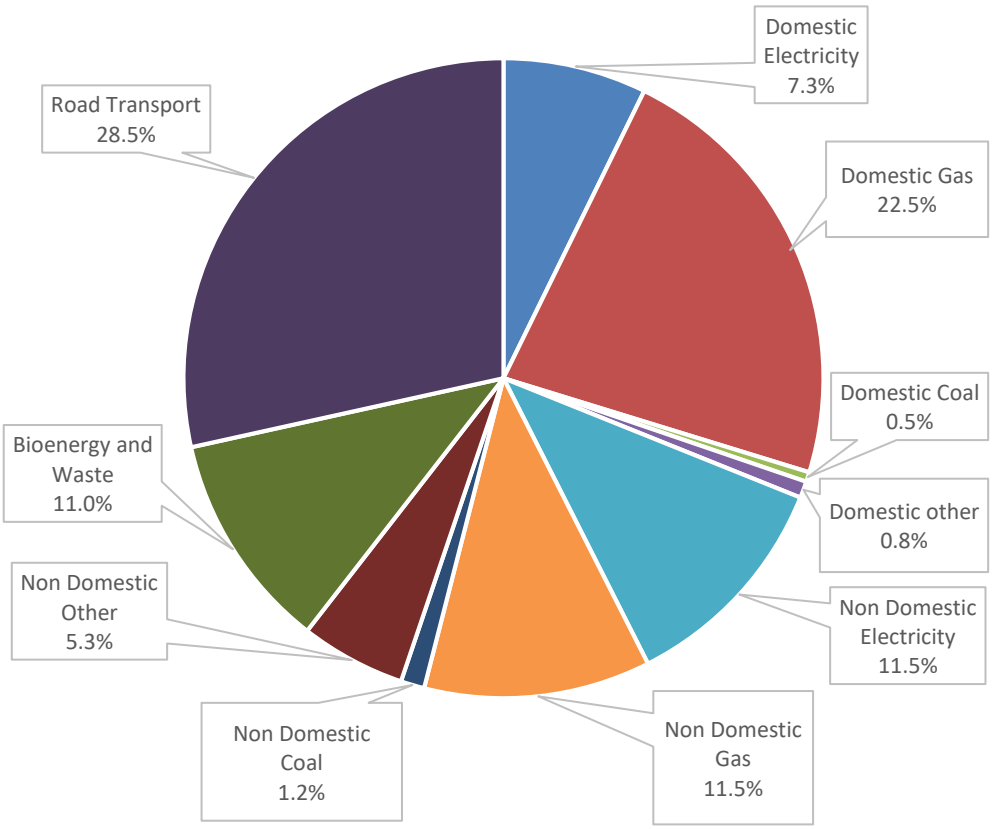

Figure 6: Energy use by fuel and sector in Lancashire (12) (13) (14) (15)

Figure 6 shows the split of overall energy use by sector and fuel type in Lancashire. This breaks down the consumption by domestic/non-domestic use and final fuel consumed i.e. electricity, gas, coal, bioenergy and road transport fuels.

From this it can be seen that road transport makes up over a quarter of energy consumed in Lancashire, the largest single energy use. Domestic energy consumption is marginally higher than non-domestic energy consumption, with has the major fuel use, demonstrating the relatively wide access to the gas network within Lancashire. Domestic energy use from coal (0.5%) and other fuels (0.8%) are similar to the national average in these sectors of 0.4% and 1.2% respectively. Non-domestic 'other' and domestic coal together make up 6%, indicating there is still some energy demand that is met by high carbon fuels such as oil and coal rather than gas or electricity.

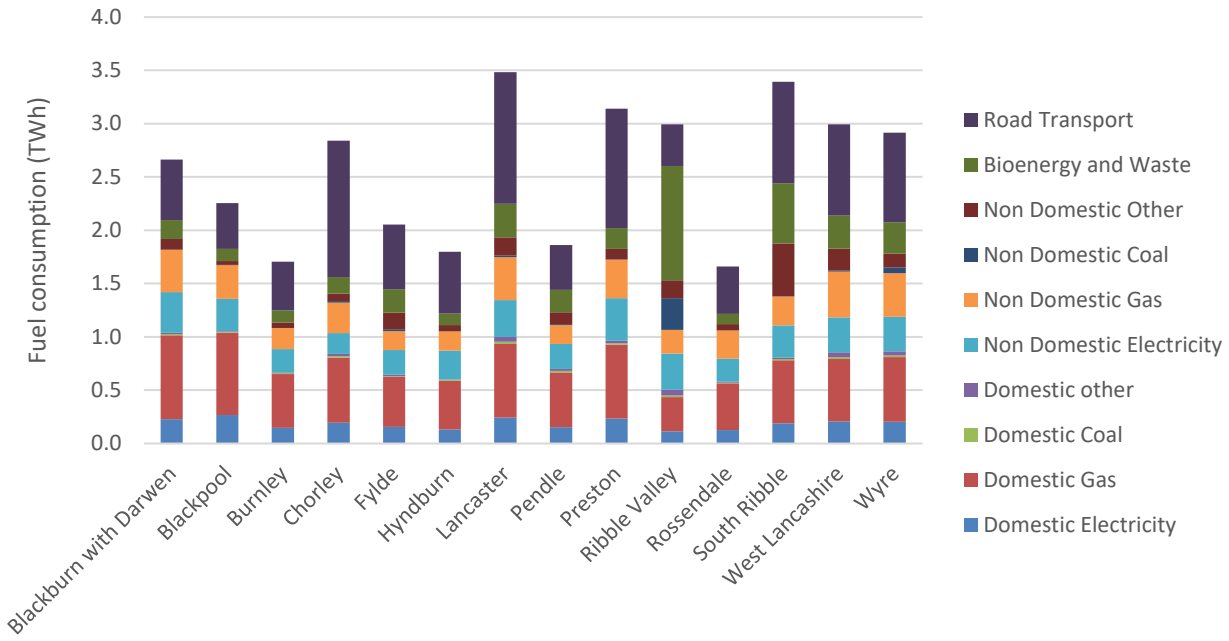

Figure 7: Energy consumption by fuel and by sector per local authority (12) (13) (14) (15)

From Figure 7 it can be seen that road transport is the single largest energy use in many of the local authority areas. Domestic gas consumption is significant, representing the large fuel demands for heating homes, while non-domestic energy demands vary with the levels of industry in the district. Ribble Valley has significant consumption of bioenergy and waste for fuel.

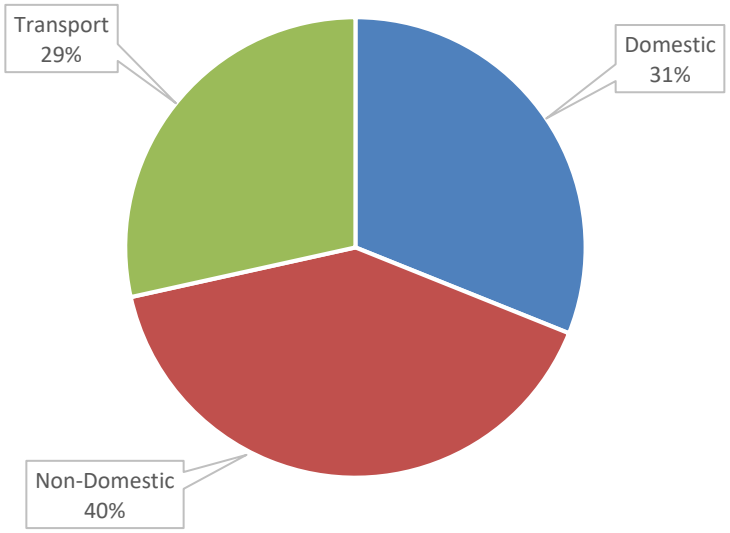

Figure 8: Energy use by sector (12) (13) (14) (15)

Energy use by sector is typically split approximately into thirds, non-domestic here makes up 40% of total energy consumption. An increased proportion of non-domestic energy consumption vs domestic and transport energy consumption could represent a

differing ratio of industry to population to the national norm. It could also point to a higher density of businesses that are large energy users.

Figure 9 shows the percentage of off-gas properties within each Lower Super Output Area (LSOA). Off-gas properties are those that are not connected to the gas network. LSOAs represent divisions of England for census purposes based on population, and so represent smaller geographical zones within urban areas than within rural areas. By comparing the number of domestic gas meters within each LSOA with the number of households from the previous census, the proportion of households that are connected to the gas network and are therefore capable of using gas for domestic heating purposes can be estimated.

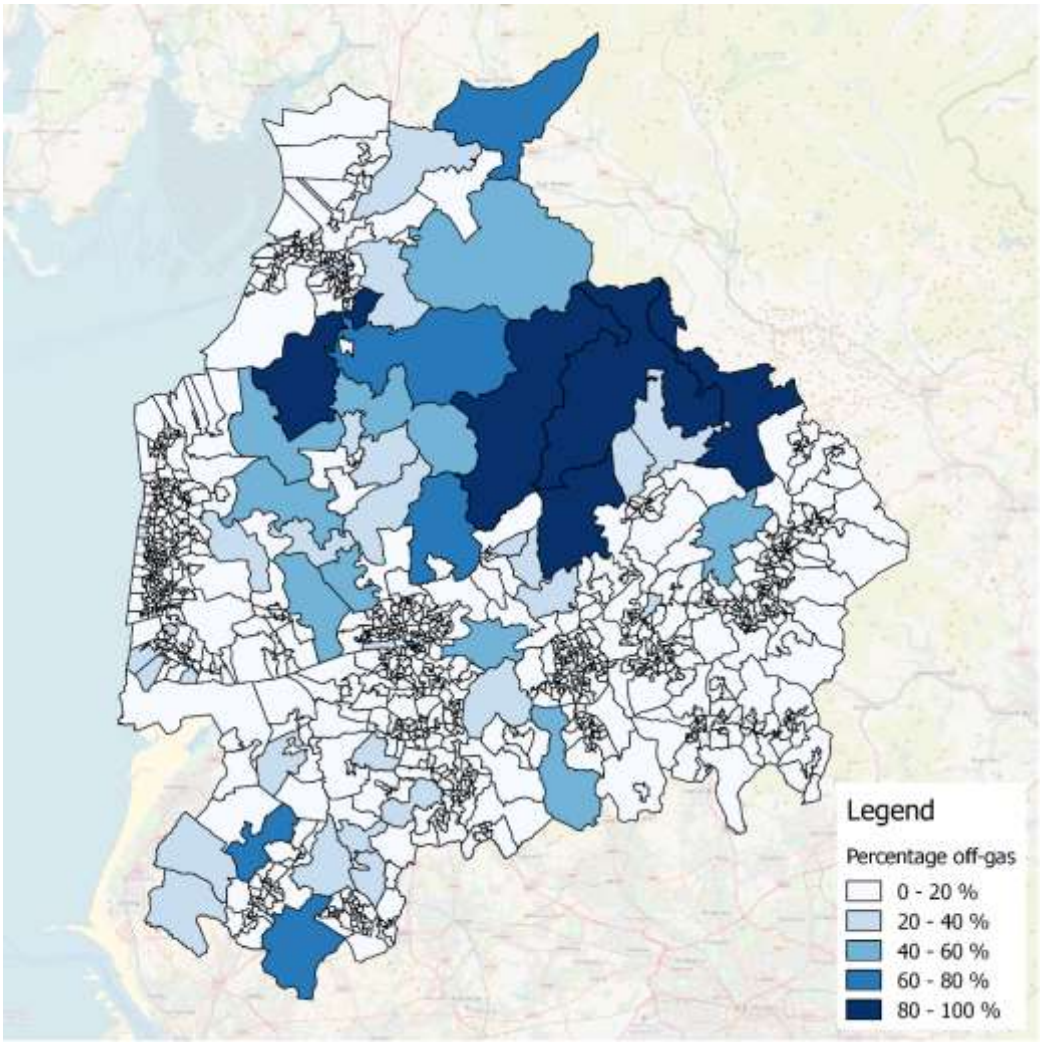

Figure 9: Percentage of off-gas properties by Lower Super Output Area (LSOA) (16)

From Figure 9 it can be seen that the majority of Lancashire has below 20% of properties off-gas, apart from some of the more sparsely populated rural areas, particularly in Ribble Valley and areas around the Forest of Bowland.

This lack of access to the gas network has major impacts for the heating fuels used, correlating with increased use of other more carbon-emitting fossil fuels such as oil or coal within rural homes. Changing the heating fuels in these homes is one of the government's key planks for decarbonisation of heat within the UK as set out in the Clean Growth Strategy (3). The cost of heating in off-gas areas is typically higher than

for properties connected to the gas network, this offers an opportunity for switching to renewable alternatives such as biomass boilers or heat pumps as they offer better financial savings compared to oil or coal.

2.5 Fuel Poverty

Fuel poverty is the condition of being unable to afford to keep one's home adequately heated. Fuel poverty in England is measured using the Low Income High Costs (LIHC) indicator. Under the LIHC indicator, a household is considered to be fuel poor if they have required fuel costs that are above average (the national median level) and were they to spend that amount, they would be left with a residual income below the official poverty line.

Table 4: Fuel poverty by local authority area

Geographical area	Number of households	Fuel poor households	Fuel Poverty (%)
Blackburn with Darwen	58,486	8,162	14.0
Blackpool	65,703	8,835	13.4
Burnley	38,309	5,611	14.6
Chorley	45,830	4,494	9.8
Fylde	35,564	3,038	8.5
Hyndburn	35,029	5,050	14.4
Lancaster	59,013	7,530	12.8
Pendle	38,092	6,027	15.8
Preston	58,723	8,218	14.0
Ribble Valley	24,545	2,608	10.6
Rossendale	29,631	3,608	12.2
South Ribble	47,039	4,672	9.9
West Lancashire	46,301	4,542	9.8
Wyre	48,255	4,739	9.8
Lancashire LEP area	**630,520**	**77,134**	**12.2**
North West	3,069,950	362,486	11.8
England	22,656,853	2,502,217	11.0

Use of high carbon fuels is often linked to fuel poverty, in rural areas where access to the gas network is lower there can be higher levels of fuel poverty as higher carbon fuels such as oil and coal can also lead to higher heating costs due to their cost.

From Table 4 it can be seen that Lancashire LEP area fuel poverty is higher than the regional and the national average, however there is a wide variation in fuel poverty levels across local authorities, with Chorley, Fylde, South Ribble, West Lancashire and Wyre all seeing below 10% fuel poverty levels, with other areas such as Burnley, Blackburn and Pendle seeing over 14% of households in fuel poverty.

Improving energy efficiency is a key method of tackling fuel poverty, however some homes are harder to improve than others. Cavity wall insulation and loft insulation has been put in place across a large proportion of suitable properties to improve energy efficiency, however these simple measures are not suitable in all places. Properties where energy efficiency improvement is more difficult are classed as 'hard to treat', this category includes older dwellings built with solid walls, dwellings off the gas network and high-rise flats.

2.6 Heat demand

The heat demand of each local authority area has also been explored using the DECC (now BEIS) National Heat Map (17). This is a tool that has built up heat demand using a bottom up approach assessing heat demand by building type and size, and is useful on an aggregate level to assess expected heat demands.

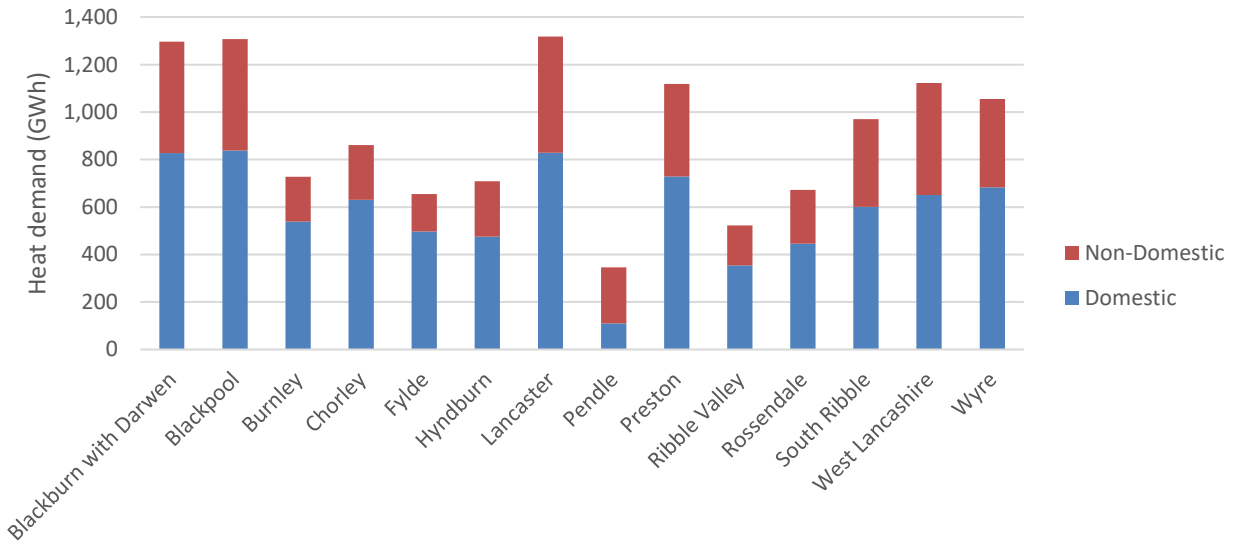

Figure 10: Heat demand by sector and local authority area (17)

Figure 10 shows that the majority of heat demand in each local authority area is for domestic premises, with the bulk of the rest made up of non-domestic demand with a small amount for transport. The domestic demand is easily understood, and is made up of heat to people's homes, supplied by a range of different fuel sources, as explored in section 2.2.3.

The non-domestic heat demand is broken down further in Figure 11. From this it can be seen that the proportion of heat demand for industrial buildings is significant in

many of the local authority areas, with other significant contributions to total heat demand from Retail, Hotels, Health and Education.

This analysis helps to understand the potential opportunities that may be in place for heat networks or provision of alternative heating options in non-domestic premises.

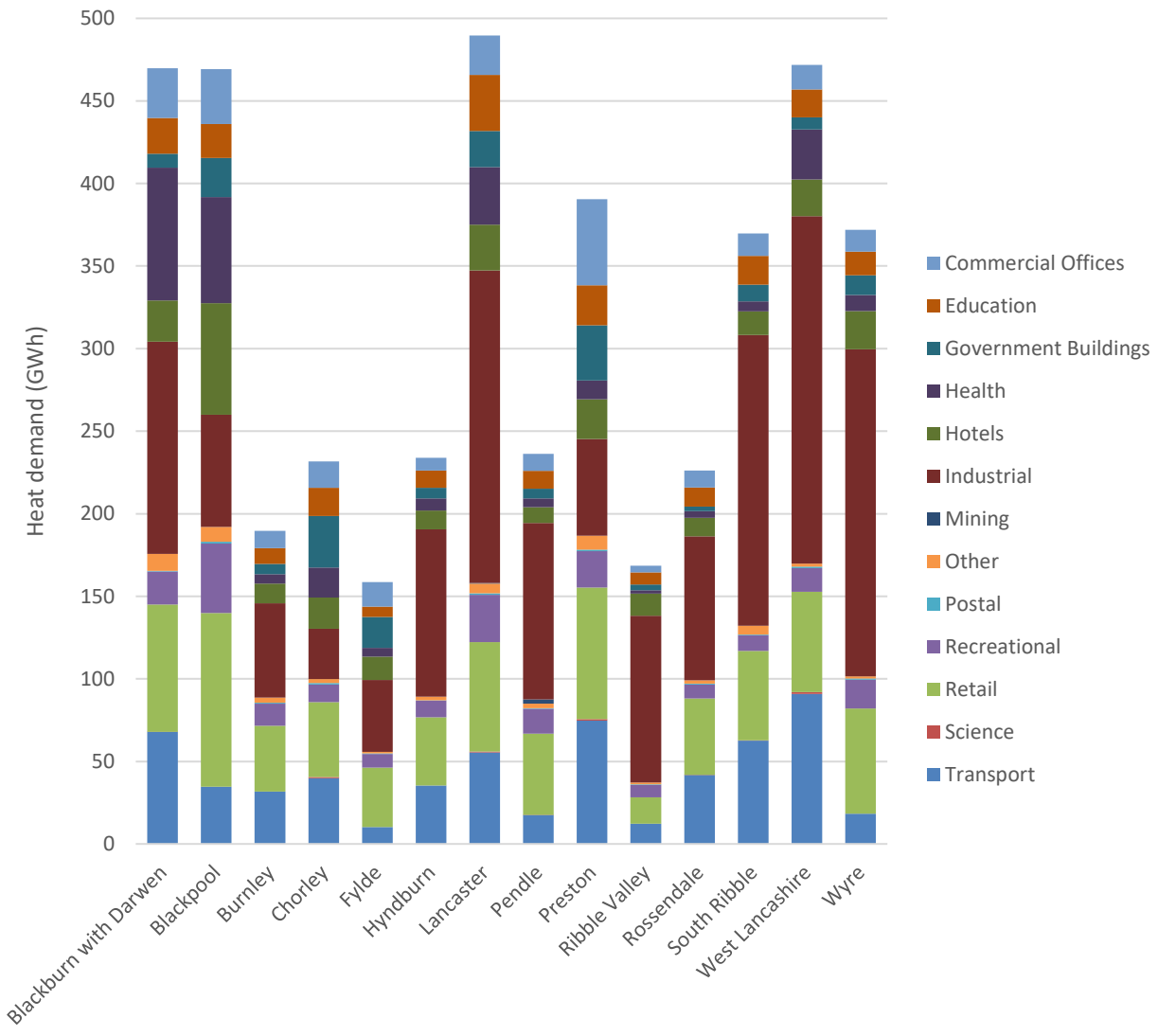

Figure 11: Non-domestic heat demand by industry and local authority area (17)

There have been mapping and masterplanning studies carried out using BEIS Heat Network Development Unit funding for Preston North-West, Lancashire Business Park and White Cross Business Park, with further studies commissioned for central Preston and Blackburn. There are a number of urban areas within Lancashire than have not had their heat network opportunities assessed and that may have future potential for heat network implementation.

2.7 Carbon emissions

In this section, Carbon is used as shorthand for greenhouse gas emissions. This is made up primarily of Carbon Dioxide (CO_2), but also includes other major greenhouse gases weighted by global warming potential to produce a single aggregate figure known as Carbon Dioxide equivalent (CO_2e).

The following data comes from the National Statistics publication *'UK local authority and regional carbon dioxide emissions 2005-2015'*. (18)

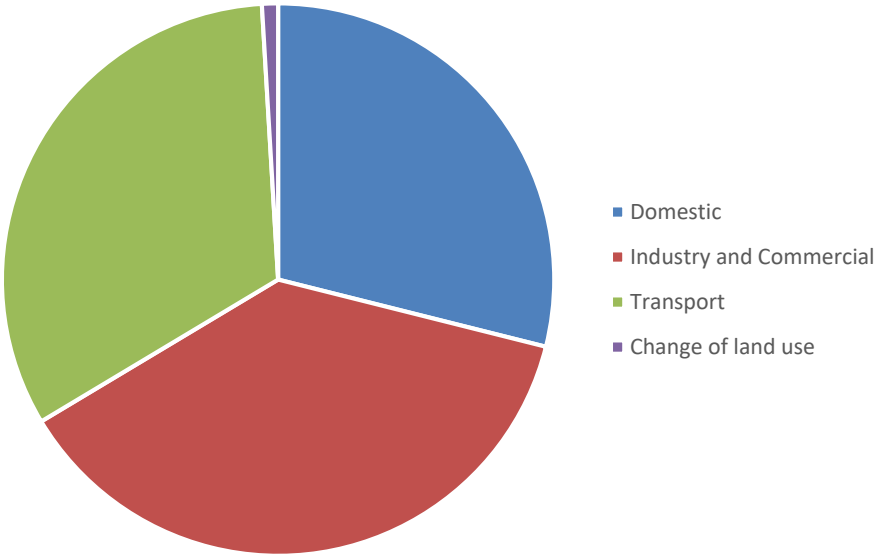

Figure 12: Lancashire proportion of carbon emissions by sector, 2015 (18)

Carbon emissions by sector are roughly evenly split, with the largest sector being industry and commercial emissions. Change of land use is a category that encompasses change of the sector utilisation of land including removal of forests. This is a small proportion of overall carbon emissions, but it useful to monitor particularly its impact within rural areas where there is significant potential for development on Greenfield sites.

Transport emissions have grown relative to the proportion of total energy use set out in Figure 6. This indicates that transport is a relatively high source of carbon emissions utilising primarily fossil fuels.

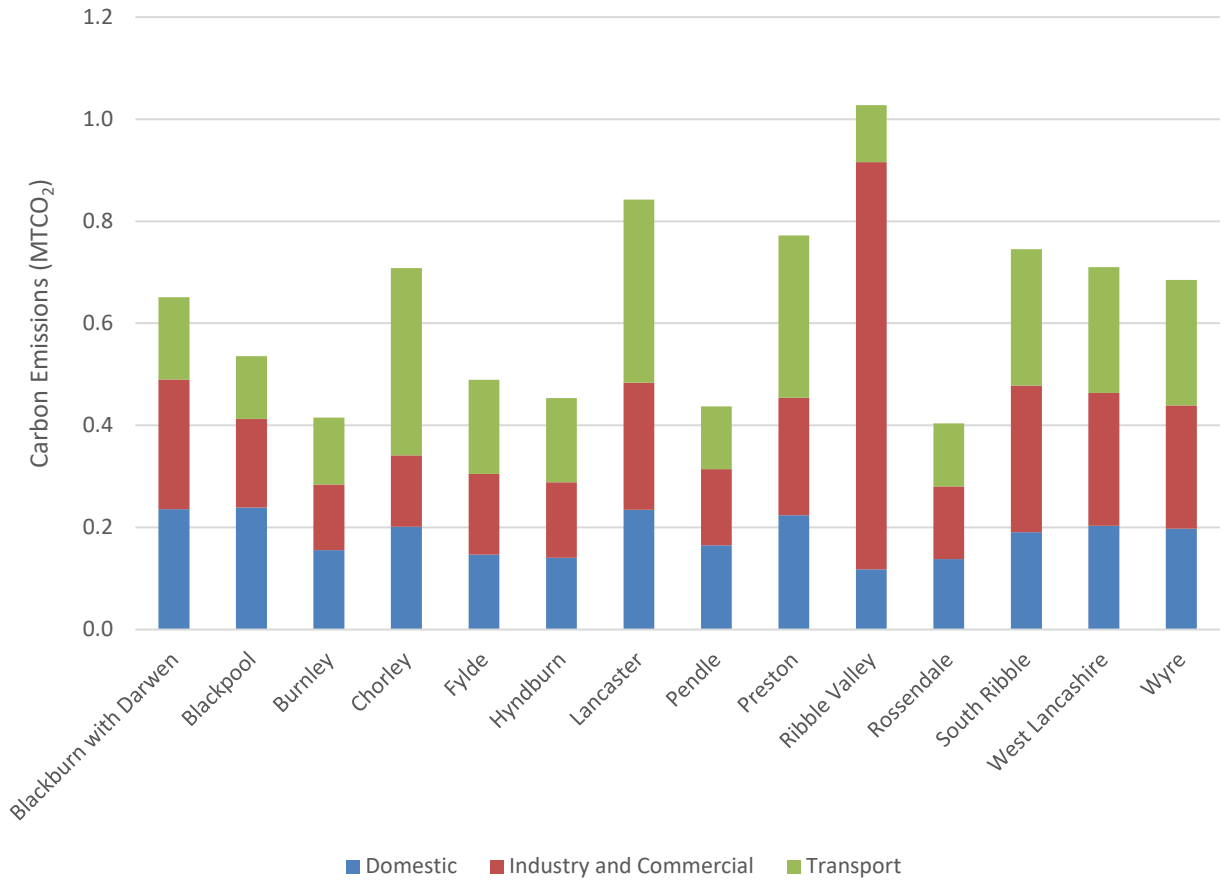

Figure 13: Total Carbon emissions breakdown by sector and local authority area, 2015 (18)

Figure 13 shows the sectoral breakdown of carbon emissions between domestic, non-domestic and transport emissions. From this it can be seen that Ribble Valley industrial carbon emissions are substantial, Encraft understand that this exceptionally high figure is due to the presence of a major cement producer in the district.

Converting total carbon emissions figures for each local authority area to a normalised figure of tonnes emitted per person allows us to compare these figures on a more even footing, as well as a comparison to national benchmarks.

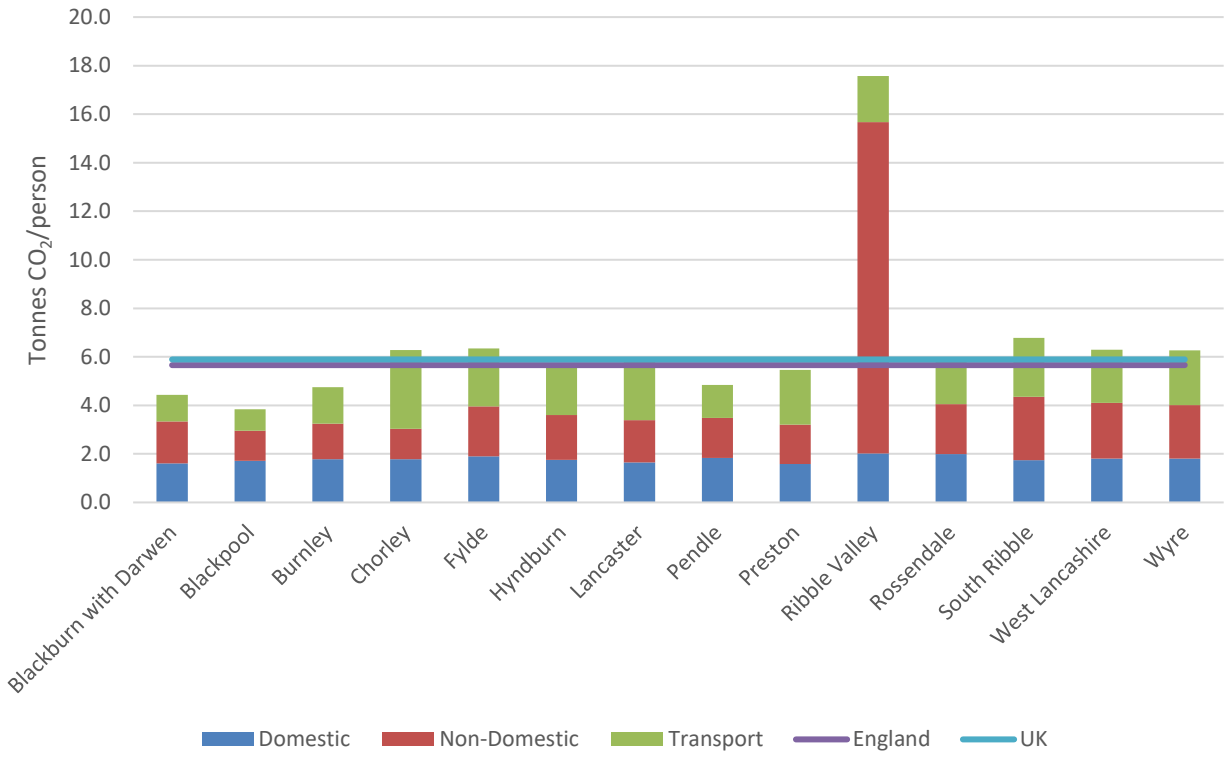

Figure 14: Carbon emissions per capita by category and local authority area compared to national benchmarks (18)

Figure 14 shows that that most of the local authority areas have emissions per capita figures around or below the national average. Carbon emissions on a domestic basis are similar, while non-domestic and transport emissions vary more widely. As seen in Figure 13, we can see the scale of the emissions from Ribble Valley. On this scale they look even larger relative to the other areas due to the relatively low population of the area.

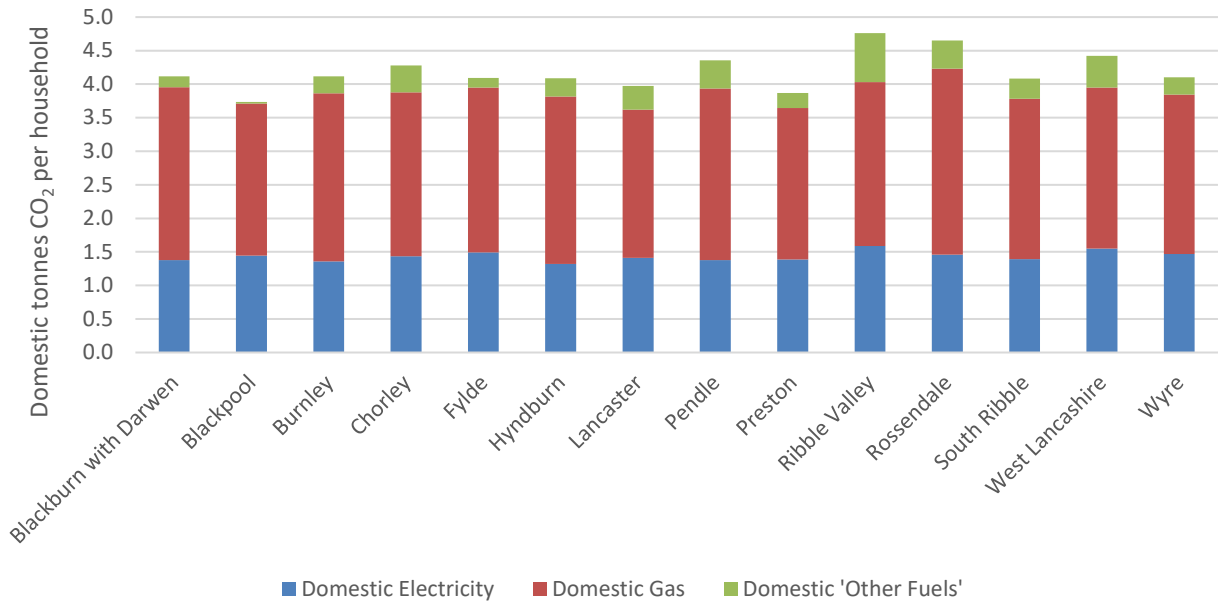

Figure 15: Domestic Carbon emissions by household (18)

Figure 15 shows domestic carbon emissions split by fuel consumed on a per household basis. A per household basis is most appropriate for comparison here as it is the number of households not the number of people that is more important in determining energy consumption.

Domestic electricity consumption carbon emissions are similar across all areas, with varying proportions from gas consumption, however we see that the prevalence of gas as the heating fuel of choice minimises the contribution to emissions from 'other fuels' such as coal and oil. We see that areas with higher proportion of non-access to the gas network, such as Ribble Valley and Rossendale, have marginally higher emissions from 'other fuels.' This category includes oil and solid fuels such as coal which have significant carbon emissions and so will have a proportionately higher contribution to carbon emissions than to energy consumption alone.

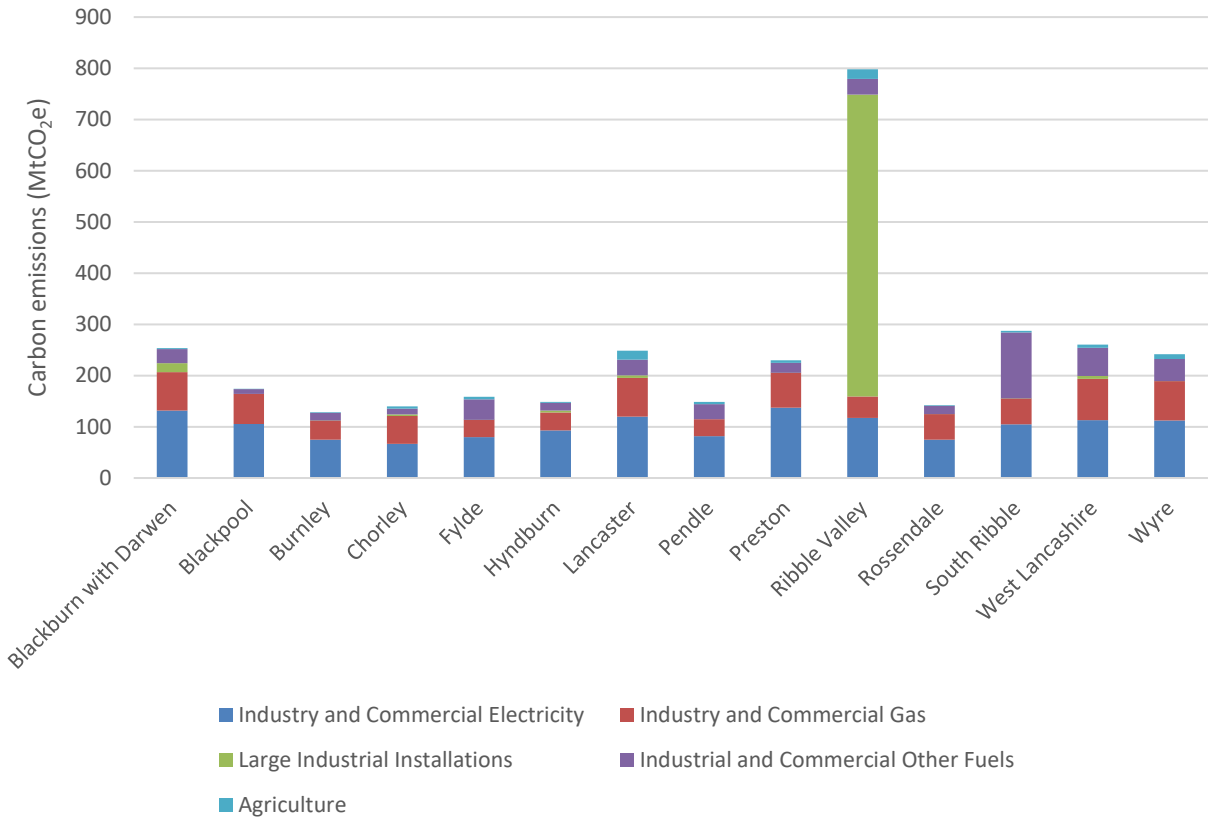

Figure 16: Non-domestic Carbon emissions broken down by sector and local authority area (18)

Figure 16 shows non-domestic carbon emissions broken down by sector. From this it can be seen that the largest contributor to carbon emissions within each local authority area is typically industrial and commercial electricity use. The graph separates agriculture out specifically from industrial and commercial carbon emissions, and it can be clearly seen that agriculture to an extent to the larger, more rural areas such as Lancaster and Ribble Valley, but relatively little to that of more urban areas. Given the agricultural land within each local authority area this is to be expected, but it does highlight that for more rural areas to decarbonise they will need to tackle carbon emissions from agriculture.

The main stand out from the graph is again the carbon emissions contribution from Ribble Valley, categorised here as 'Large Industrial Installations', which skews the graph somewhat. Samlesbury Aerodrome, the BAE systems manufacturing site, is located within the area as well as a major cement producer which has associated large carbon emissions. Within South Ribble there is a substantial contribution to emissions from industrial use of 'Other fuels'. This highlights a potentially easy route for initial carbon reduction if some of this energy use could be switched to gas as a lower carbon fuel.

Carbon emissions from electricity use are not something that can be controlled on a local authority or regional level, given the interconnected nature of the electricity network and the responsibility of national government to set policy related to the electricity generation mix. However, current national projections show carbon emissions from electricity generation following the current trend and falling over time, indicating that carbon emissions from electricity use should decrease.

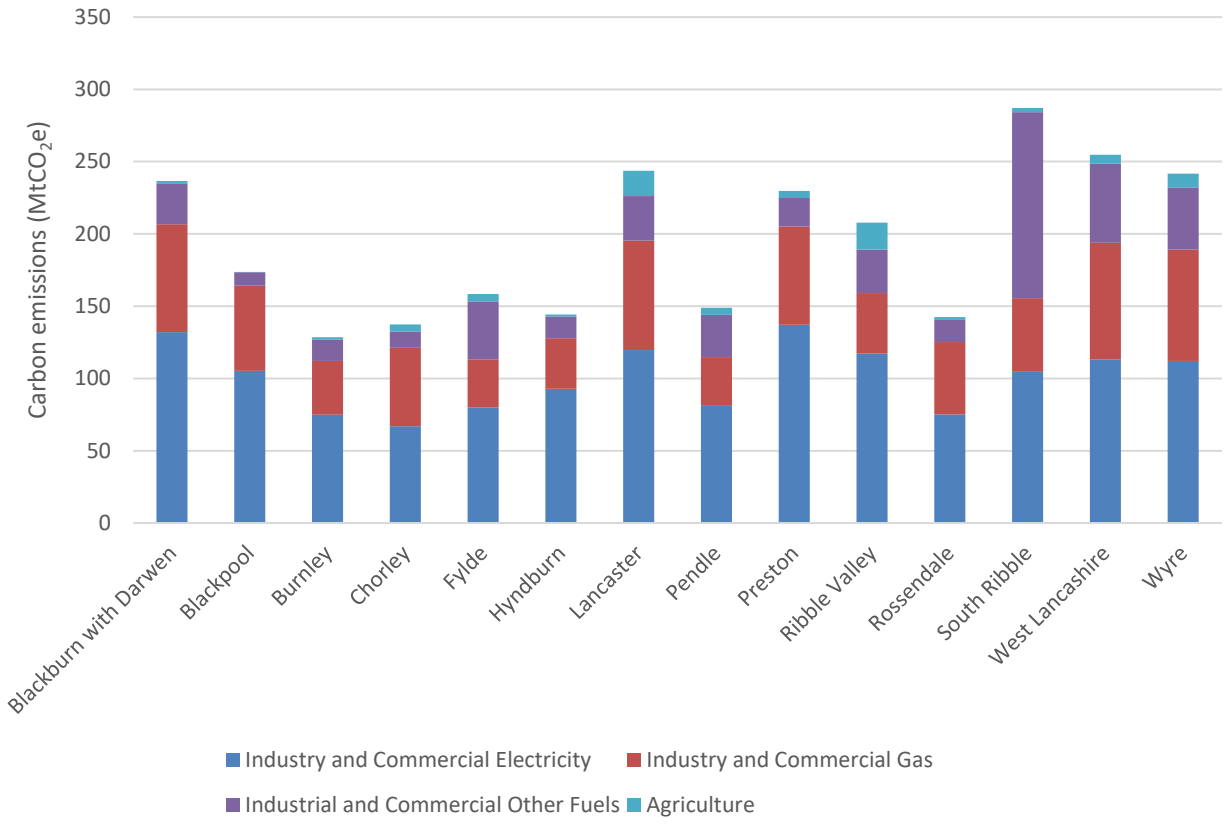

Figure 17: Non-domestic Carbon emissions broken down by sector and local authority area (large industrial installations removed) (18)

Figure 17 shows the data from Figure 16 with the effect of large industrial installations stripped out for ease of comparison of some of the other figures. On this basis it is easier to interpret some of the data discussed above.

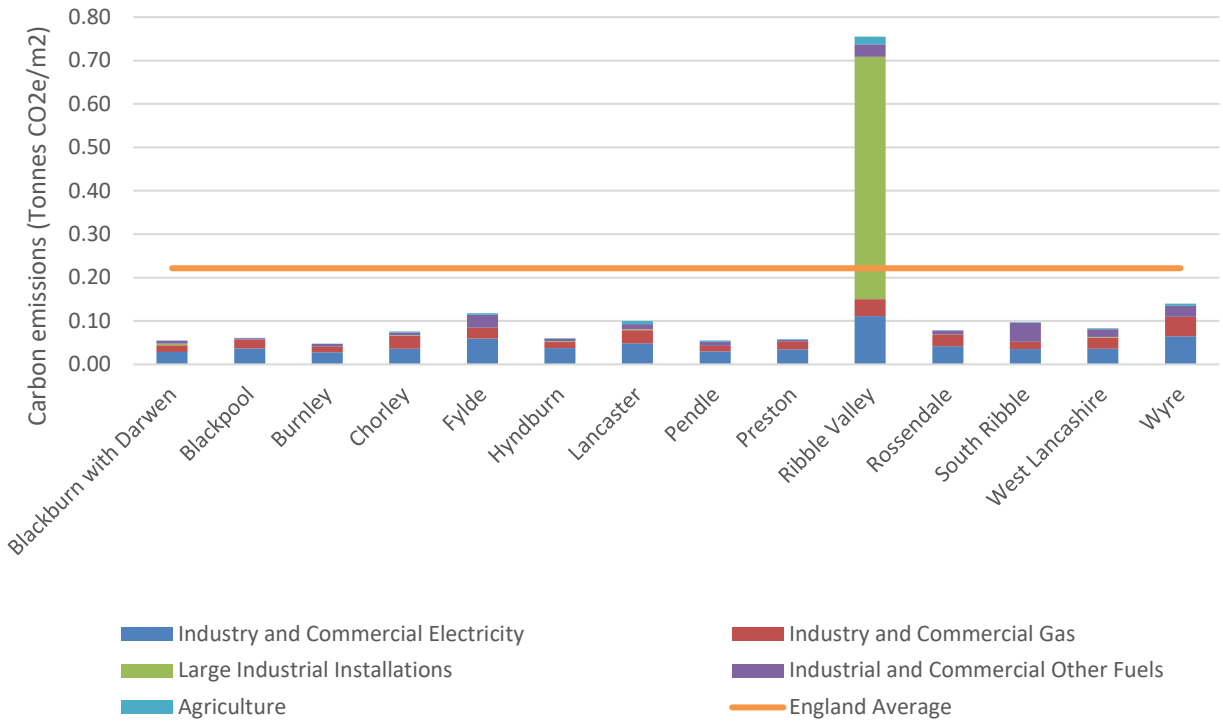

Figure 18: Non-domestic Carbon emissions per metre squared of commercial floor area by sector and local authority area (18)

Figure 18 shows the same data as Figure 16, but presented on a normalised basis for ease of comparison. Total emissions have been set against total commercial floor area from Valuation Office Agency (VOA) statistics to produce a carbon emissions figure per metre squared of commercial floor area, which is then compared to the national figure.

From this it can be seen that the majority of the local authority areas have emissions below the national average on this basis, some substantially below. This indicates that in some places where emissions have been relatively higher this is due to a concentration of industry in these places.

Energy efficiency measures could help reduce industrial carbon emissions, and as set out in the Clean Growth Strategy (3), tackling commercial and industrial carbon emissions is an area that the government is looking at closely.

2.8 Grid capacity review

The Long Term Development Statements have been reviewed from Electricity North West, who are the Distributed Network Operator (DNO) responsible for the majority of Lancashire, as well as Northern Power Grid and SP Energy Networks who cover smaller parts of Lancashire. The 33kV and 132kV substations within each region will be colour coded according to how feasible it is to connect additional generation to them, and considered separately for demand.

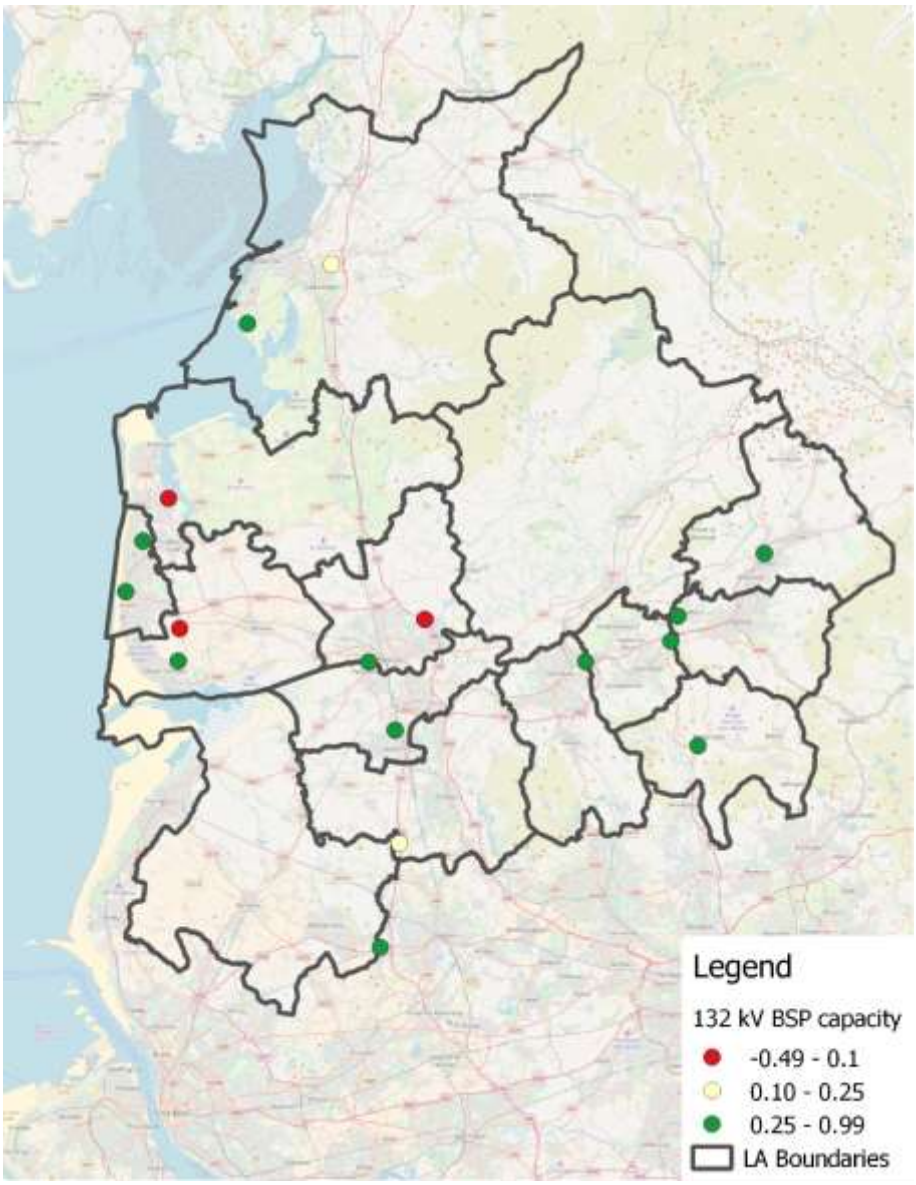

Figure 19: Capacity for new generation connections at 132kV level

Figure 19 and Figure 20 show the 132kV substations within Lancashire with a traffic light system, where red indicates less than 10% capacity available, amber is 10-25% capacity available and green is greater than 25% substation capacity available. This shows that at the high voltage level there is broadly capacity for new connections of both demand and generation, however this doesn't account for site-specific issues where 33kV substations may have their own individual constraints and also doesn't account for fault level requirements which can also put a barrier in place to the connection of new load and generation.

We understand there are constraint issues at industrial sites in Samlesbury and Cuerden that have not been highlighted as part of this analysis where there is a shortage of available demand capacity for industrial expansion.

Figure 20: Capacity for new demand connections at the 132kV level by 2021

2.9 Electric vehicle charging

One important area to explore is availability of electric vehicle charge points, as a lack of availability of these is likely to put consumers off electric vehicle ownership. The geographical spread of these is important, as is the power of the charger. The larger the power output of the chargers the faster cars will charge, and the shorter the waiting time for customers. The power of the chargers that it is possible to install is however limited by the locally available grid capacity.

Electric vehicle chargepoint data comes from the National Chargepoint Registry (this incorporates all data included in Zap Map and Chargepoint databases). These are all charge points that can be accessed by the public, although some include restrictions.

Domestic charge points installed by consumers at home are not included in this map. Electric vehicles can be charged from a domestic plug socket at up to 3kW, while a specially installed domestic charge point can charge the car at up to 7kW.

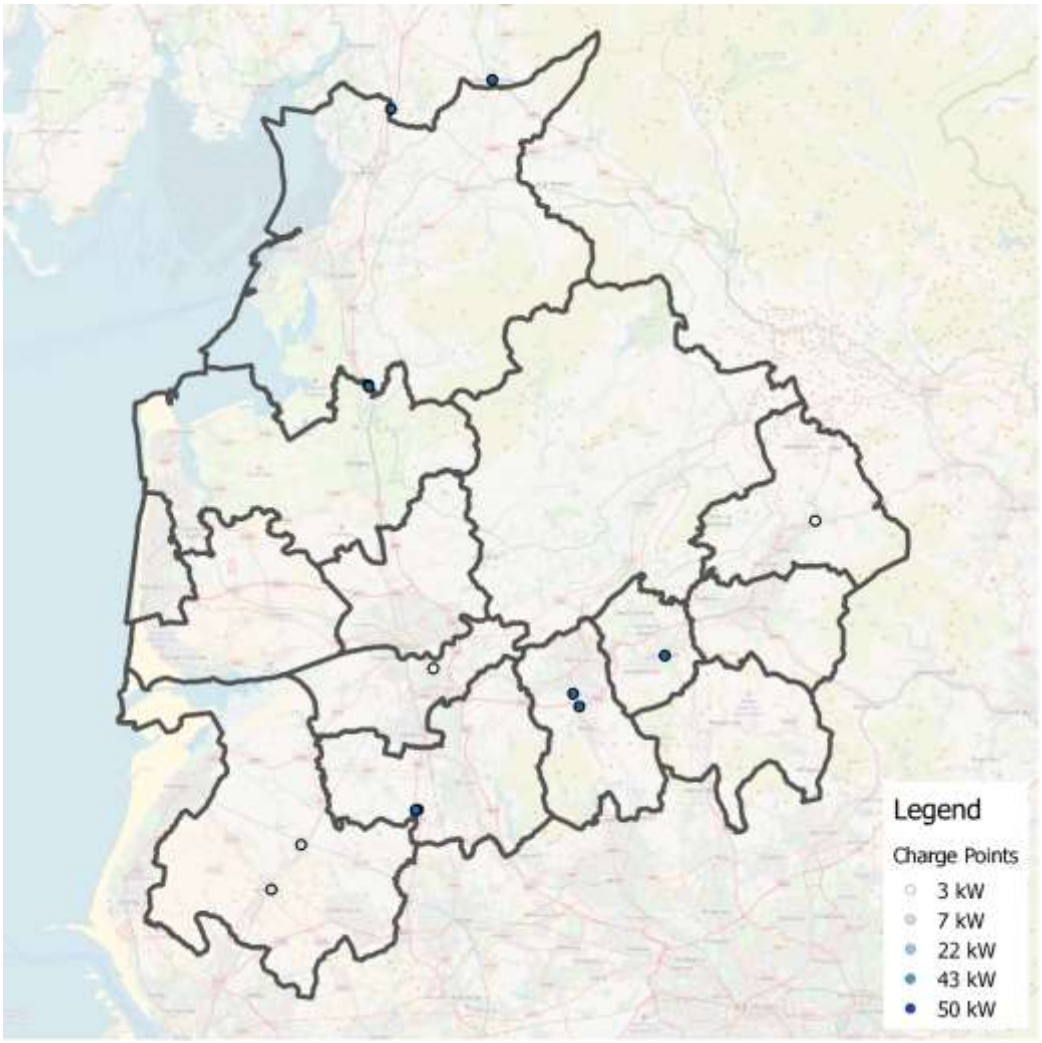

Figure 21: Electric vehicle charge point locations (19)

From Figure 21 it can be seen that there are not huge numbers of charge points across Lancashire, with just 13 separate charging locations, with 43 charge points. There is a spine of fast charging locations at service stations up the M6, these are operated by Ecotricity and account for 5 of the charging locations. Other sites include a Nissan dealership (for Nissan customers only), a park and ride and several public car parks.

At each of the locations on the map there are up to six chargers per site, although not all of them will necessarily be the same capacity as the maximum one denoted by the colour of the dot on the map, for example at some of the Ecotricity sites two of the three charging points are 50kW while a third is 43kW.

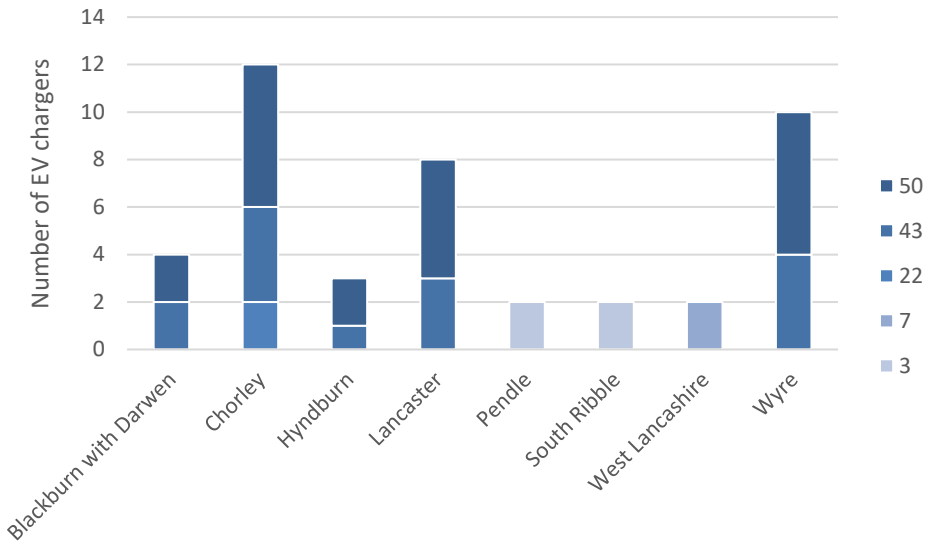

Figure 22: Electric vehicle charge point availability by local authority area (19)

Figure 22 shows the breakdown of charging point numbers by local authority area, this refers to total available charging points, not charging locations, the number of charging points is greater than the number of locations as many locations have more than one available charger.

From Figure 21 and Figure 22 it can be seen that current charging provision for electric vehicles is limited, with a particular lack of fast charging provision across much of Lancashire minimising the attractiveness of electric vehicles to consumers within the Lancashire. This is part of a chicken and egg type problem which the electric vehicle industry is currently grappling with in that consumer uptake of EVs will be slower while charging point infrastructure is inadequate, however private charge point providers have no incentive to invest in charging point provision without the customers there to use them. This situation is slowly changing, particularly with use of central government or European grant funding to deliver additional charging points.

Lancashire County Council has commissioned Chargemaster to install 150 new charging points across Lancashire using funding from the Department for Transport's Highway Maintenance Challenge Fund. This will include 18 'Ultracharge' 50kW units (able to charge 1 car at a time – approx. half an hour to 80% charge) and 66 dual socket Fastcharge (up to 22kW) able to charge 2 cars (3-4 hours for 80% charge).

These spaces will all be on the highway network and spread across the county to create a network of spaces for the public to use, they should be in place by the end of 2018. These units will all be available on the same charging network, POLAR, which should make use of these straightforward for consumers within Lancashire. This investment should help overcome the initial perceived barrier posed by lack of public charging points. The locations of these have been mapped in Figure 23. From this it can be seen that the spread of additional charge points significantly improves the geographical spread of charge points within Lancashire. The rapid charge locations (50kW) are located close to the motorway network, while the fast charge (22kW) charge points are more numerous and spread across Lancashire, with particular focus on destination charging in urban centres and provision in facilities such as park and ride schemes.

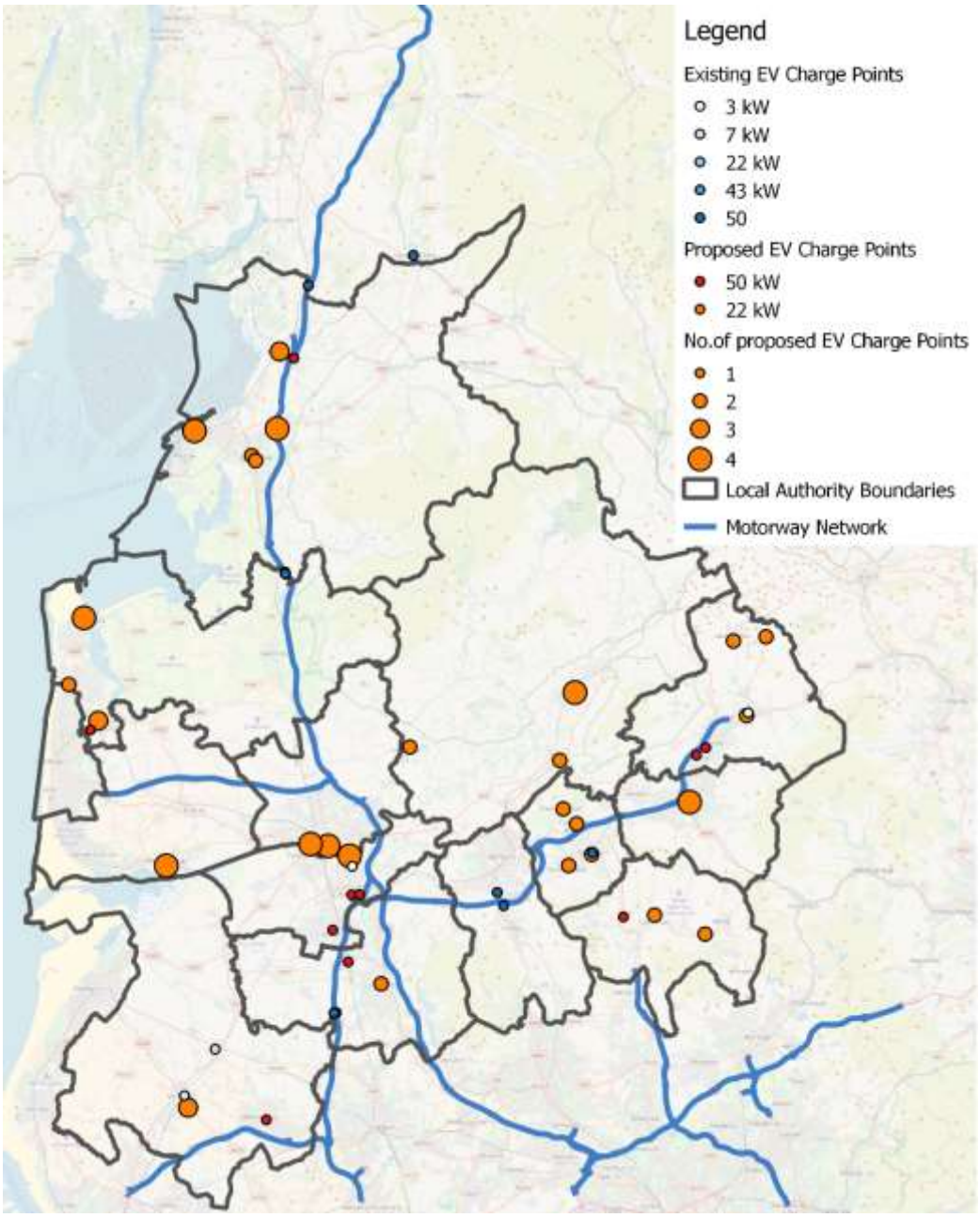

Figure 23: Proposed and existing electric vehicle charge points within Lancashire

2.10 Smart grids and flexibility

One potential route to circumvent network capacity restrictions as seen in Lancashire, is the utilisation of smart grid technology and smart energy management. The inclusion of storage with smart controls within some of these opportunity areas may free up additional capacity.

Co-locating new generation and new demand and potentially integrating smart approaches to balancing supply and demand including storage is one avenue that could get around the capacity constraints.

The network operators already make connection offers to potential generators including 'Alternative Connections'. This is a type of connection that involves a limit on

the times that they are allowed to export on to the grid, so generators are able to connect if they won't be exporting at the times of peak generation. This usually occurs during the day in the summer, when solar PV generation is at its peak.

The addition of flexibility and storage can present an opportunity for generators to circumvent expensive grid reinforcement options that would be involved in their site.

3. Future Energy Scenarios

Both the national and local energy system is complex and highly interconnected. It is also going through a period of transformation due to emerging disruptive technologies and systems, such as the growth of local renewable energy production. The energy system is transitioning from a situation where there were under one hundred electricity generators on the UK electricity network – almost all large power stations – to the current state where there are thousands of smaller distributed generators such as wind and solar farms connected to the network, and domestic and industrial customers generating their own power.

Regulatory bodies such as OFGEM (Office of Gas and Electricity Markets) and the local Distribution Network Operators (DNOs) are working hard to react to the changes whilst still safeguarding the integrity of the overall system; this can produce new opportunities but also unexpected barriers to new technology adoption. The rapid cost reduction of a number of technologies such as solar photovoltaics (PV) combined with government support for low carbon energy have led to economic investment and development opportunities, however the regulatory regime can throw up barriers as new commercial models are appropriate for new technology which may not fit within the existing regulatory framework.

Against this context, it is very challenging to predict future energy consumption. The direction of travel is generally accepted, successive central governments stated commitment to a low carbon future is well documented, but the rate of change to achieve this is unknown. National Grid have therefore developed a number of Future Energy Scenarios (FES) to reflect the different ways the energy system could progress over the next thirty years. These have been considered to assess the likely future development of energy supply and demand within Lancashire.

Figure 24: National Grid Future Energy Scenarios 2017

These Energy Scenarios are laid out considering two axes, the horizontal axis focuses on 'Green ambition' and the impetus from both consumers and government to reduce carbon emissions and improve energy efficiency. The vertical axis considers prosperity – with the assumption that in a more prosperous world with higher levels of economic growth there is more money available to be spent on the transition to cleaner, lower carbon forms of energy. Of the four scenarios only the 'Two Degrees' scenario meets the UK's climate objectives under the Paris Agreement 2016, and is in line with domestic legal obligations under the Climate Change Act (2008).

There are major differences between the Steady State and Two Degrees scenarios, meeting the ambitious goals for 2050 carbon reduction will require a revolution in how energy is generated and consumed with major technological change across different sectors.

3.1 Energy system pathways for change

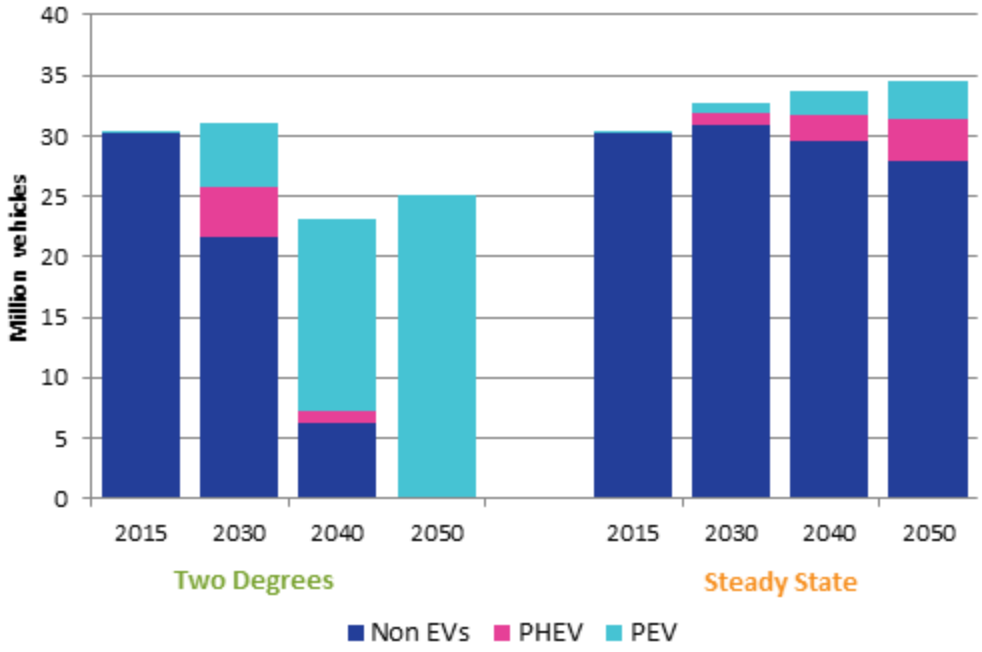

Figure 25: National numbers of electric vehicles on the roads in each scenario out to 2050

In Figure 25 the differing trajectories of electric vehicle (EV) deployment can be seen – within the Two Degrees scenario it can be seen that by 2050 all vehicles on the roads are electric, while within the steady state scenario 80% of vehicles are petrol or diesel powered. The government's recent commitment in policy to eliminating combustion engine car sales by 2040 has provided a boost to the low carbon vehicle sector. Almost all major car manufacturers have either already produced an electric vehicle or are currently developing one. The modelling separates out Plug-in Electric Vehicles (PEVs), which are purely electric, from Plug-in Hybrid Electric Vehicles (PHEVs) which typically have an electric motor with a battery which can be recharged by an onboard internal combustion engine as well as by being plugged into mains electricity.

Within the Two Degrees scenario, the milestone of two million EVs on the roads is met by 2021, whereas in the Steady State scenario this milestone is not reached until 2031.

The direction of travel, however, is clear: electric vehicle sales will continue to increase over time as the industry adapts to this new standard. The current FES were developed in 2017, as discussed in the previous section, prior to the government EV policy announcement referenced above. This has changed the baseline, so the Steady State forecast set out in Figure 25 is already likely too pessimistic in terms of electric vehicle growth and without any further policy change, we would expect the numbers of electric vehicles in 2050 to be significantly greater than the projected 20%.

In 2017 there were around 38 million licensed vehicles on the road, of which 131,000 were EVs, however low carbon vehicles (of which these are primarily electric vehicles) make up an increasing proportion of new car registrations, more than doubling from around 1% in the third quarter of 2015 to 2.1% in the third quarter of 2017. As things stand two million EVs on the road by 2021 is clearly still a very high figure, with the proportion of electric vehicle sales needing to continue to grow exponentially to over 30% of new vehicle sales to reach this figure, with new vehicle registrations typically between 2.5 and 3.2m annually. The Steady State figure would require only 6% of new vehicle registrations to be electric by 2031.

The level of electric vehicle take-up will naturally have a major knock-on effect on the local infrastructure requirements in terms of availability of charging points to support these and the associated electricity grid infrastructure. Electric vehicles could also require increases in additional electricity generation if they are charged at times of current peak electricity demand (winter weekday evenings, 4-7pm). Smart charging that time shifts home electric vehicle charging would help mitigate this.

A ‘smart’ charging system could respond to signals from the grid to manage the charging of connected electric vehicles to reduce strain on the network. For example, when a vehicle is expected to be plugged in all night, charging could be shifted from 4-7pm to take place later when there are fewer constraints on the network. This could reduce consumer electricity bills when combined with time of use tariffs.

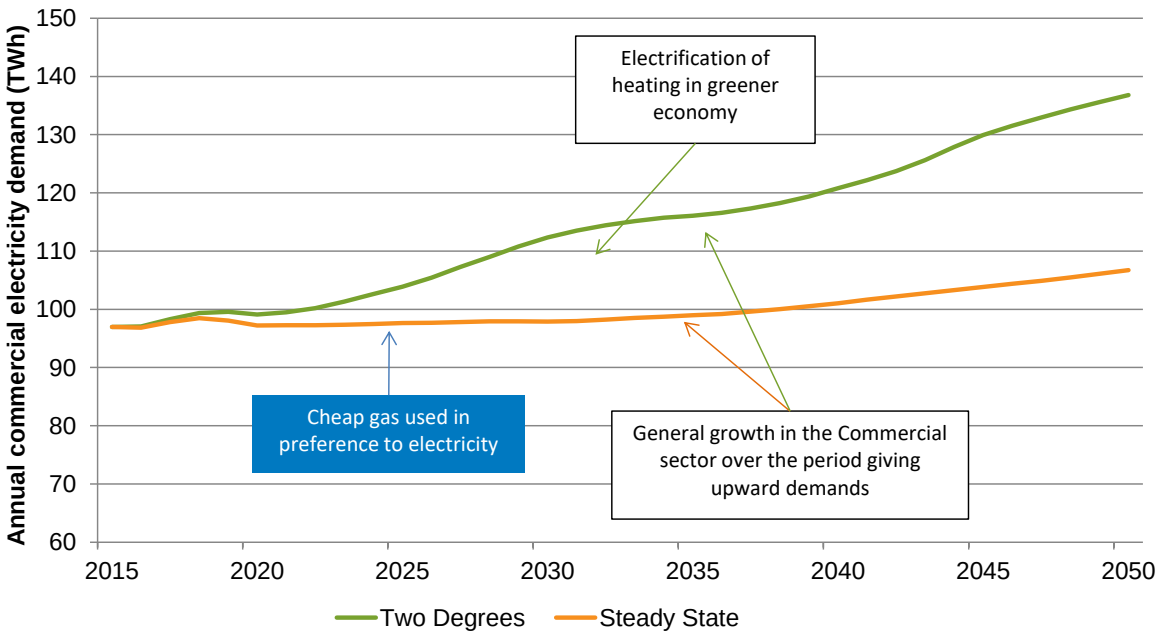

Figure 26: Projected development of commercial electricity demand in Terawatt Hours

Commercial electricity demand has seen a downward trajectory over the last five years, primarily as a result of improved energy efficiency within business, however, there are a range of potential outcomes for how this could develop in future. The growth in commercial electricity demand is driven primarily by electrification of heating within the sector.

Another key area to consider is the deployment of low carbon heating technologies. Within the Two Degrees scenario, significant deployment of these technologies is seen, as shown in Figure 27. The primary technologies seen to be developed in the Two Degrees scenario are air source heat pumps, ground source heat pumps and hybrid heat pump gas boilers. These technologies all include electrification of heat provision, which may prove challenging in some rural areas unable to accept significantly greater new demands from homes and businesses.

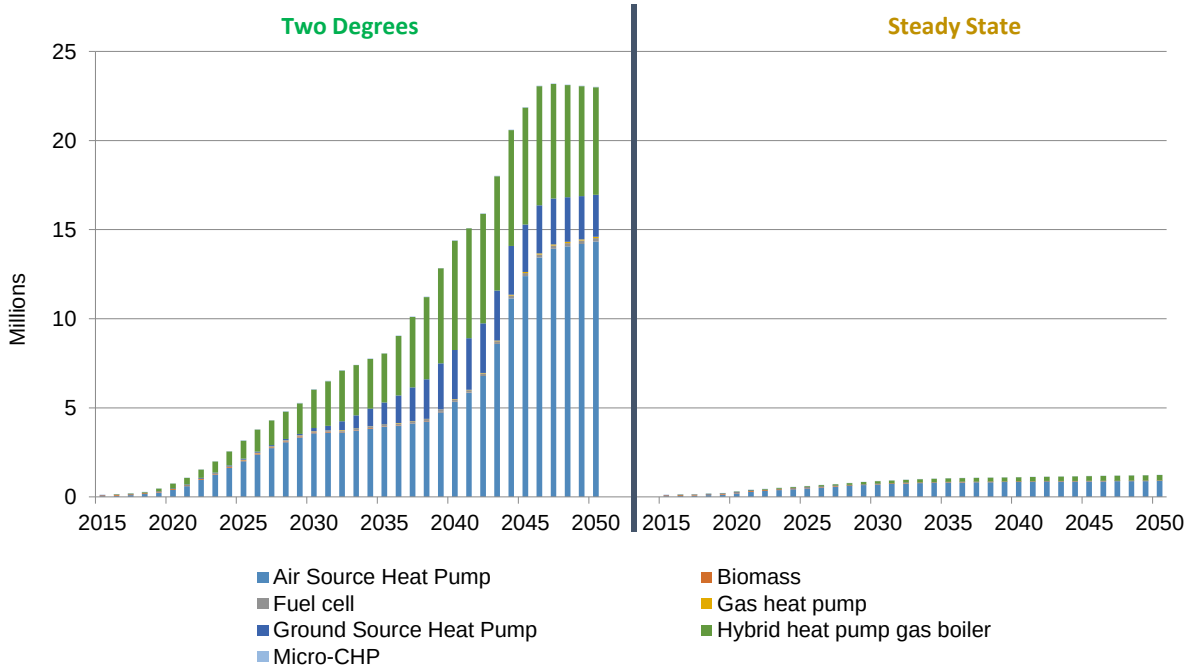

Figure 27: Deployment of low carbon heating technologies to 2050

3.2 Carbon emissions targets

The UK as a whole has committed to legally binding targets of a reduction in carbon emissions of 80% by 2050 compared to the 1990 baseline. The figure below shows the current state of play in meeting these targets for Lancashire, assuming that Lancashire meets the same proportional reduction. This demonstrates the significant progress that has been made to date, and also the distance that remains to go to meet these targets over the next 30 years.

Much of the change to date has come from the increase in renewable generation within our electricity generation mix, combined with the reduced use of coal as a source of electricity generation. There are significant challenges to come, not only in how to continue with the decarbonisation of power generation, but also in the decarbonisation of other sectors of energy use, in particular heat and transport.

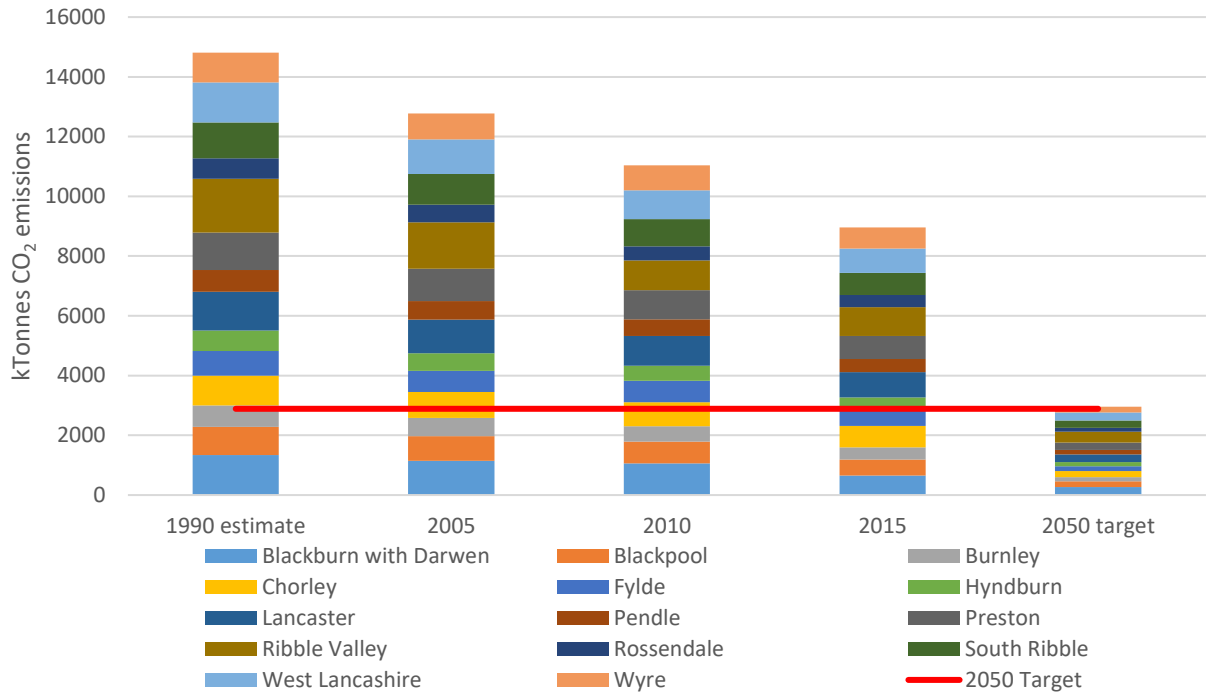

Figure 28: Carbon emissions targets to 2050

All local authorities within the UK are likely to struggle to meet national carbon targets under current trajectories. The Steady State scenario would lead to significant undershoot of the 2050 carbon target, i.e. much higher carbon emissions than required, while the Two Degrees scenario would just meet the target. For local authorities to achieve targets some areas are covered primarily by national policy, for example decarbonisation of the power generation sector, however local authorities and LEPs still have an important role to play in influencing, facilitating and in some cases delivering the investment needed to implement the projects which will decarbonise the power sector.

Local authorities and LEPs have a role to play in areas such as decarbonisation of heat, improvements in energy efficiency across all sectors, improvements to the grid, decarbonisation of transport. Local authorities and LEPs have more direct involvement in areas such as domestic and business carbon emissions and reducing emissions from the public sector estate, however their actions can touch on all areas of the Clean Growth Strategy. The challenge of this can be seen through some of the previous graphs, particularly Figure 27 showing the potential growth in low carbon heating options.

4. SWOT analysis of energy in Lancashire

The integration of the policy review with the development of the evidence base has revealed a number of location-specific factors relating to Lancashire, which have been categorised into strengths, weaknesses, opportunities and threats (SWOT). These have been considered in the context of the scenarios discussed in the previous section, focussing primarily on the Steady State and Two Degrees scenarios. These have been informed through engagement with the wider energy strategy steering group including a range of attendees from public, private and third sectors.

4.1 Strengths, Weaknesses, Opportunities, Threats analysis

4.1.1 Strengths

- Large industrial base and engineering technology sector
  - Could build on this to put Lancashire industry at the centre of UK manufacturing for new technology such as EV charge points or Air Source Heat Pumps
  - Manufacturers could incubate new technology growth
- Heysham has good transport access to port for servicing and maintenance contracts of Offshore Wind. Link to Blackpool College for training up necessary skills
- Large shale gas resource - could retain energy value within local economy
- Gas grid is accessible, no major constraints, could be used for gas storage with technologies such as Power to Gas or Hydrogen
- Potential use of Anaerobic Digestion to generate green gas locally given the strong agricultural sector
- Strong nuclear technology sector that has built up around Heysham - could be at the core of new government investment into nuclear
- The North of England has historically been an energy exporter to the rest of the country
- Preston and South Ribble City deal has moved forwards, the Lancashire Combined Authority could do so which would increase local powers and enable greater local decision making, local political leadership
- Ongoing electric vehicle charge point infrastructure investment will make Lancashire one of the better served areas in the country for fast and rapid EV charge points (22-50 kW)
- Strong local research focused universities with energy skills
  - Lancaster Energy work with SMEs
- Good data available on domestic energy performance

- SME innovation
  - Eco paint company in Heynsham
  - Local Enterprise Zone support
- Very reliable distribution network (Electricity North West), average outage frequency greater than 2 years, outages fixed rapidly

Lancashire has unique strengths within the energy space and the wider market which would allow it to capture the advantages that the transition to clean growth will afford, and mitigate risks to existing industries. Strengths such as the large-scale renewables sector, nuclear, shale gas and other large energy supply industries are complimented by a flourishing engineering and technology sector supporting small scale renewable installations.

The existing large industrial base within Lancashire, including a wide range of energy technology manufacturing ensures that Lancashire is well prepared to take advantage of a national and international shift towards low carbon technologies. Existing manufacturing including technologies such as heat pumps, indicates the opportunities for growth that will come as part of a shift towards clean growth and low carbon options. The local industrial base is also well placed to work with local research-focused universities and academic institutions to make the most of energy sector innovation and leverage this to drive local commercialisation of new technologies.

Lancashire also has strengths in local low carbon generation in particular, the pre-existing relationships with offshore wind installations off the coast, but also from onshore generation including wind and solar. Lancashire is home to what was upon opening the largest wind farm in England – Scout Moor – at 65 MW and has extensive further wind generation potential indicating the opportunities for future growth in this generation area. Lancashire Energy HQ offers training programmes to help develop local expertise in the energy sector and is a leading example of collaboration between academia and industry.

The North West Nuclear Arc around Preston encompasses the majority of the UK's existing nuclear research, development and operational capability and is a major area for new nuclear deployments. This expertise will be crucial to the deployment of future nuclear power generation within the UK, and is a key growth area for Lancashire. Within the *Two Degrees* scenario for the UK's future energy system significant investment is expected to take place in new nuclear generation facilities in order to decarbonise electricity production. To deliver the outcomes envisioned as part of this scenario Lancashire would have a key role in providing expertise for the development of these, and there would be opportunities for growth in companies that are part of the nuclear supply chain.

The Nuclear Advanced Manufacturing Research Centre *Fit For Nuclear* programme has helped UK manufacturers get ready to bid for work in civil nuclear, allowing companies to measure their operations against industry standards and take the necessary steps to close any gaps. These supplier development programmes have benefitted small and medium-sized enterprises (SMEs) in particular. This helps smaller manufacturers in Lancashire engage with the nuclear industry, enabling them to understand what the market expects from them, what they may be capable of supplying, and where they sit in the nuclear supply chain, and therefore how to benefit from future Government investment in the nuclear industry.

Lancashire universities have significant research strengths in the energy sector. SciVal is an evaluation of the performance of research institutions and shows the high-performance levels of Lancashire institutions in Figure 29. This graph measures the strength of research in each field according to the frequency of citation of published papers and compares the North West Coast Arc of Lancashire institutions with other high-performing groupings of universities including the UK's Russell Group and French Allenvi. Lancashire's strength is particularly apparent in the fields of aerospace, environmental engineering, ocean engineering and architecture.

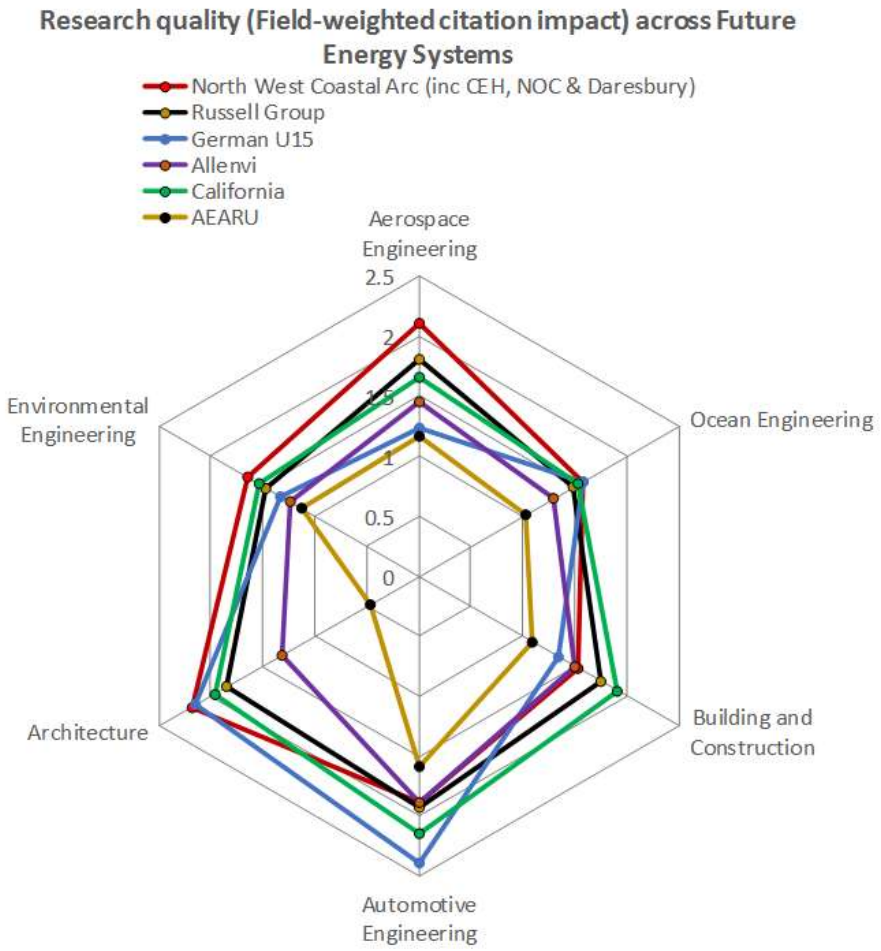

Figure 29: Research quality across Future Energy Systems sectors for the North West Coastal Arc compared to other high performing university groupings

The development of the UK's shale gas resource is seen by Government as important for the UK's future energy security. The shale gas resource within Lancashire, as highlighted in section 2.3.2, is significant and there has been an initial exploration in order to quantify the nature of this and the potential. The local gas grid is robust and could incorporate the injection of significant quantities of locally produced gas from shale or other sources such as local anaerobic digestion biogas production. The growth of this industry within Lancashire has the potential to bring local energy sector jobs and benefits to the area. A similar SME engagement programme as has taken place in the nuclear sector has the potential to maximise local business engagement in the development of this resource and ensure value is maintained within the area.

Additionally, Lancashire has a particularly reliable local electricity grid, with very low levels of outages, providing local businesses with certainty and supply for their energy

needs. Lancashire's investment in fast electric vehicle charge points, due to be completed by the end of 2018, will make Lancashire one of the better-served areas in the country for fast (22kW) and rapid (50kW) electric vehicle charge points, increasing local. These additional power demands are able to be supported by the local electricity network.

4.1.2 Weaknesses

- Consumers currently show no preference for green/low carbon at same/higher cost
- LEP/LAs unable to significantly influence specification of current housing development
- Areas with homes of poor energy efficiency and fuel poverty - hard to treat
- ECO measures often not suitable to Lancashire housing stock
- Not enough financial support for heat pumps to incentivise two degrees transit
- University graduates not necessarily retained within the area (net loss of graduates, but all areas bar London/Bristol experience net loss)
- Cost of measures can be significant
  - E.g. £7k ASHP for every household ~£120bn
- Easy win short payback energy efficiency measures have been done e.g. cavity wall, loft insulation, remaining hard to treat properties are expensive and don't pay back for consumers to do themselves
- No effective market mechanism for home owners (able to pay market) to implement energy efficiency measures
- Lack of current joined up capability in energy unlike e.g. Liverpool and Manchester which have greater access to cheaper third party funding
- Manufacturing needs support for demonstrators
- Lancashire slow to respond to technology change
- Rail electrification schemes on hold
- Lack of clarity over who has the responsibility to take forward different initiatives - local authorities or the market?
- Can't invest in low carbon vehicle infrastructure without 'picking winners' of EV/Hydrogen/Fuel cell
- Lack of awareness of energy opportunities or momentum behind low carbon shift
- Planning context provides a dis-incentive to develop onshore wind proposals

4.1.3 Opportunities

- Developing a Hydrogen network - could build on development of hydrogen pipeline in Cheshire
- CNG freight could represent an opportunity for decarbonising transport
- New nuclear – this would be driven by government appetite, but development of new nuclear power would drive growth of existing local nuclear industry

  - Small Modular Reactors (SMRs) may be a future investment area
- Offshore wind development - the Lancashire coast has large offshore wind resource
- Building on low carbon and renewables industry
- Transport for the North to appropriately leverage transport funding
- Range of low carbon technologies with academic support
- Death of the high street/growth of delivery services and a shift to hub and spoke type deliveries, potential for decarbonisation of these new chains.
- Automotive/aerospace manufacture could lead to new markets
- NHS fleet opportunities
- Energy efficiency savings as well as technology change
- Use Access 4 funding to support able to pay market for fuel poverty
- Large warehouses roofs could host solar panels to reduce ongoing energy costs
- New developments planned can adopt best practice energy measures to reduce running costs and improve competitiveness

4.1.4 Threats

- EV charging causing local grid issues
- Decarbonisation initiatives cause a threat to local industry
- E.g. carbon pricing adding significantly to local business costs
- Unpredictability of incentives regimes – once the region gears up to take advantage of an area of government support
- National policy short termism
- Ability to put in smart charging for EVs; if the infrastructure cannot support smart charging then this could increase peak demands further
- Power infrastructure constraints at large industrial sites constraining growth - Samlesbury, Cuerden
- Domestic consumers bear some of the socialised cost of grid reinforcement, standing charges are projected to increase to facilitate greater uptake of intermittent generation technologies
- Levy control framework (subsides for renewables) not to be revisited until 2025 (Budget 2017), uncertainty of continuation of export tariff
- Off-gas grid properties to use low carbon forms of heat – cost implications uncertain

5. Energy vision for Lancashire

5.1 Lancashire in 2030

2030 Vision Statement

Lancashire has well-developed industry in the low carbon sector, sustaining secure high skilled jobs and supporting further energy efficiency and decarbonisation improvements in wider homes and businesses

5.2 Targets

Insulate	Improving energy efficiency of hard to treat properties.
Heat	Delivery of a city centre heat network within a Lancashire urban area.
Jobs	Supporting the creation of jobs in the energy and low carbon sectors.
Low carbon	Carbon emissions reduced in line with UK targets, a 57% reduction on 1990 levels by 2032.
Active	Double journeys by bike and increase the number of people walking by 10% by 2027 in line with Lancashire's Cycling and Walking Strategy
Productivity	Improve energy productivity by 20% in commercial and industrial sectors

To achieve this vision a number of priorities have been developed. As part of the work done to build the evidence base and analyse the strengths and weaknesses of the Lancashire energy system, some strong themes have emerged. Lancashire has some ambitious growth plans, including increases in the delivery of housing and new employment. There are many opportunities for growth of the low carbon sector as energy consumption and generation change where the focus on low carbon development leads to further economic growth.

Aerial thermal surveys of Lancashire housing stock classified properties as 'high, 'average or 'low' levels of heat loss, with 33.9% classified as having high levels of heat loss and poor energy efficiency. Lancashire aims to reduce this figure to 25% or lower.

The low carbon sector is an important part of the Lancashire economy. The definitions of the sector and how data is collected nationally have changed over time. Up to 2015 government collected data on the low carbon environmental goods and services (LCEGS) sector, since 2015 this dataset has been revised to encompass a smaller more focused area of the UK economy known as the low carbon and renewable energy (LCRE) economy.

In 2011/12, the most recent year for which data on a local authority basis is available, the LCEGS sector in Lancashire was made up of 647 companies employing 7,953 people with sales of £1, 351.5m (20). This made up 0.94% of UK LCEGS employment. The 2016 national figures for the LCRE sector (21) indicate England had 165,000 full-time equivalent employees in this area. Assuming the Lancashire share of the LCRE economy is consistent with earlier LEP level data, this indicates that in 2016 the LCRE sector employed 1551 people in Lancashire.

Lancashire LEP is committing to drive growth of above the national average for the sector, which has been around 5% per annum in recent years. This translates to a target of doubling employment in the Low Carbon and Renewable Energy sector to over 3,000 by 2030.

5.3 Key priorities

Key Priority 1: Build the low carbon supply chain in areas of existing strength

The Energy and Environmental Technologies (EET) sector is one of seven key business sectors in Lancashire that the Local Enterprise Partnership (LEP) has identified as a future driver of jobs and wealth. Lancashire's Strategic Economic Plan (SEP) identifies five key opportunities for growth in the EET sector:

- Growth relating to power generation, including green technologies;
- Nuclear, with the presence of Heysham in Lancaster (and expected decommissioning of Heysham 1 in 2019, with Heysham 2 soon after) and the Springfield Fuels site which the capability and capacity to manufacture fuel for all designs of worldwide nuclear reactors;
- The area's potential as a site for bringing offshore energy to shore to connect with the National Grid;
- The Port of Heysham, which provides logistics support to one of the largest offshore gas fields in UK waters, is well placed to exploit the market opportunities presented by existing and new offshore wind operations and maintenance facilities; and
- The potential development of shale gas extraction, and work to assess the extent and viability of this economic opportunity.

The North West Nuclear Arc (NWNA) of radius 100km, centred on Preston, encompasses the majority of the UK's existing nuclear RD&I and operational capability and is a major area for new nuclear deployments. The NWNA Consortium is committed to maximising the positive impact of nuclear science and innovation on driving down the cost of the UK nuclear programmes and driving up the economic growth from a growing nuclear sector both through national programmes and, importantly, international engagement. This type of organisation offers an important route to demonstrating existing strengths and ensuring they can be built on.

The low carbon supply chain within Lancashire includes a number of companies involved manufacture of low carbon technologies, however this currently isn't necessarily recognised. The LEP can support business development by promoting awareness of these existing strengths and encouraging local business collaboration.

Key Priority 2: Supporting businesses to improve energy productivity
Secure and reliable energy supplies are crucial to the growth of new and existing businesses within Lancashire. Without access to sufficient energy existing businesses may not be able to expand while new businesses may not choose Lancashire as a key growth area. There are two main strands to this; access to connection to the local gas and electricity networks, and access to low-cost energy.

The UK's Aerospace industry has its single largest concentration in Lancashire, while there are also strong industrial bases in other types of advanced manufacturing including the automotive sector. The Lancashire Enterprise Zone being developed at Samlesbury and Warton could serve as exemplar sites for energy efficiency in industry to help set standards for Lancashire business to adopt.

Boost – Lancashire's Business Growth Hub - is actively promoting the Carbon Trust's Green Business Fund, which provides grants of up to £5,000 as a contribution to installing energy efficient solutions. This is another avenue to improving business energy efficiency.

The high energy users within Lancashire industry may benefit from the establishment of a high energy users group to share best practice in energy efficiency improvements and carbon reductions. These could be particularly affected by central government decisions in the future regarding national carbon pricing that may add additional cost to high carbon industries such as the cement works in Ribble Valley. This could contribute to improving business energy productivity within Lancashire.

Key Priority 3: Accelerating the shift to low carbon transport
Lancashire are in the process of introducing a network of rapid and fast chargers across the county by the end of 2018 providing 150 charging spaces. This will help alleviate the issues faced by many vehicle owners when looking at shifting away from combustion engine vehicles to electric vehicles. A clear plan needs to ensure that extensive charging networks can be put in place as the number of EV users increases; this will involve liaising with electricity network operators to establish the limitations of the local network and assessing the local demand for the technologies to ensure that lack of access to charging doesn't prove to be bottleneck that hampers EV development.

The latest Lancashire County Council Local Transport Plan (22) covers the period from 2011 to 2018, and sets out the intention to '*complement regional initiatives for new electric vehicles charging points, through the infrastructure provided in new developments*.' As this document is reviewed and refreshed then a more detailed strategy should be put in place considering growth in local electric vehicle demand as well as the best way to meet this future need. A future-looking transport plan should also consider the approach to future changes in the transport sector such as the growth of autonomous vehicles and change in car ownership rates through the rise of alternative business models such as mobility as a service.

Air quality is a major challenge for Lancashire, particularly in urban areas, with poor air quality having an impact on local health outcomes. The shift to low carbon transport

ties in with ambitions to improve local air quality due to the contributions from existing modes of transport to local air pollution. Electric vehicles with no tailpipe emissions can play a major role in improving air quality.

Nationally £1.2 billion is to be invested in cycling and walking with the intention of making them the natural choice for shorter journeys. Lancashire has secured Local Sustainable Transport funding in a number of areas that have had a specific remit in linking housing to employment areas and have worked with a number of district authorities through the local plan process looking towards cycling and walking as the key modal choice for these shorter journeys.

It will take a coordinated approach at the LEP level to ensure that cycling and walking schemes link appropriately with public transport provision to enable changes in mobility that include more active modes of travel. A combined Lancashire Cycling and Walking Strategy within input from Lancashire County Council, Blackpool Council and Blackburn with Darwen Borough Council has been developed in order to set specific targets and actions within this area, and the targets within the energy strategy have been aligned with these. This document highlighted that there are 27 Air Quality Management Areas in Lancashire where national air quality objectives are not being met (23).

Key Priority 4: Developing heat networks

The urban concentrations within Lancashire represent a big opportunity to change the way homes and businesses energy needs are met. Heat networks present an ideal opportunity to shift homes and businesses in urban areas away from higher carbon forms of heating and to improve the efficiency of heat provision. No investable opportunities have been identified to date as the areas studied so far have not had dense enough heat loads to make a scheme viable, however Lancashire has not had as much focus in this area as some other local authority areas around the country. There are a number of good practice case studies across the UK that can be looked to in order to identify ways these schemes can be taken forwards. There are further studies in being brought forward by local authority districts to examine these.

Funding is available through the Heat Networks Development Unit (HNDU) to support the investigation and development of heat networks to a commercial stage and can be accessed by local authorities. The LEP has a role in ensuring that good practice development of these opportunities can be shared between local authorities within Lancashire so opportunities to leverage funding to deliver these types of schemes are not missed.

Key Priority 5: Improving domestic energy efficiency

Lancashire LEP and Lancashire County Council are committed to improving domestic energy efficiency, particularly for those in fuel poverty. While fuel poverty is only slightly above the national average in Lancashire, Lancashire has many properties classed as 'hard-to-treat', such as those off the gas-grid or solid wall properties where standard heating and insulation measures are not appropriate. Fuel poverty can be particularly acute in some off-gas areas without access to cheaper forms of energy. Lancashire

The Energy Company Obligation (ECO) is the main driver behind energy efficiency improvements, however, it has limits to both the level of funding and the interventions available to individual properties and households. To achieve the

ambitions set out there will need to be a review of the support available through ECO, both in terms of measures available and the level of funding provided, otherwise many measures will not be "cost-effective" or "affordable" for many households.

Where ECO funding has been available for standard measures in recent years the experience in Lancashire has been that the level of funding does not fully cover the cost of the measures. This leaves the homeowner having to find a contribution to enable the work to go ahead. Lancashire County Council has provided additional support through its affordable warmth grant programme to those residents vulnerable to the effects of living in a cold home and who struggle to afford to heat their home to meet the shortfall in ECO funding which has enabled interventions to go ahead that would not otherwise have been completed as the household simply cannot find the contribution themselves. As the plans set out in the Clean Growth Strategy are developed further, appropriate emphasis must be placed on ensuring that appropriate measures can be taken forward particularly in hard to treat properties.

Key Priority 6: Decarbonisation

Lancashire is committed to meeting the targets in place under the 5th Carbon Budget of a 57% reduction in Carbon emissions by 2032. National focus on decarbonisation has increased in recent years, culminating in the publishing of the Clean Growth Strategy, and committing to meeting these decarbonisation goals will help Lancashire be at the forefront for government investment in the low carbon sector, and tie in with ambitions to increase low carbon jobs in Lancashire.

6. How to deliver this vision

In order to deliver the energy vision a comprehensive action plan has been developed, with actions set against each of the priorities.

6.1 Action plan

6.1.1 Strategy implementation

	Action	Timescale	Owner
0.1	Set terms of reference for ongoing role of Steering Group	May 2018	Steering Group
0.2	Adopt LEP Energy Strategy Vision	May 2018	Lancashire LEP Board
0.3	Liaise with BEIS North-West Energy Hub to understand changes in national policy	Annually	Steering Group
0.4	Engage with neighbouring LEPs to identify opportunities for cross-LEP working	December 2018	Lancashire LEP
0.5	Seek to harness support of the new North West Energy Hub to support these actions moving forward	2018	Steering Group
0.6	Reflect Lancashire's clean growth strengths and aspirations within the Local Industrial Strategy	2019	Lancashire LEP
0.7	Ensure that best use is made of remaining ERDF budget and Shared Prosperity Fund to deliver on these actions	2020	Steering Group

To develop this strategy there needs to be oversight of actions and accountability. To facilitate this the energy strategy steering group that has been in place throughout the development of this strategy should continue. This steering group needs agreed terms of reference in order for it to function effectively to oversee the implementation of the strategy.

The Steering Group needs to work to ensure that the Energy Strategy has support at a LEP Board level so that there is commitment to the goals within the strategy from the top of the LEP. Close coordination with the North West Energy Hub will enable better understanding of changes to government policy so that the Steering Group can better analyse the local impact of these. Available support from the Energy Hub should be utilised to facilitate the delivery of the actions in this strategy.

The steering group should coordinate with the other local LEP areas in order to understand the opportunities for cross-LEP knowledge dissemination, particularly in areas already identified as part of this strategy. Some issues cross LEP boundaries and a coordinated approach is best suited to tackle these, for example domestic retrofit faces many of the same problems within both Cumbria and Lancashire in rural areas, as property types are similar in both LEP areas.

The steering group should ensure that the energy strategy can be used to inform future strategic plans, for example the development of a Local Industrial Strategy, and the clean growth strengths and aspirations should be reflected within this.

While ERDF funding is still available, it should be utilised where possible to support delivery of appropriate projects and to support the delivery of this strategy. The UK government has proposed a Shared Prosperity Fund to replace European funding with the aim *"to tackle inequalities between communities by raising productivity, especially in those parts of our country whose economies are furthest behind".* This funding should also be leveraged to support the delivery of energy related projects.

6.1.2 Key Priority 1 - Build the low carbon supply chain in areas of existing strength

	Action	Timescale	Owner
1.1	LEP spread recognition of North West low carbon technology focus	Ongoing	Lancashire LEP
1.2	LEP support energy industry with export licensing	Ongoing	Lancashire LEP
1.3	Trade fair for local industry	July 2019	Chamber of Commerce
1.4	Update envirolink database	March 2019	Lancashire LEP
1.5	Establish project database for low carbon and energy opportunities in Lancashire	July 2018	Steering group
1.6	Explore opportunities to enable local SMEs to pre-qualify for Shale Gas supply chain	2019	Steering Group
1.7	Support for the development of Small Modular Reactors	Ongoing	Lancashire LEP
1.8	Support local technology innovation and low carbon demonstration projects	2019	Lancashire LEP
1.9	Local University/Academic specialisms further support industry	2020	Lancaster University, UCLAN

In a number of areas in which Lancashire has particular strength there will be opportunities to build on this as part of the national shift in the energy system towards

clean growth. The chamber of commerce has identified areas of existing strength that may not currently be established prominently enough. There are opportunities to highlight these areas through activities such as running a trade fair. This could be brought forwards using Priority 4 ERDF funding.

The North West's existing areas of low carbon technology specialism have not necessarily been highlighted appropriately in the past, despite Lancashire manufacturing strengths in areas such as heat pumps. One area that can prove particularly difficult for SMEs involved in manufacturing to negotiate is dealing with regulations around technology exporting. LEP support for energy technology companies to secure appropriate export licences could have a real impact on local firms. This could also encourage businesses to utilise available resources such as the Government's Exporting is Great programme[1].

Lancashire's previous Envirolink database tried to overcome the difficulty in mapping local energy and low carbon industry. This type of resource could be referred to and updated in order to better understand the local low carbon and renewable industry. This could better enable the mapping of low carbon jobs and opportunities for business collaboration to be better identified and improve the visibility of low carbon industry.

Part of the role of the North West Energy Hub is to support the delivery of energy-related projects by the North West LEPs. To facilitate this the Steering Group should produce a project database for potential opportunities, including those that are at an early stage and have not yet identified an appropriate funding source.

There are also opportunities emerging in areas of strength, such as the shale gas sector and nuclear sector. The Steering Group should explore opportunities to enable local SMEs to pre-qualify to be part of the shale gas supply chain. This is an approach that has taken place previously within the nuclear sector in Lancashire as part of the Nuclear Advanced Manufacturing Research Centre (AMRC) *Fit For Nuclear* programme and could enable more of the economic benefits of the development of Lancashire's shale gas resource to be retained within the region. The LEP should explore the opportunities to replicate this for the shale gas industry to spread benefits to Lancashire SMEs.

Within the nuclear sector the expertise of the North-West Nuclear Arc means that Lancashire is well placed to benefit from the future deployment of nuclear technology in the UK. Expertise has been built up around the existing nuclear facilities within Lancashire at Heysham and also those close by such as the Nuclear Advanced Manufacturing Research Centre based in Sheffield. Future research and development for Small Modular Reactors represents a key opportunity for Lancashire. The LEP has a role to liaise with the nuclear industry to promote Lancashire as a destination for this type of demonstration project.

Demonstrators and exemplar projects can be crucial in bringing forwards new technologies and supporting the growth of innovation within the energy technology sector. The LEP and local authorities can offer support to help bring forward innovation projects within their area, this could involve being open to collaboration with the local DNO Electricity North West and local SMEs in order to enable early-stage feasibility and demonstration projects to move forwards.

[1] https://www.great.gov.uk/

Existing academic expertise in the low carbon sector can also be leveraged to further support local industry as highlighted in Section 4.1.1. This could take the form of innovation project partnerships with local businesses.

6.1.3 Key Priority 2 – Supporting businesses to improve energy productivity

	Action	Timescale	Owner
2.1	Establish high energy users group	Autumn 2018	Steering Group
2.2	Facilitate business awareness of energy opportunities	2018	Lancashire LEP
2.3	Use Enterprise Zones as sites for best practice in this area	2020	Lancashire LEP
2.4	Track government proposals in relation to energy performance reporting and disseminate information	Ongoing	Lancashire LEP

The UK's Aerospace industry has its single largest concentration in Lancashire, while there are also strong industrial bases in other types of advanced manufacturing including the automotive sector. These businesses are typically large energy users and may have energy representing a significant cost to them. Establishing a working group for representatives from businesses that are major energy users can help local business collaboration and enable the sharing of best practice in the energy sector.

One of the factors holding back the improvement of commercial energy productivity is the lack of business focus on the area when energy is not part of their core offering. The LEP can play a role in increasing business awareness of the benefits of action in this area and improving awareness of available business funding streams for energy efficiency and low carbon technologies. LEP funding for business facing activity could enable the running of events and promotions to business in this area. There could also be support for businesses to access funding streams such made available by BEIS for support in this area.

The use of Enterprise Zones to drive best practice development is an important opportunity for Lancashire. The Lancashire Enterprise Zone being developed at Samlesbury and Warton could serve as exemplar sites for energy efficiency in industry to help set standards for Lancashire business to adopt. This ties in with the action under key priority 1 to support exemplar and demonstration projects.

The LEP can help business by keeping track of government proposals in relation to energy performance reporting, for example the future of the Energy Savings Opportunity Scheme (ESOS), the Climate Change Levy (CCL) and disseminate this to businesses. Large businesses are required to comply with the ESOS Phase 2 reporting deadline of December 2019.

6.1.4 Key priority 3 – Accelerating the shift to low carbon transport

	Action	Timescale	Owner
3.1	Support active travel strategy implementation	September 2018	Lancashire LEP
3.2	Explore opportunities for street lighting charging points	2018	Lancashire County Council
3.3	Coordination of clean air targets for air quality management zones	2019	Lancashire LEP
3.4	Investigate opportunities to meet clean air targets using hybrid vehicles	2019	Lancashire LEP
3.5	Update Lancashire transport plan	2020	Lancashire County Council
3.6	Engagement with local DNO Electricity North West on the envisaged reinforcement costs to facilitate private EV take-up	2019	Lancashire LEP

Local authorities within Lancashire have been developing a joint cycling and walking strategy, which sets out a vision and a number of targets for increasing the use of active travel modes within Lancashire. The LEP should support the implementation of this strategy as it aligns closely with energy strategy goals to reduce emissions from transport.

Other locations in the UK have trialled the use of street lights as electric vehicle charging points. This could be explored as an innovation opportunity through liaison with the local distribution network operator to trial the scheme within their network area. This would require collaboration with Electricity North West as the local DNO in order to deliver this.

Local authorities in the UK have a responsibility under Local Air Quality Management (LAQM) legislation to review air quality and take action where emissions exceed national objectives. The LEP can aid coordination of the different local authorities in this area to tackle local air quality issues and produce air quality action plans (AQAP) to take action in this area. This will allow a coordinated approach to be taken and the role of change in transport modes to be taken into account.

There are clearly opportunities to tie in the meeting of air quality targets with change in the transport system. Many urban areas across the country, including Lancashire, have high levels of air pollution including pollutants such as nitric oxides and particulates. Electric vehicles have substantially lower air quality impacts than traditional vehicles, particularly diesel, and so the rise in use of electric vehicles is likely to have a positive effect on these emissions. As the shift to electric vehicles is likely to take time there are potential measures that could help accelerate the air quality impacts. In particular the increased use of hybrid vehicles which can operate in electric-only mode within zones of poor air quality while still having the range to meet

the needs of vehicle owners for medium and longer journeys outside of urban areas. A study on the required range that would match future requirements for hybrids to operate in electric-only mode within clean air zones would help guide the development of policy in this area.

The latest Lancashire County Council Local Transport Plan covers the period from 2011 to 2021 and will be up for review before this date. A key part of the new strategy will be ensuring Lancashire is prepared for changes in the transport system including the growth in the use of electric vehicles and autonomous vehicles. The LEP can play a role in coordinating a joined-up approach within Lancashire between the county council and the two unitary authorities.

Electricity North West have developed a plan for their transition to a Distribution System Operator (DSO) (4). They plan to work closely with industry partners and customers to explore strategies to facilitate the roll out of electric vehicles without incurring prohibitive reinforcement costs. The LEP should engage with the DNO to represent Lancashire infrastructure priorities as part of this approach.

6.1.5 Key priority 4 – Heat Network development

	Action	Timescale	Owner
4.1	Disseminate information to industry on heat network opportunities	September 2018	Lancashire LEP
4.2	Liaise with North West Energy Hub to develop database of opportunities	2018	Steering Group
4.3	Share best practice heat network development case studies with local authorities	2018	Lancashire LEP
4.4	Liaise with Liverpool and Manchester Combined Authorities to learn from wider experience in the North West	December 2018	Lancashire LEP
4.5	Explore local authority appetite for investment in heat networks	2019	Lancashire LEP

Lancashire has potential opportunities to deliver a heat network or networks within the local urban areas, and the LEP and the public sector have an opportunity to show leadership in this area to enable innovative heat provision solutions to be explored. Lancashire LEP has a role to play in ensuring that local industry can be engaged with heat network development. Connecting to a heat network can offer a number of benefits to business which are not always well known, including lower costs, more reliable energy supply and the avoidance of capital expenditure on energy costs. There are a number of best practice case studies that can be pointed to nationally where heat networks have been delivered that may be helpful to reference[2].

[2] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/691643/Heat_Network_Case_Study_Brochure.pdf

Local authorities within Lancashire have been slower to take up access to funding for early-stage heat network development through the Heat Networks Development Unit (HNDU). The experience that some of the local authorities have gained through procurement of the initial mapping and masterplanning studies that have been undertaken or are ongoing in Preston and Blackburn with Darwen can be shared with other local authority areas within Lancashire.

There is also wider experience to draw on in the North West, particularly within both Liverpool and Manchester where heat network projects that are closer to commercialisation are moving forwards, particularly in Knowsley Industrial Park and Manchester's Civic Quarter. The relevant City Region Combined Authorities have been proactive in promoting the opportunities in this sector and there are clear opportunities to learn from the activity undertaken in this area to understand the applicability to Lancashire.

It is also important to understand at an early stage the appetite within Lancashire's local authorities towards investment in heat network projects. Many of these projects will come with long-term investment cases, with rates of return of 5-10% over 25 years due to their long project lifetimes (heat network pipework can last 50-80 years). These can be difficult to take forwards in the private sector, but represent opportunities for local authorities to undertake investment to secure long-term revenue streams.

The timeline for government heat network support means that there is some urgency in the drive to bring this forward. Current proposals commit the Heat Network Investment fund availability to 2021 which limits the time to go through the necessary feasibility stages to reach an investable proposition.

6.1.6 Key Priority 5 – Domestic Energy Efficiency

	Action	Timescale	Owner
5.1	Work with local energy efficiency installers to help them diversify revenue streams	2018-19	Lancashire LEP
5.2	Lobby national government regarding stability of energy efficiency support schemes	December 2018	Lancashire LEP
5.3	Liaise with government to help shape the future design of ECO	2018	Lancashire County Council
5.4	Work with Cumbria LEP on delivery of hard to treat property energy efficiency	2018	Lancashire LEP
5.5	Develop local expertise in improving Lancashire's hard to treat housing stock	2019	Lancashire LEP
5.6	Develop local Statement of Intent under ECO flexibility to support energy efficiency for vulnerable homes	2019	Lancashire councils

5.7	Develop exemplar energy efficiency retrofit demonstration project(s) to show best practice and normalise new or innovative technology	2020	Lancashire LEP

The variability in national government support for energy efficiency schemes has led to significant upheaval in the private sector delivery of these measures. Consistency of funding and long term plans in place that enable businesses to better plan for the future are key to retaining local expertise in SMEs in this sector of the low carbon economy. One avenue to enacting change in this area is through lobbying national government for greater future clarity and consistency in policy in this area that is developed as part of the Clean Growth Strategy. Another is the role of the LEP to support local businesses in this area. This could be through working with energy efficiency installers to help them diversify their revenue streams and make themselves more resilient to change in national funding levels.

The issues facing Lancashire's hard-to-treat housing stock have not been addressed by national initiatives. There is an opportunity to work with local research and develop a commercial niche that can be applied locally and potentially exported to other areas with similar issues, particularly Cumbria. The LEP should liaise with Cumbria LEP in order to design appropriate measures to deal with the hard-to-treat properties within the two LEP areas. This will help the development of local expertise to tackle some of these issues and can help to build a local supply chain including use of locally available insulation materials such as sheep's wool.

The Energy Company Obligation (ECO) has been the main driver behind energy efficiency improvements in the past, and will continue to play a major role in funding energy efficiency in Lancashire, but moving forwards will have greater focus on areas of fuel poverty. Government have held consultations on the future design of this support mechanism, Lancashire County Council and the LEP should ensure that they respond to future consultations to highlight the particular issues Lancashire faces. One potential avenue would be to support the suggestion from Electricity North West for ECO to be a DNO obligation under their next regulatory period.

One potential opportunity is to develop exemplar energy efficiency retrofit demonstration project(s) to show best practice. This is a key area for development, as demonstrator and exemplar innovation projects can help to normalise new or innovative technology and help drive improvements in local standards. The LEP should explore opportunities to leverage funding from the Industrial Strategy Challenge Fund to support his type of activity and bring forward retrofit demonstrators for Lancashire in particular.

Under ECO flexibility, Councils can develop Statement of Intent to deem vulnerable homes as eligible. A coordinated approach across multiple councils would improve access to energy efficiency measures for vulnerable homes.

6.1.7 Key priority 6 - Decarbonisation

Action	Timescale	Owner

6.1	Commit to meeting the UK's Carbon reduction targets	September 2018	LEP Board
6.2	Creation of dashboard to monitor progress against carbon targets	Annually	Steering Group
6.3	Demonstrate leadership in the public sector	2020	Lancashire County Council

The UK has committed to meeting legally binding carbon targets as part of the 2008 Climate Change Act. This sets out the requirement to reduce carbon emissions by 80% based on 1990 levels by 2050. As part of this process 'carbon budgets' are agreed covering regular periods to set interim targets. The most recent was the fifth carbon budget passed in 2017 that set out a target of 57% reduction in carbon emissions by 2032. Local authorities and LEPs do not have the same commitment to reducing carbon emissions as the national government does, however, could commit to achieving the same proportional level of reduction as national targets to demonstrate the local commitment to decarbonisation.

Actions that will aid in achieving this decarbonisation goal include the majority of actions in the other priority areas, so those set out in this section are primarily about focus on target setting and monitoring.

Monitoring ongoing carbon emissions should be supplemented by the creation of a dashboard to track annual updates in emissions and the progress made within each sector and each local authority area. This dashboard could also monitor other key data indicators from the strategy to enable visibility of change across Lancashire. Some of these key indicators can then be reported at LEP Board level to encourage buy-in and support from senior levels of the LEP.

There is an opportunity for the public sector to show leadership in this area through investing in technologies to reduce energy consumption and carbon emissions, in particular in areas highlighted in previous sections, for example through improving energy efficiency or investment in heat network projects.

6.2 Funding and support

6.2.1 European Structural and Investment Fund (ESIF)

ESIF includes money from the European Social Fund (ESF), European Regional Development Fund (ERDF)[3] and European Agricultural Fund for Rural Development (EAFRD).

While the decision to leave the European Union will affect this funding in the medium term, in the short term UK local authorities still have access to this funding and it can be used to support appropriate projects that align with the ESIF strategy. The Government has confirmed that it will guarantee EU funding for structural and investment fund projects signed before the UK's departure from the EU, even when these projects continue after the country has left the EU. In practice this still means

[3] https://www.gov.uk/government/publications/draft-european-regional-development-fund-operational-programme-2014-to-2020

that funding bids for new projects need to be submitted by September 2018 to ensure funding is accessible.

The primary categories of funding that should be targeted are Priority Axis 4: Supporting the Shift Towards a Low Carbon Economy, Priority Axis 1: Promoting Research and Innovation and Priority Axis 6: Preserving and Protecting the Environment and Promoting Resource Efficiency.

Lancashire's ESIF Strategy sets out priorities for Lancashire under a set of themes.

- Theme 1 – Investing in Strategic infrastructure, Development and Environmental Resilience
- Theme 2 – Boosting Business Growth and Innovation
- Theme 3 – Promoting Growth sectors and Supply Chains
- Theme 4 – Encouraging Inward investment and Marketing
- Theme 5 – Driving the Skills for Growth
- Theme 6 - Creating opportunities for disadvantaged communities/groups

6.2.2 Other European funding opportunities

There are two other European funds that can help to develop projects in the energy and low carbon space; these are:

Horizon 2020

According to the dedicated website,[4] "Horizon 2020 is the biggest EU Research and Innovation programme ever with nearly €80 billion of funding available over 7 years (2014 to 2020) – in addition to the private investment that this money will attract. It promises more breakthroughs, discoveries and world-firsts by taking great ideas from the lab to the market." Its goal is to ensure European nations can produce world-class science, remove barriers to innovation and make it easier for the public and private sectors to work together in delivering innovation. Within this pot of money is the 'societal challenges' tranche, which includes 'secure, clean and efficient energy,' along with 'smart, green and integrated transport' and 'climate action, environment, resource efficiency and raw materials. All these present opportunities for the LEP to bring together consortia and collaborations to help fund the priority actions outlined in this strategy.

In particular, the 'secure, clean and efficient energy'[5] aspect of Horizon 2020 is structured around seven specific objectives and research areas:

- Reducing energy consumption and carbon footprint
- Low-cost, low-carbon electricity supply
- Alternative fuels and mobile energy sources
- A single, smart European electricity grid
- New knowledge and technologies
- Robust decision making and public engagement
- Market uptake of energy and ICT innovation.

[4] https://ec.europa.eu/programmes/horizon2020/en/what-horizon-2020
[5] https://ec.europa.eu/programmes/horizon2020/en/h2020-section/secure-clean-and-efficient-energy

Its three main priorities are energy efficiency, low carbon technologies and smart cities and communities.

Interreg

Interreg Europe[6] offers opportunities for regional and local public authorities across Europe to share ideas and experience on public policy in practice, therefore improving strategies for their citizens and communities. Two of the categories that it provides funding for are listed as 'low carbon economy' and 'environment and resource efficiency.' It also provides what it calls the '3 C's:' cooperation, collaboration and community engagement and helps public authorities to access peer learning, policy advice, CPD and network expansion, again with particular support offered in the low carbon arena.

Funding for Interreg Europe projects is allocated through calls for project proposals; the next is due in approximately May 2018.

As with ERDF, both Horizon 2020 and Interreg funds provide an excellent opportunity to develop some exciting projects in this area, however, because it is a European fund the amount of time remaining to apply is limited and there is uncertainty about what support, if any, will replace them post-Brexit

6.2.3 Local energy support from the Department for Business, Energy and Industrial Strategy (BEIS)

BEIS has identified that barriers to progression towards a low carbon economy at a local level include 'limited capacity and capability amongst Local Enterprise Partnerships (LEPs) and local authorities' to deliver local energy investment.

The BEIS Local Energy Programme is designed to address the gap in the capacity and capability of LEPs and other local organisations. Part of this involves funding LEP Energy Strategies to understand the opportunities and challenges across each LEP area.

BEIS is also supporting the establishment of a series of local energy hubs across England that, via staff and funding, will:

- Develop and prioritise a pipeline of local energy projects identified through LEP and partner energy strategies and take these projects from concept to business cases that attract investment and are then taken forwards to implementation by other partners.
- Help coordinate local action across several local LEP areas.
- Provide a local good practice link between local LEP activity, other local LEP areas, and national Government.

This will take the form of around five hubs established around the country that will provide regional support to LEPs and local authorities for energy.

It has been agreed by North West LEP Chairs that Liverpool City Region LEP will acts as the lead LEP, while the Liverpool City Region Combined Authority will act as the grant recipient. For operational purposes, the NW Energy Hub Board will comprise Corinne

[6] https://www.interregeurope.eu/about-us/what-is-interreg-europe/

Watson (Cumbria LEP); Mark Knowles (Liverpool LEP); Mark Atherton (GM LEP); Andy Walker (Lancashire LEP) and Andy Hulme (Cheshire and Warrington LEP) and a BEIS representative, potentially inviting external partners to join as appropriate. The Board will meet on a quarterly basis to oversee the establishment, operation and delivery of the North West Hub.

6.2.4 Innovation funding

Innovate UK

Given the government's focus on innovation within the Industrial Strategy, this is an important area to explore. Access to this funding is likely to primarily be through Innovate UK, which offers part funding for projects which do the following:

- to test the feasibility of an idea and make sure it will work
- create a new product, process or service, or improve an existing one, through research and development
- work with other businesses or research organisations on collaborative projects

These opportunities will typically be business led, but could incorporate local authority or LEP involvement to encourage commercialisation of innovative projects that have been taken forwards by private sector partners. Opportunities may initially be considered at the feasibility stage, but this could then lead to opportunities for implementation of pilot projects and indeed larger scale roll outs.

Network Innovation

There are also opportunities to work with Distribution Network Operators (DNOs) on their innovation projects to ensure that DNO spending on innovation is appropriately targeted at the local area. DNOs have licence to invest in innovation through Ofgem's regulatory framework. This includes an annual Network Innovation Competition (NIC) which DNOs are encouraged to submit bids into, as well as support for new technology or operation through the Network Innovation Allowance (NIA). Electricity North West spent an average of £9m per year on innovation projects between 2010 and 2017; increasingly there are opportunities for third parties to participate in the innovation schemes, including a recent joint call for innovation with Scottish and Southern Electricity (SSE).

Gas Network Operators also have access to their own NIC funding, and can also look to develop innovative local projects. This could include developments such as piloting areas with increased proportion of green gas (gas produced from sources including anaerobic digestion and landfill).

The LEP could liaise with Electricity North West as the local electricity network operators, and with Cadent as the local gas distribution network (GDN) in order to ensure that the LEP's views and local challenges within Lancashire are adequately represented when the operators are considering their bids for this type of funding.

Industrial Strategy Challenge Fund (ISCF)

ISCF[7] provides funding and support to UK businesses and researchers. The fund is part of the government's £4.7 billion increase in research and development over four

[7] https://www.gov.uk/government/collections/industrial-strategy-challenge-fund-joint-research-and-innovation

years. Government has worked with businesses and academics to identify the biggest core industrial challenges where:

- the UK has a world-leading research base and businesses ready to innovate
- there is a large or fast-growing and sustainable global market

One important challenge area for Lancashire is 'manufacturing and future materials'. This is a £26 million fund for research and development programmes, to support the UK's civil aerospace industry to develop the next generation of affordable light-weight composite materials for aerospace, automotive and other advanced manufacturing sectors.

Another key challenge area is 'prospering from the energy revolution' including up to £41.5m of support for smart energy system projects and ground-breaking, localised energy system demonstrators. Other relevant challenges have also been identified such as 'transforming construction,' 'next generation services,' and 'the Faraday Battery Challenge'. Further challenges may be added to the list in the near future.

The ICSF is managed by a combination of BEIS and Innovate UK. Developments to come in 2018, according to a recent government blog,[8] include the recruitment of Directors for each of the nine challenges and the launch of the next round of competition.

6.2.5 Salix funding

Salix Finance Ltd.[9] provides interest-free Government funding to the public sector to improve their energy efficiency, reduce carbon emissions and lower energy bills. Salix is funded by BEIS and was established in 2004 as an independent, publicly funded company, dedicated to providing the public sector with loans for energy efficiency projects. Given its longevity, Salix is one of the most popular, flexible and trusted funding sources in operation and can provide significant energy savings for any local authority, school, college, university or NHS Trust based in Lancashire.

6.2.6 Heat network support

The Heat Network Delivery Unit (HNDU) has been running since 2013 and was set up to address the capacity and capability challenges which local authorities identified as barriers to heat network deployment in the UK.

Government is keen to support the development of heat networks because they can enable a transition to lower carbon heating sources, and can be effectively implemented using a variety of different heat supply technologies. Once the infrastructure is in place, even if carbon emitting fuel sources such as gas boilers are used to supply the heat initially, it will be possible in future to replace the central plant used to supply the heat with lower carbon options without causing any disruption to the homes or businesses supplied, therefore enabling easier decarbonisation of heat supply.

HNDU provides support to local authorities in England and Wales through the early stages of heat network development:

[8] https://innovateuk.blog.gov.uk/2017/11/30/industrial-strategy-challenge-fund-more-challenges-more-opportunities/
[9] https://www.salixfinance.co.uk/loans

- Heat mapping
- Energy masterplanning
- Techno-economic feasibility
- Detailed project development
- Early commercialisation

This funding enables local authorities to explore the potential opportunities for heat networks within their towns and cities, and move from there through feasibility to initial commercialisation to a point where a local heat network may become commercially viable. HNDU grant funding can provide up to 67% of the estimated eligible external costs of these early stage development studies (meaning the money paid by the local authority to third parties to deliver the heat network development stages). The local authority will have to secure at least 33% in match funding.

Many of these studies have identified networks where the commercial returns are marginal, and are unlikely to be taken forward by the private sector; this has led to capital funding being made available by government to support these in order to overcome initial economic barriers to investment. This funding is known as the Heat Networks Investment Project (HNIP), and is a £320m capital investment programme providing support for the capital costs of heat networks. So far £24m of support has been provided to a total of nine local authority projects. The supported heat network projects provide heat to approximately 5,000 domestic customers and 50 non-domestic buildings.

In order to ensure carbon reductions, HNIP funding requires that heat networks must meet one of the following criteria for their heat supply:

- 75% of heat from non-renewable fuelled CHP
- 50% of heat from a non-renewable source
- 50% of heat recovered a waste heat source
- 50% of the heat from any combination of renewable/recovered heat and non-renewable fuelled CHP

This places some limitations on the type of networks that are eligible for support. HNIP will also only contribute a proportion of total eligible capital expenditure and this funding should be used to lever in other sources of funding.

6.2.7 Private sector investment

Where opportunities have been identified for businesses to improve their own energy efficiency or reduce energy consumption, there are potential funding routes available for them to implement some of these schemes that are financially viable. These may include energy efficiency improvements, heating system replacement or lighting upgrades through to more ambitious energy projects such as local heat networks.

‘Green’ finance has started to become more common, with funding offered specifically for energy related projects that can reduce energy consumption or carbon emissions. These loans often include attractive rates of interest for credit that is used for

qualifying projects, and is typically appropriate for once a project is ready for implementation, rather than feasibility or early project development.

The Green Investment Group (formerly UK Green Investment Bank) offers finance specifically for energy projects and energy infrastructure, typically funding large-scale multimillion-pound energy projects including development funding, construction phase equity and debt and asset financing. Their main investment sectors are in onshore and offshore wind and investment in waste facilities including anaerobic digestion and energy from waste, however they also invest in a wider array of energy projects including energy efficiency, transport and energy storage.

There are also funding solutions from more traditional corporate banking known as 'green loans' which offer finance dependent on meeting environmental criteria for the planned use of funds. These can be used to support delivery of a variety of thematic projects including energy efficiency, renewable energy, green transport, sustainable food, agriculture and forestry, waste management and greenhouse gas emission reduction. This type of finance allows medium sized firms who do not have available capital to invest in these types of opportunities a bespoke funding route to delivery of their energy objectives. The implementation of new technologies such as LED lighting present opportunities for businesses to save significant amounts of energy and hence also reduce their costs, with the costs and paybacks of these type of opportunities now well understood.

Large firms have been required to undergo an assessment under the Energy Savings Opportunity Scheme (ESOS) since July 2014 to identify potential energy savings measures that could then be delivered cost effectively to save both time and money. This type of opportunity identification has led to a number of energy projects being taken forward; the government is currently holding a consultation to better understand the effectiveness of the scheme to date. Firms that have undertaken an ESOS audit will have identified energy efficiency projects that may be easier to take forwards using third party funding.

6.2.8 Green Finance Taskforce

In March 2018 an independent taskforce established by Government reported on measures to accelerate green finance. The Green Finance Taskforce report sets out a series of recommendations on how the government and the private sector can work together to make green finance an integral part of our financial services. These include:

- boosting investment into innovative clean technologies
- driving demand and supply for green lending products
- setting up Clean Growth Regeneration Zones
- improving climate risk management with advanced data
- building a green and resilient infrastructure pipeline
- issuing a sovereign green bond

The response from Government to these recommendations should be monitored to identify any resultant changes in access to finance.

6.2.9 Other sources of funding

Other funding sources that may be relevant to the LEP and the energy and low carbon agenda are listed on the government website.[10]

6.3 Future governance

A clear governance strategy needs to be in place to support this Energy Strategy. This governance structure should incorporate the North-West Local Energy Hub as well as identified actors within the LEP and the local authorities. Figure 30 below sets out a potential structure. Each action within the action plan will be assigned an action owner within one of the members of the steering group LEP, with oversight of this provided by a steering group convened quarterly to review progress.

The steering group needs an agreed terms of reference and a regular meeting structure.

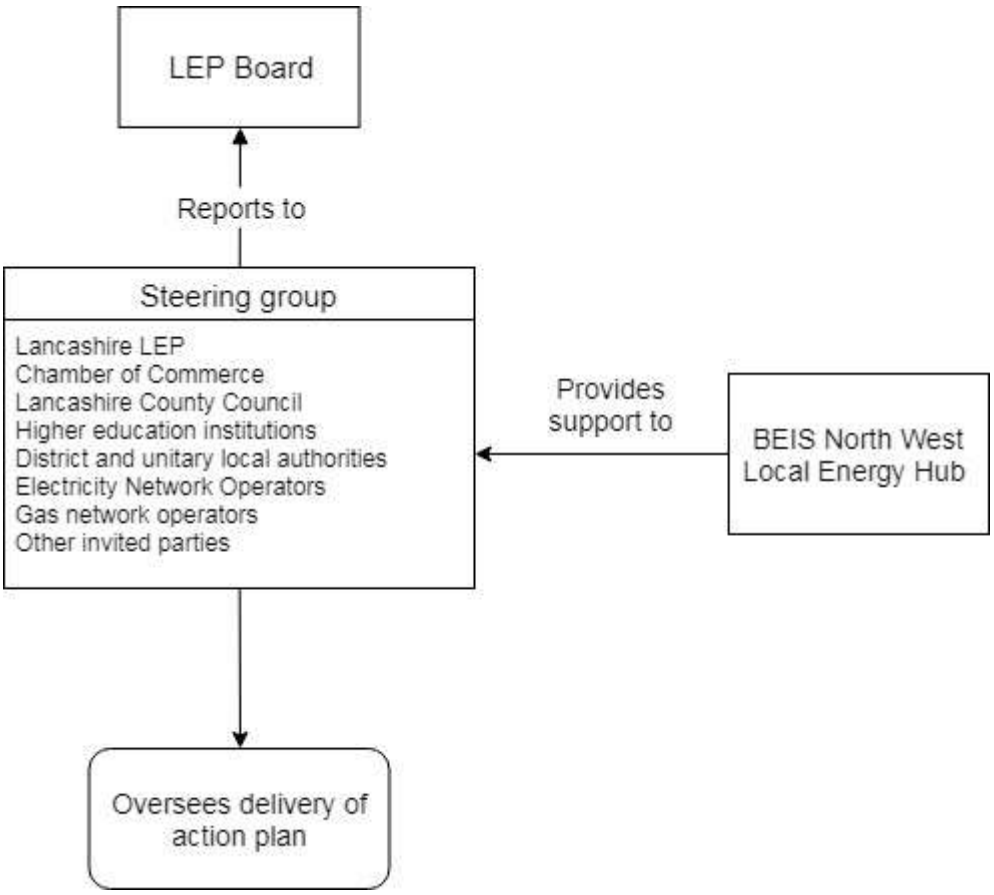

Figure 30: Governance Structure

[10] https://www.gov.uk/guidance/innovation-funding-for-low-carbon-technologies-opportunities-for-bidders

Appendix I Glossary

Term	Acronym	Definition
Air Source Heat Pump	ASHP	ASHPs extract heat from outside air and transfer this heat to inside air.
Anaerobic Digestion	AD	The process by which organic matter such as animal or food waste is broken down to produce biogas for electricity and bio-fertiliser.
Area of Outstanding Natural Beauty	AONB	An area of countryside in the UK which has been designated for conservation due to its significant landscape value.
Climate Change Act (2008)		Act of parliament that established a legally binding UK target of reducing the UK's greenhouse gas emissions by at least 80% (from the 1990 baseline) by 2050.
Combined Heat and Power	CHP	A generator that generates electricity and useful thermal energy in a single, integrated system
Demand Side Response	DSR	A scheme where customers are incentivized financially to lower or shift their electricity use at peak times
Department for Business, Energy and Industrial Strategy	BEIS	BEIS is responsible for business, industrial strategy, and science and innovation with energy and climate change policy, merging the functions of the former departments of Business Innovation and Skills and Energy and Climate Change
Department of Energy and Climate Change	DECC	Precursor department to BEIS, responsible for energy
Distribution Network Operator	DNO	Companies licensed to distribute electricity in Great Britain by Ofgem. There are 14 DNOs in GB which are currently owned by six different groups, each one a regulated monopoly covering a different region of the country.
Distribution Systems Operator	DSO	A DNO that more actively manages supply and demand within their area, what DNOs are transitioning towards
Electric Vehicle	EV	Vehicle powered by an electric engine
Electricity distribution system		Electricity cables and assets facilitating the movement of electricity on more localised networks at voltages from 230 V to 132 kV
Electricity North West	ENWL	The DNO responsible for the electricity network in the North-West of England, covering the majority of Lancashire
Electricity transmission system		Electricity cables and assets facilitating the movement of electricity at high voltages, typically 400 kV
Energy Company Obligation	ECO	Government energy efficiency scheme in Great Britain to help reduce carbon emissions and tackle fuel poverty in which larger energy suppliers fund the installation of energy efficiency measures in British households.
Energy infrastructure		Gas and electricity networks

Energy Performance Certificate	EPC	EPCs present the energy efficiency of dwellings on a scale of A to G. It is compulsory for all buildings that have been newly built, sold or rented out to have an EPC.
Feed-In Tariff	FIT	Government subsidy scheme for renewable electricity generation that pays generators a small amount for every unit of electricity generated
Fossil fuel		A fuel such as coal or gas, formed in the geological past from plant or animal remains.
Future Energy Scenarios	FES	A set of scenarios setting possible pathways for the development of the national energy system produced by National Grid
Greenhouse gas		A gas that contributes to the greenhouse effect and climate change
Ground Source Heat Pump	GSHP	GSHPs extract heat from the ground and transfer this heat to inside air.
Heat Pump	HP	Heat pumps are devices to move heat from a cold space to a warmer one.
Lancashire energy system		The local energy supply, demand and infrastructure within Lancashire
Local Enterprise Partnership	LEP	Local business-led partnerships between local authorities and businesses that undertake activities to drive economic growth
Liquefied Petroleum Gas	LPG	Bottled gas that can be used for domestic heating
Lower Super Output Area	LSOA	Small unit of geographic area within England and Wales used for reporting national statistics
Ministry of Housing, Communities and Local Government	MHCLG	Government department responsible for housing and supporting local government
National Grid		The UK's electricity system operator operating the transmission system that ensures that electricity supply and demand are balanced in real-time.
Office of Gas and Electricity Markets	Ofgem	Government regulator who protect the interests of existing and future electricity and gas consumers.
Plug-in Electric Vehicle	PEV	Electric vehicle that draws electricity from a battery with a and is capable of being charged from an external source
Plug-in Hybrid Electric Vehicle	PHEV	A hybrid electric vehicle that can be recharged by plugging it in to an external source of electric power as well by its on-board engine and generator.
Renewable Heat Incentive	RHI	Government incentive scheme to encourage uptake of low carbon heating technologies that pays households or businesses for each unit of renewable heat they generate
Scottish Power Energy Networks	SPEN	The DNO that covers an area around Merseyside including parts of Lancashire.
Solar photovoltaics	PV	Panels which turn the sun's energy into electricity
Steady State	SS	Scenario from the National Grid Future Energy Scenarios in which there are only incremental changes in policy and the way energy is generated and consumed.
Two Degrees	TD	Scenario from the National Grid Future Energy Scenarios in which there is significant change in energy consumption

		and supply with decarbonisation that will meet the UK's climate change targets.

Appendix II Best practice case studies

LEPs prioritising low carbon economic growth

Introduction

Examples of LEPs making progress on both economic growth and reducing carbon emissions are included in this document to provide good practice case studies for Lancashire LEP to review.

The first three case studies overleaf are taken directly from the newly published *Fit for the Future II* report,[11] compiled by Sustainability West Midlands (SWM) and supported by BEIS, which demonstrates good practice taking place in LEPs on energy, low carbon and climate change management across the country. The three examples are particularly strong at demonstrating low carbon and economic benefits simultaneously. The examples thereafter also arise from the research undertaken to inform *Fit for the Future II* albeit they are not presented as case studies in the report and this information is taken from the deeper research and evidence based compiled by SWM in August 2017. All examples focus primarily on low carbon energy (rather than transport or other interventions).

One of the main ways that Lancashire LEP can enhance economic growth whilst reducing carbon is to strengthen its low carbon economy. The initial starting point to help achieve this is to determine the growth potential from low carbon industries in the Lancashire LEP area by undertaking a Low Carbon and Environmental Goods and Services review, which many LEPs have carried out. This will provide an evidence base outlining the best way that Lancashire LEP can exploit the low carbon sector and strengthen its economy, whilst at the same time continuing to reduce emissions. LEPs that have undertaken good Low Carbon Environmental Goods and Services (LCEGS) studies include:

- Liverpool City Region[12]
- Cumbria[13]
- Coast to Capital[14]
- D2N2[15]
- Greater Manchester[16]

The three primary case studies taken from *Fit for the Future II* commence on the next page.

For each LEP figures for GVA and CO_2 emissions have been benchmarked. Changes between 2011 (when LEPs formed) and 2015 (latest available data):
GVA in Lancashire LEP increased by 14.9% and CO_2 fell by 10.4%

[11] http://www.sustainabilitywestmidlands.org.uk/resources/fit-for-the-future-ii-2/
[12] http://bit.ly/2FWVyMP
[13] http://bit.ly/2mVWybS
[14] http://www.coast2capital.org.uk/storage/downloads/low_carbon_sector_report-1475583426.pdf
[15] http://www.d2n2lep.org/write/D2N2_Low_Carbon_Action_Plan.pdf
[16] http://www.neweconomymanchester.com/media/1758/06-lcegs-deep-dive-report-final.pdf

MANCHESTER'S LOW CARBON VISION

Greater Manchester LEP

The Greater Manchester LEP, in partnership with the Greater Manchester Combined Authority, has demonstrated leadership in low carbon integration, demonstration and implementation for several years and continues to do so despite continuous changes to policy and drivers. This can be demonstrated by:

Ambitious carbon targets

- 48% reduction in carbon by 2020 from 1990 levels.
- 80% reduction by 2050 and/or two tonnes per head per capita by 2050 from 1990 levels.

Implementation Plan

- The Whole Place Implementation Plan for Greater Manchester sets out what the area will do under five headline goals: reducing carbon emissions; growing the low carbon economy; rapidly adapting to a changing climate; embedding low carbon behaviours and achieving air quality thresholds.

Partnership working and integration

- The Low Carbon Hub and its Board brings together leading figures in the space, including from local authorities, higher education, large private sector and energy distributors.
- The Hub manages several other sustainability related Boards including one on energy, one focusing on buildings and one around carbon literacy.

Green growth

- The Greater Manchester Growth Hub contains the Green Growth team which *"is here to help you increase your profitability by reducing your environmental impact and taking advantage of the growing market for low carbon and environmental goods and services."*

Smart energy

- The Greater Manchester Smart Energy project sees 600 homes fitted with air source heat pumps which are then connected to a smart grid system which can manage the energy produced in people's homes and help reduce demand on the National Grid.

Low Carbon Project Delivery Unit (PDU)

- The Low Carbon PDU has four additional main work streams: heat networks, LED street lighting conversion, non-domestic energy efficiency and the District Energy Procurement Agency.

Links: Implementation Plan | Low Carbon Hub | Green Growth | Smart energy | LC PDU

Changes between 2011 (when LEPs formed) and 2015 (latest available data):
GVA in Manchester increased by 13.9% and CO_2 fell by 15.9%

HEATING LEEDS CITY REGION

Leeds City Region LEP

One of Leeds City Region LEP's four key pillars is clean energy and environmental resilience and beneath this one of its key priorities is energy generation. This recognition of the economic importance of the energy and low carbon sector is reflected in its commitment to developing heat networks across the LEP area.

The LEP's heat network journey began in 2013 when it started investigating options for heat network implementation across the city region. This would provide a secure source of local low carbon heat as well as create the opportunity to develop the region as a hub for heat network skills and expertise as part the LEPs economic growth agenda.

Ten of the projects have the potential to save over 55,000 tonnes of carbon every year, generate nearly 400 GWh of heat and 165 GWh of electricity.

A mapping exercise initially took place, which identified hundreds of potential sites for district heating schemes in ninety different clusters. This included supply from a variety of sources, including a combined heat and power generator and an energy from waste facility. These were then prioritised and so far, fifteen individual schemes have been or are being implemented.

Partnership working was key and along with engaging with local authorities, housing associations, energy distributors and large heat users, the LEP also obtained funding from the government Heat Networks Delivery Unit's initiative and the Carbon Trust, who undertook a benefits analysis study to quantify the benefits and challenges of implementing district heating schemes in the region. The LEP has a team working on the low carbon agenda, allowing it significant resource to put towards these type of projects.

Locations where heat network schemes are currently being implemented or investigated include Aire Valley, Barnsley, Bradford City Centre Civic Quarter, Castleford, Halifax Town Centre, Huddersfield Town Centre, Knottingley, Leeds City Centre, Wakefield City Centre, Wakefield City Fields and York.

The whole low carbon and energy agenda is driven by the LEP's Green Economy Panel, consisting of large and small public and private sector bodies. It appears, therefore, that the LEP's low carbon agenda is fully embedded into its way of working, not least emphasised by their achievements with heat networks.

Links: Carbon Trust's case study | Green Economy Panel

Changes between 2011 (when LEPs formed) and 2015 (latest available data):
GVA in Leeds increased by 13.7% and CO_2 fell by 13.3%

DEMONSTRATING RENEWABLE TECHNOLOGIES

Humber LEP

There is no doubt that the Humber is one of the best places to go to access facilities, training and support in the renewable energy sector, particularly offshore wind. The flagship development in the region is the Humber Enterprise Zone, the largest Enterprise Zone in the whole country at over 3,000 acres. Not only that, but the Zone contains two leading low carbon centres:

- **Able Marine Energy Park** (AMEP): this is a fully consented project that will be a bespoke port facility for the renewable energy sector. It is designed specifically for the marine renewables sector providing a multi-user facility for the manufacture, storage, assembly and deployment of next generation offshore wind turbines and their associated supply chains.

- **Green Port Hull**: its vision is to establish Hull and the East Riding of Yorkshire as a world class centre for renewable energy and contains a range of incentives including land with quayside access, being located with a designated Centre for Offshore Renewable Engineering (CORE) and utilisation of the Local Growth Fund (LGF) to provide skills and employment, business support and research and development to ensure that local people and businesses gain maximum benefit from the renewable energy sector.

Local Growth Funding, administered through the LEP, has also helped to supplement the renewable energy strengths of the Enterprise Zone by establishing three further centres that help to strengthen business and industry capability in renewables and offshore technologies. These are:

Nearly £5m has been provided through Local Growth Funding to help develop the ERGO Centre, CATCH Energy Offshore and the Environmental Logistics Learning Hub.

- **ERGO Centre** at Bridgehead Business Park: This Centre has the potential to support 3,000 jobs in its lifetime by creating managed workspaces targeting businesses and professional services that support the development of environmental technologies sector.

- **Environmental Logistics Learning Hub:** this will be a centre of excellence for the delivery of education and training for the ports, logistics and energy sectors. It will provide state of the art simulators for training lifting and support vessel operatives working in the offshore energy sector.

- **CATCH Energy Offshore:** this is an investment programme in specialist training facilities and infrastructure for the offshore wind industry. These will include indoor and outdoor training environments to deliver marine survival and a wide range of health and safety-related training.

There is no doubting that Humber offers a multifarious range of opportunities for businesses, specialists and academics to help develop their skills and supply chains in the renewable energy sector; the biggest challenge will be choosing which of the sites to visit first!

Links: ABLE | Green Port Hull | ERGO | Environmental Logistics Learning Hub | CATCH Energy

Changes between 2011 (when LEPs formed) and 2015 (latest available data):
GVA in Hull increased by 9.9% and CO_2 fell by 14.5%

Other examples

Other examples where LEPs are demonstrating economic growth whilst implementing projects that are reducing carbon are included below. Note that these are not solely projects that will strengthen the low carbon economy directly (although many will), but rather they are activities that the LEPs are implementing that their main intention is to reduce emissions, whilst not compromising economic growth (and in many cases, enhancing it).

Cornwall and Isles of Scilly LEP
£90m with leveraged match for low carbon projects using EU funds is being implemented. Several projects, supported by the LEP, have been commissioned, including:

- Green Drive Cornwall: Ambitions for a compressed natural gas/bio-methane refuelling station, additional 65 electric vehicle charging points and low emission buses and a Drive EV project funded by OLEV.
- A Cornwall energy company is being considered.
- Hydrogen refuelling station and injection systems are being considered.
- The Jubilee Pool Geothermal Heat project will act as a high profile demonstrator of how geothermal can be used directly to provide renewable heat.
- A Smart Islands programme is intended to sustainably and affordably tackle some of the Isles of Scilly's main infrastructure and utilities issues.

Changes between 2011 (when LEPs formed) and 2015 (latest available data):
GVA in Cornwall increased by 15.6% and CO_2 fell by 11.3%

Liverpool City Region LEP
Projects to reduce carbon emissions include:

- Master-planning potential systems and investment locations to create area-based systems of Combined Heat and Power District Heat Networks.
- Taken from the Strategic Economic Plan: "*One of the more substantive interventions for energy infrastructure development is our ambition to construct a tidal power scheme in the Mersey to harness one of the highest tidal ranges in Europe. This could provide countless opportunities for environmental and lifestyle improvements as well as a boost to the visitor economy*."
- There is also research being undertaken to determine the possibility of developing and utilising the hydrogen gas grid.

Changes between 2011 (when LEPs formed) and 2015 (latest available data):
GVA in Liverpool increased by an average of 8.5% and CO_2 fell by 17.3%

New Anglia LEP
Relevant successful projects cited as a result of the LEP's Green Economy Pathfinder include the following:

- Big Community Switch, a collective energy switch scheme to help householders save money on their energy bills.
- Centre of Excellence in promoting the government's 'Green Deal' energy saving scheme and other projects worth more than £1 million.
- Installation of renewable heating systems in homes.
- £3.4m contract awarded by Government to develop and build a revolutionary modular energy storage system at the Lotus Engineering's headquarters at Hethel.
- Broadland District Council successfully secured European funding to pilot a carbon reduction scheme to help hard to treat property owners.

Changes between 2011 (when LEPs formed) and 2015 (latest available data):
GVA in Norfolk and Suffolk increased by an average of 15.0% and CO_2 fell by 10.0%

Oxfordshire

Projects that have been implemented where the LEP has had strong involvement include the following:

- The Smart Oxford Strategy has made a strong link with one of its key areas, primarily making homes and businesses more sustainable in terms of resource consumption.
- A heat network has been implemented in Headington which serves two very large hospitals so that they can share heat from one to another.
- There is also a second waste heat scheme initiating from Sainsbury's and will service a social housing estate; an implementation study is currently underway.
- There is also a new development in the eco-town of Bicester, where a new development of 800 low carbon houses has been built and this has been connected to a heat network.

Changes between 2011 (when LEPs formed) and 2015 (latest available data):
GVA in Oxfordshire increased by an average of 21.7% and CO_2 fell by 12.2%

Summary

The examples above show that it is possible for LEPs to embrace the low carbon agenda and reduce emissions via implementation of projects that also enhance energy security and clean energy, whilst not having a detrimental effect on the economy. In fact, the majority of these projects are likely to have boosted the economy of the region, making it a more attractive, resilient and cleaner place to live and invest. Moreover, as mentioned at the start of this document, there are several examples where LEPs can specifically invest in projects that boost the low carbon economy, a sector in itself, that can attract investment, develop skills, improve productivity and strengthen markets and supply chains. This approach, which several LEPs have taken, represents the best of both worlds, as any such projects will automatically benefit the economy but will do it in a sustainable, carbon neutral way.

Appendix III References

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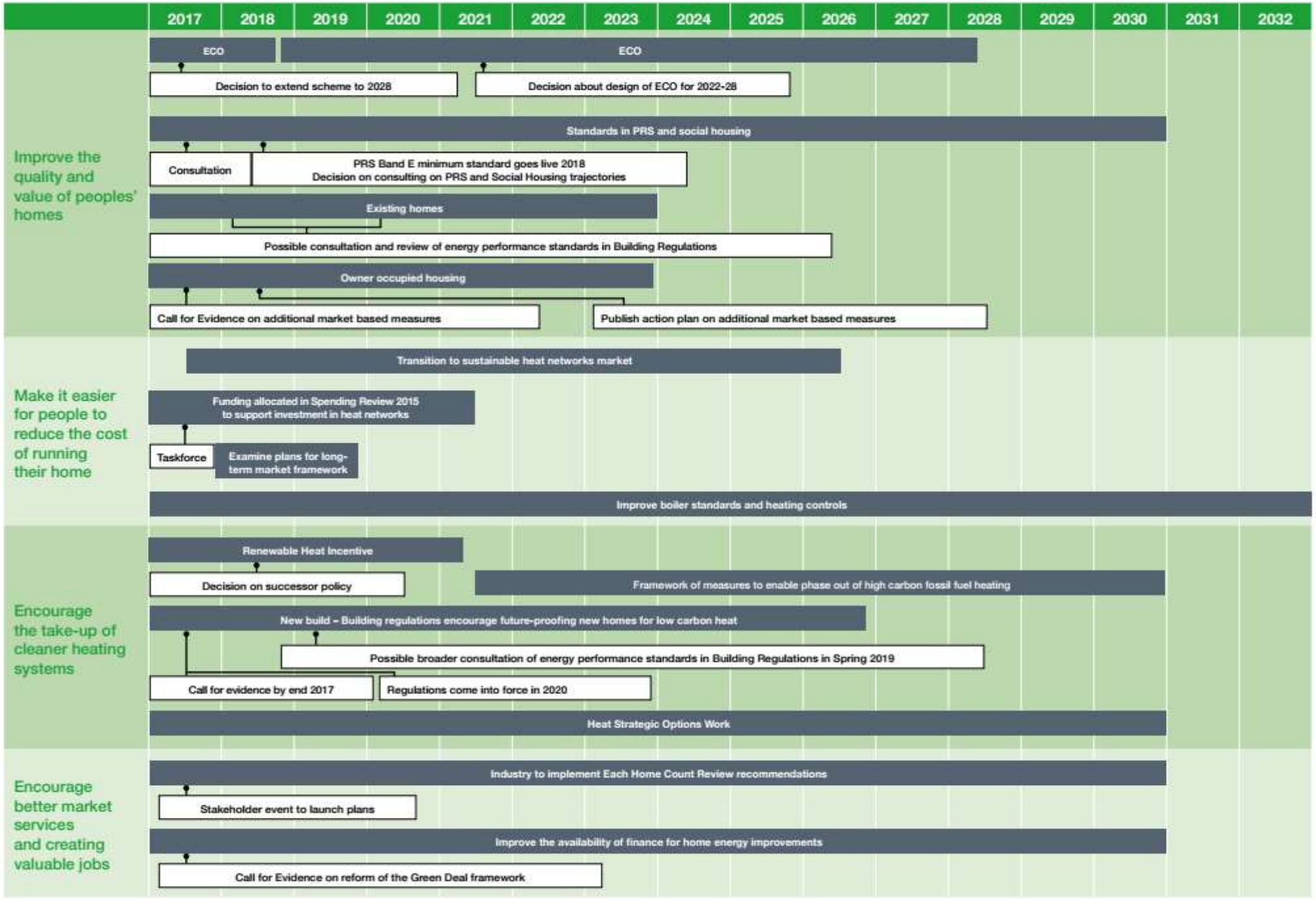
Appendix IV Clean Growth Strategy Transition Plans

The following four pages set out government policy plans to 2032, and include a number of areas in which new policies or successor policies to current support has not yet been set out, in particular in relation to:

- Business energy efficiency (consultation on support 2018)
- Changes to minimum standards
- Low carbon heat technology support - successor policy to the Renewable Heat Incentive to be decided 2018
- Development of industrial energy efficiency scheme 2018
- Development of policy framework to support decarbonisation of heavy industry 2018-2021
- Decision on future design of ECO (domestic energy efficiency funds) 2021
- Review of energy performance standards in Building Regulations 2019
- Low carbon freight detailed plans set out 2021 building on innovation trials
- Low carbon electricity generation no further support before 2025, existing Feed-In Tariff scheme closes 2019

Homes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Improve the quality and value of peoples' homes
ECO
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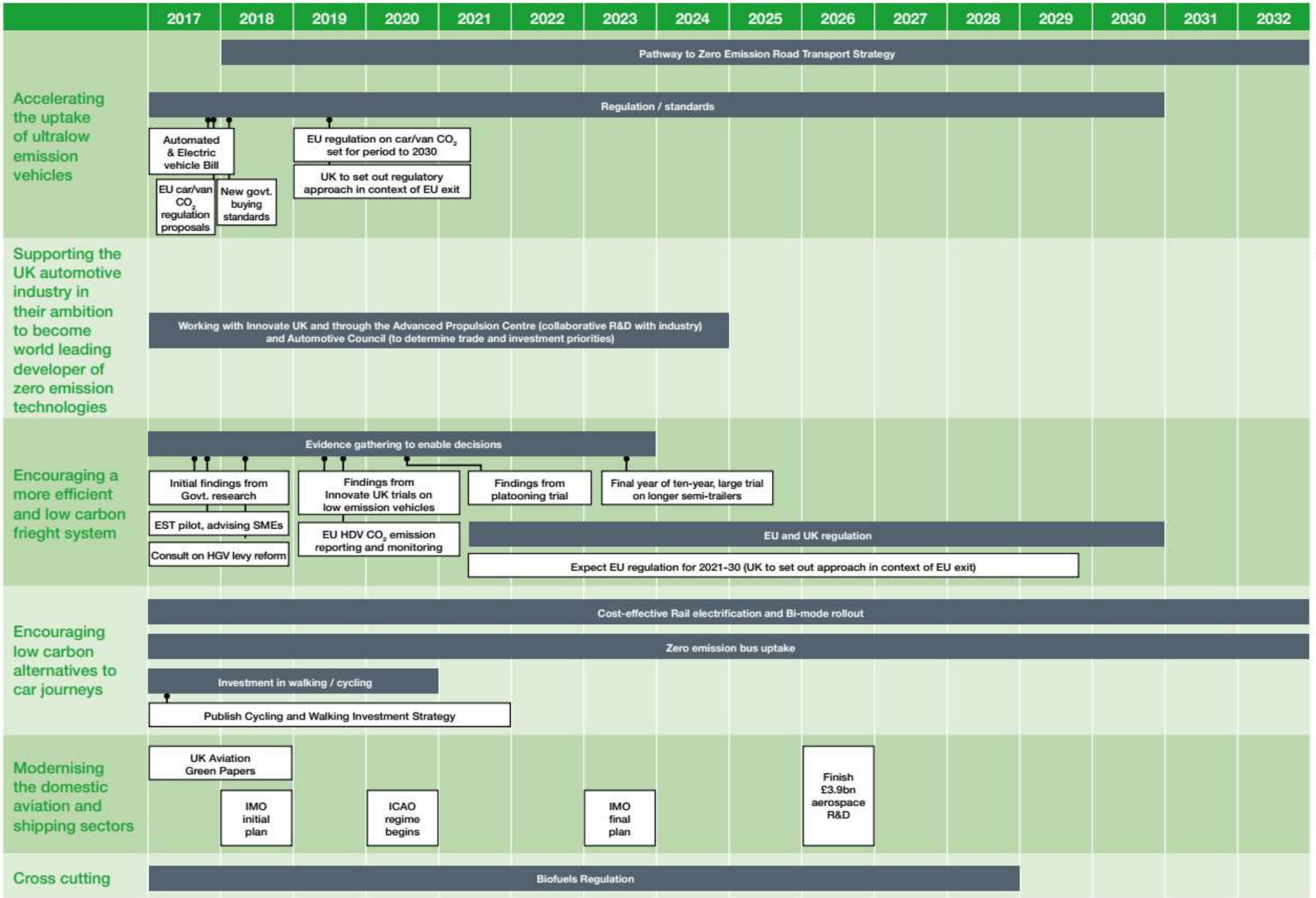
Decision to extend scheme to 2028
Decision about design of ECO for 2022-28
Standards in PRS and social housing
Consultation
PRS Band E minimum standard goes live 2018
Decision on consulting on PRS and Social Housing trajectories
Existing homes
Possible consultation and review of energy performance standards in Building Regulations
Owner occupied housing
Call for Evidence on additional market based measures
Publish action plan on additional market based measures
Make it easier for people to reduce the cost of running their home
Transition to sustainable heat networks market
Funding allocated in Spending Review 2015 to support investment in heat networks
Taskforce
Examine plans for long-term market framework
Improve boiler standards and heating controls
Encourage the take-up of cleaner heating systems
Renewable Heat Incentive
Decision on successor policy
Framework of measures to enable phase out of high carbon fossil fuel heating
New build – Building regulations encourage future-proofing new homes for low carbon heat
Possible broader consultation of energy performance standards in Building Regulations in Spring 2019
Call for evidence by end 2017
Regulations come into force in 2020
Heat Strategic Options Work
Encourage better market services and creating valuable jobs
Industry to implement Each Home Count Review recommendations
Stakeholder event to launch plans
Improve the availability of finance for home energy improvements
Call for Evidence on reform of the Green Deal framework

Transport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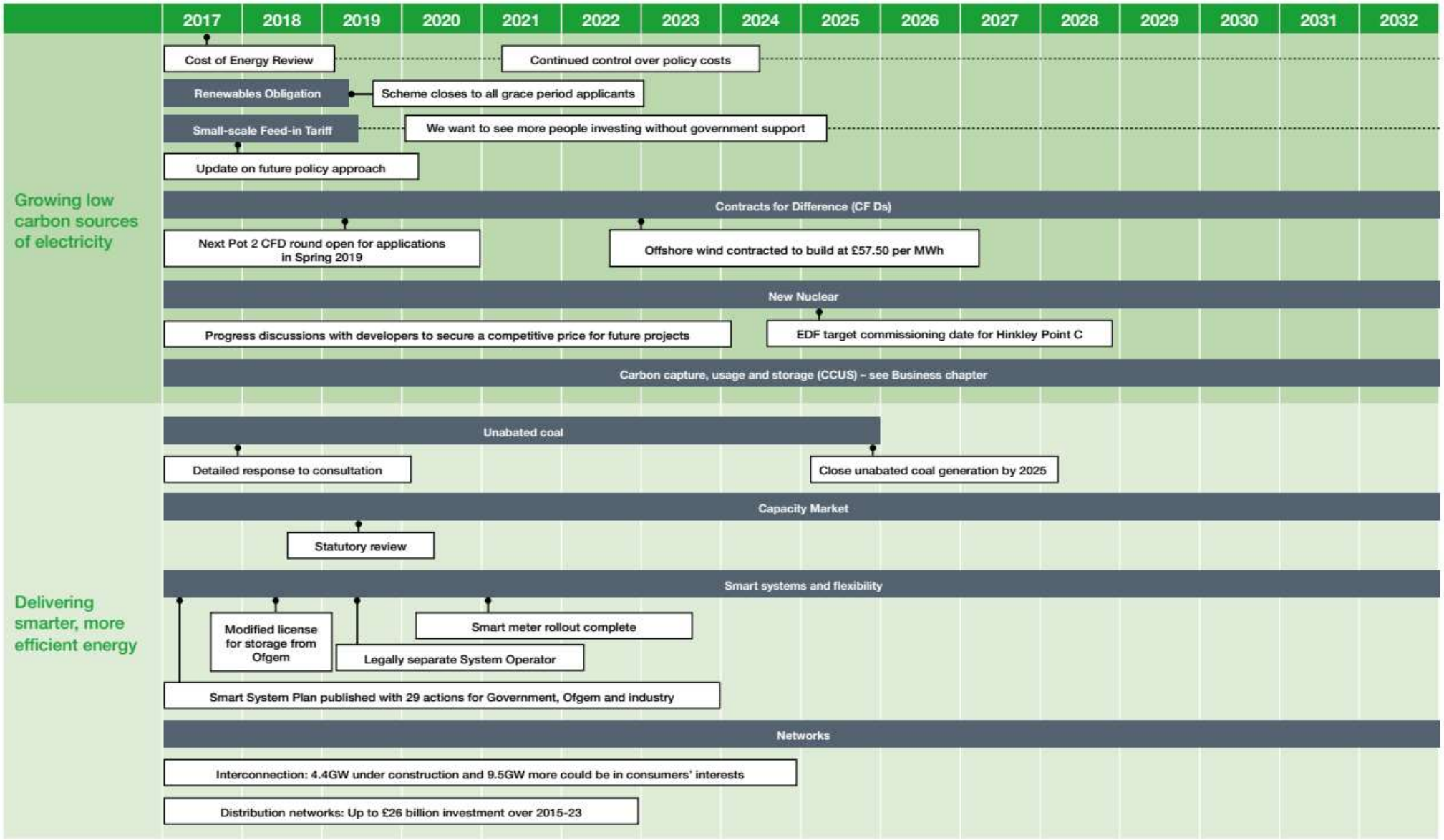
Pathway to Zero Emission Road Transport Strategy
Accelerating the uptake of ultralow emission vehicles
Regulation / standards
Automated & Electric vehicle Bill
EU car/van CO2 regulation proposals
New govt. buying standards
EU regulation on car/van CO2 set for period to 2030
UK to set out regulatory approach in context of EU exit
Supporting the UK automotive industry in their ambition to become world leading developer of zero emission technologies
Working with Innovate UK and through the Advanced Propulsion Centre (collaborative R&D with industry) and Automotive Council (to determine trade and investment priorities)
Encouraging a more efficient and low carbon frieght system
Evidence gathering to enable decisions
Initial findings from Govt. research
EST pilot, advising SMEs
Consult on HGV levy reform
Findings from Innovate UK trials on low emission vehicles
EU HDV CO2 emission reporting and monitoring
Findings from platooning trial
Final year of ten-year, large trial on longer semi-trailers
EU and UK regulation
Expect EU regulation for 2021-30 (UK to set out approach in context of EU exit)
Encouraging low carbon alternatives to car journeys
Cost-effective Rail electrification and Bi-mode rollout
Zero emission bus uptake
Investment in walking / cycling
Publish Cycling and Walking Investment Strategy
Modernising the domestic aviation and shipping sectors
UK Aviation Green Papers
IMO initial plan
ICAO regime begins
IMO final plan
Finish £3.9bn aerospace R&D
Cross cutting
Biofuels Regulation

Power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Growing low carbon sources of electricity
Cost of Energy Review
Continued control over policy costs
Renewables Obligation
Scheme closes to all grace period applicants
Small-scale Feed-in Tariff
We want to see more people investing without government support
Update on future policy approach
Contracts for Difference (CF Ds)
Next Pot 2 CFD round open for applications in Spring 2019
Offshore wind contracted to build at £57.50 per MWh
New Nuclear
Progress discussions with developers to secure a competitive price for future projects
EDF target commissioning date for Hinkley Point C
Carbon capture, usage and storage (CCUS) – see Business chapter
Delivering smarter, more efficient energy
Unabated coal
Detailed response to consultation
Close unabated coal generation by 2025
Capacity Market
Statutory review
Smart systems and flexibility
Modified license for storage from Ofgem
Smart meter rollout complete
Legally separate System Operator
Smart System Plan published with 29 actions for Government, Ofgem and industry
Networks
Interconnection: 4.4GW under construction and 9.5GW more could be in consumers' interests
Distribution networks: Up to £26 billion investment over 2015-23

Business and Industry