Durham County Council

County Durham

Green Economy Study

Low Carbon Environmental Goods and Services (LCEGS2023)

April 2023

Report Years:
2019/20 to 2021/22

kMatrix

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kMatrix Data Services Ltd

This information is provided to quantify sub-sectors and help the client identify opportunities in the current and future Green Economy defined within this study as the Low Carbon Environmental Goods and Services sector, using the LCEGS2023 dataset.

It does not constitute advice to the client as to what they should do, when, where or with whom.

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Durham County Council

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Study Overview and Definitions

This study was commissioned by Durham County Council to provide a baseline analysis and growth potential of County Durham's Green Economy. The overriding aim of the study is to provide data in evidence for the Green Economy in County Durham.

The Low Carbon Environmental Goods and Services (LCEGS) LCEGS taxonomy includes 2,769 activities from across the economy which provides goods or services which contribute to the reduction in carbon, improve energy efficiency, provide renewable energy or environmental benefits. It has been used by the Department for Business Innovation and Skills (now the Department for Business, Energy & Industrial Strategy) and then continued by Greater London Authority, providing continuous reporting of the UK and London since 2007/08. Alongside this timeline data, Greater Manchester has commissioned LCEGS measurements for the last nine years, and several Local Enterprise Partnerships across England have commissioned their own reports, culminating in 2020 with the Midlands Energy Hub (now Midlands Net Zero Hub) commissioning detailed reporting for the 65 Local Authorities, within 9 LEPs of the Midlands Net Zero Hub area.

The continued reporting of the same definition has the benefit of longevity, has been rigorously tested and is widely accepted as a robust definition of the sector. It allows comparison of market across the UK, because the same activities are measured.

Despite these advantages, the LCEGS dataset does have limitations due to its longevity, ironically because of the market desire for directly comparable datasets, i.e., how and when do you or can you update the definition?

The LCEGS definition was developed in 2008, when Air Source Heat Pumps, Electric Vehicles, Hydrogen and District Heat Networks were niche, low value markets. Although elements of all of these markets are within LCEGS, they are not easy to find and in some cases, such as Electric Vehicles, measured economic output is limited to early-stage activities such as R&D and Manufacture, missing the more developed-market activities of supply and maintenance, which are an aspect of the same market in 2022.

The Introduction of LCEGS2023

The LCEGS dataset was updated through work with Glasgow City Council in the Autumn of 2022, establishing the LCEGS2022 dataset. The dataset has been further extended within this study to include Sustainable Food Production and Energy from Waste, resulting in an updated LCEGS dataset, referred to a LCEGS2023. Within this dataset, there are 6 Level 1 sub-sectors: Low Carbon, Renewable Energy, Environmental, District Heat Networks, Green Infrastructure & Nature Based Solutions and Sustainable Food Production. Collectively, these now encompass 36 Level 2 sub-sectors.

LCEGS2023 extends the LCEGS dataset from 2,769 to 5,133 activities, through the addition of District Heat Networks, Green Infrastructure & Nature Based Building and Sustainable Food Production at Level 1. Existing Level 1 sub-sectors Low Carbon, Renewable Energy and Environmental have been extended to include:

Low Carbon – more detail Electric Vehicles, Hydrogen Vehicles, EV Batteries, Production of Hydrogen, Insulation and Heat retention Materials, split by domestic and non-domestic applications, alterations in Levels 3-5 and addition of mature-market activities e.g., maintenance

Renewable Energy – Air Source Heat Pumps extracted from lower levels to create a visible Level 2 sub-sector, Geothermal re-structured at Level 3 to increase usability and Wind split into offshore and onshore at Level 3, alterations in Levels 3-5 and addition of mature-market activities e.g., maintenance

Environmental – Addition of Energy from Waste as a Level 2 sub-sector

Some of the alterations are drawn from standalone taxonomies held by kMatrix and reported to other cities and LEPs, such as the change to Wind and Geothermal, other areas were extended by kMatrix as a response to stakeholders request for further detail, such as splitting building insulation materials into domestic and non-domestic applications. Further detail on the taxonomy is provided in Section 1.

Study Overview in Brief:

This market intelligence study provides quantification of the Low Carbon Environmental Goods and Services sector for County Durham.

It is not intended as a policy document but provides data in evidence through a snapshot of the market across a 3-year period, to be used alongside other studies and market intelligence reporting.

The intention of the study is not to answer every question, but to be a tool to understand what is present in County Durham, from which to build further capacity. The dataset and reporting has been designed to provide data in evidence, to answer as many questions as possible within the study boundaries, and to provide data at a level of granulation to enable it to answer most questions not yet asked, e.g., it will provide detail on some aspects of the Circular Economy, such as waste and recycling, but doesn't measure the entire ecosystem.

The focus of the snapshot is the historic market (2019/20 to 2021/22) and four-year forecasts to 2025/26, which indicate the industry interpretation of current policy, giving insight into the current expectation of market trajectory by industry itself.

What the dataset measures:

The data provides a snapshot of the market for goods and services which improve the environment and/or actively assist in the move to net zero. It measures the goods and services regardless of *where* they are used, e.g., solar panels on a hospital roof are included

What the dataset does not measure:

It does not count those activities which the green economy is *applied to*, e.g., the hospital needs to use the solar panels to reach net zero, but the green economy does not count the surgical team within healthcare

A good analogy is Cybersecurity, which was a niche market 25 years ago, until awareness and need grew. It is now relevant to some extent across every aspect of society, with every online activity having some element of cybersecurity embedded, but not every activity is counted as cybersecurity. Likewise the Green Economy needs to be applied to the whole economy, but the whole economy is not counted in the Green Economy.

LCEGS Concept:

Within LCEGS and this study, the dataset measures those products and services needed to reach net zero targets and other environmental activities, such as waste water treatment etc.

Study Key Points

Key characteristics of the Low Carbon Environmental Goods and Services Sector in County Durham:

➢ **Top Ten Sub-sectors**

County Durham's Low Carbon Environmental Goods and Services (LCEGS2023) sector was worth £1.7bn to County Durham's economy in 2021/22, with over 600 businesses and employing over 11,000 people. The top ten sub-sectors by Sales in 2021/22 are:

- Wind – £226m
- Alternative Fuels – £210m
- Alternative Fuels Vehicle – £177m
- Building Technologies – £168m
- Carbon Finance – £138m
- Low Carbon Meat Alternatives – £132m
- Geothermal – £76m
- Photovoltaic – £76m
- Biomass – £65m
- Recovery & Recycling – £62m

➢ **County Durham is a LCEGS Cluster**

The LCEGS2023 sector is an economically significant sector within County Durham, at 16%, County Durham's LCEGS2023 sector accounts for a significantly higher proportion of the County's GDP than the UK average of 11%, and the wider North East at 14%.

County Durham accounts for 24% of the North East's LCEGS2023 sector, which is higher than County Durham's 22% contribution to the wider economy.

When the North Pennines Area of Outstanding Natural Beauty is taken into consideration, the density of companies across the available area of County Durham is relatively even, with strong chains and networks of supply across the County. This strong business base of high performing LCEGS2023 activity should be considered as a County-wide cluster.

➢ **Resilience of the Sector to the Economic Shock of the Covid-19 Pandemic**

By 2021/22, the LCEGS2023 sector in County Durham saw 94.8% recovery from the economic shock of the Covid-19 pandemic, which is in line with the UK average of 94.7%.

Although contraction of the sector is similar to the UK average, 22 of the 36 sub-sectors performed better than the UK and four of the largest sub-sectors in County Durham are the highest performing:

- Carbon Finance grew by 4.9% compared with the UK average of 2.2%
- Biomass grew by 0.0% compared with the UK average of -2.4%
- Low Carbon Meat Alternatives contracted by -3.4% compared with the UK average of -5.7%
- Building Technologies contracted by -4.7% compared with the UK average of -5.9%

Of the six largest sub-sectors, only Alternative Fuels had contraction greater than the UK, it contracted by -6.8% compared with the UK average of -4.0%.

County Durham's heritage is its strength

The Industrial base and heritage of the County and wider North East, which has been formed through a strong history of manufacturing and engineering, has resulted in an area with particularly strong chains and networks of supply, across many sectors which then feed into the 'umbrella' LCEGS sector.

Executive Summary

LCEGS2023 in the North East

County Durhams's Low Carbon and Environmental Goods and Services (LCEGS2023) sector was worth £1.7bn to County Durham's economy in 2021/22, as indicated by the value of sales in the sector. These sales were generated by over 600 businesses that employed over 11,000 people in the sector in 2021/22.

County Durham's LCEGS2023 Sales accounted for 24% of the North East LEP (and new North East Mayoral Combined Authority) LCEGS2023 sector Sales of £7.0bn in 2021/22. In contrast, County Durham contributed 22% to the North East's GDP in 2020[1].

LCEGS2023 North East Spotlight

This Spotlight compares the latest GDP data released by the ONS for Local Authority GDP, which is for 2020, with LCEGS2023 Sales for the fiscal year 2020/21, for comparative purposes.

	2020 GDP (ONS*)	2020/21 LCEGS2023	2020/21 LCEGS2023 as a % of GDP 2020	GDP as a % of UK GDP	LCEGS2023 as % of UK LCEGS2023
North East	**£46.2bn**	**£6.7bn**	**14%**	**2.2%**	**2.7%**
County Durham	£10.2bn	£1.6bn	16%	0.5%	0.7%
Newcastle	£9.9bn	£1.5bn	15%	0.5%	0.6%
Sunderland	£7.8bn	£1.1bn	14%	0.4%	0.5%
Northumberland	6.2bn	£0.9bn	14%	0.3%	0.4%
Gateshead	£4.8bn	£0.7bn	14%	0.2%	0.3%
North Tyneside	£5.1bn	£0.6bn	11%	0.2%	0.2%
South Tyneside	£2.3bn	£0.3bn	15%	0.1%	0.1%

- ➢ LCEGS2023 Sales in 2020/21 as a percentage of 2020 GDP for the UK is 11%, while the average for the North East is 14%

- ➢ County Durham's LCEGS2023 Sales as a percentage of GDP was 16%, compared with Newcastle and South Tyneside at 15%, Sunderland, Northumberland and Gateshead with 14% and North Tyneside with 11%.

- ➢ The North East contributed 2.2% to the UK's GDP in 2020, but 2.7% of LCEGS2023 sector Sales in 2020/21

- ➢ County Durham contributed 0.5% to the UK's GDP in 2020, but 0.7% of LCEGS2023 sector Sales in 2020/21

- ➢ All Local Authorities within the North East contributed a higher proportion of LCEGS2023 Sales to the UK sector than their proportional contribution to GDP

- ➢ The North East is strong in the LCEGS2023 sector

Office for National Statistics, reference 1 below

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[1]

https://www.ons.gov.uk/economy/grossdomesticproductgdp/datasets/regionalgrossdomesticproductlocalauthorities

County Durham is the largest Local Authority in the North East LEP and holds the largest proportion of LCEGS2023 Sales:

- County Durham 24%
- Newcastle 22%
- Sunderland 17%
- Northumberland 13%
- Gateshead 10%
- North Tyneside 9%
- South Tyneside 5%

County Durham's LCEGS2023 Sector

Sales and growth

The Low Carbon and Environmental Goods and Services sector in County Durham contracted between 2019/20 and 2020/21, from £1.8bn to £1.6bn and then grew to £1.7bn between 2020/21 and 2021/22, representing 94.8% recovery of sales after the economic shock of the Covid-19 pandemic.

The sector in County Durham contracted by -9.5% during the financial year 2019/20 to 2020/21 and grew 4.7% during 2020/21 to 2021/22.

In comparison, UK sales growth in LCEGS was -9.8% and 5.0% with a 94.7% recovery.

Recovery within the North East was higher than the UK, with 95.4%, caused by stronger recovery in Newcastle with 96.7% and Sunderland with 96.0%, resulting in a higher recovery percentage for the North East than the County Durham recovery rate of 94.8%, which is more in-line with the UK recovery. The higher recovery rate within Newcastle and Sunderland is primary within Alternative Fuels and Carbon Finance, while County Durham saw stronger recovery in Building Technologies, Low Carbon Meat Alternatives and Green Infrastructure.

Employment

Employment in County Durham's Low Carbon and Environmental Goods and Services sector was 12,642 in 2019/20, it then contracted to 11,135 in 2020/21 and then grew to 11,478 in 2021/22, representing 90.8% recovery of employment after the economic shock.

Annual growth rate in employment was -11.9% between 2019/20 and 2020/21 and 3.1% between 2020/21 and 2021/22. In comparison, UK Employment growth in LCEGS was -12.1% and 3.7% with a 91.2% recovery.

Companies

The number of companies in County Durham's Low Carbon and Environmental Goods and Services sector was 670 in 2019/20, they contracted to 580 in 2020/21 and grew to 603 in 2021/22, representing 90.3% recovery of companies after the economic shock.

Annual growth rate in the number of companies was -13.4% between 2019/20 and 2020/21 and 4.0% between 2020/21 and 2021/22. In comparison, UK company growth in LCEGS was -13.5% and 5.9% with a 91.6% recovery.

County Durham's Level 1 Sub-sectors

In 2021/22 County Durham's Low Carbon and Environmental Goods and Services sector was made up by the following proportions:

Level 1 Sub-sectors	County Durham	UK
• Low Carbon	45%	47%
• Renewable Energy	28%	33%
• Environmental	15%	18%
• Sustainable Food Production	10%	1%
• Green Infrastructure & Nature Based Solutions	1%	1%
• District Heat Networks	1%	~0%

County Durham's Level 2 Sub-sector Strengths

The six largest Level 2 sub-sectors in the Low Carbon and Environmental Goods and Services sector by sales account for 63% of the County Durham's total sector sales and are made up of:

- Wind (£226m) – this includes control systems development and manufacture, drive train development, manufacture and systems integration, consulting houses and companies providing power firming systems and services, maintenance services and grid integration services

- Alternative Fuels (£210m) – this includes R&D functions, alternative fuel providers, designers and consultancy, process implementation, sales and accounting and application development specialists

- Alternative Fuel Vehicle (£177m) - include selling agencies, alternative fuel development companies and consulting and applications development for vehicle conversion specialists.

- Building Technologies (£168m) - this includes building systems design and consultancy and building systems providers and installers

- Carbon Finance (£138m) – this includes financial advisory organisations who then connect to carbon trading houses, in London and other financial centres.

- Low Carbon Meat Alternatives (£132m) – this includes the manufacture and supply of food production equipment and componentry, along with meat alternatives products and the provision of plant-based animal protein replacement products (e.g., protein powders)

The next twelve largest sub-sectors by sales account for a further 32% of County Durham's total sector sales and are made up of:

- Geothermal (£76m) – mid-chain sub-componentry manufacture and supply, along with whole systems assembly and supply. Also includes lateral geothermal systems providers and installers at the domestic and small commercial level, and vertical control systems developers and suppliers

- Photovoltaic (£76m) – this includes systems developers, providers and installers, along with manufacturing of frames and ancillary equipment

- Biomass (£65m) – this includes manufacture of biomass mid-chain and processing equipment, developers, installers and consultancies

- Recovery and Recycling (£62m) – this includes waste collection, glass stock processing and paper feedstock processing

- Water & Waste Water Treatment (£60m) – development and implementation by utilities along with supply, consultancy and implementation by independent consulting engineers

- Energy from Waste (£58m) – Energy Extraction Processes, Mechanical and Biological Treatment (MBT), Pre-treatment, Autoclaving, Incineration, Gasification, Conversion Treatment, Waste Incineration Directive (WID) Compliant Biomass and Pyrolysis

- Waste Management (£41m) - this includes process development and new process implementation and consulting, public and private operations management and supply and installation of operational equipment

- Low Carbon Agriculture (£31m) – manufacture and supply of mid-chain componentry for predominantly Biogas Low Carbon Agricultural Vehicles, mainly Off-road Utility Vehicles, with some Tractors and Large Farm Vehicles

- Nuclear Power (£27m) – this includes management operations, engineering services, consulting and other services

- Energy Management (£25m) – this includes registered gas engineers, measurement and control systems and fitting and maintenance

- Air Source Heat Pumps (£17m) – manufacturing of mid-chain componentry, supply of imported whole systems and consulting services, with some installation

- Additional Energy Sources (£15m) – predominantly R&D, with manufacturing, services and installation of Fuel Cells and Hydrogen produced through electrolysis

Level 2 Sub-sector growth and economic impact recovery

County Durham's six largest Level 2 sub-sectors by sales all contracted between 2019/20 and 2020/21 and then experienced some recovery between 2020/21 and 2021/22 for sales, number of employees and number of companies:

- Wind – sales in 2021/22 had recovered to 93% of their 2019/20 value after contracting from £244m to £22m, then growing to £226m (-10.3% then 3.2% growth), number of employees recovered by 92% and number of companies by 96%

- Alternative Fuels – sales in 2021/22 had recovered to 93% of their 2019/20 value after contracting from £225m to £203m, then growing to £210m (-10.0% then 3.6% growth), number of employees recovered by 87% and number of companies by 90%

- Alternative Fuel Vehicle – sales in 2021/22 had recovered to 92% of their 2019/20 value after contracting from £192m to £164m, then growing to £177m (-14.6% then 7.5% growth), number of employees recovered by 95% and number of companies by 90%

- Building Technologies – sales in 2021/22 had recovered to 95% of their 2019/20 value after contracting from £176m to £164m, then growing to £168m (-6.5% then 1.9% growth), number of employees recovered by 92% and number of companies by 89%

- Carbon Finance – sales in 2021/22 grew 4.9% from their 2019/20 value after contracting from £131m to £121m, then growing to £138m (-8.2% then 14.2% growth), number of employees recovered by 95% and number of companies by 94%

- Low Carbon Meat Alternatives – sales in 2021/22 had recovered to 96% of their 2019/20 value after contracting from £138m to £127m, then growing to £132m (-8.2% then 4.2% growth), number of employees recovered by 82% and number of companies by 83%

Level 2 Sub-sector Strengths and Weaknesses

Some Level 2 sub-sectors in County Durham had less contraction across the three-year reporting period than the UK and should be considered strengths of the region:
- Biomass with 0.0% (UK -2.4%)
- Renewable Consultancy with -6.6 (UK -7.3%)
- Environmental Monitoring with -4.9% (UK -5.9%)
- Carbon Capture & Storage with -4.9% (UK -6.0%)
- Building Technologies with -4.7% (UK -5.9%)
- Low Carbon Meat Alternative with -4.2% (UK -5.7%)
- Wave & Tidal with -2.4% (UK -3.4%)

Some Level 2 sub-sectors had significantly more contraction across the three-year reporting period than the UK:
- Nature Base Building with -13.2% (UK -11.6%)
- Biodegradable food Packaging with -12.4% (UK -6.0%)
- Water & Waste Water Treatment with -8.4% (UK -7.6%)
- Waste Management with -7.3% (UK -6.4%)
- Alternative Fuels with -6.8% (UK -4.0%)
- Photovoltaic with -5.1% (UK -3.6%)
- Energy Management with -4.5% (UK -3.6%)

One Level 2 sub-sector saw growth across the three-year reporting period:
- Carbon Finance with 4.9% (UK 2.2%)

Scalability of sub-sectors

Scalability of the sub-sectors within the County Durham is variable and when combined with Sales, strengths include:
- Wind with high Sales and high Scalability
- Building Technologies with high Sales and high Scalability
- Nuclear Power with very high Scalability and moderate Sales
- Geothermal with high Scalability and large Sales
- Photovoltaic with high Scalability and large Sales

County Durham's Exports

The value of exports in County Durham's Low Carbon and Environmental Goods and Services sector in 2021/22 was £97m, an increase from £91m in 2020/21, after contraction from £113m in 2019/20. This accounted for 0.6% of the UK's LCEGS2023 exports in 2021/22 and is slightly lower than County Durham's 0.7% share of the overall UK LCEGS2023 market.

County Durham's LCEGS exports contracted by -19.1%, then grew by 5.9%, representing an 86% recovery from the economic shock. This compares with the UK growth of -15.0% and 8.2% with a 92% recovery.

County Durham's top Export sub-sectors which saw large export market and growth between 2020/21 and 2021/22 include:
- Alternative Fuels - £10m
- Carbon Finance - £7m
- Low Carbon Agriculture - £6m
- Recovery & Recycling - £5m

County Durham's top Export sub-sectors which saw large export market but further contraction between 2020/21 and 2021/22 include:

- Biomass - £4m
- Alternative Fuel Vehicle - £10m
- Low Carbon Meat Alternatives - £1m

County Durham's Imports

The value of imports in County Durham's Low Carbon and Environmental Goods and Services sector in 2021/22 was £79m, a contraction from £80m in 2020/21, after contraction from £90m in 2019/20. This accounted for 0.6% of the UK's LCEGS2023 imports in 2021/22 and is slightly lower than County Durham's 0.7% share of the overall UK LCEGS2023 market.

County Durham's LCEGS imports contracted by -10.8%, then -1.4%, representing an 88% reduction in imports and no recovery from the economic shock. This compares with the UK growth of -10.6% and -1.0% with a 92% reduction.

County Durham's Company Maps

The maps of LCEGS2023 companies illustrates that activity within the sector is relatively evenly spread across County Durham.

The City of Durham has a large proportion of companies, in line with being an economic centre. The exception is a small cluster of Environmental Consulting, where all companies listed within this SIC code are located within or close to the City.

The geography of County Durham, along with the strong chains and networks of supply within the economy of County Durham lend it to being considered County-wide cluster for the LCEGS2023 sector.

The strength of the sector, with LCEGS2023 accounting for 16% of County Durham's GDP compared with 14% for the North East and 11% for the wider UK, is supported by a strong business base, evenly spread across the county.

Section 1:   Introduction to the Low Carbon and Environmental Goods and Services Sector

This section includes a summary definition of the Low Carbon Environmental Goods Services sector, followed by a detailed description of the dataset that sits behind the data analysis and detail regarding the types of activities measured.

Summary Sector Definition

The Low Carbon Environmental Goods and Services sector comprises products and services from across the economy, which actively enable a shift towards a green economy. The LCEGS sector is considered an 'umbrella' or horizontal sector, crossing many other traditional sectors, counting products and services from those sectors which can reduce carbon emissions and improve the environment:

The sector is comprised of both core elements and those in the chain and network of supply, without whom the sector could not function.

Brief Methodology

kMatrix uses a unique data triangulation methodology, developed with Professor R. Jaikumar of Harvard University over 35 years ago.

The process was originally developed to look at individual companies, providing evidenced data for development. As such, sectors are classified from the 'bottom up', collecting activities from the most finite level of granulation and grouping them into successive levels of detail.

kMatrix Sector Classification System
Example of Bottom-up Approach to Classification– LCEGS2023 Taxonomy

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This is quite different to the National Statistical Approach, which classifies from the 'top down', with a company choosing their 2-digit code, then successive codes down through the classification system. The SIC system is very good as a national accounting system, but it struggles with hard to measure sectors such LCEGS. Here, the kMatrix system of data collection, which triangulates transactional data from many sources, up to 70,000 for this study, provides the flexibility of a definition tailored to the sector being studied. Although the sector is classified from the bottom up, the sector taxonomy is reported from the sector level down, through a series of levels of complexity.

This process has measured the LCEGS sector for the Greater London Authority and the UK for over a decade. kMatrix also collaborate with academic colleagues in several fields, co-authoring academic papers, which are peer-reviewed and published in academic journals including Nature, Climate Services and the Lancet.

Example sectors the process has been applied to, where evidence is available in the public domain via published peer-reviewed academic journals include:

- Carbon Finance – Nature (2012): https://www.nature.com/articles/nclimate1492?draft=marketing
- Adaptation Economy – Nature (2016): https://www.nature.com/articles/nclimate2944
- Weather and Climate – Science Advances (2017): https://www.science.org/doi/10.1126/sciadv.1602632
- The Green Economy – Geo: Geography and Environment (2017): https://rgs-ibg.onlinelibrary.wiley.com/doi/pdf/10.1002/geo2.36
- The Green Economy – Nature (2019): https://www.nature.com/articles/s41599-019-0329-3
- Climate Services (2020): https://www.sciencedirect.com/science/article/pii/S2405880719300494?via%3Dihub
- **The Lancet (annually 2017-current):** https://www.thelancet.com/pdfs/journals/lancet/PIIS0140-6736(21)01787-6.pdf

The Lancet Countdown is a global collaboration of academics and represents the consensus of 43 academic institutions and UN agencies and has used the kMatrix A&RCC dataset for annual updates since 2017.

The LCEGS2023 Dataset

The data used in this report is based upon the work and methodology used by kMatrix to provide datasets on the UK's Low Carbon Environmental Goods and Services (LCEGS) sector for UK Government reported annually by the Department for Business, Innovation and Skills (BIS) from 2008/09 to 2011/12 and further reported every 3 years for the UK and London by the Greater London Authority to 2017/18, representing a continuous annual timeseries of the LCEGS sector for over a decade. This has now been updated to LCEGS2023 dataset, with changes outlined on page 9.

The dataset measures the core activities of the sector along with those in the supply chain, without whom the LCEGS sector could not operate. For example, the Wind sector includes those companies which develop the systems integration software enabling the power generated though turbines to be integrated into the National Grid, but it also includes those companies installing and maintaining the system integration software itself. Another example would be the collection of household waste, where the collection, processing and recycling of the waste is included, along with those companies who design, manufacture and supply the waste collection equipment.

The kMatrix methodology is based around the production of a taxonomy, similar to that used for biological taxonomic ranking, with similar products and services being grouped together. In Table 1, the LCEGS2023 sector is broken down into six Level 1 sub-sectors, one of which is Renewable Energy, which is in turn broken down into eight Level 2 sub-sectors, one of which is Wind, that is then broken down into a further five Level 3 sub-sectors, then Level 4 and so on:

Table 1: LCEGS2023 Sector disaggregated into the first two levels:

Sector	Level 1	Level 2	Level 3
LCEGS2023	Low Carbon	Additional Energy Sources	9 sub-sectors
		Alternative Fuel Vehicle	2 sub-sectors
		Alternative Fuels	6 sub-sectors
		Building Technologies	4 sub-sectors
		Carbon Capture & Storage	11 sub-sectors
		Carbon Finance	5 sub-sectors
		Energy Management	6 sub-sectors
		Nuclear Power	7 sub-sectors
	Renewable Energy	Air Source Heat Pumps	3 sub-sectors
		Biomass	5 sub-sectors
		Geothermal	3 sub-sectors
		Hydro	4 sub-sectors
		Photovoltaic	5 sub-sectors
		Renewable Consultancy	2 sub-sectors
		Wave & Tidal	6 sub-sectors
		Wind	5 sub-sectors
	Environmental	Air Pollution	6 sub-sectors
		Contaminated Land	2 sub-sectors
		Energy from Waste	11 sub-sectors
		Environmental Consultancy	4 sub-sectors
		Environmental Monitoring	3 sub-sectors
		Marine Pollution Control	3 sub-sectors
		Noise & Vibration Control	3 sub-sectors
		Recovery and Recycling	18 sub-sectors

		Waste Management	4 sub-sectors
		Water & Waste Water Treatment	4 sub-sectors
	District Heat Networks	DHNW Construction & Maintenance	5 sub-sectors
		DHNW Energy Centres	2 sub-sectors
		DHNW Operation	6 sub-sectors
	Green Infrastructure & Nature Based Solutions	Green Infrastructure	5 sub-sectors
		Nature Based Solutions	2 sub-sectors
	Sustainable Food Production	Biodegradable Food Packaging	1 sub-sector
		Food Waste Reduction Activities	2 sub-sectors
		Low Carbon Agriculture	3 sub-sectors
		Low Carbon Meat Alternatives	2 sub-sectors
		Low Carbon Milk Alternatives	2 sub-sectors

Although the taxonomy is reported and organised 'top down' as it goes from the sector to Level 1, to Level 2 etc., the data is gathered and organised from the 'bottom up'. The data is collected at the most finite disaggregation and then 'rolled up' to form the different levels. The current LCEGS2023 sector definition includes 5,133 product and service activities at level 5 that are derived from sector supply chain activities (componentry & assemblies) and value chain activities (R&D, Supply & Training).

A glossary of economic activities included for each sub-sector of LCEGS2023 is included as Appendix 1, a brief explanation of the LCEGS methodology as Appendix 2 and then a high-level comparison of data and methodologies between the Office of National Statistics (ONS) Environmental Goods and Services sector and LCEGS is presented in Appendix 3.

What is actually measured?

The dataset measures the core activities of the sector along with enabling activities in the supply chain, without whom the LCEGS2023 sector could not operate. For example, the Wind sector includes those companies which develop the systems integration software enabling the power generated though turbines to be integrated into the National Grid, but it also includes those companies installing and maintaining the system integration software itself. Another example would be the collection of household waste, where the collection, processing and recycling of the waste is included, along with those companies who design, manufacture and supply the waste collection equipment.

The purpose of the LCEGS dataset is to provide a standardized measure of the complete LCEGS sector. The whole dataset includes those 'core' activities, which would immediately come to mind such as the manufacture of a wind turbine blade, but also the less obvious 'non-core' activities, such as the manufacture of the bearings for the turbine. Non-Core activities can be considered "enablers" for the Core sector and are often companies who have diversified from existing strengths into new sector activities. Non-core activities also include mid-stream activities, R&D, finance, training and other activities which cross multiple other sectors, but without which the LCEGS sector could not function.

Total LCEGS Market	**=**	**Core LCEGS Market**	**+**	**Non-Core Enabling LCEGS Market**

The definition of a sector is almost always open to debate, in terms of what is, or is not, considered to be part of the sector in question. The kMatrix methodology includes all aspects that could realistically be considered part of the LCEGS sector, as per the definition in 2023. The taxonomy is built and interrogated by assembling activities and services which are then grouped together under different headings.

The following picture illustrates the two distinctive sides of the LCEGS market, the smaller Core market and the much larger Non-Core market, provided by enablers within the LCEGS sector. Examples give a simplistic overview of the types and differences between activities, with the Core side including activities such as manufacture of wind turbines and building insulation materials. The enablers providing Non-Core activities are offering components that are non-sector specific, such as valves, gaskets, drive chains etc., alongside financial, legal and administration activities.

In essence, Core activities are those products and services which are generally LCEGS specific, whereas the Non-Core activities, provided by enablers are products and services which are not LCEGS specific and can generally be found in other sectors. Core activities are considered vertical in nature, being sector specific, whereas Non-Core activities are horizontal, crossing other sectors. Both sides of the market are required for the sector to function.

Core LCEGS Activities (example activities)

Total LCEGS Market = Core + Non-Core / Enabling Activities

Non-Core/Enabling LCEGS Activities (example activities)

- Wind Turbine & Tower Manufacture & Supply
- Design and Installation of Large Geothermal Systems
- Manufacture of Building Insulation Materials
- Production & Supply of Methane
- Production & Supply of Auto Gas (aka LPG, LP Gas, Propane)
- All Other Core Activities

- Manufacture and Supply of Non-Sector Specific Components (e.g. Standard Valves, Drive Chains etc.)
- Financial, Legal and Administration Services
- Training Services
- Design and Supply of Precision Engineering Machine Control Software
- Production and Supply of Operations Journals, Information Packs etc.
- All Other Non-Core/Enabling Activities

The economic values provided are Sales values, which are transactions made within the sector, which have an economic footprint that can be measured. For companies which service multiple sectors, for example in finance, the sales value is the value of sales that company has in the LCEGS market, it does not include finance sales into other sectors.

Section 2.1: LCEGS2023 Compared by Year

In this section of the report County Durham's (County Durham) LCEGS2023 performance is compared for the last three years for the three key measures of Sales, Employment and Growth.

Figure 1: County Durham's Total Sales (£m) for 2019/20 to 2021/22

County Durham's LCEGS2023 sales in 2021/22 were £1.68bn, up from £1.60bn in 2020/21, after falling from £1.77bn in 2019/20. This represents a 94.8% recovery of sales after the economic shock.

Annual sales growth in County Durham's LCEGS2023 was -9.5% from 2019/20 to 2020/21 and 4.7% from 2020/21 to 2021/22.

In comparison, UK sales growth in LCEGS2023 was -9.8% and 5.0% with a 94.7% recovery.

Figure 2: County Durham's Employment 2019/20 to 2021/22

County Durham's LCEGS2023 employment in 2021/22 was 11,478, up from 11,135 in 2020/21, after falling from 12,642 in 2019/20. This represents a 90.8% recovery in employment.

Annual employment growth in County Durham's LCEGS2023 was -11.9% from 2019/20 to 2020/21 and 3.1% from 2020/21 to 2021/22

In comparison, UK Employment growth in LCEGS2023 was -12.1% and 3.7% with a 91.2% recovery.

Figure 3: County Durham's Companies 2019/20 to 2021/22

County Durham's LCEGS2023 company count in 2021/22 was 603, up from 580 in 2020/21, after falling from 670 in 2019/20. This represents a 90.3% recovery in companies.

Annual company growth in County Durham's LCEGS2023 was -13.4% from 2019/20 to 2020/21 and 4.0% from 2020/21 to 2021/22.

In comparison, UK company growth in LCEGS2023 was -13.5% and 5.9% with a 91.6% recovery.

Section 2.2: LCEGS2023 Level 1 Sub-sectors

The analysis in this section of the report focuses on the Level 1 split of LCEGS2023 in County Durham for each of the last three years.

Figure 4: County Durham's Total Sales (£m) for 2019/20 to 2021/22

Figure 4 shows the three-year LCEGS2023 sales split by Level 1.

In 2019/20 the split was 45% Low Carbon, 28% Renewable Energy, 15% Environmental, 10% Sustainable Food Production, 1% District Heat Networks and 1% Green Infrastructure & Nature Based Solutions. The split was the same 2021/22.

Figure 5: County Durham's Employment 2019/20 to 2021/22

Figure 5 shows the three-year LCEGS2023 Employment split by Level 1.

In 2019/20 the split was 42% Low Carbon, 27% Renewable Energy, 14% Environmental, 12% District Heat Networks, 5% Sustainable Food Production and 2% Green Infrastructure & Nature Based Solutions. The split was similar in 2021/22, with 41%, 27%, 14%, 12%, 6% and 1%.

Figure 6: County Durham's Companies 2019/20 to 2021/22

Figure 6 shows the three-year LCEGS2023 Companies split by Level 1.

In 2019/20 the split was 46% Low Carbon, 29% Renewable Energy, 14% Environmental, 8% Sustainable Food Production, 2% District Heat Networks, and 1% Green Infrastructure & Nature Based Solutions. The split was similar in 2021/22, with 47%, 27%, 14%, 9%, 2% and 1%.

In 2021/22 UK LCEGS2023 sales was split - 47% Low Carbon, 33% Renewable Energy, 18% Environmental, 1% Sustainable Food Production, 1% Green Infrastructure & Nature Based Solutions and ~0% District Heat Networks. The split was similar in 2021/22, with 47%, 33%, 17%, 1%, 1% and ~0%.

Section 2.3: LCEGS2023 Level 1 Sub-sectors by Activity Code

Figure 7: County Durham's LCEGS2023 Sales Split by Activity Code 2021/22 (Level 1)

Activities vary by Level 1 sub-sector (Figure 7), with the largest activity code being Fuel Supply & Distribution in Low Carbon (26%), Manufacture in Renewable Energy (39%), Environmental (20%) and District Heat Networks (28%) and Supply in Green Infrastructure & Nature Based Solutions (50%) and Sustainable Food Production (46%).

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Section 3.1: LCEGS2023 Level 1 – Low Carbon

In this section we look at the Low Carbon market in greater detail. Initially we split the market into eight further sub-sectors (Level 2) and then look at the highest performing Level 2 sub-sectors in more detail by highlighting activity happening within them at Level 3.

Table 2 provides detail on activities within the Level 2 sub-sectors of the Low Carbon market in County Durham.

Table 2: LCEGS2023 Level 1 sub-sector description – Low Carbon

Level 1	Level 2	Description
Low Carbon	Additional Energy Sources	R&D, Design and Prototyping activities relating to a range of new Low Carbon energy sources.
		These energy sources include: Fuel Cells, Hydraulic Accumulators, Hydrogen (not vehicle fuel), Molten Salt, Thermal Mass, Compressed Air, Superconducting Magnets and more general energy storage research.
		This is a small sub-sector (in value and impact) because only energy sources that have a current economic footprint (i.e., trading) are included.
	Alternative Fuel Vehicle	Low Carbon Fuel and technology activities that relate to (predominantly) automotive transport. It is divided into Alternative Fuels (main stream) for Vehicles Only, and Other Fuels and Vehicles.
		Alternative Fuels (main stream) for Vehicles Only includes the production, supply and distribution of Natural Gas (Compressed or Liquefied), Synthetic Fuel and Auto Gas (LPG, LP Gas or Propane). This sub-sector does not include bio diesel (see Alternative Fuels).
		Other Fuels and Vehicles includes Research, Design, Engineering, Maintenance, Manufacture, Services, Supply and Training activities are included for: Hydrogen fuel cells and hydrogen internal combustion cars and non-cars; Electric; Hybrid Electric, Plug-in Hybrid Electric, Organic waste fuel, MAGLEV, Solar powered and Air powered vehicles and Prototyping fuel and vehicle technologies
	Alternative Fuels	Wide range of Low(er) carbon fuel sources that are not included under Renewable Energy. It includes the manufacture, production, supply and distribution of:
		• EV Batteries, including cables, charge controllers, charge points, chargers, chemicals, connectors, containers, suppliers and testing equipment
		• Non-EV Batteries - chemicals, chargers, controllers, cables, connectors, containers, suppliers and testing equipment

27		• Hydrogen – non-vehicle hydrogen • Bio fuels for Alternative Vehicles only - bio diesel, butanol, ethanol and vegetable oils • Mainstream Bio fuel applications (non-transport) - bio diesel, butanol and ethanol • Other Bio fuels - biomass, methane, peanut oil, vegetable oil, wood and woodgas
	Building Technologies	Main stream building materials and systems that contribute to reduced energy use and to lowering the carbon footprint of buildings. It includes: • Windows • Doors • Insulation and heat retention materials, with some split by Domestic and Non-domestic • Monitoring and control systems
	Carbon Capture & Storage	Activities that store carbon emissions - from locations like power plants and prevent them entering the atmosphere. It includes manufacturing, supply, distribution, installation, maintenance, development and design of: • Pre combustion capture systems • Post combustion capture systems • Oxy-Fuel combustion systems • Pipeline systems and services • Ship storage and discharge systems • Ocean storage equipment and services • Mineral storage equipment and services • Geological storage equipment and services • Engineering, project management and consulting services.
	Carbon Finance	Includes investment activities and financial instruments for emission reduction projects and carbon trading
	Energy Management	Energy saving and power management activities for industrial and domestic use
	Nuclear Power	All activities that relate to the generation of nuclear power, excluding decommissioning of nuclear sites

Further detail is provided in Appendix 1.

Section 3.1.1: **Low Carbon (Level 2)**

Figure 8: County Durham's Low Carbon Sales 2021/22 in £m (Level 2)

Low Carbon is further sub-divided into eight sub-sectors, of which four account for 91% of sales (Figure 8). These four are made up of Alternative Fuels 28% (31% in 2019/20), Alternative Fuel Vehicle 23% (27% in 2019/20), Building Technologies 22% (22% in 2019/20), and Carbon Finance 18% (18% in 2019/20).

Carbon Finance is the only sub-sector to have a larger Sales value in 2021/22 than 2019/20. The other three of the largest sub-sectors have seen Sales values in 2021/22 almost recover to 2019/20 values after the 2019/20 to 2020/21 economic shock. Alternative Fuels sales were £225.1m in 2019/20 and were £209.9m in 2021/22 (93.2% of 2019/20); Alternative Fuel Vehicle £192.4m in 2019/20 and £176.6m in 2021/22 (91.8% of 2019/20); Building Technologies £175.8m in 2019/20 and £167.6m in 2021/22 (95.3% of 2019/20) and Carbon Finance £131.4m in 2019/20 and £137.8m in 2021/22 (4.9% growth since 2019/20).

Figure 9: County Durham's Low Carbon Employment 2021/22 (Level 2)

The same four sub-sectors account for 88% of employment (Figure 9). These four are made up of Alternative Fuels 29% (31% in 2019/20), Building Technologies 29% (29% in 2019/20), Alternative Fuel Vehicle 22% (22% in 2019/20), and Carbon Finance 8% (7% in 2019/20).

All four of the largest sub-sectors have seen Employment in 2021/22 almost recover to 2019/20 figures after the 2019/20 to 2020/21 economic shock. Alternative Fuels employed 1,602 in 2019/20 and 1,400 in 2021/22 (87.4% of 2019/20); Building Technologies employed 1,489 in 2019/20 and 1,375 in 2021/22 (92.3% of 2019/20); Alternative Fuel Vehicle employed 1,123 in 2019/20 and 1,068 in 2021/22 (95.1% of 2019/20); and Carbon Finance employed 386 in 2019/20 and 367 in 2021/22 (95.1% of 2019/20).

Figure 10: County Durham's Low Carbon Companies 2021/22 (Level 2)

The same four sub-sectors account for 89% of companies (Figure 10). They are Alternative Fuels 30% (30% in 2019/20), Building Technologies 25% (25% in 2019/20), Alternative Fuel Vehicle 23% (22% in 2019/20), and Carbon Finance Management 11% (10% in 2019/20).

All four of the largest sub-sectors have seen the number of Companies in 2021/22 almost recover to 2019/20 figures after the 2019/20 to 2020/21 economic shock. The number of companies in Alternative Fuels was 95 in 2019/20 and 85 in 2021/22 (89.5% of 2019/20); Building Technologies was 80 in 2019/20 and 71 in 2021/22 (88.8% of 2019/20); Alternative Fuel Vehicle was 70 in 2019/20 and 63 in 2021/22 (90.0% of 2019/20); and Carbon Finance was 32 in 2019/20 and 30 in 2021/22 (93.8% of 2019/20).

Section 3.1.2: Low Carbon by Activity Code (Level 2)

Figure 11: County Durham's Low Carbon Split by Activity Code 2021/22 (Level 2)

Note:

Alternative Fuel Vehicle – Manufacture refers to vehicles and Fuel Production refers to the production of Auto Gas etc.

Alternative Fuels – Manufacture refers to Batteries, Fuel Production refers to production of Methane, Butanol, Hydrogen, Biomass, Biodiesel etc.

Activities vary by Level 2 sub-sector (Figure 11), with the largest activity code being R&D for Additional Energy Sources 38%, Fuel Supply & Distribution for Alternative Fuel Vehicle 42% and Alternative Fuels 59%, Supply for Building Technologies 35% and Energy Management 30%, Services for Carbon Capture & Storage 29%, and Carbon Finance 97% and Engineering Services for Nuclear Power 56%. This is within one percentage point of the split in 2019/20.

Section 3.1.3: Low Carbon at Level 3

Figure 12: County Durham's Summary of selected metrics for 2021/22 for selected Low Carbon Level 2 sub-sectors at Level 3

		Sales (£m)	# Employees	# Companies
Alternative Fuels	Other Bio Fuels	126.5	862	53
	Hydrogen Fuel	42.2	279	17
	Main Stream Bio Fuels	25.4	170	10
	Bio Fuels Alternative for Vehicles Only	7.1	48	3
	Non-EV Batteries	4.9	31	2
	EV Batteries	3.8	9	1
	Alternative Fuels (main Stream) for Vehicles Only	116.3	780	56
	Other Fuels and Vehicles	60.3	288	7
Alternative Fuel Vehicle				
Building Technologies	Windows	58.5	500	29
	Insulation and Heat Retention Materials	44.3	338	11
	Doors	34.2	283	18
	Monitoring and Control Systems	30.6	254	13
Carbon Finance	Carbon Credits Trading	97.1	213	20
	Carbon Credits Finance & Fund Management	25.6	123	6
	Carbon Market Intelligence & Forecasting	10.4	18	2
	Carbon Credits Journals and Press Periodicals	4.3	14	1
	Projects and Verification	0.4		

The top four Level 2 sub-sectors for Low Carbon are Alternative Fuels, Alternative Fuel Vehicle, Building Technologies, and Carbon Finance, making up 91% of Sales, 88% of Employment and 89% of Companies in the Low Carbon market in County Durham. Figure 12 shows a summary of the Sales, Companies and Employees for these Level 2 sub-sectors, broken out into their Level 3 sub-sectors.

Alternative Fuels has five sub-sectors at level 3, of which, Other Biofuels accounts for 60% of Sales (61% in 2019/21), with an emphasis on Methane. Example companies of this sub-sector would include process designers and consultancy, process implementation and sales and application development specialists.

Alternative Fuel Vehicle has only two sub-sectors at level 3, with Alternative Fuels (main stream) for Vehicles Only holding 66% of the market share (65% in 2019/20). Example companies in this sub-sector would include selling agencies, alternative fuel vehicle development companies and consulting and applications development for vehicle conversion specialists.

Building Technologies has four sub-sectors at Level 3, with the largest being Windows, making up 35% of the market (33% in 2019/20). Example companies in this sub-sector would include window manufacturers, agents and installers.

Carbon Finance has five sub-sectors at level 3 and the largest is Carbon Credits Trading, with 70% of the market (69% in 2019/20). Example companies in this sub-sector include financial advisory organisations who then connect to carbon trading houses, in London and other financial centres.

Section 3.2:   LCEGS2023 Level 1 - Renewable Energy

In this section we look at the Renewable Energy market in greater detail. Initially we split the market into eight further sub-sectors, Level 2, and then look at the highest performing Level 2 sub-sectors in more detail by highlighting activity happening within them at Level 3.

Table 3 provides detail on activities within the Level 2 sub-sectors of the Renewable Energy market in County Durham.
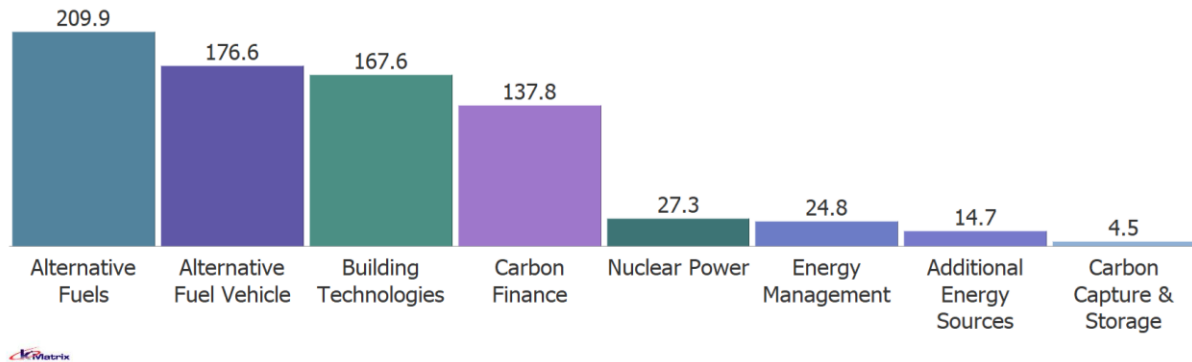
Table 3: LCEGS2023 Level 1 sub-sector description – Renewable Energy

Level 1	Level 2	Description
Renewable Energy	Air Source Heat Pumps	Activities relating to the R&D, Manufacture, Supply, Engineering Services, Consulting and Installation of Commercial/Large Scale, Community and Domestic Air Source Heat Pumps split by: • Ancillary Equipment • Architectural Services • Components • Project Development Services • Whole Systems
	Biomass	All activities that convert biomass into energy but excludes biomass materials (see Alternative Fuels, Low Carbon). • Biomass furnace systems • Biomass energy systems • Manufacture of biomass boilers and systems • Biomass boilers and related systems • Technical and operational consulting
	Geothermal	Activities relating to the extraction and use of heat generated from the earth. Activities relating to the R&D, Manufacture, Supply, Engineering Services, Consulting and Installation of Commercial/Large Scale, Community and Domestic. It includes: • Ground Source Heat Pumps • Specialist Systems and Equipment • Water Source Heat Pumps
	Hydro	Hydroelectric. Activities that help to extract energy from river and other water sources held in dams (as opposed to wave or tidal energy) that is used to drive turbines and generators. Large scale civil engineering/construction activities associated

		with dam building have not been included in this analysis. • Turbines • Dams & structures • Pumping & lubrication • Electricity supply
	Photovoltaic	Activities that help to convert solar radiation into useable energy. It includes: • Chemicals • Systems & equipment • R&D • Photovoltaic cells • Other equipment & chemicals
	Renewable Energy Consultancy	Consulting and legal services specific to Renewables i.e., not included in general or specific environmental consulting. It includes: • Legal services • Consulting
	Wave & Tidal	Activities that help to convert the energy from waves and tides into usable power (also known as marine renewable energy). It includes: • Turbines & generators • Pumps & equipment • Two basin schemes • Ebb & flow systems • Assessment & Measurement • Other general services
	Wind	Activities that convert wind power into usable energy. This includes wind farm systems, large and small wind turbines. It includes: • Offshore Large Wind Turbine • Offshore Wind Farm Systems • Onshore Large Wind Turbine • Onshore Wind Farm Systems • Small Wind Turbine

Further detail is provided in Appendix 1.

Section 3.2.1: Renewable Energy at Level 2

Figure 13: County Durham's Renewable Energy Sales 2021/22 in £m (Level 2)

Renewable Energy is split into eight sub-sectors, of which five account for 98% of sales (Figure 13). These five are made up of Wind 48% (49% in 2019/20), Geothermal 16% (16% in 2019/20), Photovoltaic 16% (16% in 2019/20), Biomass 14% (13% in 2019/20) and Air Source Heat Pumps 4% (4% in 2019/20).

Only Biomass saw Sales recover between 2019/20 and 2021/22, with the other four of the largest sub-sectors with Sales values in 2021/22 almost recovering to 2019/20 values after the 2019/20 to 2020/21 economic shock.   Wind sales were £243.9m in 2019/20 and were £225.9m in 2021/22 (92.6% of 2019/20); Geothermal £79.1m in 2019/20 and £76.2m in 2021/22 (96.3% of 2019/20); Photovoltaic £79.9m in 2019/20 and £75.9m in 2021/22 (95.0% of 2019/20), Biomass £64.7m in 2019/20 and £64.7m in 2021/22 (100.0% of 2019/20) and Air Source Heat Pumps £18.5m in 2019/20 and £17.4m in 2021/22 (94.1% of 2019/20).

Figure 14: County Durham's Renewable Energy Employment 2021/22 (Level 2)

The same five sub-sectors account for 98% of employment (Figure 14). These five are made up of Wind 40% (40% in 2019/20), Geothermal 21% (20% in 2019/20), Photovoltaic 19% (19% in 2019/20), Biomass 14% (14% in 2019/20) and Air Source Heat Pumps 4% (4% in 2019/20).

All five of the largest sub-sectors have seen Employment in 2021/22 almost recover to 2019/20 figures after the 2019/20 to 2020/21 economic shock. Wind employed 1,332 in 2019/20 and 1,231 in 2021/22 (92.4% of 2019/20); Geothermal employed 674 in 2019/20 and 639 in 2021/22 (94.8% of 2019/20); Photovoltaic employed 635 in 2019/20 and 584 in 2021/22 (92.0% of 2019/20); Biomass employed 485 in 2019/20 and 449 in 2021/22 (92.6% of 2019/20); and Air Source Heat Pumps employed 148 in 2019/20 and 138 in 2021/22 (93.2% of 2019/20).

Figure 15: County Durham's Renewable Energy Companies 2021/22 (Level 2)

And the same five sub-sectors also account for 98% of companies (Figure 15). These five are made up of Wind 43% (42% in 2019/20), Geothermal 20% (20% in 2019/20), Photovoltaic 18% (19% in 2019/20), Biomass 13% (13% in 2019/20) and Air Source Heat Pumps 5% (4% in 2019/20).

Only Air Source Heat Pumps saw the Number of Companies recover between 2019/20 and 2021/22, with the other four of the largest sub-sectors seeing the number of Companies in 2021/22 almost recover to 2019/20 figures after the 2019/20 to 2020/21 economic shock.   The number of companies in Wind was 77 in 2019/20 and 74 in 2021/22 (96.1% of 2019/20); Geothermal was 36 in 2019/20 and 35 in 2021/22 (97.2% of 2019/20); Photovoltaic was 35 in 2019/20 and 32 in 2021/22 (91.4% of 2019/20); Biomass was 23 in 2019/20 and 22 in 2021/22 (95.7% of 2019/20) and Air Source Heat Pumps was 8 in 2019/20 and 8 in 2021/22 (100.0% of 2019/20).

Wave & Tidal has a company count of 0 because these are services from various companies, delivered by the equivalent of 5 employees from various organisations, however counting all of those organisations as companies would give a false impression of the sub-sector being larger than it is. The sales are opportunistic and not necessarily regular by their nature.

Section 3.2.2:   Renewable Energy by Activity Code (Level 2)

Figure 16: County Durham's Renewable Energy Split by Activity Code 2021/22 (Level 2)

Activities vary by Level 2 sub-sector (Figure 16), with the largest activity code being Supply for Air Source Heat Pumps 31%, and Photovoltaic 38%, Manufacture for Biomass 49%, Geothermal 38%, Wave & Tidal 39% and Wind 39%, Installation for Hydro 36% and Consulting for Renewable energy General Consulting 97%. This is within two percentage points of the split in 2019/20.

Section 3.2.3: Renewable Energy at Level 3

Figure 17: County Durham's Summary of selected metrics for 2021/22 for selected Renewable Energy Level 2 sub-sectors at Level 3

		Sales (£m)	# Employees	# Companies
Wind	Onshore Wind Farm Systems	83.1	450	27
	Small Wind Turbine	48.2	285	17
	Onshore Large Wind Turbine	46.6	248	15
	Offshore Wind Farm Systems	24.7	124	7
	Offshore Large Wind Turbine	23.3	124	7
Geothermal	Ground Source Heat Pumps	34.7	286	15
	Water Source Heat Pumps	31.0	267	15
	Specialist Systems & Equipment	10.5	85	4
Photovoltaic	Systems & Equipment	33.1	257	14
	Photovoltaic Cells	20.7	160	9
	Other Related Equipment and Chemicals	19.2	146	8
	Chemicals	1.4	12	1
	Research & Development	1.4	10	1
Biomass	Biomass Energy Systems	28.9	214	9
	Boilers and Related Systems	20.3	132	7
	Manufacturing Of Boilers and Related Systems	8.0	50	3
	Biomass Furnace Systems	7.3	53	3
	Education and Technical Consulting			
	Commercial / Large Scale	6.8	48	3
	Community Based	6.5	50	3
Air Source Heat Pumps	Domestic / Small Scale	4.2	40	2

The top five Level 2 sub-sectors for Low Carbon are Wind, Geothermal, Photovoltaic and Biomass, making up 98% of the Renewable Energy market in County Durham. Figure 17 shows a summary of the Sales, Companies and Employees for these Level 2 sub-sectors, broken out into their Level 3 sub-sectors.

Wind is the largest Level 2 sub-sector with 48% of sales and has five sub-sectors at Level 3, the largest being Onshore Wind Farm Systems which makes up 37% of sales in this market (34% in 2019/20). Example companies include manufacture, supply, installation and maintenance of systems components, grid entry cables, insulators and fittings, switching systems and towers and gantries, central controls systems and integration systems, along with energy management consulting services and production of publications.

Geothermal has three sub-sectors at Level 3, the largest being Ground Source Heat Pumps 46% (45% in 2019/20) and Water Source Heat Pumps which makes up 41% of the sales in this market (41% in 2019/20). Example companies for Ground Source and Water Source Heat Pumps include mid-chain sub-componentry manufacture and supply, along with whole systems assembly and supply. Also includes lateral geothermal systems providers and installers at the domestic and small commercial level, and vertical control systems developers and suppliers.

Photovoltaic has five sub-sectors at level 3, the largest being Systems & Equipment which makes up 44% of sales in this market (43% in 2019/20). Example companies include systems developers, suppliers and installers. Manufacturing refers to frames and ancillary equipment.

Biomass has five sub-sectors at level 3, the largest being Biomass Energy Systems which makes up 45% of the sales in this market (43% in 2019/20), example companies include manufacture of biomass mid-chain and processing equipment, developers, installers and consultancies.

Air Source Heat Pumps has three sub-sectors at level 3, which are relatively even in size, with the largest being Commercial/Large Scale which makes up 39% of the sales in this market (37% in 2019/20), followed by Community Based which makes up 37% of the sales in this market (37% in 2019/20), and Domestic/Small Scale which makes up 24% of the sales in this market (26% in 2019/20), example companies include manufacturing of mid-chain componentry, supply of imported whole systems and consulting services, with some installation.

Section 3.3: LCEGS2023 Level 1 - Environmental

In this section we look at the Environmental market in greater detail. Initially we split the market into ten further sub-sectors, Level 2, and then look at the highest performing Level 2 sub-sectors in more detail by highlighting the activity happening within them at Level 3.

Table 4 provides detail on activities within the Level 2 sub-sectors of the Environmental market in County Durham.
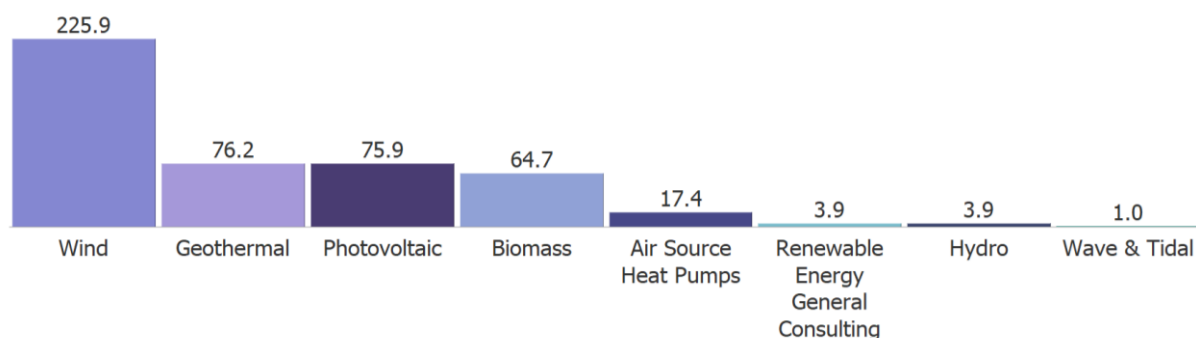
Table 4: LCEGS2023 Level 1 sub-sector description – Environmental

Level 1	Level 2	Description
Environmental	Air Pollution	Includes a range of manufacturing, operations, consulting and engineering functions relating to improving and maintaining air quality. It includes: • Emission Control sensing and monitoring systems and technologies • Indoor Air Quality Control • Dust & Particulate Control • Process Engineering • Industrial Emission Control • Emission Control through manufacture, installation and operation of sampling, control and evaluation systems
	Contaminated Land	Activities that bring land back into agricultural, industrial, community or commercial use. This includes longer term activities like the decommissioning of nuclear sites.
	Energy From Waste	End-user industries for Energy from Waste i.e., Automotive, Chemicals, Domestic, Farming, Food & Drink, Landfill, Transport, Manufacturing, Processing Industries and Secondary Sewage. Energy extractive technologies and processes i.e., autoclave, conversion treatment, gasification, incineration, MBT, pyrolysis, pre-treatment and compliant biomass.

	Environmental Consultancy	Consulting, training and management services that are specific to the environmental sector.
	Environmental Monitoring	Activities that measure water, soil and air quality, and that support wider pollution control activities in other land, water, marine or air-based environmental sub-sectors.
	Marine Pollution Control	Responses to pollution hazards at sea and also discharged from land-based sources. It includes the following products and services for deep sea, coastal waters and inland waterways. It includes: • Marine pollution abatement • R&D • Specialist consulting and training
	Noise & Vibration Control	Activities that prevent or control noise and vibration pollution. It includes: • Noise abatement • R&D • Consulting and training
	Recovery & Recycling	Activities relating to the collection and processing of domestic and industrial waste products. It includes: • Waste collection • Engineering & equipment • Consulting & training • R&D
	Waste Management	Treatment/management of domestic and industrial waste that cannot otherwise be recycled. It includes: • Construction & operation of waste treatment facilities • Equipment for Waste treatment • R&D
	Water & Waste Water Treatment	Activities relating to the treatment of pollutants in the water supply. Including water treatment and distribution, engineering and R&D

Further detail is provided in Appendix 1.

Section 3.3.1:   Environmental at Level 2

Figure 18: County Durham's Environmental Sales 2021/22 in £m (Level 2)

Environmental is split into ten sub-sectors, of which four account for 90% of sales (90% in 2019/20) (Figure 18). These four are made up of Recovery & Recycling 25% (25% in 2019/20), Water Supply & Waste Water Treatment 24% (25% in 2019/20), Energy from Waste 24% (23% in 2019/20) and Waste Management 17% (17% in 2019/20).

All four of the largest sub-sectors have seen Sales values in 2021/22 almost recover to 2019/20 values after the 2019/20 to 2020/21 economic shock.   Sales for Recovery & Recycling sales £65.0m in 2019/20 and £61.6m in 2021/22 (94.8% of 2019/20) Water Supply & Waste Water Treatment were £65.1m in 2019/20 and were £59.6m in 2021/22 (91.6% of 2019/20); Energy from Waste were £61.6m in 2019/20 and £58.1m in 2021/22 (94.3% of 2019/20) and Waste Management £44.0m in 2019/20 and £40.8m in 2021/22 (92.7% of 2019/20).

Figure 19: County Durham's Environmental Employment 2021/22 (Level 2)

The same four sub-sectors account for 88% of employment (Figure 19). They are made up of Water Supply & Waste Water Treatment 29% (29% in 2019/20), Recovery & Recycling 26% (26% in 2019/20), Waste Management 19% (19% in 2019/20) and Energy from Waste 12% (13% in 2019/20).

All four of the largest sub-sectors have seen Employment in 2021/22 almost recover to 2019/20 figures after the 2019/20 to 2020/21 economic shock. Water Supply & Waste Water Treatment employed 532 in 2019/20 and 470 in 2021/22 (88.3% of 2019/20); Recovery & Recycling employed 465 in 2019/20 and 424 in 2021/22 (91.2% of 2019/20); Waste Management employed 348 in 2019/20 and 311 in 2021/22 (89.4% of 2019/20) and Energy from Waste employed 241 in 2019/20 and 198 in 2021/22 (82.2% of 2019/20).

Figure 20: County Durham's Environmental Companies 2021/22 (Level 2)

The same four sub-sectors also account for 87% of companies (88% in 2019/20) (Figure 20). They are made up of Recovery & Recycling 30% (30% in 2019/20), Water Supply & Waste Water Treatment 29% (29% in 2019/20), Waste Management 20% (20% in 2019/20) and Energy from Waste 7% (9% in 2019/20).

All four of the largest sub-sectors have seen the number of Companies in 2021/22 almost recover to 2019/20 figures after the 2019/20 to 2020/21 economic shock. The number of companies in Recovery & Recycling was 28 in 2019/20 and 25 in 2021/22 (89.3% of 2019/20); Water Supply & Waste Water Treatment was 27 in 2019/20 and 24 in 2021/22 (88.9% of 2019/20); Waste Management was 19 in 2019/20 and 16 in 2021/22 (84.2% of 2019/20) and Energy from Waste was 8 in 2019/20 and 6 in 2021/22 (75.0% of 2019/20).

Marine Pollution Control has a company count of 0 because these are services from various companies, delivered by the equivalent of 8 employees from various organisations, however counting all of those organisations as companies would give a false impression of the sub-sector being larger than it is. The sales are opportunistic and not necessarily regular by their nature.

Section 3.3.2:   **Environmental by Activity Code (Level 2)**

Figure 21: County Durham's Environmental Energy Split by Activity Code 2021/22 (Level 2)

Activities vary by Level 2 sub-sector (Figure 21), with the largest activity code being Manufacture for Air Pollution 36%, and Waste Management 21%; Services for Contaminated Land 38%, and Environmental Monitoring 45%, Supply for Energy from Waste 38%, Consulting for Environmental Consulting 69%, R&D for Marine Pollution Control 28% and Noise & Vibration Control 33%, Recycling & Resale for Recovery and Recycling 68% and Engineering Services for Water & Waste Water Treatment 29%. This is within one percentage point of the split in 2019/20.

Section 3.3.3:   Environmental at Level 3

Figure 22: County Durham's Summary of selected metrics for 2021/22 for Water & Waste Water Treatment and Waste Management at Level 3

Figure 22 shows the Sales, Companies and Employees the Level 2 Water & Waste Water Treatment and Waste Management sub-sectors broken down into their Level 3 sub-sectors.

Water & Waste Water Treatment is made up of four Level 3 sub-sectors, the largest being Water Treatment and Distribution which makes up 70% of sales (69% in 2019/20). Example activities include development and implementation by utilities along with supply, consultancy and implementation by independent consulting engineers.

Waste Management is made up of four Level 3 sub-sectors, with the largest being Construction & Operation of Waste Treatment Facilities which makes up 38% of sales (38% in 2019/20). Example companies are those involved in both public and private operations management and supply and installation of operational equipment. The next largest sub-sector is Equipment for Waste Treatment which makes up 35% of sales in the market (35% in 2019/20). Example companies are those involved in development, manufacture and supply.

Figure 23: County Durham's Summary of selected metrics for 2021/22 for Recovery and Recycling sub-sector at Level 3

	Sales (£m)	# Employees	# Companies
Waste Collection	24.7	182	10
Glass Stock Processing	8.0	50	3
Rubber Products Stock Processing	7.0	43	3
Textiles Feed Stock Processing	4.3	32	2
Paper Feed Stock Processing	4.1	28	2
Composting Feed Stock Processing	2.7	15	1
Engineering & Equipment	2.3	16	1
Technologies, Research & Development	1.5	11	1
Plastics Stock Processing	1.3	9	1
Metals Recycling Stock Processing	1.2	7	
Automobile Recycling	1.1	8	
Wood Stock Processing	1.0	6	
Electronics & Related Stock Processing	0.6	4	
Consulting, Training and Education	0.6	4	
Construction and Demolition Debris Stock Processing	0.5	3	
Oil Stock Processing	0.4	3	
Household Electrical Goods Stock Processing	0.3	2	
Coal Combustion Products Stock Processing	0.1	1	

Recovery and Recycling

Figure 23 shows the Sales, Companies and Employees for the Recovery & Recycling Level 2 sub-sector broken down into Level 3 sub-sectors. There are eighteen Level 3 sub-sectors and Waste Collection, including the collection of all waste, both municipal and commercial (landfill and recyclates), is clearly the largest sub-sector making up 40% of all sales in the Recovery and Recycling sub-sector (40% in 2019/20). There are then a number of waste stream stock processing sub-sectors with the largest ones being Glass, Rubber Products, Textiles, Paper and Composting.

Figure 24: County Durham's Summary of selected metrics for 2021/22 for Energy from Waste sub-sector at Level 3

	Sales (£m)	# Employees	# Companies
Domestic Sector NED	7.0	24	1
Logistics & Transport Sector	6.1	19	1
Manufacturing	5.7	20	1
Other Sectors NED	5.5	20	1
Other Processing Industry	5.4	18	1
Energy from Waste Food Processing & Prep	5.1	17	1
Chemicals Industry	5.1	18	1
Automotive Sector	5.0	17	1
Land Fill	4.6	15	1
Farming	4.6	16	1
Secondary Sewage	4.0	14	1

Figure 24 shows the Sales, Companies and Employees for the Energy from Waste Level 2 sub-sector broken down into Level 3 sub-sectors. There are eleven Level 3 sub-sectors, relating to the origin of waste, with the Domestic Sector being the largest sub-sector making up 12% of all sales (12% in 2019/20). This is followed in size by Logistics & Transport Sector with 10% (10% in 2019/20) and Manufacturing with 10% (10% in 2019/20), the smallest sub-sector is Secondary Sewage with 7% (7% in 2019/20). Example activities include Energy Extraction Processes, Mechanical and Biological Treatment (MBT), Pre-treatment, Autoclaving, Incineration, Gasification, Conversion Treatment, Waste Incineration Directive (WID) Compliant Biomass and Pyrolysis.

Section 3.4:   LCEGS2023 Level 1 – District Heat Networks

In this section we look at the District Heat Network market in greater detail. Initially we split the market into three further sub-sectors, Level 2, and then look at the highest performing Level 2 sub-sectors in more detail by highlighting the activity happening within them at Level 3.

Table 5 provides details on activities within the Level 2 sub-sectors of the District Heat Network market in County Durham.
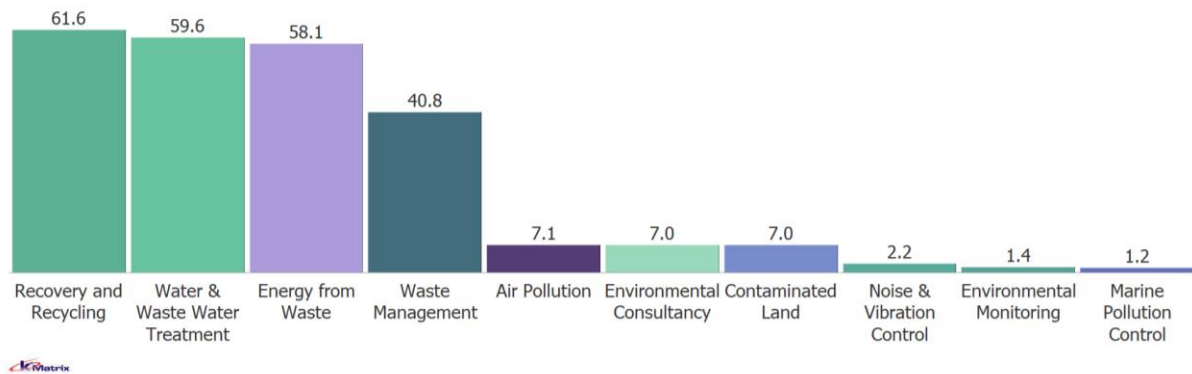
Table 5: LCEGS2023 Level 1 sub-sector description – District Heat Networks

Level 1	Level 2	Description
District Heat Networks	DHNW Construction & Maintenance	Measures the infrastructure for Heat Networks but excludes heat source. It includes: • Consumer Side Heat Network Connections • Grid Connections • Ground Works • Project Consulting Services • Underground DHNW Assets
	DHNW Energy Centres	Measures the infrastructure and maintenance of Energy Centres. It includes: • Energy Centre and Sub-station Buildings • Energy Centre Equipment
	DHNW Operation	Measures the operation of Heat Networks. It includes: • DHNW Ownership and Operational Management • DHNW System Energy Measurement & Monitoring • DHNW-supplied Energy Sales • Energy Storage for DHNW • Fuel Supply & Storage at DHNW Energy Centres • Heat Supply (sales of waste heat from industrial and commercial processes)

Further detail is provided in Appendix 1.

Section 3.4.1:   District Heat Networks at Level 2

Figure 25: County Durham's District Heat Networks Sales 2021/22 in £m (Level 2)

District Heat Networks is split into three sub-sectors (Figure 25). These are DHNW Construction & Maintenance 51% (51% in 2019/20), DHNW Operation 27% (27% in 2019/20), and DHNW Energy Centres 23% (22% in 2019/20).

All three of the sub-sectors have seen Sales values in 2021/22 almost recover to 2019/20 values after the 2019/20 to 2020/21 economic shock.   Sales for DHNW Construction & Maintenance were £12.5m in 2019/20 and were £11.8m in 2021/22 (94.4% of 2019/20); DHNW Operation sales £6.7m in 2019/20 and £6.1m in 2021/22 (91.0% of 2019/20) and DHNW Energy Centres £5.5m in 2019/20 and £5.2m in 2021/22 (94.5% of 2019/20).

Figure 26: County Durham's District Heat Networks Employment 2021/22 (Level 2)

Figure 26 shows the employment within the three sub-sectors for District Heat Networks, DHNW Construction & Maintenance 51% (51% in 2019/20), DHNW Operation 26% (27% in 2019/20), and DHNW Energy Centres 23% (23% in 2019/20).

All three sub-sectors have seen Employment in 2021/22 almost recover to 2019/20 figures after the 2019/20 to 2020/21 economic shock. DHNW Construction & Maintenance employed 745 in 2019/20 and 686 in 2021/22 (92.1% of 2019/20); DHNW Operation employed 394 in 2019/20 and 358 in 2021/22 (90.9% of 2019/20); and DHNW Energy Centres employed 335 in 2019/20 and 306 in 2021/22 (91.3% of 2019/20).

Figure 27: County Durham's District Heat Networks Companies 2021/22 (Level 2)

Figure 27 shows the companies within the three sub-sectors for District Heat Networks, DHNW Construction & Maintenance 50% (50% in 2019/20), DHNW Operation 25% (25% in 2019/20), and DHNW Energy Centres 25% (25% in 2019/20).

All three sub-sectors have retained the same number of companies between 2019/20 and 202/21, with 6 companies in DHNW Construction & Maintenance, 3 in DHNW Operation and 3 in DHNW Energy Centres.

Figure 28: County Durham's District Heat Networks Sales Split by Activity Code 2021/22 (Level 2)

DHNW Construction and Maintenance

DHNW Energy Centres

DHNW Operation

Activities vary by Level 1 sub-sector (Figure 28), with the largest activity code being Manufacture for DHNW Construction and Maintenance 28% and DHNW Energy Centres 35% and Supply for DHNW Operation 33%, which refers a combination of the Level 3 sub-sectors of Fuel Supply and Storage at DHNW Energy Centres and Heat Supply (Sales of waste heat from industrial and commercial processes).

Section 3.4.3: District Heat Networks at Level 3

Figure 29: County Durham's Summary of selected metrics for 2021/22 for District Heat Networks at Level 3

		Sales (£m)	# Employees	# Companies
DHNW Construction & Maintenance	Ground works	7.1	412	4
	Underground DHNW assets	3.1	176	2
	Grid connections	0.6	37	
	Consumer side heat network connections	0.5	32	
	Project consulting services	0.5	28	
DHNW Operation	DHNW System energy measurement and monitoring	2.2	132	1
	Fuel supply and storage at DHNW Energy Centres	2.1	121	1
	DHNW ownership and operational management	0.9	57	
	DHNW-supplied energy sales	0.4	20	
	Energy storage for the DHNW	0.3	16	
	Heat supply (Sales of waste heat from industrial...	0.2	12	
DHNW Energy Centres	Energy Centre equipment	3.9	233	2
	Energy Centre and sub-station buildings	1.2	74	1

Figure 29 shows the Sales, Companies and Employees the Level 2 District Heat Network sub-sectors broken down into their Level 3 sub-sectors.

DHNW Construction & Maintenance is made up of five Level 3 sub-sectors, the largest being Ground works which makes up 60% of sales (61% in 2019/20). Example activities include underground assets installation and testing; groundworks equipment, tools, supplies and consumables, specialist contracting and site management.

DHNW Operation is made up of six Level 3 sub-sectors, the largest being DHNW system energy measurement and monitoring which makes up 36% of sales (36% in 2019/20). Example activities include energy and fuel meters, asset condition monitoring and safety sensors and non-domestic energy monitoring and control systems. This is followed by Fuel supply and storage at DHNW energy centres, which makes up 34% (34% in 2019/20). Example activities include fuel storage and supply of fuels used to generate heat for DHNWs in dedicated energy centres only.

DHNW Energy Centres is made up of two Level 3 sub-sectors, with the largest being Energy Centre Ground works which makes up 75% of sales (76% in 2019/20). Example activities include heat generation equipment, back-up and top-up boilers, back-start generation sets (gas or diesel), water pumping equipment, electrical switchgear and controls and cooling systems.

Section 3.5: LCEGS2023 Level 1 – Green Infrastructure & Nature Based Solutions

In this section we look at the Green Infrastructure & Nature Based Solutions (GI&NBS) market in greater detail. Initially we split the market into two further sub-sectors, Level 2, and then look at the highest performing Level 2 sub-sectors in more detail by highlighting the activity happening within them at Level 3.

Table 6 provides detail on activities within the Level 2 sub-sectors of the GI&NBS market in County Durham.

Table 6: LCEGS2023 Level 1 sub-sector description – GI&NBS

Level 1	Level 2	Description
Green Infrastructure & Nature Based Solutions	Green Infrastructure	Green Infrastructure relates to the R&D, Consulting, Engineering Services, Installation, Maintenance, Supply and Training related to the management of Green Infrastructure including: • Agricultural Land • Coastal Habitats • Forest & Woodland • Freshwater Systems (Fish Ladders etc.) • Green Linkages
	Nature Based Solutions	Nature Based Solutions relates to the R&D, Consulting, Engineering Services, Installation, Maintenance, Supply and Training related to the management of: • Green Roofing • Green Walls

Further detail is provided in Appendix 1.

Section 3.5.1:   GI&NBS at Level 2

Figure 30: County Durham's GI&NBS Sales 2021/22 in £m (Level 2)

The sub-sectors within Green Infrastructure & Nature Based Solutions are shown in Figure 30. Sales were split: Green Infrastructure 93% (93% in 2019/20) and Nature Based Solutions 7% (7% in 2019/20).

Both sub-sectors have seen Sales values in 2021/22 almost recover to 2019/20 values after the 2019/20 to 2020/21 economic shock. Sales for Green Infrastructure were £9.7m in 2019/20 and were £8.0m in 2021/22 (88.9% of 2019/20); and Nature Based Solutions £0.7m in 2019/20 and £0.6m in 2021/22 (85.7% of 2019/20).

Figure 31: County Durham's GI&NBS Employment 2021/22 (Level 2)

The sub-sectors within Green Infrastructure & Nature Based Solutions are shown in Figure 31. Employment was split: Green Infrastructure 93% (93% in 2019/20) and Nature Based Solutions 7% (7% in 2019/20).

Both sub-sectors have seen Employment in 2021/22 almost recover to 2019/20 figures after the 2019/20 to 2020/21 economic shock. Green Infrastructure employed 64 in 2019/20 and 57 in 2021/22 (89.1% of 2019/20); and Nature Based Solutions employed 5 in 2019/20 and 4 in 2021/22 (80.0% of 2019/20).

Figure 32: County Durham's GI&NBS Companies 2021/22 (Level 2)

The sub-sectors within Green Infrastructure & Nature Based Solutions are shown in Figure 32. Number of companies were split: Green Infrastructure 75% (80% in 2019/20) and Nature Based Solutions 25% (20% in 2019/20).

Green Infrastructure seen the number of Companies in 2021/22 almost recover to 2019/20 figures, employment was 3 in 2019/20 and 4 in 2021/22 (75.0% of 2019/20); and Nature Based Solutions maintained 1 company between 2019/20 and 2021/22.

Section 3.5.2:   GI&NBS by Activity Code (Level 2)

Figure 33: County Durham's GI&NBS Energy Split by Activity Code 2021/22 (Level 2)

Activities vary by Level 2 sub-sector (Figure 33), with the largest activity code for Green Infrastructure being Supply 51%, followed by R&D 10% and Training 8%; while the largest activity codes for Nature Based Solutions are Manufacture 29%, Supply 28% and R&D 9%. This is within one percentage point of the split in 2019/20.

Section 3.5.3:   **GI&NBS at Level 3**

Figure 34: County Durham's Summary of selected metrics for 2021/22 for GI&NBS at Level 3

Figure 34 shows the Sales, Companies and Employees of the Level 2 Green Infrastructure & Nature Based Solutions sub-sectors broken down into their Level 3 sub-sectors.

Green Infrastructure is made up of five Level 3 sub-sectors, the largest being Agricultural Land which makes up 58% of sales (57% in 2019/20), followed by Green Linkages which makes up 26% of sales (27% in 2019/20). Example activities include the supply of aggregates, soil and planting materials, along with fish ladders, banks stabilization material etc.

Nature Based Solutions is made up of two Level 3 sub-sectors, the largest being Green Roofing which makes up 67% of sales (71% in 2019/20), followed by Green Walls which makes up 33% of sales (29% in 2019/20). Example activities include the supply and installation of both hard infrastructure and planting material.

Section 3.6: LCEGS2023 Level 1 – Sustainable Food Production

In this section we look at the Sustainable Food Production market in greater detail. Initially we split the market into five further sub-sectors, Level 2, and then look at the highest performing Level 2 sub-sectors in more detail by highlighting the activity happening within them at Level 3.

Table 7 provides detail on activities within the Level 2 sub-sectors of the Sustainable Food Production market in County Durham.
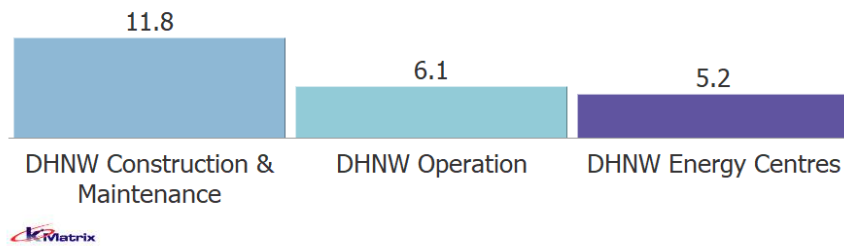
Table 7: LCEGS2023 Level 1 sub-sector description – Sustainable Food Production

Level 1	Level 2	Description
Sustainable Food Production	Biodegradable Food Packaging	Includes the R&D, Consulting, Manufacture, Services, Supply and Training for Biodegradable Food Packaging
	Food Waste Reduction Activities	Includes the R&D, Consulting, Engineering Services, Manufacture, Installation, Maintenance, Services, Supply and Training for: • Zero waste Catering – includes Food Recycling (unsold food to restaurants), Unsold Food Apps (catering), Zero Waste Cafes & Restaurants • Zero Waste Food Retail – End of Shelf Life Food & Drink Sales, Extended Shelf Life R&D and Unsold Food Apps (retail)
	Low Carbon Agriculture	Includes the R&D, Consulting, Engineering Services, Manufacture, Installation, Maintenance, Services, Supply and Training for: • Low Carbon Agricultural Vehicles – Biogas, Electric and Hydrogen • Low Carbon Farming Consultancy and Related Services – Consultancy and Training • Low Carbon Farming Equipment – Low Carbon Grain Dryers and Specialist Low Carbon Farming Equipment (incl. Agri-robots, remote imaging, vertical farming systems etc.)
	Low Carbon Meat Alternatives	Includes the R&D, Consulting, Engineering Services, Manufacture,

		Installation, Maintenance, Services, Supply and Training for: • Low Carbon Meat Alternatives Production Equipment – Mycoprotein, Pea-based, Soy-based, Wheat-based and Other • Low Carbon Meat Alternatives Products – Mycoprotein, Pea-based, Soy-based, Wheat-based and Other
	Low Carbon Milk Alternatives	Includes the R&D, Consulting, Engineering Services, Manufacture, Installation, Maintenance, Services, Supply and Training for: • Low Carbon Milk Alternatives Production Equipment – Almond, Coconut, Hazelnut, Hemp, Oat, Pea and Soya • Low Carbon Milk Alternatives Products – Almond, Coconut, Hazelnut, Hemp, Oat, Pea and Soya

Further detail is provided in Appendix 1.

Section 3.6.1: Sustainable Food Production at Level 2

Figure 35: County Durham's Sustainable Food Production Sales 2021/22 in £m (Level 2)

Sustainable Food Production is split into five sub-sectors, of which three account for 98% of sales (93% in 2019/20) (Figure 35). These three are made up of Low Carbon Meat Alternatives 78% (77% in 2019/20), Low Carbon Agriculture 18% (18% in 2019/20), and Low Carbon Milk Alternatives 3% (3% in 2019/20).

All three of the largest sub-sectors have seen Sales values in 2021/22 almost recover to 2019/20 values after the 2019/20 to 2020/21 economic shock.   Sales for Low Carbon Meat Alternatives sales £137.9m in 2019/20 and £132.0m in 2021/22 (95.7% of 2019/20); Low Carbon Agriculture were £32.6m in 2019/20 and were £30.7m in 2021/22 (94.2% of 2019/20); and Low Carbon Milk Alternatives £5.0m in 2019/20 and £4.7m in 2021/22 (94.0% of 2019/20).

Figure 36: County Durham's Sustainable Food Production Employment 2021/22 (Level 2)

The same three sub-sectors account for 98% of employment (98% in 2019/20) (Figure 36). These three are made up of Low Carbon Meat Alternatives 76% (76% in 2019/20), Low Carbon Agriculture 19% (19% in 2019/20), and Low Carbon Milk Alternatives 3% (3% in 2019/20).

All three of the largest sub-sectors have seen Employment in 2021/22 almost recover to 2019/20 figures after the 2019/20 to 2020/21 economic shock. Low Carbon Meat Alternatives employed 550 in 2019/20 and 452 in 2021/22 (82.2% of 2019/20); Low Carbon Agriculture employed 138 in 2019/20 and 113 in 2021/22 (81.9% of 2019/20); and Low Carbon Milk Alternatives employed 20 in 2019/20 and 16 in 2021/22 (89.4% of 2019/20).

Figure 37: County Durham's Sustainable Food Production Companies 2021/22 (Level 2)

The same three sub-sectors accounts for 100% of companies (100% in 2019/20) (Figure 37). They are split Low Carbon Meat Alternatives 92% (93% in 2019/20), Low Carbon Agriculture 16% (7% in 2019/20), and Low Carbon Milk Alternatives 2% (2% in 2019/20).

All two of the three largest sub-sectors have seen the number of Companies in 2021/22 almost recover to 2019/20 figures after the 2019/20 to 2020/21 economic shock. The number of companies in Low Carbon Meat Alternatives was 57 in 2019/20 and 47 in 2021/22 (82.5% of 2019/20); Low Carbon Agriculture was 4 in 2019/20 and 3 in 2021/22 (75.0% of 2019/20) and Low Carbon Milk Alternatives remained on 1 company between 2019/20 and 2021/22.

Food Waste Reduction Activities and Biodegradable Food Packaging have a company count of 0 because these are services from various companies, delivered by the equivalent of 8 employees and 2 employees respectively, from various organisations, however counting all of those organisations as companies would give a false impression of the sub-sector being larger than it is.

Section 3.6.2:   Sustainable Food Production by Activity Code (Level 2)

Figure 38: County Durham's Sustainable Food Production Split by Activity Code 2021/22 (Level 2)

Activities vary by Level 2 sub-sector (Figure 38), with the largest activity code for all sub-sectors being Supply, with Biodegradable Food Packaging being 43%, Food Waste Reduction Activities 67%, Low Carbon Agriculture 37%, Low Carbon Meat Alternatives 48% and Low Carbon Milk Alternatives 39%. This is within one percentage point of the split in 2019/20.

Section 3.6.2: Sustainable Food Production at Level 3

Figure 39: County Durham's Summary of selected metrics for 2021/22 for Sustainable Food Production at Level 3

Figure 39 shows the Sales, Companies and Employees of the Level 2 Sustainable Food Production sub-sectors broken down into their Level 3 sub-sectors.

Low Carbon Meat Alternatives is made up of two Level 3 sub-sectors, the largest being Low Carbon Meat Alternatives Production Equipment which makes up 63% of sales (63% in 2019/20), followed by Low Carbon Meat Alternatives Products which makes up 38% of sales (37% in 2019/20). Example activities include food manufacturing equipment across the chain of supply, both componentry and whole systems assembly.   Low Carbon Meat Alternative Products include food production and packaging of meat alternatives, along with ingredients for animal protein replacement products such as protein powders, i.e., plant-based ingredients intended to increase the protein content of foods.

Low Carbon Agriculture is made up of three Level 3 sub-sectors, the largest being Low Carbon Agricultural Vehicles which makes up 84% of sales (84% in 2019/20), followed by Low Carbon Farming Equipment which makes up 16% of sales (16% in 2019/20). Example activities include the manufacture and supply of mid-chain componentry for predominantly Biogas Low Carbon Agricultural Vehicles, mainly Off-road Utility Vehicles, with some Tractors and Large Farm Vehicles.

Low Carbon Milk Alternatives is made up of two Level 3 sub-sectors, the largest being Low Carbon Milk Alternatives Production Equipment which makes up 66% of sales (68% in 2019/20), followed by Low Carbon Milk Alternatives Products which makes up 34% of sales (34% in 2019/20). Example activities include milk alternative manufacturing equipment across the chain of supply, both componentry and whole systems assembly.   Low Carbon Milk Alternative Products include milk production and packaging of milk alternatives.

Food Waste Reduction Activities is made up of two Level 3 sub-sectors, the largest being Zero Waste Food Retail which makes up 55% of sales (52% in 2019/20), followed by Zero Waste Catering which makes up 45% of sales (48% in 2019/20). Example activities of Zero Waste Food Retail include End of Shelf Life Food & Drink Sales, through a combination of Online, Retail and Wholesale outlets. Example activities of Zero Waste Catering include the recycling of unsold food from restaurants into non-food products and into meals through soup kitchens; also Zero Waste Cafes and community cafes – the dataset returns a ~0 company count for this activity, because the café-side of these businesses are generally a very small proportion of a larger company, involved in the re-distribution of food, including charitable donations etc, which are not registered within the dataset, resulting in a ~0 count.

Biodegradable Food Packaging is not split by further sub-sectors. Example activities include manufacture and supply.

Section 3.7:   County Durham's LCEGS2023 Level 2 Summary

Figure 40: County Durham's LCEGS2023 Summary 2021/22 for Sales, Number of Companies and Number of Employees

	Sales (£m)	# Employees	# Companies
Wind	225.9	1,231	74
Alternative Fuels	209.9	1,400	85
Alternative Fuel Vehicle	176.6	1,068	63
Building Technologies	167.6	1,375	71
Carbon Finance	137.8	367	30
Low Carbon Meat Alternatives	132.0	452	47
Geothermal	76.2	639	35
Photovoltaic	75.9	584	32
Biomass	64.7	449	22
Recovery and Recycling	61.6	424	25
Water & Waste Water Treatment	59.6	470	24
Energy from Waste	58.1	198	6
Waste Management	40.8	311	16
Low Carbon Agriculture	30.7	113	3
Nuclear Power	27.3	207	13
Energy Management	24.8	205	12
Air Source Heat Pumps	17.4	138	8
Additional Energy Sources	14.7	106	6
DHNW Construction & Maintenance	11.8	686	6
Green Infrastructure	8.0	57	3
Air Pollution	7.1	58	3
Environmental Consultancy	7.0	54	3
Contaminated Land	7.0	52	3
DHNW Operation	6.1	358	3
DHNW Energy Centres	5.2	306	3
Low Carbon Milk Alternatives	4.7	16	1
Carbon Capture & Storage	4.5	35	2
Renewable Energy General Consultancy	3.9	32	2
Hydro	3.9	31	2
Noise & Vibration Control	2.2	16	1
Food Waste Reduction Activities	2.2	8	
Environmental Monitoring	1.4	11	1
Marine Pollution Control	1.2	8	
Wave & Tidal	1.0	5	
Nature Based Building	0.6	4	1
Biodegradable Food Packaging	0.6	2	

■ Low Carbon   ■ Renewable Energy   ■ Environmental   ■ District Heat Networks   ■ Green Infrastructure & Nature Based Solutions   ■ Sustainable Food Production

Figure 40 compares all 36 sub-sectors of LCEGS2023, coloured by Level 1 sub-sectors and shows that the six leading sub-sectors: Wind (13%), Alternative Fuels (12%), Alternative Fuel Vehicles (11%), Building Technologies (10%), Carbon Finance (8%), and Low Carbon Meat Alternatives (8%) have the largest share in terms of sales (although not company numbers or employment) and accounted for 63% of County Durham's LCEGS2023 sector activity in 2020/21 (62% in 2019/20).

There is a second grouping of twelve sub-sectors that are: Geothermal 5%, Photovoltaic 5%, Biomass 4%, Recovery and Recycling 4%, Water and Waste Water Treatment 4%, Energy from Waste 3%, Waste Management 2%, Low Carbon Agriculture 2%, Nuclear Power 2%, Energy Management 1%, Air Source Heat Pumps 1% and Additional Energy Sources 1%, make up a further 32% of the LCEGS2023 sector sales in 2020/21 (32% in 2019/20).

These 18 sub-sectors dominate the LCEGS2023 sector sales and together made up 95% of its overall sales in 2020/21 (95% in 2019/20).

Analysis of Employment shows Low Carbon Agriculture, Air Source Heat Pumps and Additional Energy Sources are not within the top 18 sub-sectors, and are replaced by DHNW Construction and Maintenance, DHNW Operation and DHNW Energy Centres. There are seven leading sub-sectors: Alternative Fuels (12%), Building Technologies (12%), Wind (11%), Alternative Fuel Vehicles (9%), DHNW Construction and Maintenance (6%), Geothermal (6%) and Photovoltaic (5%) have the largest share in terms of employment and accounted for 61% of County Durham's LCEGS2023 sector activity in 2020/21 (60% in 2019/20).

There is a second grouping of nine sub-sectors that are: Water and Waste Water Treatment 4%, Low Carbon Meat Alternatives 4%, Biomass 4%, Recovery and Recycling 4%, Carbon Finance 3%, DHNW Operation 3%, Waste Management 3%, DHNW Energy Centres 3%, Nuclear Power 2%, Energy Management 2% and Energy from Waste 2%, make up a further 35% of the LCEGS2023 sector sales in 2020/21 (38% in 2019/20).

These 18 sub-sectors dominate the LCEGS2023 sector employment and together made up 94% of its overall sales in 2020/21 (93% in 2019/20).

Section 4: County Durham, and the UK's LCEGS2023 Compared

Figure 41: County Durham and UK Measures 2021/22 by Level 1

Figure 41 compares the profile of County Durham and the UK's LCEGS2023 activities at Level 1 for sales (outer circle), companies (middle circle) and employment (inner circle). County Durham has a Level 1 sub-sector split with a distinct pattern compared with the UK, with the proportion of the three largest sub-sectors slightly smaller than the UK, for all three measures. Low Carbon is 2-3 percentage points smaller; Renewable Energy is 7-5 percentage points smaller; and Environmental is 1-2 percentage points smaller than the UK. Conversely, the proportion of Sustainable Food Production in County Durham is significantly higher than the UK, with 10% of Sales, 8% of Companies and 5% of Employment, compared with 1% Sales, ~0% Companies and 1% Employment in the UK. The DHNW sub-sector is also proportionally higher, with 1% of Sales, 2% of Companies and 12% of Employment, compared with ~0% Sales, 1% Companies and 4% Employment in the UK.

Figure 42: County Durham's LCEGS2023 sub-sectors for 2021/22 at Level 2

Figure 43: UK's LCEGS2023 sub-sectors for 2021/22 at Level 2

Figures 42 and 43 extend the analysis by comparing the profile of County Durham and UK's LCEGS2023 activities at Level 2 for sales (outer circle), companies (middle circle) and employment (inner circle).

The most significant differences between County Durham and the UK is the large proportion for Low Carbon Meat Alternatives with 8% of Sales in Country Durham and ~0% in the UK.

Although Wind is the largest sub-sector it accounts for 13% in Country Durham and 15% in the UK and Geothermal accounts for 5% in County Durham and 7% in the UK. Some this difference is attributable to the relatively large proportion of market within Low Carbon Meat Alternatives.

Section 5: County Durham's LCEGS2023 Historic Growth

In Section 1.1 annual growth in County Durham's LCEGS2023 sales, companies and employment was compared with growth in the UK's LCEGS2023 sector as a whole for 2019/20 to 2021/22. Table 8 shows County Durham's annual growth in more detail by breaking it down into sub-sectors for those years. Growth between one year and the next is shown in red.

Table 8: County Durham's LCEGS2023 Sales (£m), Company and Employment Growth 2019/20 to 2021/22

Sub-sector Level		Sales £m					# Companies					# Employees				
1	2	2019/20	Growth %	2020/21	Growth %	2021/22	2019/20	Growth %	2020/21	Growth %	2021/22	2019/20	Growth %	2020/21	Growth %	2021/22
Low Carbon	Additional Energy Sources	15.6	-8.6%	14.3	3.4%	14.7	6	-12.9%	6	3.0%	6	113	-11.9%	99	7.1%	106
	Alternative Fuel Vehicle	192.4	-14.6%	164.2	7.5%	176.6	70	-22.2%	55	15.1%	63	1,123	-8.0%	1,033	3.4%	1,068
	Alternative Fuels	225.1	-10.0%	202.5	3.6%	209.9	95	-13.4%	82	2.8%	85	1,602	-17.9%	1,315	6.5%	1,400
	Building Technologies	175.8	-6.5%	164.4	1.9%	167.6	80	-14.8%	68	3.0%	71	1,489	-12.3%	1,306	5.3%	1,375
	Carbon Capture & Storage	4.8	-8.9%	4.3	4.4%	4.5	2	-13.3%	2	6.2%	2	40	-13.8%	34	1.7%	35
	Carbon Finance	131.4	-8.2%	120.7	14.2%	137.8	32	-12.0%	28	7.5%	30	386	-18.0%	317	16.1%	367
	Energy Management	25.9	-7.0%	24.1	2.8%	24.8	14	-18.4%	11	6.4%	12	234	-16.6%	195	5.0%	205
	Nuclear Power	29.3	-9.2%	26.6	2.6%	27.3	15	-14.4%	12	2.8%	13	232	-13.3%	201	2.7%	207
Renewable Energy	Air Source Heat Pumps	18.5	-8.1%	17.0	2.3%	17.4	8	-12.7%	7	10.0%	8	148	-11.0%	131	5.1%	138
	Biomass	64.7	-5.8%	60.9	6.2%	64.7	23	-12.7%	20	6.5%	22	485	-10.5%	434	3.6%	449
	Geothermal	79.1	-7.6%	73.0	4.3%	76.2	36	-10.4%	33	6.7%	35	674	-11.0%	600	6.5%	639
	Hydro	4.1	-8.7%	3.8	3.2%	3.9	2	-12.4%	2	0.7%	2	35	-13.1%	31	2.1%	31
	Photovoltaic	79.9	-11.9%	70.5	7.7%	75.9	35	-12.3%	31	6.2%	32	635	-15.1%	540	8.3%	584
	Renewable Consultancy	4.2	-10.1%	3.8	3.9%	3.9	2	-13.8%	2	-0.9%	2	36	-14.3%	31	3.6%	32
	Wave & Tidal	1.0	-8.3%	0.9	6.5%	1.0	0	-13.3%	0	6.6%	0	6	-12.7%	5	7.2%	5
	Wind	243.9	-10.3%	218.9	3.2%	225.9	77	-10.8%	69	7.6%	74	1,332	-11.0%	1,185	3.8%	1,231
Environ	Air Pollution	7.6	-9.0%	6.9	2.5%	7.1	4	-14.7%	3	4.0%	3	66	-15.1%	56	4.0%	58
	Contaminated Land	7.5	-9.3%	6.8	3.4%	7.0	4	-14.1%	3	1.9%	3	58	-14.0%	50	4.5%	52
	Energy from Waste	61.6	-9.1%	56.0	3.7%	58.1	8	-9.5%	7	-9.6%	6	241	-9.3%	218	-9.3%	198

	Environmental Consultancy	7.5	-8.3%	6.9	2.6%	7.0	3	-13.0%	3	3.5%	3	60	-13.8%	52	4.3%	54
	Environmental Monitoring	1.4	-8.4%	1.3	3.7%	1.4	1	-13.6%	1	1.8%	1	12	-13.6%	10	3.5%	11
	Marine Pollution Control	1.2	-8.0%	1.1	2.8%	1.2	0	-14.2%	0	3.4%	0	9	-14.5%	8	6.2%	8
	Noise & Vibration Control	2.3	-8.1%	2.1	2.2%	2.2	1	-15.9%	1	3.7%	1	18	-12.6%	16	1.3%	16
	Recovery and Recycling	65.0	-8.2%	59.7	3.1%	61.6	28	-10.6%	25	0.8%	25	465	-12.1%	409	3.7%	424
	Waste Management	44.0	-10.0%	39.6	3.0%	40.8	19	-14.8%	16	3.3%	16	348	-14.0%	300	3.7%	311
	Water & Waste Water Treatment	65.1	-9.8%	58.8	1.5%	59.6	27	-13.7%	23	1.2%	24	532	-12.9%	464	1.3%	470
DHNW	DHNW Construction & Maintenance	12.5	-6.7%	11.7	0.7%	11.8	6	-8.3%	6	-0.1%	6	745	-3.8%	717	-4.2%	686
DHNW	DHNW Energy Centres	5.5	-3.4%	5.3	-3.6%	5.2	3	-8.2%	3	-0.9%	3	335	-8.0%	308	-0.5%	306
DHNW	DHNW Operation	6.7	-7.6%	6.2	-1.3%	6.1	3	-6.8%	3	-4.1%	3	394	-7.6%	364	-1.6%	358
GI&NBS	Green Infrastructure	9.0	-12.1%	7.9	0.6%	8.0	4	-11.5%	3	-0.6%	3	64	-9.2%	58	-3.0%	57
GI&NBS	Nature Based Building	0.7	-14.3%	0.6	1.3%	0.6	1	-5.5%	1	-6.8%	1	5	-9.1%	4	-3.1%	4
Sustainable Food	Biodegradable Food Packaging	0.6	-15.9%	0.5	4.1%	0.6	0	-10.7%	0	-11.0%	0	2	-10.0%	2	-11.6%	2
Sustainable Food	Food Waste Reduction Activities	2.3	-8.5%	2.1	3.8%	2.2	0	-9.2%	0	-9.7%	0	10	-8.3%	9	-9.2%	8
Sustainable Food	Low Carbon Agriculture	32.6	-9.4%	29.6	3.9%	30.7	4	-7.6%	4	-10.0%	3	138	-8.8%	126	-10.0%	113
Sustainable Food	Low Carbon Meat Alternatives	137.9	-8.2%	126.6	4.2%	132.0	57	-9.8%	51	-8.0%	47	550	-10.9%	490	-7.9%	452
Sustainable Food	Low Carbon Milk Alternatives	5.0	-9.4%	4.6	3.6%	4.7	1	-9.6%	1	-10.0%	1	20	-9.3%	18	-8.9%	16
Total		**1,508.8**	-9.5%	**1,365.0**	5.0%	**1,433.7**	576	-13.5%	498	4.5%	521	10,833	-11.8%	9,553	3.4%	9,876

While annual growth in the LCEGS2023 sector as a whole has varied between -13.5 and 5.0% for the three parameters, Table 8 shows that there is considerable variation in growth between the Level 2 sub-sectors. This reflects County Durhams's strengths and its share of these sub-sector markets all of which are growing at different rates, it also reflects the varying impact of the Covid-19 pandemic on different sub-sectors. For this section, the growth rates between 2019/20 and 2020/21 will be discussed regarding the impact of market contraction on the sub-sectors, while the growth rates between 2020/21 and 2021/22 will be looked at in respect to the recovery from the impact of the Covid-19 pandemic on the different sub-sectors.

Section 5.1: 2019/20 to 2020/21 sales contraction comparisons

Sub-sectors in County Durham have been impacted by the pandemic to different degrees, varying from -3.4% for DHNW Energy Centres to -15.9% for Biodegradable Food Packaging. In contrast, the impact across all sub-sectors for the UK varied between -3.9% for DHNW Energy Centres, to -13.3% for Alternative Fuel Vehicle. In some sub-sectors, the impact of Covid-19 in County Durham was lower than the UK:

- Marine Pollution Control, where the County Durham growth rate was -8.0%, and the UK -8.9% between 2019/20 and 2020/21
- Noise & Vibration Control, where the County Durham growth rate was -8.1%, and the UK -9.1% between 2019/20 and 2020/21
- Recovery & Recycling, where the County Durham growth rate was -8.2%, and the UK -9.1% between 2019/20 and 2020/21
- Building Technologies, where the County Durham growth rate was -6.5%, and the UK -8.2% between 2019/20 and 2020/21
- Biomass, where the County Durham growth rate was -5.8%, and the UK -8.9% between 2019/20 and 2020/21
- Geothermal, where the County Durham growth rate was -7.6%, and the UK -9.5% between 2019/20 and 2020/21
- Wind, where the County Durham growth rate was -10.3%, and the UK -11.6% between 2019/20 and 2020/21
- Food Waste Reduction Activities, where the County Durham growth rate was -8.5%, and the UK -9.4% between 2019/20 and 2020/21
- Low Carbon Meat Alternatives, where the County Durham growth rate was -8.2%, and the UK -9.1% between 2019/20 and 2020/21

Section 5.2: 2020/21 to 2021/22 growth rate comparisons

The higher growth rates for some sub-sectors in County Durham are a reflection of the opportunities that are being created by drivers of growth including policy, regulation and consumer choices. Most sub-sectors in County Durham have growth rates within one percentage point of the UK growth rates. Sub-sectors with higher growth than the UK by one percentage point or more include:

- Alternative Fuel Vehicle, where the County Durham growth rate was 7.5%, and the UK 5.4% between 2019/20 and 2020/21
- Carbon Capture & Storage, where the County Durham growth rate was 4.4%, and the UK 3.2% between 2019/20 and 2020/21
- Carbon Finance, where the County Durham growth rate was 14.2%, and the UK 12.2% between 2019/20 and 2020/21
- Renewable Consultancy, where the County Durham growth rate was 3.9%, and the UK 2.4% between 2019/20 and 2020/21
- Nature Based Building, where the County Durham growth rate was 1.3%, and the UK -0.1% between 2019/20 and 2020/21

Section 5.3: 3-year growth 2019/20-2021/22 County Durham and UK

Table 8 shows the greatest impact from Covid-19 was seen by the highest contraction in Nature Based Building and Green Infrastructure (GI&NBS), Biodegradable food Packaging (Sustainable Food Production), DHNW Operation (DHNW), Water & Waste Water Treatment (Environmental) and Alternative Fuel Vehicle (Low Carbon), while the highest levels of actual growth in County Durham's LCEGS2023 occurred in Carbon Finance (Low Carbon) and Biomass (Renewable Energy) between 2019/20 and 2021/22.

Some sub-sectors had less contraction across the three-year reporting period than the UK and should be considered strengths of the region:
- Biomass with 0.0% (UK -2.4%)
- Renewable Consultancy with -6.6% (UK -7.3%)
- Environmental Monitoring with -4.9% (UK -5.9%)
- Carbon Capture & Storage with -4.9% (UK -6.0%)
- Building Technologies with -4.7% (UK -5.9%)
- Low Carbon Meat Alternative with -4.2% (UK -5.7%)
- Wave & Tidal with -2.4% (UK -3.4%)

Some sub-sectors had significantly more contraction across the three-year reporting period than the UK:
- Nature Base Building with -13.2% (UK -11.6%)
- Biodegradable food Packaging with -12.4% (UK -6.0%)
- Water & Waste Water Treatment with -8.4% (UK -7.6%)
- Waste Management with -7.3% (UK -6.4%)
- Alternative Fuels with -6.8% (UK -4.0%)
- Photovoltaic with -5.1% (UK -3.6%)
- Energy Management with -4.5% (UK -3.6%)

One sub-sector saw growth across the three-year reporting period:
- Carbon Finance with 4.9% (UK 2.2%)

Section 5.4: Comparison Graphs for growth 2019/20-2021/22 County Durham and UK

By overlaying the sales as a proportion of the UK market for each sub-sector, and sub-sector growth compared with the UK as a growth factor, the impact of stronger or weaker sales growth can be examined more closely.

In this section we look at the contraction of the market between 2019/20 and 2020/21, followed by the growth between 2020/21 and 2021/22, and finally the overall performance of sub-sectors compared with the UK between 2019/20 and 2021/22.

Section 5.4.1: Contraction in Sales of LCEGS2023 market, by Level 2 sub-sector, between 2019/20 and 2020/21, County Durham and UK

Table 9 illustrates how County Durham compares with the UK as a whole for the 36 Level 2 sub-sectors, in terms of size of market in 2019/20 and contraction between 2019/20 and 2020/21 and illustrates the impact of contraction.

County Durham as a % of UK Sales has been converted to a Proportionality Factor, where:
- 1.0 equals the sector value (0.7% of the UK total)
- below 1.0 represents a smaller market than the sector total proportion
- above 1.0 represents a market which is larger than the sector total proportion

Likewise, the County Durham/UK Impact Factor indicates where contraction has been higher in County Durham than the UK, where:
- 1.0 equals the same contraction in County Durham as the UK
- below 1.0 represents a smaller contraction than the UK
- above 1.0 represents a larger contraction than the UK

Table 9: Comparison of County Durham and UK LCEGS2023 Sales (£m) and Contraction in Sales between 2019/20 and 2020/21

Level 1	Level 2	UK Sales £m 2019/20	UK % Contraction 2019/20 to 2020/21	County Durham Sales £m 2019/20	County Durham % Contraction 2019/20 to 2020/21	County Durham Sales as % of UK in 2019/20	County Durham/UK Sales Prop.	County Durham/UK Impact Factor
Low Carbon	Additional Energy Sources	2,129.7	-8.8%	15.6	-8.6%	0.7%	1.1	1.0
	Alternative Fuel Vehicle	28,940.2	-13.3%	192.4	-14.6%	0.7%	1.0	1.0
	Alternative Fuels	33,307.7	-8.3%	225.1	-10.0%	0.7%	1.0	0.9
	Building Technologies	30,194.9	-8.2%	175.8	-6.5%	0.6%	0.9	0.9
	Carbon Capture & Storage	816.0	-8.9%	4.8	-8.9%	0.6%	0.9	0.9
	Carbon Finance	22,871.0	-8.9%	131.4	-8.2%	0.6%	0.9	0.9
	Energy Management	4,359.0	-5.5%	25.9	-7.0%	0.6%	0.9	0.9
	Nuclear Power	4,946.3	-8.8%	29.3	-9.2%	0.6%	0.9	0.9
Renewable Energy	Air Source Heat Pumps	4,110.7	-8.1%	18.5	-8.1%	0.5%	0.7	1.1
	Biomass	11,234.4	-8.9%	64.7	-5.8%	0.6%	0.9	1.1
	Geothermal	17,516.0	-9.5%	79.1	-7.6%	0.5%	0.7	1.0

	Hydro	703.5	-9.0%	4.1	-8.7%	0.6%	0.9	1.1
	Photovoltaic	13,350.9	-11.1%	79.9	-11.9%	0.6%	0.9	1.2
	Renewable Consultancy	722.1	-9.5%	4.2	-10.1%	0.6%	0.9	0.8
	Wave & Tidal	171.5	-8.9%	1.0	-8.3%	0.6%	0.9	1.0
	Wind	41,516.6	-11.6%	243.9	-10.3%	0.6%	0.9	0.9
Environmental	Air Pollution	1,283.9	-8.9%	7.6	-9.0%	0.6%	0.9	1.3
	Contaminated Land	1,269.2	-9.1%	7.5	-9.3%	0.6%	0.9	1.0
	Energy from Waste	13,617.6	-9.6%	61.6	-9.1%	0.5%	0.7	1.0
	Environmental Consultancy	1,268.4	-9.0%	7.5	-8.3%	0.6%	0.9	0.7
	Environmental Monitoring	247.6	-9.0%	1.4	-8.4%	0.6%	0.9	0.8
	Marine Pollution Control	206.3	-8.9%	1.2	-8.0%	0.6%	0.9	1.0
	Noise & Vibration Control	394.7	-9.1%	2.3	-8.1%	0.6%	0.9	1.1
	Recovery and Recycling	11,071.7	-9.1%	65.0	-8.2%	0.6%	0.9	1.1
	Waste Management	7,384.8	-8.9%	44.0	-10.0%	0.6%	0.9	0.9
	Water & Waste Water Treatment	10,943.9	-9.2%	65.1	-9.8%	0.6%	0.9	0.9
District Heat Networks	DHNW Construction & Maintenance	565.1	-7.2%	12.5	-6.7%	2.2%	3.4	0.9
	DHNW Energy Centres	248.8	-3.9%	5.5	-3.4%	2.2%	3.4	0.9
	DHNW Operation	298.6	-7.3%	6.7	-7.6%	2.2%	3.4	1.0
Green Infrastructure & Nature Based Solutions	Green Infrastructure	1,525.1	-11.6%	9.0	-12.1%	0.6%	0.9	1.0
	Nature Based Building	111.6	-11.5%	0.7	-14.3%	0.6%	0.9	1.2
Sustainable Food Production	Biodegradable Food Packaging	101.0	-9.0%	0.6	-15.9%	0.6%	1.0	1.8
	Food Waste Reduction Activities	391.8	-9.4%	2.3	-8.5%	0.6%	0.9	0.9
	Low Carbon Agriculture	1,758.9	-9.6%	32.6	-9.4%	1.9%	2.8	1.0
	Low Carbon Meat Alternatives	897.4	-9.1%	137.9	-8.2%	15.4%	23.4	0.9
	Low Carbon Milk Alternatives	850.3	-9.3%	5.0	-9.4%	0.6%	0.9	1.0
Total		**271,327.1**	**-9.8%**	**1,772.1**	**-9.5%**	**0.7%**		

Figure 44 illustrates the data in Table 9 and shows how County Durham compares with the UK for the 36 Level 2 sub-sectors, with regards to size of market and contraction in sales between 2019/20 and 2020/21.

The x-axis represents the County Durham/UK sales proportionality factor for 2019/20, which was calculated for each sub-sector by dividing the County Durham sales as a percentage of UK, by 0.7%. This proportionality factor demonstrates where County Durham holds a larger or smaller share of the UK market than the sector proportion as a whole, where:

- 1.0 = 0.7% of the UK market
- >1.0 = larger than 0.7% share
- <1.0 = smaller than 0.7% share

The y-axis represents the contraction of County Durham's Level 2 sub-sectors compared with the UK. This was calculated for each sub-sector by dividing the contraction within County Durham by the contraction for the UK. This growth rate factor demonstrates which sub-sectors have been more strongly impacted by the economic shock, where:

- 1.0 = the same contraction in sub-sector sales as the UK
- >1.0 = larger contraction in sub-sector sales than the UK
- <1.0 = smaller contraction in sub-sector sales than the UK

The graph is split into four quadrants along 1 on each axis, with sub-sectors in each demonstrating:

- Top right = larger market share than expected, but larger contraction in sub-sector sales than the UK
- Bottom Right = larger market share than expected, and smaller contraction in sub-sector sales than the UK
- Top left = smaller market share than expected, but larger contraction in sub-sector sales than the UK
- Bottom left = smaller market share than expected, and smaller contraction in sub-sector sales than the UK

The bubbles represent the 36 Level 2 sub-sectors and are sized by the 2019/20 sales £m, illustrating the relative sizes of each sub-sector.

Figure 44: County Durham/UK 2019/20 Sales proportionality factor vs. County Durham/UK 2019/20 to 2020/21 Impact factor of Level 2 Sub-sectors – Bubbles Sized by 2019/20 Sales £m

Figure 44 clearly illustrates the Low Carbon Meat Alternatives sub-sector holds a larger proportion of the UK market compared with the other sub-sectors, with Low Carbon Agriculture (another Sustainable Food Production sub-sector) also holding a larger proportion of the market than expected. All three Level 2 sub-sectors for DHNW are also proportionally larger than the LCEGS2023 average. The impact of the economic shock was similar to the UK average for Low Carbon Agriculture, DHNW Construction & Maintenance and DHNW Operation as evidenced by their close proximity to 1 on the x-axis, while Low Carbon Meat Alternatives and DHN Energy Centres were impacted less severely than the UK average. These five sub-sectors are excluded in Figure 45 to allow further analysis of the remaining 31 sub-sectors.

Figure 45: County Durham/UK 2019/20 Sales proportionality factor vs. County Durham/UK 2019/20 to 2020/21 Impact factor of Level 2 Sub-sectors – Bubbles Sized by 2019/20 Sales £m – Outlier Sub-sectors Excluded

Figure 45 excludes the five outlier sub-sectors from Figure 44 and illustrates the variance in both proportionality of market and contraction between 2019/20 and 2020/21 of the remaining 31 sub-sectors within the LCEGS sector. Biodegradable Food Packaging was one of the most heavily impacted sub-sectors in County Durham but had a smaller than average proportion of the UK market. Alternative Fuels is a large sub-sector, which was impacted more strongly than the UK average, along with Energy Management, which holds a proportionally smaller share of the market. Biomass, Building Technologies, Carbon Finance, Geothermal and Wind were impacted less strongly than the UK average, while Energy from Waste and Air Source Heat Pumps were impacted in line with the UK, but hold a smaller proportion of the UK market compared with the sector average for County Durham.

Section 5.4.2: Growth in Sales of LCEGS2023 market, by Level 2 sub-sector, between 2020/21 and 2021/22, County Durham and the UK

Table 10 illustrates how County Durham compares with the UK as a whole for the 36 Level 2 sub-sectors, in terms of size of market in 2021/22 and growth between 2020/21 and 2021/22.

County Durham as a % of UK Sales has been converted to a Proportionality Factor, where:
- 1.0 equals the sector value (0.7% of the UK total)
- below 1.0 represents a smaller market than the sector total proportion
- above 1.0 represents a market which is larger than the sector total proportion

Likewise, the County Durham/UK Impact Factor indicates where contraction has been higher in County Durham than the UK, where:
- 1.0 equals the same contraction in County Durham as the UK
- below 1.0 represents a smaller contraction than the UK
- above 1.0 represents a larger contraction than the UK

Table 10: Comparison of County Durham and UK LCEGS2023 Sales (£m) and Growth in Sales between 2020/21 and 2021/22

Level 1	Level 2	UK Sales £m 2021/22	UK % Growth 2020/21 to 2021/22	County Durham Sales £m 2021/22	County Durham % Growth 2020/21 to 2021/22	County Durham as % of UK	County Durham/UK 2021/22 Sales Prop.	County Durham/UK Growth Factor
Low Carbon	Additional Energy Sources	2,009.3	3.4%	14.7	3.4%	0.6%	0.9	1.1
	Alternative Fuel Vehicle	26,448.1	5.4%	176.6	7.5%	0.6%	0.9	1.2
	Alternative Fuels	31,961.7	4.6%	209.9	3.6%	0.5%	0.7	0.9
	Building Technologies	28,414.8	2.5%	167.6	1.9%	0.6%	0.9	0.7
	Carbon Capture & Storage	767.1	3.2%	4.5	4.4%	0.6%	0.9	1.1
	Carbon Finance	23,366.9	12.2%	137.8	14.2%	0.6%	0.9	0.7
	Energy Management	4,202.7	2.0%	24.8	2.8%	0.6%	0.9	0.6
	Nuclear Power	4,625.4	2.5%	27.3	2.6%	0.6%	0.9	0.8
Renewable Energy	Air Source Heat Pumps	3,842.0	1.7%	17.4	2.3%	0.6%	0.9	1.1
	Biomass	10,963.9	7.1%	64.7	6.2%	0.6%	0.9	0.9
	Geothermal	16,796.1	6.0%	76.2	4.3%	0.7%	1.1	1.0

	Hydro	658.8	2.9%	3.9	3.2%	0.7%	1.0	1.4
	Photovoltaic	12,868.2	8.4%	75.9	7.7%	0.7%	1.0	0.8
	Renewable Consultancy	669.6	2.4%	3.9	3.9%	0.6%	0.9	0.8
	Wave & Tidal	165.6	6.0%	1.0	6.5%	0.6%	0.9	1.4
	Wind	38,301.3	4.4%	225.9	3.2%	0.6%	0.9	1.2
Environmental	Air Pollution	1,196.2	2.2%	7.1	2.5%	0.6%	0.9	1.4
	Contaminated Land	1,187.2	2.9%	7.0	3.4%	0.6%	0.9	1.0
	Energy from Waste	12,801.5	4.0%	58.1	3.7%	0.5%	0.7	1.3
	Environmental Consultancy	1,194.9	3.5%	7.0	2.6%	0.6%	0.9	0.9
	Environmental Monitoring	233.1	3.4%	1.4	3.7%	0.5%	0.7	0.7
	Marine Pollution Control	195.6	4.0%	1.2	2.8%	0.6%	0.9	1.1
	Noise & Vibration Control	372.5	3.8%	2.2	2.2%	0.6%	0.9	0.9
	Recovery and Recycling	10,442.5	3.7%	61.6	3.1%	0.6%	0.9	1.6
	Waste Management	6,914.0	2.7%	40.8	3.0%	0.6%	0.9	1.1
	Water & Waste Water Treatment	10,110.8	1.7%	59.6	1.5%	0.6%	0.9	0.7
District Heat Networks	DHNW Construction & Maintenance	527.8	0.6%	11.8	0.7%	2.2%	3.4	1.2
	DHNW Energy Centres	231.2	-3.3%	5.2	-3.6%	2.2%	3.4	1.1
	DHNW Operation	273.1	-1.3%	6.1	-1.3%	2.2%	3.4	1.0
Green Infrastructure & Nature Based Solutions	Green Infrastructure	1,355.1	0.5%	8.0	0.6%	0.6%	0.9	1.2
	Nature Based Building	98.6	-0.1%	0.6	1.3%	0.6%	0.9	1.3
Sustainable Food Production	Biodegradable Food Packaging	94.9	3.3%	0.6	4.1%	0.6%	0.9	1.2
	Food Waste Reduction Activities	369.8	4.1%	2.2	3.8%	0.6%	0.9	0.9
	Low Carbon Agriculture	1,650.5	3.8%	30.7	3.9%	1.9%	2.8	1.0
	Low Carbon Meat Alternatives	846.2	3.7%	132.0	4.2%	15.6%	23.8	1.1
	Low Carbon Milk Alternatives	800.4	3.8%	4.7	3.6%	0.6%	0.9	0.9
Total		**255,761.3**	**5.0%**	**1,679.6**	**4.7%**	**0.7%**		

Figure 46 illustrates the data in Table 10 and shows how County Durham compares with the UK for the 36 Level 2 sub-sectors, with regards to size of market and growth in sales between 2020/21 and 2021/22.

The x-axis represents the County Durham/UK sales proportionality factor for 2021/22, which was calculated for each sub-sector by dividing the County Durham sales as a percentage of UK, by 0.7%. This proportionality factor demonstrates where County Durham holds a larger or smaller share of the UK market than the sector proportion as a whole, where:

- 1.0 = 0.7% of the Scottish market
- >1.0 = larger than 0.7% share
- <1.0 = smaller than 0.7% share

The y-axis represents the growth of County Durham's Level 2 sub-sectors compared with the UK between 2020/21 and 2021/22. This was calculated for each sub-sector by dividing the growth within County Durham by the growth for the UK. This growth rate factor demonstrates which sub-sectors have grown more strongly than the UK, where:

- 1.0 = the same growth in sub-sector sales as the UK
- >1.0 = stronger growth in sub-sector sales than the UK
- <1.0 = slower growth in sub-sector sales than the UK

The graph is split into four quadrants along 1 on each axis, with sub-sectors in each demonstrating:

- Top right = larger market share than expected and stronger growth in sub-sector sales than the UK
- Bottom Right = larger market share than expected and slower growth in sub-sector sales than the UK
- Top left = smaller market share than expected and stronger growth in sub-sector sales than the UK
- Bottom left = smaller market share than expected and slower growth in sub-sector sales than the UK

The bubbles represent the 36 Level 2 sub-sectors and are sized by the 2021/22 sales £m, illustrating the relative sizes of each sub-sector.

Figure 46: County Durham/UK 2020/21 Sales proportionality factor vs. County Durham/UK 2020/21 to 2021/22 Growth factor of Level 2 Sub-sectors – Bubbles Sized by 2021/22 Sales £m

Figure 46 clearly illustrates the same outlier sub-sectors as Figure 44: Low Carbon Meat Alternatives and Low Carbon Agriculture sub-sectors with a larger proportion of the UK market compared with the other sub-sectors, with growth for Low Carbon Agriculture similar to the UK average, and Low Carbon Meat Alternatives with slightly stronger growth between 2020/21 and 2021/22 than the UK average. The three sub-sectors within the DHNW Level 1 sub-sector also remain proportionally larger than the LCEGS2023 average, with DHNW Construction & Maintenance with stronger growth than the UK average and DHNW Operation and DHNW Energy Centres with growth similar to the UK average. These five sub-sectors are excluded in Figure 47 to allow further analysis of the remaining 31 sub-sectors.

Figure 47: County Durham/UK 2020/21 Sales proportionality factor vs. County Durham/UK 2020/21 to 2021/22 Growth factor of Level 2 Sub-sectors – Bubbles Sized by 2021/22 Sales £m – Outlier Sub-sectors Excluded
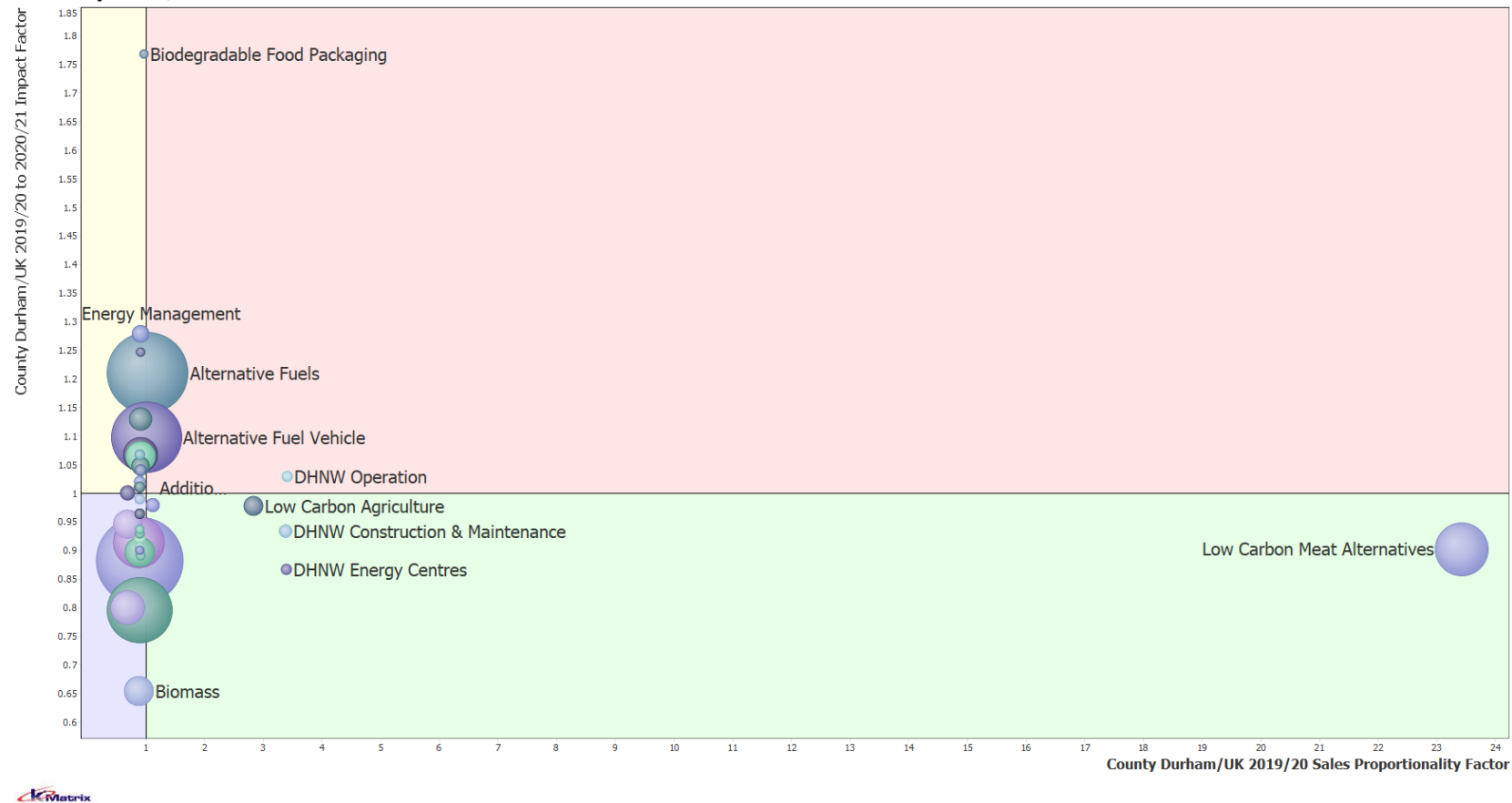

Figure 47 excludes the five outlier sub-sectors from Figure 46 and illustrates the variance in both proportionality of market and contraction between 2019/20 and 2020/21 of the remaining 31 sub-sectors within the LCEGS sector. Biodegradable Food Packaging was one of the most heavily impacted sub-sectors in County Durham but had stronger growth than the average UK market, likewise, Alternative Fuel Vehicle and Energy Management were impacted more strongly than the UK average, but saw stronger growth than the UK. Carbon Finance was impacted less than the UK average and also grew more strongly, while Air Source Heat Pumps were impacted in line with the UK but saw stronger growth between 2020/21 and 2021/22.

Figure 48: Figures 45 and 47 Compared

Figure 48 illustrates Figures 45 and 47 side by side for easy comparison of changes in proportionality factor of sub-sectors in 2019/20 and 2021/22. Despite the differences in market contraction between 2019/20 and 2020/21 and growth between 2020/21 and 2021/22, the proportion of the UK market held by County Durham sub-sectors has not altered significantly. In terms of contraction and growth, there is little pattern with regards to high contraction leading to either slow or strong growth, for example, Carbon Capture & Storage was not heavily impacted and saw reasonable growth; Biomass was impacted more than the UK average, but grew in line with the UK average; Alternative Fuel Vehicle saw severe contraction, but strong growth; and Alternative Fuel Vehicle saw more contraction than the UK, and also slow growth.

Figure 49: Figure 47 in Further Detail

Figure 49 removes a further six sub-sectors from Figure 47, to display the proportionalities within the group of 25 sub-sectors. When compared with Figure 45 (on the left above), Carbon Finance had a smaller proportion of the UK market than Wind in 2019/20, but a larger proportion of the UK market than Wind in 2021/22. In reality, Noise & Vibration Control in the bottom centre of Figure 49 is almost the same proportion of the UK market in 2021/22 as it was in 2019/20, so all sub-sectors to the right, including Wind, Building technologies, Biomass, and Recovery & Recycling have slightly increased their proportion of the UK market, while those on the Left of Noise & Vibration Control have slightly reduced their share of the UK market. This has caused the sub-sectors to group in Figure 47 and it will be interesting to see over time whether this trend continues, or whether this is an anomaly due to recovery from the Covid-19 pandemic.

Section 5.4.3: Summary of County Durham and UK 3-Year LCEGS2023 Market Contraction in Sales, by Level 2 sub-sector, between 2019/20 and 2021/22

Table 11 shows the 3-year contraction in sales, by sub-sector for County Durham and the UK as a percentage contraction of sales from 2019/20 to 2021/22.

Table 11: Summary of County Durham and UK 3-Year LCEGS2023 Market Contraction in Sales between 2019/20 and 2021/22

Category	Level 2 Sub-sector	Level 1 Sub-sector	County Durham 2021/22 Sales £m	County Durham % Growth in Sales 2019/20 to 2021/22	UK % Growth in Sales 2019/20 to 2021/22	Percentage Point Difference
County Durham sub-sectors with Less Contraction than the UK 2019/20 to 2021/22	Carbon Finance	Low Carbon	137.8	4.9%	2.2%	2.7
	Biomass	Renewable Energy	64.7	0.0%	-2.4%	2.4
	Low Carbon Meat Alternatives	Sustainable Food Prod'n	132.0	-4.3%	-5.7%	1.4
	Building Technologies	Low Carbon	167.6	-4.7%	-5.9%	1.2
	Carbon Capture & Storage	Low Carbon	4.5	-4.9%	-6.0%	1.1
	Wave & Tidal	Renewable Energy	1.0	-2.4%	-3.4%	1.0
	Environmental Monitoring	Environmental	1.4	-4.9%	-5.9%	1.0
	Renewable Consultancy	Renewable Energy	3.9	-6.6%	-7.3%	0.7
	Hydro	Renewable Energy	3.9	-5.8%	-6.4%	0.6
	DHNW Construction & Maintenance	District Heat Networks	11.8	-6.0%	-6.6%	0.6
	Food Waste Reduction Activities	Sustainable Food Prod'n	2.2	-5.0%	-5.6%	0.6
	Air Source Heat Pumps	Renewable Energy	17.4	-6.0%	-6.5%	0.5
	Alternative Fuel Vehicle	Low Carbon	176.6	-8.2%	-8.6%	0.4
	Recovery and Recycling	Environmental	61.6	-5.3%	-5.7%	0.4
	Low Carbon Agriculture	Sustainable Food Prod'n	30.7	-5.8%	-6.2%	0.4
	Geothermal	Renewable Energy	76.2	-3.7%	-4.1%	0.4
	Wind	Renewable Energy	225.9	-7.4%	-7.7%	0.3
	Energy from Waste	Environmental	58.1	-5.7%	-6.0%	0.3
	Contaminated Land	Environmental	7.0	-6.2%	-6.5%	0.3
	DHNW Energy Centres	District Heat Networks	5.2	-6.8%	-7.1%	0.3
	Additional Energy Sources	Low Carbon	14.7	-5.5%	-5.7%	0.2

	Air Pollution	Environmental	7.1	-6.7%	-6.8%	0.1
County Durham sub-sectors with Greater Contraction than the UK 2019/20 to 2021/22	Environmental Consultancy	Environmental	7.0	-5.9%	-5.8%	-0.1
	Low Carbon Milk Alternatives	Sustainable Food Prod'n	4.7	-6.1%	-5.9%	-0.2
	Marine Pollution Control	Environmental	1.2	-5.4%	-5.2%	-0.2
	DHNW Operation	District Heat Networks	6.1	-8.8%	-8.6%	-0.2
	Nuclear Power	Low Carbon	27.3	-6.9%	-6.5%	-0.4
	Green Infrastructure	GI&NBS	8.0	-11.5%	-11.1%	-0.4
	Noise & Vibration Control	Environmental	2.2	-6.1%	-5.6%	-0.5
	Water & Waste Water Treatment	Environmental	59.6	-8.4%	-7.6%	-0.8
	Waste Management	Environmental	40.8	-7.3%	-6.4%	-0.9
	Energy Management	Low Carbon	24.8	-4.5%	-3.6%	-0.9
	Photovoltaic	Renewable Energy	75.9	-5.1%	-3.6%	-1.5
	Nature Based Building	GI&NBS	0.6	-13.2%	-11.6%	-1.6
	Alternative Fuels	Low Carbon	209.9	-6.8%	-4.0%	-2.8
	Biodegradable Food Packaging	Sustainable Food Prod'n	0.6	-12.4%	-6.0%	-6.4

Table 11 illustrates the difference in contraction between geography and sub-sector between 2019/20 and 2021/22. County Durham has performed better than the UK in 22 of the 36 sub-sectors, by between 0.1 percentage point for Air Pollution and 2.7 percentage points for Carbon Finance. County Durham has performed less well than the UK in 14 of the 36 sub-sectors, by between -0.1 percentage point from Environmental Consultancy and -6.4 percentage points for Biodegradable Food Packaging.

Four of the largest sub-sectors were also the highest performing: Carbon Finance is the 5th largest sub-sector with Sales in 2021/22 of £137.8m and grew by 4.9% compared with the UK average of 2.2%; Biomass is the 9th largest sub-sector with Sales in 2021/22 of £64.7m and grew by 0.0% compared with the UK average of -2.4%; Low Carbon Meat Alternatives is the 6th largest sub-sector with Sales in 2021/22 of £132.0m and contracted by -3.4% compared with the UK average of -5.7%; and Building Technologies is the 4th largest sub-sector with Sales in 2021/22 of £167.6m and contracted by -4.7% compared with the UK average of -5.9%.

Of the six largest sub-sectors, only one had contraction greater than the UK, Alternative Fuels is the 2nd largest sub-sector with Sales in 2021/22 of £209.9m and contracted by -6.8% compared with the UK average of -4.0%.

Note: Analysis of the Alternative Fuels Level 2 sub-sector at Levels 3 and 4 indicates:

Level 3 Sub-sectors within the Alternative Fuels Level 2 Sub-sector	County Durham 2021/22 Sales £m	County Durham % Growth in Sales 2019/20 to 2021/22	UK % Growth in Sales 2019/20 to 2021/22	Percentage Point Difference	Country Durham as % of UK
Bio Fuels Alternative for Vehicles Only	7.1	-2.0	-4.3	2.4	0.6%
EV Batteries	3.8	-14.5	-15.2	0.7	0.7%
Hydrogen Fuel	**42.2**	**-7.3**	**-5.1**	**-2.2**	**1.3%**
Main Stream Bio Fuels	**25.4**	**-3.2**	**-2.3**	**-0.9**	**0.6%**
Non-EV Batteries	4.9	1.4	1.2	0.2	0.6%
Other Bio Fuels	**126.5**	**-7.6**	**-4.0**	**-3.6**	**0.6%**

The strong contraction of Alternative Fuels compared with the UK average is predominantly caused by strong contraction within three Level 3 sub-sectors which account for 92% of Sales: Hydrogen Fuels, Main Stream Bio Fuels; and Other Bio Fuels.

Within these Level 3 sub-sectors, each contains one Level 4 sub-sector of significant size, with strong contraction, resulting in three Level 4 sub-sectors (one from each Level s sub-sector above) which contributes 78% of Sales to the Alternative Fuels Level 2 sub-sector. These are:

- **Methane** (within Other Bio Fuels), with Sales of £110.6m and which contracted -8.3% compared with the UK average of -3.9%

- **Hydrogen** (within Hydrogen Fuel), with Sales of £42.2m and which contracted -5.1% compared with the UK average of -2.2%

- **Butanol** (within Main Stream Bio Fuels), with Sales of £10.0m and which contracted -5.9% compared with the UK average of -1.5%

Hydrogen Fuel is also of significance due to County Durham Contributing 1.3% to the UK Hydrogen Fuel sub-sector Sales, significantly higher than the 0.7% LCEGS2023 sector average.

Section 6:   County Durham's LCEGS2023 Forecast Sales Growth

Forecasts are triangulated from industry forecasts from within and around the sector, using the study methodology and provide a snapshot of industry 'best guess' as of March 2023.

Figure 50 Shows the forecast growth rates for the LCEGS2023 sector between 2021/22 and 2025/26. The growth rates would be applied to the previous year to calculate the sales for the year indicated, so for example, the 2022/23 growth rate indicates the expected growth in sales between the 2021/22 and 2022/23.

Figure 50: County Durham and UK's LCEGS Sector Forecast Growth (%) 2022/23 to 2025/26

County Durham

6.1	8.6	10.7	12.4
2022/23	2023/24	2024/25	2025/26

UK

6.4	9.0	11.2	12.9
2022/23	2023/24	2024/25	2025/26

 Figure 50 Shows the LCEGS2023 sector in County Durham is forecast to see consistent growth through the forecast period, of 6.1% growth between 2021/22 and 2022/23, growing year-on-year to reach 12.4% growth between 2024/25 and 2025/26.

The UK is expected to see stronger growth than County Durham, with 6.4% growth between 2021/22 and 2022/23, growing year-on-year to reach 12.9% growth between 2024/25 and 2025/26.

Table 12 shows the sales value for Level 2 sub-sectors for 2021/22, the forecast sales values for 2022/23 through to 2025/26 and the annual percentage growth from the previous year. The growth rates refer to the growth expected during the financial year listed. Forecast growth for the majority of sub-sectors is generally consistent with levels of historical growth, but in the current economic climate, forecasts beyond 2023/24 will be less robust.

Table 12: County Durham's LCEGS2023 Forecast Sales (£m) and Growth (%) 2021/22 to 2025/26

Level 1	Level 2	2021/22 Sales £m	2022/23 Forecast Growth %	2022/23 Forecast Sales £m	2023/24 Forecast Growth %	2023/24 Forecast Sales £m	2024/25 Forecast Growth %	2024/25 Forecast Sales £m	2025/26 Forecast Growth %	2025/26 Forecast Sales £m
Low Carbon	Additional Energy Sources	14.7	4.9%	15.5	5.8%	16.4	7.2%	17.5	7.6%	18.9
	Alternative Fuel Vehicle	176.6	5.1%	185.6	7.9%	200.2	9.9%	220.0	12.8%	248.1
	Alternative Fuels	209.9	5.7%	221.8	6.5%	236.2	8.6%	256.5	8.9%	279.2
	Building Technologies	167.6	5.0%	175.9	7.3%	188.7	9.2%	206.1	11.7%	230.3
	Carbon Capture & Storage	4.5	3.9%	4.7	4.7%	4.9	6.1%	5.2	6.0%	5.5
	Carbon Finance	137.8	14.0%	157.0	16.3%	182.6	20.5%	220.2	22.1%	268.7
	Energy Management	24.8	3.9%	25.7	5.5%	27.1	6.8%	29.0	7.6%	31.2
	Nuclear Power	27.3	3.2%	28.1	3.9%	29.2	4.9%	30.7	5.1%	32.2
Renewable Energy	Air Source Heat Pumps	17.4	6.9%	18.6	15.0%	21.4	17.1%	25.1	20.9%	30.3
	Biomass	64.7	8.6%	70.2	10.6%	77.7	14.4%	88.8	15.5%	102.6
	Geothermal	76.2	8.1%	82.4	16.0%	95.5	18.6%	113.2	21.8%	138.0
	Hydro	3.9	3.4%	4.0	4.3%	4.2	5.5%	4.4	5.8%	4.7
	Photovoltaic	75.9	7.1%	81.3	9.1%	88.7	11.1%	98.6	13.0%	111.4
	Renewable Consultancy	3.9	3.1%	4.1	3.8%	4.2	4.2%	4.4	4.9%	4.6
	Wave & Tidal	1.0	7.3%	1.0	9.1%	1.1	11.0%	1.3	11.7%	1.4
	Wind	225.9	6.6%	240.7	11.1%	267.3	12.3%	300.1	13.5%	340.6
Environmental	Air Pollution	7.1	2.8%	7.2	3.3%	7.5	4.1%	7.8	4.3%	8.1
	Contaminated Land	7.0	3.7%	7.3	4.6%	7.6	5.5%	8.0	5.8%	8.5
	Energy from Waste	58.1	4.9%	60.9	5.9%	64.5	7.1%	69.1	8.6%	75.0
	Environmental Consultancy	7.0	4.6%	7.4	5.6%	7.8	6.9%	8.3	7.1%	8.9
	Environmental Monitoring	1.4	4.2%	1.4	5.1%	1.5	6.5%	1.6	7.1%	1.7

	Marine Pollution Control	1.2	4.9%	1.2	6.0%	1.3	8.1%	1.4	7.6%	1.5
	Noise & Vibration Control	2.2	4.7%	2.3	5.8%	2.4	6.9%	2.6	7.8%	2.8
	Recovery and Recycling	61.6	4.6%	64.4	5.7%	68.0	7.2%	72.9	7.5%	78.4
	Waste Management	40.8	3.4%	42.1	4.0%	43.8	5.0%	46.0	5.3%	48.5
	Water & Waste Water Treatment	59.6	2.1%	60.9	2.5%	62.4	3.1%	64.4	3.3%	66.5
GI&NBS DHNW	DHNW Construction & Maintenance	11.8	3.0%	12.1	7.4%	13.0	10.1%	14.3	11.9%	16.0
	DHNW Energy Centres	5.2	3.0%	5.3	7.7%	5.7	10.3%	6.3	12.2%	7.1
	DHNW Operation	6.1	3.0%	6.3	7.9%	6.8	10.5%	7.5	12.5%	8.4
	Green Infrastructure	8.0	5.2%	8.4	10.4%	9.3	11.6%	10.4	13.9%	11.8
	Nature Based Building	0.6	4.8%	0.6	10.7%	0.7	12.2%	0.8	14.4%	0.9
Sustainable Food Production	Biodegradable Food Packaging	0.6	4.2%	0.6	4.9%	0.6	6.2%	0.6	6.3%	0.7
	Food Waste Reduction Activities	2.2	4.9%	2.3	5.8%	2.4	7.4%	2.6	8.8%	2.8
	Low Carbon Agriculture	30.7	4.8%	32.2	5.7%	34.0	6.8%	36.4	8.7%	39.5
	Low Carbon Meat Alternatives	132.0	4.5%	137.9	5.5%	145.5	6.7%	155.3	8.3%	168.3
	Low Carbon Milk Alternatives	4.7	4.6%	4.9	5.4%	5.2	6.5%	5.5	7.8%	6.0
Total		**1,679.6**	**6.1%**	**1,782.4**	**8.6%**	**1,935.9**	**10.7%**	**2,143.1**	**12.4%**	**2,409.2**

Table 12 illustrates that forecast growth rates vary between sub-sectors, with DHNW Construction & Maintenance, DHNW Energy Centres, DHNW Operation Green Infrastructure, Nature Based Building, Alternative Fuel vehicle, Building Technologies, Carbon Finance, Air Source Heat Pumps, Biomass, Hydro, Renewable Energy Consultancy, Wind and Geothermal all forecast to see double-digit growth by 2025/26.

Growth is generally within one percentage point of the UK forecasts. Sub-sectors where growth is expected to be more than 5 percentage points stronger in County Durham than the UK by 2025/26 are:
- Hydro, with County Durham forecast annual growth of 8.1% to 21.8%, compared to the UK 3.5% to 5.8%
- Renewable Consultancy, with County Durham forecast annual growth of 7.1% to 13.0%, compared to the UK 3.1% to 4.8%

Sub-sectors where growth is expected to be more than 5 percentage points slower in County Durham than the UK by 2025/26 are:
- Photovoltaic, with County Durham forecast annual growth of 3.4% to 5.8%, compared to the UK 7.2% to 13.0%
- Wave & Tidal, with County Durham forecast annual growth of 3.1% to 4.9%, compared to the UK 7.3% to 11.6%
- Geothermal, with County Durham forecast annual growth of 6.6% to 13.5%, compared to the UK 8.0% to 21.7%

Section 7:   County Durham's LCEGS2023 Available Sales and Sector Scalability

Section 7.1: County Durham's Sales and Available Sales 2019/20 to 2021/22

The Available Sales metric is a sub-set of the Sales value and refers to the non-dominated portion of the market, i.e., the portion of the Sales market which is not 'locked' through long term contracts or aggressive sales tactics and is realistically available to new market entrants under usual cost of sales. It is important because if the market is heavily dominated, and the Available Sales market is small, this can represent a significant barrier to market. Table 13 shows the Sales, Available Sales and Available Sales as a Percentage of Sales for County Durham, by Level 2 Sub-sector for all three reporting years.

Table 13: County Durham's LCEGS2023 Level 2 Sales (£m), Available Sales (£m) and Available Sales as a Percentage of Sales (%) 2019/20 to 2021/22

Level 1	Level 2	2019/20 Sales £m	2019/20 Available Sales £m	2019/20 Available Sales as a % of Sales	2020/21 Sales £m	2020/21 Available Sales £m	2020/21 Available Sales as a % of Sales	2021/22 Sales £m	2021/22 Available Sales £m	2021/22 Available Sales as a % of Sales
Low Carbon	Additional Energy Sources	15.6	6.8	43.7%	14.3	6.2	43.1%	14.7	6.8	46.2%
	Alternative Fuel Vehicle	192.4	91.8	47.7%	164.2	72.2	43.9%	176.6	78.6	44.5%
	Alternative Fuels	225.1	108.0	48.0%	202.5	89.8	44.4%	209.9	94.0	44.8%
	Building Technologies	175.8	78.5	44.6%	164.4	73.1	44.5%	167.6	75.2	44.9%
	Carbon Capture & Storage	4.8	2.1	44.4%	4.3	2.0	45.1%	4.5	1.9	43.0%
	Carbon Finance	131.4	64.0	48.7%	120.7	59.1	49.0%	137.8	61.2	44.4%
	Energy Management	25.9	12.3	47.4%	24.1	10.8	44.9%	24.8	11.3	45.7%
	Nuclear Power	29.3	12.9	44.2%	26.6	11.7	44.0%	27.3	12.3	45.1%
Renewable Energy	Air Source Heat Pumps	18.5	8.3	44.8%	17.0	7.6	44.7%	17.4	7.6	43.5%
	Biomass	64.7	29.0	44.9%	60.9	28.6	46.9%	64.7	30.6	47.3%
	Geothermal	79.1	35.4	44.7%	73.0	34.5	47.2%	76.2	34.7	45.6%
	Hydro	4.1	1.8	43.3%	3.8	1.7	46.2%	3.9	1.7	44.8%
	Photovoltaic	79.9	35.7	44.7%	70.5	32.0	45.3%	75.9	33.8	44.5%
	Renewable Consultancy	4.2	1.8	43.7%	3.8	1.7	44.2%	3.9	1.7	43.5%
	Wave & Tidal	1.0	0.4	44.9%	0.9	0.4	47.9%	1.0	0.4	45.5%
	Wind	243.9	110.6	45.4%	218.9	96.2	43.9%	225.9	100.7	44.6%
Environmental	Air Pollution	7.6	3.4	45.4%	6.9	3.1	45.8%	7.1	3.1	43.9%
	Contaminated Land	7.5	3.4	46.0%	6.8	3.1	46.1%	7.0	3.3	46.9%

	Energy from Waste	61.6	27.6	44.8%	56.0	24.5	43.7%	58.1	26.1	45.0%
	Environmental Consultancy	7.5	3.5	47.3%	6.9	3.1	45.7%	7.0	3.1	43.3%
	Environmental Monitoring	1.4	0.7	45.6%	1.3	0.6	45.9%	1.4	0.6	47.1%
	Marine Pollution Control	1.2	0.5	43.0%	1.1	0.5	44.7%	1.2	0.5	42.5%
	Noise & Vibration Control	2.3	1.1	46.5%	2.1	0.9	43.4%	2.2	1.0	45.8%
	Recovery and Recycling	65.0	28.9	44.5%	59.7	26.8	44.9%	61.6	26.7	43.3%
	Waste Management	44.0	20.5	46.6%	39.6	17.9	45.3%	40.8	18.3	45.0%
	Water & Waste Water Treatment	65.1	28.0	42.9%	58.8	26.6	45.2%	59.6	27.0	45.3%
DHNW	DHNW Construction & Maintenance	12.5	5.5	44.2%	11.7	5.3	45.1%	11.8	5.4	45.9%
	DHNW Energy Centres	5.5	2.5	45.3%	5.3	2.4	45.3%	5.2	2.3	43.9%
	DHNW Operation	6.7	3.0	44.4%	6.2	2.8	45.2%	6.1	2.7	44.8%
GI&NBS	Green Infrastructure	9.0	4.1	45.7%	7.9	3.6	45.6%	8.0	3.3	41.8%
	Nature Based Building	0.7	0.3	43.2%	0.6	0.3	45.5%	0.6	0.3	43.8%
Sustainable Food Production	Biodegradable Food Packaging	0.6	0.3	54.4%	0.5	0.3	50.5%	0.6	0.2	42.3%
	Food Waste Reduction Activities	2.3	1.1	46.8%	2.1	0.9	44.1%	2.2	0.9	42.9%
	Low Carbon Agriculture	32.6	14.7	45.1%	29.6	13.6	46.0%	30.7	13.9	45.4%
	Low Carbon Meat Alternatives	137.9	64.6	46.8%	126.6	57.7	45.6%	132.0	61.2	46.4%
	Low Carbon Milk Alternatives	5.0	2.3	45.2%	4.6	2.0	43.8%	4.7	2.1	45.2%
Total		**1,772.1**	**815.7**	**46.0%**	**1,604.2**	**723.5**	**45.1%**	**1,679.6**	**754.7**	**44.9%**

Table 13 illustrates that the proportion of the Sales market which is considered 'Available', is not 'locked' by long term contracts and is realistically available to new market entrants has fallen overall for the sector from 46% to 45%. The proportion of Available market can vary depending on the sector or sub-sector and from country to country. Within County Durham, Available Sales as a percentage of Sales was between 42.9% for Water & Waste Water Treatment and 54.4% for Biodegradable Food Packing in 2019/20 and between 41.8% for Green Infrastructure and 47.3% for Biomass in 2021/22.

Within sub-sectors, the proportion of Available market has contracted by 3.2 percentage points for Alternative Fuel Vehicles and Alternative Fuels; 3.8 percentage points for Food Waste Reduction Activities; 3.9 percentage points in Environmental Consultancy and Green Infrastructure; 4.3% for Carbon Finance and 12.1 percentage points for Biodegradable Food Packaging.

Conversely, the proportion of Available market has increased by 2.3 percentage points for Water & Waste Water Treatment; 2.4 percentage points for Biomass and 2.5 percentage points for Additional Energy Sources.

Section 7.2: County Durham's Sector Scalability 2021/22

In this section, we explain the concept of scalability of sub-sectors, what influences it, how it can be combined with Sales to explore opportunities.

The concept of sector scalability explicitly refers to the scalability of the sector, it does not necessarily refer to the ability of **individual companies** to scale, as each individual company will experience their own limiting factors and factors promoting growth. All of the metrics in this section (and the report as a whole) refer to and provide detail on the sector as a collective.

Scalability refers to the combination of:
- Existence of appropriate available market
- The scalability of technology within a company, area or market
- Affordability of technology
- Availability of appropriate skill sets in the locality
- Historic growth
- Accessibility of networks and chains of supply

All of these factors are taken into consideration when grading scalability.

The scalability of the sector has been calculated by attributing a scalability factor of 'Low', 'Medium' or 'High' per product or service, which has been given the corresponding value of 1 = Low; 2 = Medium and 3 = High. We have then taken the average of those values for the products and services grouped together for the Levels to produce an index of scalability.

For example, there are 54 products and services within the Level 3 sub-sector of Windows, within the Building technologies (Low Carbon) sub-sector. Each product and service was allocated a scalability factor:

- 15 products and services listed as 'High' with a score of 3
- 22 products and services listed as 'Medium' with a score of 2
- 17 products and services listed a 'Low' with a score of 1

Calculation:

$$\frac{(15x3) + (22x2) + (17x1)}{54} = 1.96$$

The scalability index has been calculated for the 5,133 products and services at Level 5 of the dataset, with the average being used to plot the potential for scalability against the Sales of the sector at Level 2.

Figure 51 shows the Sales plotted against the scalability index of the 36 Level 2 sub-sectors for County Durham, with each bubble sized by the Sales of that sub-sector. The most desirable position would be the top right-hand corner of the graph, with high Sales and high Scalability.

Figure 51: County Durham's Scalability vs. Sales of Level 2 Sub-sectors – Bubbles Sized by Sales

Figure 51 shows that although small, Biodegradable Food Packaging is the most easily scalable sub-sector, while Wind holds the most desirable position, with large sales and high scalability. Nuclear Power, Geothermal, Photovoltaic and Building Technologies are top sub-sectors in terms of size and are above average in terms of scalability. Conversely Low Carbon Meat Alternatives, Alternative Fuel Vehicle, Water & Waste Water Treatment, Recovery & Recycling and air Source Heat Pumps are large sub-sectors with scalability challenges.

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Section 8: County Durham's LCEGS2023 International Trade

In this section, we look at the exports and imports of the LCEGS2023 sector and Level 2 sub-sectors.

This section of the report addresses County Durham's LCEGS2023 Exports over the past two years when compared with totals for the UK.

Figure 52: County Durham's Exports (£m) 2019/20 to 2021/22

The value of County Durham's LCEGS2023 Exports were £97m 2021/22, up from £91m in 2020/21, after falling from £113m in 2019/20.

This represents 85.7% recovery of exports after the economic shock.

Growth was -19.1% between 2019/20 and 2020/21 and 5.9% between 2020/21 and 2021/22.

In comparison, UK Export growth in LCEGS2023 was -15.0% and 8.2% with a 92.0% recovery.

Figure 53: County Durham's Exports (%) by Sub-Sector 2021/22

Figure 53 shows County Durham's Exports by Level 2 sub-sector.

County Durham represented 0.6% of all UK LCEGS2023 exports in 2020/21, slightly below County Durham's 0.7% of overall UK Sales for that year.

Figure 53 shows the proportion of County Durham's LCEGS2023 imports by Level 2 sub-sector for 2021/22, with Alternative Fuels 19%, Energy from Waste 12%, Alternative Fuel Vehicle 10%, Building Technologies 8%, Carbon Finance 7%, Wind 7%, Low Carbon Agriculture 6%, Recovery & Recycling 5%, Photovoltaic 4%, Water & Waste Water Treatment 4% and Biomass 4% being the leading sub-sectors and accounting for 86% of all County Durham LCEGS2023 exports.

This split is quite different to County Durham's 2019/20 exports, with Energy from Waste 11%, Carbon Finance 11%, Alternative Fuel Vehicle 10%, Alternative Fuels 9%, Building Technologies 8%, Wind 6%, Low Carbon Agriculture 6%, Photovoltaic 4%, recovery % Recycling 4% Low Carbon Meat Alternatives 4%, Water & Waste Water Treatment 4%, Biomass 3% and DHNW Construction & Maintenance 3% being the leading sub-sectors and accounting for 83% of all County Durham LCEGS2023 exports.

Figure 54: County Durham's Imports (£m) 2019/20 to 2021/22

The value of County Durham's LCEGS2023 Imports were £79m 2021/22, down from £80m in 2020/21, and £90m in 2019/20.

This represents 88.0% reduction in imports and no recovery after the economic shock.

Growth was -10.8% between 2019/20 and 2020/21 and -1.4% between 2020/21 and 2021/22.

In comparison, UK Import growth in LCEGS2023 was -10.6% and -1.0% with a 92.0% reduction.

Figure 55: County Durham's Imports (%) by Sub-Sector 2021/22

Figure 55 shows County Durham's Imports by Level 2 sub-sector.

County Durham represented 0.6% of all UK LCEGS2023 imports in 2020/21, slightly below County Durham's 0.7% of overall UK Sales for that year.

Figure 55 shows the proportion of County Durham's LCEGS2023 imports by Level 2 sub-sector for 2021/22, with Alternative Fuels 15% (14% in 2019/20), Alternative Fuel Vehicle 15%, Geothermal 11% (12% in 2019/20), Building Technologies 11%, Wind 7% (8% in 2019/20), Photovoltaic 4%, Carbon Finance 4%, Recovery & Recycling 4%, Energy from Waste 4% (3% in 2019/20), Biomass 4% (3% in 2019/20), and Water & Waste Water Treatment 3% being the leading sub-sectors and accounting for 82% of all County Durham LCEGS2023 exports (81% in 2019/20).

In Tables 14, 15 and 16 County Durham's LCEGS2023 Exports are shown by sub-sector for each of the three years of the report and are expressed as a percentage of Sales, Available Exports are expressed as a percentage of Exports and Imports are expressed as a percentage of Sales.

Level 1	Level 2	2019/20			2020/21			2021/22		
		Sales £m	Exports £m	Exports as a % of Sales	Sales £m	Exports £m	Exports as a % of Sales	Sales £m	Exports £m	Exports as a % of Sales
Low Carbon	Additional Energy Sources	15.6	1.0	6.1%	14.3	0.9	6.1%	14.7	1.1	7.4%
Low Carbon	Alternative Fuel Vehicle	192.4	11.7	6.1%	164.2	10.0	6.1%	176.6	9.8	5.6%
Low Carbon	Alternative Fuels	225.1	10.2	4.5%	202.5	15.1	7.4%	209.9	18.0	8.6%
Low Carbon	Building Technologies	175.8	8.8	5.0%	164.4	7.5	4.6%	167.6	7.8	4.7%
Low Carbon	Carbon Capture & Storage	4.8	0.4	7.4%	4.3	0.3	6.9%	4.5	0.3	6.8%
Low Carbon	Carbon Finance	131.4	12.0	9.2%	120.7	4.2	3.4%	137.8	7.1	5.1%
Low Carbon	Energy Management	25.9	1.7	6.5%	24.1	1.4	5.7%	24.8	1.4	5.7%
Low Carbon	Nuclear Power	29.3	2.1	7.1%	26.6	1.7	6.3%	27.3	1.8	6.6%
Renewable Energy	Air Source Heat Pumps	18.5	0.2	1.1%	17.0	0.2	1.0%	17.4	0.2	1.1%
Renewable Energy	Biomass	64.7	3.9	6.0%	60.9	4.6	7.5%	64.7	3.8	5.9%
Renewable Energy	Geothermal	79.1	0.9	1.1%	73.0	0.8	1.1%	76.2	0.9	1.1%
Renewable Energy	Hydro	4.1	0.3	6.8%	3.8	0.3	7.4%	3.9	0.3	8.3%
Renewable Energy	Photovoltaic	79.9	5.0	6.2%	70.5	4.1	5.8%	75.9	4.3	5.6%
Renewable Energy	Renewable Energy Consultancy	4.2	0.3	6.3%	3.8	0.2	5.8%	3.9	0.3	8.4%
Renewable Energy	Wave & Tidal	1.0	0.1	6.6%	0.9	0.1	7.4%	1.0	0.1	6.8%
Renewable Energy	Wind	243.9	7.1	2.9%	218.9	6.5	2.9%	225.9	6.8	3.0%
Environmental	Air Pollution	7.6	0.5	6.8%	6.9	0.4	6.5%	7.1	0.5	6.4%
Environmental	Contaminated Land	7.5	0.5	6.9%	6.8	0.5	7.0%	7.0	0.5	6.9%
Environmental	Energy from Waste	61.6	12.7	20.5%	56.0	11.5	20.5%	58.1	11.6	20.1%
Environmental	Environmental Consultancy	7.5	0.5	6.9%	6.9	0.4	6.5%	7.0	0.5	7.2%
Environmental	Environmental Monitoring	1.4	0.1	6.1%	1.3	0.1	7.5%	1.4	0.1	7.0%
Environmental	Marine Pollution Control	1.2	0.1	6.8%	1.1	0.1	6.5%	1.2	0.1	7.7%
Environmental	Noise & Vibration Control	2.3	0.2	6.5%	2.1	0.1	6.0%	2.2	0.1	6.8%
Environmental	Recovery and Recycling	65.0	4.5	6.9%	59.7	3.8	6.4%	61.6	4.5	7.3%
Environmental	Waste Management	44.0	2.7	6.2%	39.6	2.4	6.1%	40.8	2.4	5.8%
Environmental	Water & Waste Water Treatment	65.1	4.0	6.1%	58.8	3.9	6.6%	59.6	3.9	6.5%
DHNW	DHNW Construction & Maintenance	12.5	3.6	29.0%	11.7	0.2	1.3%	11.8	0.1	1.2%
DHNW	DHNW Energy Centres	5.5	1.7	30.8%	5.3	0.1	1.2%	5.2	0.1	1.2%
DHNW	DHNW Operation	6.7	3.2	47.8%	6.2	0.1	1.2%	6.1	0.1	1.2%
GI&NBS	Green Infrastructure	9.0	0.8	8.5%	7.9	0.1	1.0%	8.0	0.1	1.0%
GI&NBS	Nature Based Building	0.7	0.2	28.3%	0.6	0.0	3.6%	0.6	0.0	3.5%
Sust. Food Prod'n	Biodegradable Food Packaging	0.6	0.1	20.3%	0.5	0.1	19.1%	0.6	0.1	22.1%
Sust. Food Prod'n	Food Waste Reduction Activities	2.3	0.5	20.6%	2.1	0.5	21.9%	2.2	0.4	19.3%
Sust. Food Prod'n	Low Carbon Agriculture	32.6	6.6	20.2%	29.6	4.9	16.5%	30.7	5.8	19.0%
Sust. Food Prod'n	Low Carbon Meat Alternatives	137.9	4.0	2.9%	126.6	3.8	3.0%	132.0	1.0	0.8%
Sust. Food Prod'n	Low Carbon Milk Alternatives	5.0	1.0	18.9%	4.6	0.8	18.3%	4.7	0.9	19.0%
Total		**1,772.1**	**112.8**	**6.4%**	**1,604.2**	**91.3**	**5.7%**	**1,679.6**	**96.7**	**5.8%**

Table 14: County Durham's LCEGS2023 Exports as a % of Sales 2019/20 to 2021/22

Table 14 shows the Exports by sub-sector for each of the three years of the report and have been expressed as a percentage of that sub-sector's overall sales.

The overall average for 2021/22 is 5.8%, with variation across the sub-sectors from 0.8% for Low Carbon Meat Alternatives to 22.1% for Biodegradable Food Packaging.

Level 1	Level 2	Exports £m	Avail. Exports £m	Avail as a % of Exports	Exports £m	Avail. Exports £m	Avail as a % of Exports	Exports £m	Avail. Exports £m	Avail as a % of Exports
Low Carbon	Additional Energy Sources	1.0	0.3	30.0%	0.9	0.3	29.9%	1.1	0.3	30.7%
Low Carbon	Alternative Fuel Vehicle	11.7	3.7	31.4%	10.0	3.1	31.3%	9.8	3.0	30.4%
Low Carbon	Alternative Fuels	10.2	2.8	27.1%	15.1	4.2	27.6%	18.0	5.7	31.5%
Low Carbon	Building Technologies	8.8	2.6	29.6%	7.5	2.2	29.5%	7.8	2.4	30.6%
Low Carbon	Carbon Capture & Storage	0.4	0.1	31.0%	0.3	0.1	30.2%	0.3	0.1	28.9%
Low Carbon	Carbon Finance	12.0	3.5	29.5%	4.2	1.1	27.4%	7.1	2.1	30.0%
Low Carbon	Energy Management	1.7	0.5	29.7%	1.4	0.4	28.7%	1.4	0.4	29.5%
Low Carbon	Nuclear Power	2.1	0.6	29.0%	1.7	0.5	31.1%	1.8	0.6	31.1%
Renewable Energy	Air Source Heat Pumps	0.2	0.1	32.4%	0.2	0.0	28.2%	0.2	0.1	29.9%
Renewable Energy	Biomass	3.9	1.1	29.4%	4.6	1.4	30.4%	3.8	1.2	32.2%
Renewable Energy	Geothermal	0.9	0.3	31.6%	0.8	0.2	29.2%	0.9	0.3	30.9%
Renewable Energy	Hydro	0.3	0.1	29.0%	0.3	0.1	27.6%	0.3	0.1	30.2%
Renewable Energy	Photovoltaic	5.0	1.4	28.6%	4.1	1.2	30.0%	4.3	1.3	30.5%
Renewable Energy	Renewable Energy Consultancy	0.3	0.1	29.7%	0.2	0.1	29.3%	0.3	0.1	32.0%
Renewable Energy	Wave & Tidal	0.1	0.0	31.2%	0.1	0.0	32.5%	0.1	0.0	31.7%
Renewable Energy	Wind	7.1	2.2	31.6%	6.5	2.0	30.9%	6.8	2.1	31.0%
Environmental	Air Pollution	0.5	0.2	30.6%	0.4	0.1	30.5%	0.5	0.1	29.5%
Environmental	Contaminated Land	0.5	0.2	30.2%	0.5	0.1	30.4%	0.5	0.1	29.9%
Environmental	Energy from Waste	12.7	3.8	29.8%	11.5	3.5	30.1%	11.6	3.5	30.0%
Environmental	Environmental Consultancy	0.5	0.2	31.3%	0.4	0.1	30.4%	0.5	0.2	30.2%
Environmental	Environmental Monitoring	0.1	0.0	28.2%	0.1	0.0	30.1%	0.1	0.0	29.5%
Environmental	Marine Pollution Control	0.1	0.0	31.1%	0.1	0.0	30.3%	0.1	0.0	27.5%
Environmental	Noise & Vibration Control	0.2	0.0	27.3%	0.1	0.0	30.1%	0.1	0.0	29.6%
Environmental	Recovery and Recycling	4.5	1.3	29.7%	3.8	1.2	30.8%	4.5	1.3	30.1%
Environmental	Waste Management	2.7	0.8	30.3%	2.4	0.7	31.1%	2.4	0.7	28.2%
Environmental	Water & Waste Water Treatment	4.0	1.2	30.8%	3.9	1.2	30.0%	3.9	1.2	30.2%
DHNW	DHNW Construction & Maintenance	3.6	1.1	29.6%	0.2	0.0	30.1%	0.1	0.0	30.9%
DHNW	DHNW Energy Centres	1.7	0.5	30.0%	0.1	0.0	30.8%	0.1	0.0	31.6%
DHNW	DHNW Operation	3.2	1.0	29.8%	0.1	0.0	29.3%	0.1	0.0	29.1%
GI&NBS	Green Infrastructure	0.8	0.2	29.5%	0.1	0.0	30.0%	0.1	0.0	29.8%
GI&NBS	Nature Based Building	0.2	0.1	32.1%	0.0	0.0	29.7%	0.0	0.0	28.2%
Sust. Food Prod'n	Biodegradable Food Packaging	0.1	0.0	23.0%	0.1	0.0	31.8%	0.1	0.0	27.6%
Sust. Food Prod'n	Food Waste Reduction Activities	0.5	0.1	28.6%	0.5	0.1	29.4%	0.4	0.1	29.2%
Sust. Food Prod'n	Low Carbon Agriculture	6.6	2.0	30.8%	4.9	1.5	31.5%	5.8	1.8	30.3%
Sust. Food Prod'n	Low Carbon Meat Alternatives	4.0	1.2	31.0%	3.8	1.2	30.5%	1.0	0.3	28.8%
Sust. Food Prod'n	Low Carbon Milk Alternatives	1.0	0.3	29.4%	0.8	0.3	30.3%	0.9	0.3	30.6%
Total		**112.8**	**33.7**	**29.9%**	**91.3**	**27.2**	**29.8%**	**96.7**	**29.5**	**30.5%**

Table 15: County Durham's LCEGS2023 Exports and Available Exports as a % of Sales 2019/20 to 2021/22

Table 15 shows detail for Available Exports, which represent the non-dominated portion of the export market and represents the value of the export market realistically available to new market entrants under usual cost of export.

The overall average for Available Sales as a Percentage of Sales has remained similar for 2019/20 (29.9%) and 2021/22 (30.5%).

There is variation across the sub-sectors from 27.5% for Marine Pollution Control to 32.2% for Biomass.

Level 1	Level 2	2019/20			2020/21			2021/22		
		Sales £m	Imports £m	Imports as a % of Sales	Sales £m	Imports £m	Imports as a % of Sales	Sales £m	Imports £m	Imports as a % of Sales
Low Carbon	Additional Energy Sources	15.6	0.7	4.7%	14.3	0.6	4.3%	14.7	0.6	4.4%
Low Carbon	Alternative Fuel Vehicle	192.4	13.5	7.0%	164.2	12.3	7.5%	176.6	11.9	6.7%
Low Carbon	Alternative Fuels	225.1	12.5	5.5%	202.5	11.6	5.7%	209.9	12.0	5.7%
Low Carbon	Building Technologies	175.8	9.5	5.4%	164.4	8.4	5.1%	167.6	8.5	5.1%
Low Carbon	Carbon Capture & Storage	4.8	0.2	4.6%	4.3	0.2	4.4%	4.5	0.2	4.4%
Low Carbon	Carbon Finance	131.4	3.6	2.7%	120.7	3.1	2.6%	137.8	3.3	2.4%
Low Carbon	Energy Management	25.9	1.3	5.2%	24.1	1.1	4.7%	24.8	1.1	4.6%
Low Carbon	Nuclear Power	29.3	1.3	4.5%	26.6	1.2	4.4%	27.3	1.2	4.4%
Renewable Energy	Air Source Heat Pumps	18.5	2.8	15.0%	17.0	2.4	14.2%	17.4	2.2	12.6%
Renewable Energy	Biomass	64.7	3.0	4.7%	60.9	2.6	4.3%	64.7	2.8	4.4%
Renewable Energy	Geothermal	79.1	11.0	13.9%	73.0	10.0	13.7%	76.2	8.9	11.7%
Renewable Energy	Hydro	4.1	0.2	4.4%	3.8	0.2	4.3%	3.9	0.2	4.3%
Renewable Energy	Photovoltaic	79.9	3.7	4.6%	70.5	3.2	4.5%	75.9	3.3	4.4%
Renewable Energy	Renewable Energy Consultancy	4.2	0.2	4.6%	3.8	0.2	4.9%	3.9	0.2	4.7%
Renewable Energy	Wave & Tidal	1.0	0.0	4.6%	0.9	0.0	4.2%	1.0	0.0	4.2%
Renewable Energy	Wind	243.9	6.8	2.8%	218.9	5.6	2.6%	225.9	5.7	2.5%
Environmental	Air Pollution	7.6	0.3	4.4%	6.9	0.3	4.2%	7.1	0.3	4.3%
Environmental	Contaminated Land	7.5	0.4	5.0%	6.8	0.3	4.7%	7.0	0.3	4.6%
Environmental	Energy from Waste	61.6	3.1	5.1%	56.0	2.8	5.1%	58.1	3.0	5.2%
Environmental	Environmental Consultancy	7.5	0.3	4.3%	6.9	0.3	4.0%	7.0	0.3	4.2%
Environmental	Environmental Monitoring	1.4	0.1	4.6%	1.3	0.1	4.4%	1.4	0.1	4.2%
Environmental	Marine Pollution Control	1.2	0.1	4.6%	1.1	0.0	4.1%	1.2	0.0	4.2%
Environmental	Noise & Vibration Control	2.3	0.1	4.3%	2.1	0.1	4.1%	2.2	0.1	4.2%
Environmental	Recovery and Recycling	65.0	3.3	5.1%	59.7	2.6	4.4%	61.6	2.9	4.7%
Environmental	Waste Management	44.0	2.0	4.5%	39.6	1.7	4.3%	40.8	1.8	4.5%
Environmental	Water & Waste Water Treatment	65.1	2.8	4.3%	58.8	2.5	4.2%	59.6	2.5	4.2%
DHNW	DHNW Construction & Maintenance	12.5	1.9	15.2%	11.7	1.8	15.2%	11.8	1.6	13.6%
DHNW	DHNW Energy Centres	5.5	0.8	14.7%	5.3	0.7	13.9%	5.2	0.7	13.0%
DHNW	DHNW Operation	6.7	1.0	14.5%	6.2	0.9	14.7%	6.1	0.8	13.6%
GI&NBS	Green Infrastructure	9.0	0.2	2.7%	7.9	0.2	2.6%	8.0	0.2	2.4%
GI&NBS	Nature Based Building	0.7	0.0	2.0%	0.6	0.0	2.1%	0.6	0.0	1.8%
Sust. Food Prod'n	Biodegradable Food Packaging	0.6	0.0	4.7%	0.5	0.0	3.8%	0.6	0.0	3.7%
Sust. Food Prod'n	Food Waste Reduction Activities	2.3	0.1	4.8%	2.1	0.1	5.6%	2.2	0.1	5.5%
Sust. Food Prod'n	Low Carbon Agriculture	32.6	1.6	4.8%	29.6	1.7	5.8%	30.7	1.4	4.6%
Sust. Food Prod'n	Low Carbon Meat Alternatives	137.9	1.0	0.7%	126.6	1.0	0.8%	132.0	0.3	0.2%
Sust. Food Prod'n	Low Carbon Milk Alternatives	5.0	0.2	4.5%	4.6	0.3	5.7%	4.7	0.2	5.0%
Total		**1,772.1**	**89.8**	**5.1%**	**1,604.2**	**80.1**	**5.0%**	**1,679.6**	**79.0**	**4.7%**

Table 16: County Durham's LCEGS2023 Imports as a % of Sales 2019/20 to 2021/22

Table 16 shows the Imports by sub-sector for each of the three years of the report and have been expressed as a percentage of that sub-sector's overall sales.

The overall average for 2021/22 is 4.7%, with variation across the sub-sector from 0.2% for Low Carbon Meat Alternatives to 13.6% for DHNW Operation.

Figure 56 shows the 2021/21 Exports (£m), plotted against County Durham's 2019/20 Export Growth for all Level 2 sub-sectors, with the bubbles sized according to the size of the Exports.

Figure 56: County Durham's LCEGS2023 Exports vs Level 2 Export Growth between 2020/21 and 2021/22

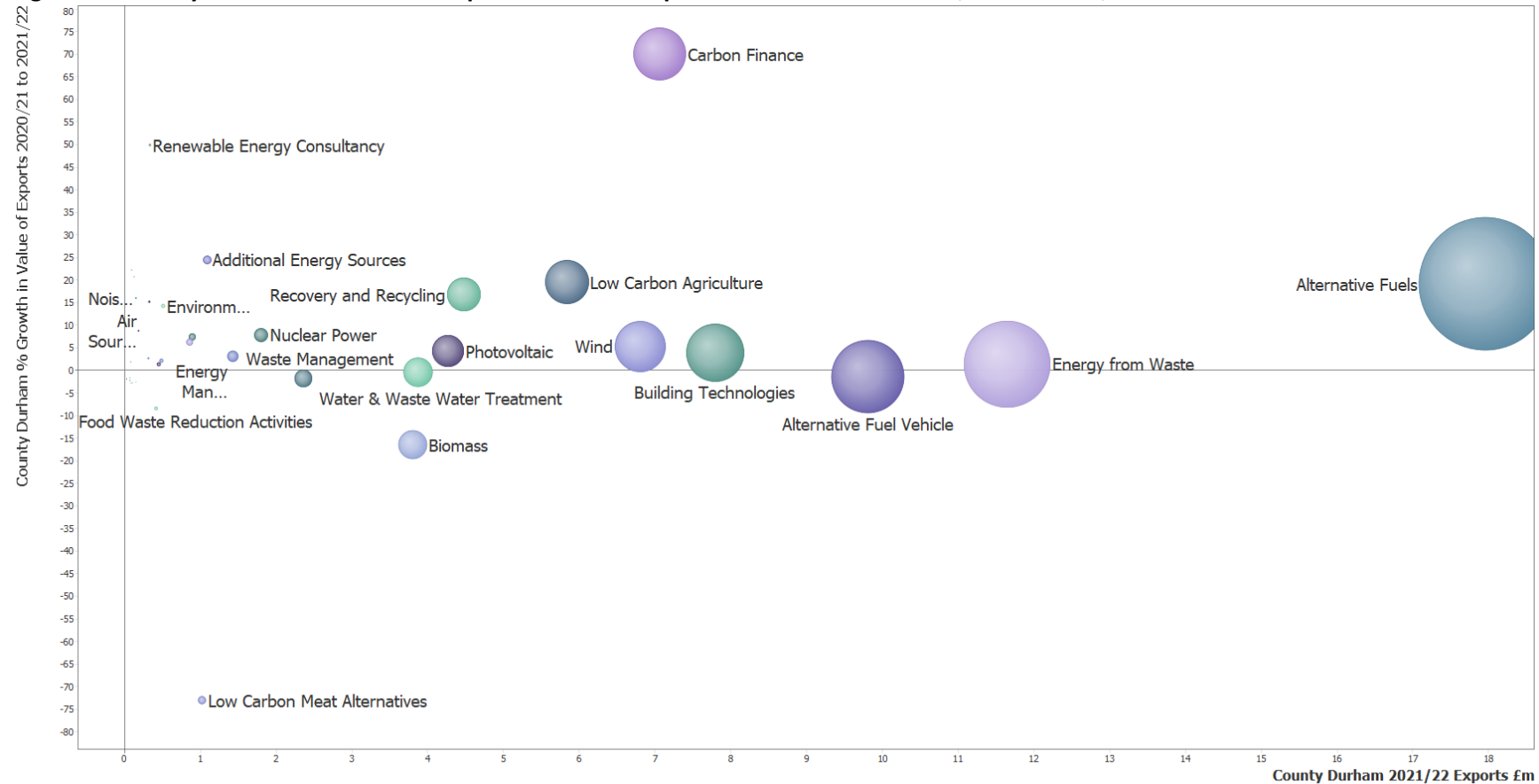Figure 56 illustrates that some sub-sectors including as Carbon Finance and Renewable Energy Consultancy saw strong growth between 2002/21 and 2021/22, while others such as Biomass and Low Carbon Meat Alternatives saw further contraction in exports. Alternative Fuels is the largest exporter and the second largest sub-sector in terms of sales and saw good growth of 19.2% between 2020/21 and 2021/22.

Section 9:   County Durham's LCEGS2023 Company Maps

This section provides detail on the geographical spread of LCEGS2023 companies within County Durham. The methodology outlining how company lists have been created during the study is followed by a series of screenshots of maps which have been created through Google Maps, with hyperlinks to each map provided for ease of navigation.

Section 9.1: Company List Methodology

The company lists within this section have been produced through a separate methodology to that used within the wider report. This is because the kMatrix data triangulation methodology counts transactional data at the product and service level of detail, and for confidentiality reasons these cannot be allocated to a single company.

Company lists within this study have been compiled through accessing third-party company lists, who use the Standard Industrial Classification (SIC) system, which has its limitations regarding identification of companies within the Green Economy. As such, the companies within this section represent those which are either currently or historically active in the LCEGS2023 sector, or which have the potential to be active. Although the SIC code system does not align perfectly to the kMatrix taxonomy, it has been used to produce the company listing through the necessity of alignment with company databases and Companies House. An example of the difficulty in identifying companies is a company installing charging points for electric vehicles being listed as the SIC code for "Electricity, gas, steam and air conditioning supply", rather than a vehicle-related SIC code.

All reasonable effort has been made to provide a complete list; however some companies may be absent from the final listing and all companies are listed as Active as of March 2023.

Company lists have been compiled through a mixture of accessing the Endole database, relevant online directories such as but not limited to kompass.co.uk; construction.co.uk; energicoast.co.uk; greendurham.org.uk/; www.nof.co.uk; the green register; Low Carbon Homes; www.yell.co.uk; and further desk-based research using multiple search engines and search terms to identify individual companies not reported by other sources.

Company status was then checked against Companies House listings and any not listed as Active were removed. Online media channels are also monitored for local initiatives with details of companies relevant to the sector.

All company postal addresses have been checked against the full seven digit postcodes within the "County Durham Unitary Authority" as listed on https://www.doogal.co.uk/AdministrativeAreas?district=E06000047 which denotes 20,263 individual postcodes within the region.

Note: Google Maps allocates colours to pins on maps, so the pin colours for specific SIC codes may differ from map to map.

A terrain map has been included in the report to visually illustrate the impact of the North Pennines Area of Outstanding Natural Beauty (AONB), resulting in fewer companies to the West of the County. This should not be considered a scarcity of companies, due to the importance of the ANOB to Green Infrastructure, biodiversity in the area and Social Value.

Hyperlinks have been provided for each map. On each map, right-clicking on a pin will provide detail of the company represented by the pin. The colour-

coding for the SIC codes on each map are to the left of the map. Additionally, clicking the down arrow to the left of the colour key (below the red box with a tick) will provide the list of companies within each SIC code listed on the map.

Section 9.2: Clusters

Cluster theory was first introduced by Professor Michael Porter of Harvard University in 1990[2] and since then has been the focus of government programs around the world. The theory was rooted in the idea that similar companies within a close geographical area could affect competition by increasing the productivity of the companies in the cluster, drive the direction and pace of innovation and stimulate the formation of new businesses, strengthening the cluster. Close proximity allowed significant business-to-business interaction in a time before broadband, virtual meetings and smart planning systems. Businesses who were physically close together, forming the critical mass needed for a cluster, could develop more rapidly together. In some cases, centralization of research and development could assist in knowledge transfer.

The original cluster theory was overhauled by Professor Porter in 1998[3], as the internet progressed, global markets were increasingly open and increased the speed of transportation and communications. Despite this evolution in business that should theoretically dimmish locational advantage, clusters were still found to be important, such as electronics in Japan or automotive around Birmingham.

As per Porter's definition, clusters are geographic concentrations of interconnected companies and institutions in a particular field. They can include linked industries and incorporate companies within the chains and networks of supply, who provide components, machinery, services and specialized infrastructure. They can also extend downstream to channels and customers and laterally to manufacturers of complementary products and further to companies in industries related by skills, technologies and common inputs. They may also include governmental and other institutions including universities, think tanks, vocational training providers, trade associations, standards-setting agencies and any other organisations that provide training, education, information, research and technical support.

The purpose of a cluster is to provide both competition and cooperation, with rivals competing for customers and cooperating with vertical companies involved in related industries and local institutions. Competition and cooperation within a cluster occur on different dimensions, between different entities. Competition is vital for a cluster to succeed.

A cluster of independent and informally linked companies (and institutions) offers an organizational form of a value chain with the advantages of efficiency, effectiveness and flexibility.

Competition depends on productivity, which rests on how companies compete, based on the methods used, use of advanced technology and unique products and services on offer. All industries have the capacity to develop and use advanced technology and all can be knowledge intensive.

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[2] Porter, M.E. (1990). *The Competitive Advantage of Nations*. New York: The Free Press. 1–857 pgs

[3] Porter, M.E. (1998). *Clusters and the New Economincs of Competition*. Harvard Business Review, Magaxine November-December 1998

Twenty years later, clusters are still visible and useful, despite the increase in global markets, leaps forward in broadband, access to information and communications development, however there is a need to distinguish between physical and virtual clusters. Inter-company planning systems such as Distribution Requirements Planning (DRP) and adaptive manufacturing processes mean that physical location has become less important.

Technology compression has further reduced the need for clustering across all sectors and services. Using the manufacturing process of desktop PC's as an example, where twenty years ago there were up to 35 value-added suppliers in the chain of supply, today there are approximately 6, with this number still reducing as more value-added steps in the manufacturing process take place at a single point. Therefore proximity of chains and networks of supply have less influence on the manufacturing process and less need for clustering.

Many clusters are now virtual, especially within the Cyber Security sector, where clusters are international. Other high-tech or R&D-based industries also have well established virtual clusters.

Within manufacturing, the benefits of physical clusters tend to be regarding the cost of logistics in terms of reduced miles travelled. With regard to this study, arguably the reduction in the miles that components for a product travel can reduce the embodied carbon within that final product. Clustering of companies within the chain and network of supply *can* potentially reduce the embodied carbon of products, but the potential for this should be viewed along with the constraints of the overall embodied carbon: a low mileage chain of supply will not negate a carbon-intensive production process or the use of high-carbon components.

There are clear benefits to clusters, however some clusters are the legacy of traditional regional strengths, as opposed to offering *significant* commercial advantage today. Bandwidth of communications, enabling smart planning systems provide high levels of business coordination, reducing dependency on physical clusters. Social aspects of clusters cannot be underestimated, like finds like and clustered companies gain value in face-to-face contact and personal relationships. However, the industrial adoption of social media has accelerated the development of business-to-business relationships and although in its early days, has shown significant increase in senior level inter-relationships on a B2B basis, offering new routes to business development. Social media is to some degree offering the potential to build relationships away from the need for face-to-face interaction, contributing to the overall business efficiency, reducing cold-calling and offering a convenient way to make connections. However, it also important to acknowledge that the changing business environment means that a focus solely on physical clusters does not necessarily provide the highest return on investment and the virtual clusters that run in parallel are just as important.

Overall, clusters remain important for driving a sector and provide an efficient method for applying interventions that can offer a high return, however not all clusters are equal in terms of benefit.

Competition within a location is strongly influenced by the quality of the local business environment, with 18 ingredients identified likely to increase the

success of the cluster including the research and teaching available, specialisms within the locality, start-up accelerators, population density and others[4].

The maps of LCEGS2023 companies illustrates that activity within the sector is relatively evenly spread across County Durham, to the west of the North Pennines Area of Outstanding Natural Beauty.

A large number of companies are present in and around the City of Durham, which is to be expected as this is the largest economic centre of the County, for example 60% of Heat Pump companies are in or around the City of Durham. The exception is a small cluster of Environmental Consulting, where all companies listed within this SIC code are located within or close to the City.

The geography of County Durham, along with the strong chains and networks of supply within the economy of County Durham lend it to being considered County-wide cluster. The strength of the sector, with LCEGS2023 accounting for 16% of County Durham's GDP compared with 14% for the North East and 11% for the wider UK, is supported by a strong business base, evenly spread across the county.

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[4] Bright, A (2017). *Ingredients for Climate Innovation Clusters: The UK Case*. Climate Innovation Insights, Series 1.4, Accelerating the Evolution of Climate Innovation Clusters

Section 9.3: County Durham Total Companies Map

Map 1 illustrates the total 952 LCEGS2023 Companies within County Durham, colour-coded by the 19 SIC codes which include activity related to the LCEGS2023 sector. The hyperlink for Map 1 is: LCEGS2023 County Durham All SIC Codes – Google My Maps

Map 1: County Durham's LCEGS2023 Companies

Map 1 illustrates the total number of companies, which are located in the East of County Durham. This pattern of distribution is predominantly determined by the North Pennines, indicated by the darker shading and illustrated by Map 2, which provides the same data, but with the terrain highlighted. The

hyperlink for Map 2 is: [LCEGS2023 County Durham All SIC Codes with Terrain Mapping – Google My Maps](#)

Map 2: County Durham's LCEGS2023 Companies with Terrain of North Pennines

Map 2 clearly illustrates the West of County Durham is the North Pennines Area of Outstanding Natural Beauty, which precludes the majority of LCEGS2023 companies, although there is likely to be activity for some sub-sectors such Environmental Monitoring, Natural Infrastructure and Sustainable Agriculture.

Section 9.4: County Durham Companies within Top 10 SIC Codes Map

Map 3 illustrates the LCEGS2023 907 companies within the Top 10 SIC Codes in County Durham, colour-coded by SIC code. The hyperlink for Map 3 is: LCEGS2023 County Durham Top ten SIC Codes – Google My Maps

Map 3: County Durham's LCEGS2023 Companies – Top Ten SIC Codes

Map 3 illustrates the LCEGS2023 companies within County Durham for the Top 10 SIC codes. Maps for each of the 10 SIC codes are in Appendix 4.

Section 9.5: County Durham Environmental Consulting Companies Map

Map 4 illustrates the LCEGS2023 17 companies within the Environmental Consulting SIC Code, which is outside the top 10 SIC codes maps in Appendix 4. The hyperlink for Map 4 is: LCEGS2023 Environmental Consulting Activities – Google My Maps

Map 4: County Durham's LCEGS2023 Companies – Environmental Consulting SIC Code

Map 4 illustrates the LCEGS2023 companies within the Environmental Consulting SIC code in County Durham, which are located within or close to Durham.

Section 10: Conclusion

County Durham's Low Carbon Environmental Goods and Services (LCEGS2023) sector was worth £1.7bn to County Durham's economy in 2021/22, with over 600 businesses and employing over 11,000 people.

At 16%, County Durham's LCEGS2023 sector accounts for a significantly higher proportion of the County's GDP than the UK average of 11%, and the wider North East at 14%.

County Durham contributes to 24% of the North East's LCEGS2023 sector, which is a higher proportion than County Durham's 22% of the North East's GDP and should be considered a strength of the County.

County Durham is the largest LCEGS2023 market in the North East with 24% of Sales, followed by Newcastle with 22% and Sunderland with 17%.

The sector saw 94.8% recovery from the economic shock of the pandemic, which is in line with the UK average of 94.7%.

Mapping of companies illustrates that LCEGS2023 activity across County Durham is relatively evenly spread to the east of the North Pennines Area of Outstanding Natural Beauty. The City of Durham has a greater density of companies due to it being the economic centre of the County, however, County Durham as a whole could be considered a cluster, due to its geography combined with the strong chains and networks of supply supporting a strong business base within this sector which is economically important to the North East.

County Durham's heritage is its strength

County Durham (and wider North East) has a Strong Industrial Base and Heritage of Engineering Excellence

This strong industrial base was formed through a long history of Manufacturing and Engineering

This has resulted in particularly strong chains and networks of supply, connecting many sectors across the County and into the wider North East

The strong chains and networks of supply in the County feed into the 'umbrella' LCEGS sector, which crosses many 'traditional' sectors

The LCEGS activity in County Durham and the wider North East, in turn feed into the Chains and Networks of Supply across the UK and internationally

Sub-sectors that are performing well in County Durham include:

➢ **Wind** – the largest sub-sector is worth £226m in Sales, is one of the most highly scalable sub-sectors, and saw less contraction in Sales than the UK sub-sector average between 2019/20 and 2021/22.

➢ **Alternative Fuel Vehicle** – the third largest sub-sector is worth £177m in Sales, it saw less contraction in Sales with -8.2% than the UK sub-sector average with -8.6% between 2019/20 and 2021/22. It is slightly below average for Scalability but has shown resilience, growing significantly more strongly than the UK between 2020/21 and 2021/22, with 7.5% growth compared with the UK average of 5.4%, which could be a factor in the current scalability rating as the chains and networks of supply increase capacity to service growth. Overall, a

large sub-sector, with very strong recovery compared with UK and good resilience to the pandemic.

➢ **Building Technologies** – the fourth largest sub-sector is worth £168m in Sales and saw less contraction with -4.9% than the UK sub-sector average with -5.9% between 2019/20 and 2021/22. Although it did contract during the reporting period, it experienced less contraction than the UK sub-sector average between 2019/20 and 2020/21, followed by higher growth than the UK sub-sector average. Overall, it is a large sub-sector with slightly above average scalability, which was resilient to the impact of the Covid-19 pandemic.

➢ **Carbon Finance** – the fifth largest sub-sector is worth £138m in Sales and grew 4.9% during the study, compared with the UK sub-sector average of 2.2%. It had the highest growth in Exports between 2020/21 and 2021/22 of 14% and is the fifth largest Exporting sub-sector. It is slightly below average for scalability, related to the business mix in the area, but overall is a large market which has also been resilient to impact of the Covid-19 pandemic.

➢ **Low Carbon Meat Alternatives** – the sixth largest sub-sector is worth £132m in Sales and saw less contraction with -4.3% than the UK sub-sector average with -5.7%, as a result of contracting less between 2019/20 and 2020/21, followed by stronger growth between 2020/21 and 2021/22. It holds a significantly larger proportion of the UK market than the sector average and its overall performance during the study period is very good, however it does currently have below average scalability partly attributable to affordability issues linked to the cost of living crisis.

➢ **Geothermal** – the seventh largest sub-sector is worth £76m in Sales and saw less contraction with -3.7% than the UK sub-sector average with -4.1% between 2019/20 and 2021/22. Although it did contract during the reporting period, it experienced less contraction than the UK sub-sector average between 2019/20 and 2020/21, followed by slower growth than the UK sub-sector average, but this growth was still strong at 4.3%. Overall, it is a large sub-sector with strong growth and good scalability.

Sub-sectors with some challenges in County Durham include:

➢ **Alternative Fuels** – the second largest Level 2 sub-sector is worth £210m in Sales and is the largest sub-sector in terms of Exports (£10m). It had greater contraction in Sales with -6.8% than the UK sub-sector average with -4.0%, between 2019/20 and 2021/22, specifically within three Level 4 sub-sectors of Methane, Hydrogen and Butanol (conversely County Durham had less contraction than the UK average for EV Batteries and Non-EV Batteries). Overall, it is a very large sub-sector, with slightly above average scalability, which has been significantly impacted by the Covid-19 pandemic

➢ **Photovoltaic** – the eighth largest sub-sector is worth £76m in Sales. It saw greater contraction in Sales with -5.1% than the UK sub-sector average with -3.6% between 2019/20 and 2021/22. This was caused by a greater impact with -11.9% than the UK with -11.1% between 2019/20 and 2020/21, followed by slower growth of 7.7% than the UK with 8.4% between 2020/21 and 2021/22.   Overall, it is a large sub-sector, with good scalability, which

has been significantly impacted by both the Covid-19 pandemic and from the Global semiconductor shortage.

➢ **Air Source Heat Pumps** – is worth £17m in Sales and experienced less contraction with -6.0% than the UK sub-sector average of -6.5%, caused by a similar contraction between 2019/20 and 2020/21, followed by stronger growth between 2020/21 and 2021/22. Despite this resilience, it is the least scalable sub-sector partly attributable to the lack of availability of manufacture in the UK, the import market and particularly competition with gas boilers, this might change with the Governments proposed plans to rebalance government levies on energy bills to bring down the cost of electricity and raise the price the gas.

➢ **Biomass** – is worth £65m in Sales and experienced no contraction in Sales, compared with the UK sub-sector average of -2.4%, caused by a smaller contraction of -5.8% compared with -8.9% for the UK sub-sector average between 2019/20 and 2020/21, followed by weaker growth with 6.2% than the UK sub-sector average of 7.1% between 2020/21 and 2021/22. Despite this resilience, it is below average for scalability, attributable to the number of new energy sources on the market or close to market, causing investment to slow down, which reduces the scalability rating, although this could improve over time.

Appendix 1: LCEGS2023 Sector Definition

This appendix describes an overview of the Level 1 sub-sectors within the LCEGS2023 taxonomy, followed by a high-level description of the Level 2 sub-sectors, then more detailed descriptions of Level 2 sub-sectors within their Level 1 Groupings.

A1.1   Level 1 Sub-sector Descriptions

The **Low Carbon and Environmental Goods and Services 2023** (LCEGS2023) taxonomy is divided into six Level 1 sub-sectors - Low Carbon, Renewable Energy, Environmental, District Heat Networks, Green Infrastructure & Nature Based Solutions and Sustainable Food Production. These are in turn divided into 36 Level 2 sub-sectors:

- **Low Carbon** sub-sector is made up of the following: Additional Energy Sources, Alternative Fuel Vehicles, Alternative Fuels, Building Technologies, Carbon Capture & Storage, Carbon Finance, Energy Management and Nuclear Power
- **Renewable Energy** sub-sector is made up of the following: Air Source Heat Pumps, Biomass, Geothermal, Hydro, Photovoltaic, Renewable Energy Consultancy, Wave & Tidal and Wind
- **Environmental** sub-sector is made up of the following: Air Pollution Control, Contaminated Land Reclamation & Remediation, Energy from Waste, Environmental Consultancy, Environmental Monitoring, Marine Pollution Control, Noise & Vibration Control, Recovery & Recycling, Waste Management and Water Supply & Waste Water Treatment
- **District Heat Networks (DHNW)** sub-sector is made up of the following: DHNW Construction & Maintenance, DHNW Energy Centres and DHNW Operation
- **Green Infrastructure & Nature Based Solutions** sub-sector is made up of the following: Green Infrastructure, and Nature Based Building
- **Sustainable Food Production** sub-sector is made up of the following: Low Carbon Agriculture, Low Carbon Meat Alternatives, Low Carbon Milk Alternatives, Food Waste Reduction Activities and Biodegradable Food Packaging

A1.2   High-level Descriptions of Level 2 Sub-sectors within Level 1 Sub-sectors

Low Carbon Level 2 sub-sectors are:
- Carbon Finance includes Credits Finance, Fund Management, Trading and Research
- Carbon Capture & Storage includes Capture, Pipeline, Storage and Engineering
- Energy Management includes Lighting, Heating & Ventilation and Engineering
- Nuclear Power includes Construction, Commissioning, Operations, Engineering and Testing Services
- Additional Energy Sources include Energy Storage Research, Fuel Cells & Hydrogen (excludes hydrogen as vehicle fuel)
- Alternative Fuel Vehicle includes main stream alternative Fuels and other fuels and vehicles.
- Alternative Fuels includes Main Stream and other Bio Fuels, EV Batteries, Non-EV Batteries, Hydrogen Fuel for Vehicles, and other fuels
- Building Technologies includes Doors, Windows, Monitoring & Control Systems and Insulation/Heat Retention Materials

Renewable Energy Level 2 sub-sectors are:
- Air Source Heat Pumps include Commercial/Large Scale, Community Based and Domestic/Small Scale
- Biomass includes Energy, Furnace, Boilers and Related Systems

- Geothermal includes Ground Source Heat Pumps, Specialist Equipment and Water Source Heat Pumps
- Hydro includes Turbines, Pumps, Electricity Supply and Dams
- Photovoltaic includes Systems & Equipment, Cells and Chemicals
- Renewable Energy consulting includes specialist consulting and legal advice
- Wave & Tidal includes Ebb & Flood, Pumps & Equipment, Turbine & Generation etc.
- Wind includes Offshore Large Turbines, Offshore Wind Farm Systems, Offshore Wind Farm Systems, Onshore Wind Farm Systems, Onshore Wind Farm Systems and Small Turbines

Environmental Level 2 sub-sectors are:
- Air Pollution includes indoor and industrial air quality and emissions control
- Contaminated Land Reclamation/Remediation includes Decommissioning of Nuclear Sites
- Energy from Waste includes the equipment manufacture, sales and maintenance for systems using waste from the Automotive Sector, Chemical Industry, Domestic Sector, Farming, Food Processing & Preparation, Land Fill, Logistics and Transport Sector, Manufacturing, Other Processing Industry, Secondary Sewage and Other sectors NEC
- Environmental Consulting includes consulting, training & other services
- Environmental Monitoring includes analysis, monitoring and instrumentation
- Marine Pollution and Noise & Vibration Control both include abatement, consulting and R&D
- Recovery & Recycling includes Waste Collection and various recycling processes
- Waste Management includes Waste Treatment Facilities & Equipment, consulting and R&D
- Water Supply and Waste Water Treatment includes treatment, distribution, consulting and R&D

District Heat Networks Level 2 sub-sectors are:
- DHNW Construction and Maintenance includes consumer side heat network connections, grid connection, ground works, project consulting services and Underground assets
- DHNW Energy Centres include energy centre and sub-station buildings and energy centre equipment
- DHNW Operation includes ownership and operational management, systems energy measurement and monitoring, DHNW-supplied energy sales, energy storage for the DHNW, fuel supply and storage at DHNW energy centres and Heat supply (specifically the supply of waste heat from industrial and commercial premises)

Green Infrastructure & Nature Based Solutions Level 2 sub-sectors are:
- Green Infrastructure includes activities aimed at the installation and/or management of green infrastructure for purposes such as flood reduction etc and are split by Agricultural Land, Coastal Habitats, Forest and woodland, Freshwater Systems (Fish ladders etc) and Green Linkages (Golf Courses, Hedges etc)
- Nature Based Building includes the installation and maintenance of both hard infrastructure and planting material for green roofs and walls

Sustainable Food Production Level 2 sub-sectors are:
- Low Carbon Agriculture includes Low Carbon Agricultural Vehicles, Farming Equipment and Consultancy
- Low Carbon Meat Alternatives includes production equipment and products
- Low Carbon Milk Alternatives includes production equipment and products
- Food Waste Reduction Activities includes zero waste catering and food retail
- Biodegradable Food Packaging includes R&D, manufacture and supply

A1.3   Further Detail on Level 2 sub-sectors within the Low Carbon Sub-sector

Low Carbon includes 8 Level 2 sub-sectors, divided into 50 Level 3 activity groupings, the Level 2 sub-sectors are:

Additional Energy Sources sub-sector groups together R&D, Design and Prototyping activities relating to a range of new Low Carbon energy sources.

These energy sources include: Fuel Cells, Hydraulic Accumulators, Hydrogen, Molten Salt, Thermal Mass, Compressed Air, Superconducting Magnets and more general energy storage research.

This is a small sub-sector (in value and impact) because only energy sources that have a current economic footprint (i.e. trading) are included. This excludes a number of promising energy sources that are still in development and for which economic evidence is not yet available.

Alternative Fuel and Vehicles sub-sector includes Low Carbon Fuel and technology activities that relate to (predominantly) automotive transport. It is divided into Alternative Fuels (main stream) and Other Fuels and Vehicles. This sub-sector does not include bio diesel (see Alternative Fuels). It includes:
- Alternative Fuels (main stream) for Vehicles Only includes the production, supply and distribution of Natural Gas (Compressed or Liquefied), Synthetic Fuel, Auto Gas (LPG, LP Gas or Propane) and Hydrogen for vehicles
- Other Fuels and Vehicles includes Research, Design, Engineering, Maintenance, Manufacture, Services, Supply and Training activities are included for: Hydrogen fuel cells and hydrogen internal combustion cars and non-cars; Electric; Hybrid Electric, Plug-in Hybrid Electric, Organic waste fuel, MAGLEV, Solar powered and Air powered vehicles and Prototyping fuel and vehicle technologies

Alternative Fuels sub-sector includes a wide range of Low(er) carbon fuel sources that are not included under Renewable Energy, it excludes fuel sources specifically for District Heat Networks, which are counted in the DHNW sub-sector. It includes the manufacture, production, supply and distribution of:
- EV Batteries, including manufacture, supply, distribution and installation of cables, charge controllers, charge points, chargers, chemicals, connectors, containers, suppliers and testing equipment
- Non-EV Batteries - including manufacture, supply and distribution of chemicals, chargers, controllers, cables, connectors, containers, suppliers and testing equipment
- Hydrogen – manufacture, supply and distribution of hydrogen (non-vehicle)
- Bio fuels for Alternative Vehicles only – the production, supply and distribution of bio diesel, butanol, ethanol and vegetable oils
- Mainstream Bio fuel applications (non-transport) – production, supply and distribution of bio diesel, butanol and ethanol
- Other Bio fuels - – production, supply and distribution of biomass feedstock, methane, peanut oil, vegetable oil, wood and woodgas

Building Technologies sub-sector includes main stream building materials and systems that contribute to reduced energy use and to lowering the carbon footprint of buildings. It includes:
- Windows - the R&D, engineering services, manufacture, supply, distribution, installation, maintenance, training and services of double glazed, electro chromatic, insulated alloy, honeycomb and triple glazed units.

- Doors - the R&D, engineering services, manufacture, supply, distribution, installation, maintenance, training and services of insulated alloy and plastic doors.
- Insulation and heat retention materials - the R&D, engineering services, manufacture, supply, distribution, installation, maintenance, training and services of Fibre insulation materials for roofing (domestic and non-domestic), granular insulation materials (domestic and non-domestic), heat retention surfaces & ceramics, Insulation materials for walls (domestic and non-domestic), electronic control systems, and controlled venting and ducting systems (non-domestic)
- Monitoring and control systems - the manufacture, supply, distribution, installation and development of energy and distributed energy control, monitoring, management and analysis systems.

Carbon Capture & Storage sub-sector includes activities that store carbon emissions - from locations like power plants and prevent them entering the atmosphere. It includes manufacturing, supply, distribution, installation, maintenance, development and design of:

- Pre combustion capture systems
- Post combustion capture systems
- Oxy-Fuel combustion systems
- Pipeline systems and services
- Ship storage and discharge systems
- Ocean storage equipment and services
- Mineral storage equipment and services
- Geological storage equipment and services
- Engineering, project management and consulting services.

Carbon Finance sub-sector includes investment activities and financial instruments for emission reduction projects and carbon trading. This includes:

- Carbon credits finance and fund management - land, project or general trading services from finance houses and investment funds.
- Carbon credits trading - development and supply of trading systems, land/project/general trading houses and transactions.
- Carbon market intelligence - carbon markets analysis & reporting and carbon trading by forecasting and reporting from journals, online, data providers or other publishing sources.
- Projects and verification - data collection, verification, legal, project development, capacity development and carbon declaration services.
- Press and journalism - financial press and periodicals, other journals, data providers and online services.

Energy Management sub-sector includes energy saving and power management activities for industrial and domestic use. It includes:

- Technologies R&D into high efficiency lighting, heating & ventilation, power, lighting, equipment & pumps and advance management systems
- Gas Supply - monitoring, meterage, leak detection & maintenance, gas supply control and manufacture of high efficiency consumer equipment and devices
- Lighting - manufacture, engineering services, supply, distribution, installation, services, training and maintenance of energy saving light bulbs & tubes, lighting and control systems for domestic and industrial systems
- Heating & Ventilation - manufacture, supply, distribution installation and maintenance of energy saving equipment and systems, for domestic and industrial systems
- Electrical - manufacture, supply and installation of energy saving power control, building control, power consumption control & monitoring systems
- Consulting and other services - advice & consultancy, publication, training and design of management systems

Nuclear Power sub-sector includes all activities that relate to the generation of nuclear power, excluding decommissioning of nuclear sites. It includes:

- Nuclear safety engineering services, regulatory compliance, reactor management, fail-to-safety engineering
- Nuclear power plant operations management, engineering and PR
- Nuclear cooling equipment - manufacture, installation and maintenance
- Construction of plant and equipment - site development, reactor and buildings and power plant/equipment construction
- Commissioning engineering services - cooling & thermal control, engineering maintenance, instrumentation, power distribution, reactor & plant commissioning
- Sampling & testing services - thermal control testing, remote monitoring, back-up plant monitoring and effluent discharge testing
- Nuclear scientific services - research, laboratory testing and fuel management

A1.4   Further Detail on Level 2 sub-sectors within the Renewable Energy Sub-sector

Renewable Energy includes 8 Level 2 sub-sectors, divided into 33 Level 3 activity groupings, Level 2 sub-sectors are:

Air Source Heat Pumps sub-sector includes all activities relating to all sizes of Air Source Heat Pumps, it does not include photovoltaic or battery systems used as power sources, these are included in Photovoltaic (Renewable Energy) and Non-EV Batteries (Low Carbon) respectively. It includes:

- Commercial Large Scale - R&D, Manufacture, Supply, Engineering Services, Consulting and Installation of Ancillary Equipment, Architectural Services, Components, Project Development Services and Whole Systems
- Community - R&D, Manufacture, Supply, Engineering Services, Consulting and Installation of Ancillary Equipment, Architectural Services, Components, Project Development Services and Whole Systems
- Domestic/Small Scale - R&D, Manufacture, Supply, Engineering Services, Consulting and Installation of Ancillary Equipment, Architectural Services, Components, Project Development Services and Whole Systems

Biomass Energy sub-sector includes all activities that convert biomass into energy but excludes biomass feedstock (see Alternative Fuels). It includes:

- Biomass furnace systems - manufacture, supply, consulting, design, installation, engineering and other services for domestic, industrial and community applications
- Biomass energy systems - manufacture, supply, consulting, design, installation, engineering and other services for domestic, industrial and community applications.
- Manufacture of biomass boilers and systems including boilers, cogeneration, heat exchange and packaged power systems for domestic, industrial and community applications
- Biomass boilers and related systems including supply, consulting, design, engineering, installation and other services for boilers, cogeneration, heat exchange and packaged power systems for domestic, industrial and community applications
- Technical and operational consulting

Geothermal Energy sub-sector includes all activities relating to the extraction and use of heat generated from the earth. It includes:

- Ground Source Heat Pumps – split by Commercial/Large Scale, Community Based, Domestic/Small Scale – R&D, Manufacture, engineering services, consulting, training, supply, installation and maintenance of ancillary equipment, architectural services, components, whole systems and project development services
- Water Source Heat Pumps – split by Commercial/Large Scale, Community Based, Domestic/Small Scale – R&D, Manufacture, engineering services, consulting, training, supply, installation and maintenance of ancillary equipment, architectural services, components, whole systems and project development services
- Specialist Systems and Equipment – split by Commercial Applications, Domestic Applications and Whole System R&D, includes R&D, engineering services, manufacture and supply of ancillary equipment, drilling equipment, flow control valves, geothermal plastic pipes, grouting equipment, installation rigs, pump sets, thermally enhanced grout

Hydroelectric Energy sub-sector includes activities that help to extract energy from river and other water sources held in dams (as opposed to wave or tidal energy) that is used to drive turbines and generators. Large scale civil engineering/construction activities associated with dam building have not been included in this analysis. It includes:

- Turbines - manufacture, supply, installation and maintenance of turbine generators, control systems, spares and structural supports and fittings
- Dams & structures - manufacture, supply, installation and maintenance of dam operational systems, control systems, maintenance services and sluice gates and actuators
- Pumping & lubrication - manufacture, supply, installation and maintenance of pumps, spares, storage and lubrication systems and spares
- Electricity supply - manufacture, supply, installation and maintenance of power factor, power distribution and grid connections and supporting structures

Photovoltaic Energy sub-sector includes all activities that help to convert solar radiation into useable energy. It includes:

- Chemicals - production and supply of solar chemicals and solar pond salt
- Systems & equipment - manufacture, supply, installation, engineering services, training, services and maintenance of active and batch systems, clerestory windows, light shelves and tubes, solar box cookers, solar combi-systems and solar lighting design
- R&D - solar power and solar car research
- Photovoltaic cells - manufacture, supply, installation, engineering services, training, services and maintenance of photovoltaic modules, mounting systems, ancillary components, cells and cell materials
- Other equipment & chemicals - manufacture, supply, installation, engineering services, training and maintenance of glass houses, convection towers, heliostats, parabolic collectors, turbines, trough collectors, towers and solar trackers

Renewable Energy Consulting sub-sector includes consulting and legal services specific to Renewables i.e., not included in general or specific environmental consulting. It includes:

- Legal services - wind farm location and other renewable energies
- Consulting - turbines, solar and photovoltaic applications, public sector and corporate Renewables policies, nuclear energy, insulation technologies and alternative fuel technologies

Wave & Tidal Energy sub-sector includes all activities that help to convert the energy from waves and tides into usable power (also known as marine renewable energy). It includes:

- Turbines & generators - the manufacture, supply, installation and maintenance of tidal turbines, structural supports and fittings, spares and turbine control systems
- Pumps & equipment - the manufacture, supply, installation and maintenance of pumps and pump spares
- Two basin schemes - provision of structural engineering and field maintenance services
- Ebb & flow systems - manufacture, supply, installation and maintenance of ebb and flood generation systems
- Assessment & Measurement - waves, water levels, turbidity, tidal energy, sediment, salinity pollutants, fish stocks monitoring and local/ global environmental impact assessment
- Other general services - financial planning, operational and maintenance services

Wind Energy sub-sector includes all activities that convert wind power into usable energy. This includes onshore and offshore wind farm systems, large and small wind turbines. It includes:

- Offshore Large Wind Turbines - manufacture, supply, installation, and maintenance of large turbine systems (blades, towers, fixing structures, cowlings, enclosures, gear boxes and drive trains), componentry and research
- Offshore Wind farm systems - manufacture, supply, installation, engineering services, consulting, operation and maintenance of integration, power plant, power control, grid entry equipment and systems and electrical and mechanical componentry
- Onshore Large Wind Turbines - manufacture, supply, installation, and maintenance of large turbine systems (blades, towers, fixing structures, cowlings, enclosures, gear boxes and drive trains), componentry and research
- Onshore Wind farm systems - manufacture, supply, installation, engineering services, consulting, operation and maintenance of integration, power plant, power control, grid entry equipment and systems and electrical and mechanical componentry
- Small wind turbines – R&D, manufacture, supply, installation and maintenance of small turbine systems (blades, towers, fixing structures, cowlings, enclosures, gear boxes and drive trains), componentry and research

A1.5   Further Detail on Level 2 sub-sectors within the Environmental Sub-sector

Environmental activities include 10 Level 2 sub-sectors, divided into 58 Level 3 activity groupings, Level 2 sub-sectors are:

Air Pollution Control sub-sector includes a wide range of manufacturing, operations, consulting and engineering functions that relate to improving and maintaining air quality. It includes:

- Emission Control sensing and monitoring systems and technologies.
- Indoor Air Quality Control (domestic and industrial) through ventilation, cooling and purification systems.
- Dust & Particulate control through installed technologies like filters, towers, scrubbers, cyclones and eliminators.
- Process Engineering for odour control and other cleaner technologies.
- Industrial Emission Control technologies and equipment (manufacture, installation, operations and maintenance).
- Emission Control through manufacture, installation and operation of sampling, control and evaluation systems.

Contaminated Land Reclamation and Remediation sub-sector includes all activities that bring land back into agricultural, industrial, community or commercial use. This includes longer term activities like the decommissioning of nuclear sites.

Remediation and land reclamation include land forming, bunds, geotextiles, storage & containment, oil interceptors, drainage systems, monitoring systems, proprietary treatment processes, sampling & analysis, site investigation, specialist cleaning services, cleaner technology R&D, surface & ground water services, organic waste composting and other services.

Decommissioning includes equipment, consulting, project management, safety critical assessment, pollution control, enviro risk analysis & impact assessment, recycling & compaction, waste collection & containment, waste water treatment, site assessment, excavation, sampling & analysis and monitoring.

Energy from Waste sub-sector includes all activities that convert energy from waste but excludes the feedstock. It includes R&D, consultancy, manufacture, supply, installation, maintenance, training and services for Autoclave, Conversion treatment, Gasification, Incineration, MBT, Pre-treatment, Pyrolysis, WID compliant biomass and other energy extraction processes NED for:
- Automotive Sector
- Chemical Industry
- Domestic Sector NED
- Farming
- Food Processing & Preparation
- Land Fill
- Logistics & Transport Sector
- Manufacturing
- Other Processing Industry
- Other Sectors NED
- Secondary Sewage

Environmental Consulting and Services sub-sector includes consulting, training and management services that are specific to the environmental sector. It includes:
- Specialist consulting - habitat assessment, regulations, compliance and management systems, audits and impact assessment, eco design, eco-investment, climate change modelling, insurance and bio-diversity advice & assessment
- Manpower and executive recruitment, temporary and permanent recruitment, contracted and interim management services.
- Management services - general consulting, financial, IT, software and marketing services.
- Training and education - publications, online publications, teaching aids, newsletters and courses for waste management, waste water treatment etc.

Environmental Monitoring, Instrumentation and Analysis sub-sector includes activities that measure water, soil and air quality and that support wider pollution control activities in other land, water, marine or air- based environmental sub-sectors. It includes:
- Environmental monitoring- development of cleaner monitoring processes and technologies, vehicle testing, oil spill detection, food testing, nitrate levels, meteorological, water/soil/air quality testing and monitoring.
- Instrumentation equipment & control manufacture, supply, maintenance and development of instrumentation, laboratory equipment and software for environmental/ air/ water/ land/ marine analysis.

- Environmental analysis - laboratory testing, data logging & recording, quality reporting, collection & collation of samples, auto sampling systems, in-field measurement and reporting and R&D in water, soil and emissions analysis.

Marine Pollution Control sub-sector includes responses to pollution hazards at sea and also discharged from land-based sources. It includes the following products and services for deep sea, coastal waters and inland waterways. It includes:

- Marine pollution abatement - manufacture, supply and maintenance of booms, chemical discharge treatment equipment, solid & liquid waste/radioactive containment and treatment equipment and monitoring services, spillage clean-up services, shoreline & shallow water remediation and maintenance services and collection & containment services.
- R&D - cleaner processes and technologies, monitoring systems, oil absorbents, boom and containment systems, water containment and treatment technologies.
- Specialist consulting and training - chemical discharge prevention, education, policy & planning, training, publications, sewerage discharge management, radioactive waste management and solid and liquid waste management.

Noise & Vibration Control sub-sector includes all activities that prevent or control noise and vibration pollution. It includes:

- Noise abatement - manufacture, supply, installation and maintenance of barriers, acoustic management equipment, noise insulation, noise & vibration control and monitoring equipment, acoustic management equipment, noise insulation materials, monitoring services, large plant services and surface modifications.
- R&D - noise attenuation, noise sensing, vibration sensing, vibration control and noise & vibration abatement equipment and cleaner technologies and process by development.
- Consulting and training - consulting, publications, training and noise monitoring services.

Recovery & Recycling sub-sector includes all activities relating to the collection and processing of domestic and industrial waste products. It includes:

- Waste collection - manufacture, supply, installation and operation of equipment and services for collection of household, industrial and hazardous waste, treatment of waste prior to landfill and supply of pre-treated recyclates.
- Engineering & equipment - engineering services and process control for the complete range of recycling stock
- Consulting & training - collection and processing consultancy and training, publishing, legal & insurance advice.
- R&D - metals recovery, pyrolysis, bio-based systems, new recyclable materials, new collection & processing technologies.
- Recycling stock - recovery, recycling, processing, sorting, supply and packaging of rubber, plastics, paper, oil, electrical, electronics, glass, composting, construction & demolition, automotive, wood and textiles stocks.

Waste Management sub-sector includes the treatment/management of domestic and industrial waste that cannot otherwise be recycled. It includes:

- Construction & operation of waste treatment facilities for anaerobic digestion, composting, incineration, landfill, waste to energy conversion and the supporting engineering services.
- Equipment for Waste treatment, manufacture, supply, installation and maintenance of bio filters, bio reactors, collection equipment, grease traps, oil interceptors, materials processing equipment, monitoring & control equipment and nightsoil & landfill leachate treatment.
- R&D - incineration technologies, energy from waste systems, cleaner processing & treatment technologies, disposal of hazardous waste and other materials processing technologies.

- Consultancy and training - books, periodicals & publications, specialist consulting and training for asbestos, hazardous materials and other waste management systems.

Water Supply and Waste Water Treatment sub-sector includes activities relating to the treatment of pollutants in the water supply. It includes:
- Water treatment and distribution, manufacture, supply, installation and maintenance of systems for activated sludge, aerobic & anaerobic treatment, biological odour & corrosion control, demand management & leakage reduction, effluent treatment, filters, microbial treatment, screens, sequencing batch reactors, water disinfection and storm/grey water treatment.
- Engineering - field engineering, pipe & valve maintenance, fitting & construction, fabrication & welding and engineering design.
- R&D - water purification, water management, black/grey water treatment, biocides, bio reactors and aerobic/anaerobic treatment technologies.
- Consulting and training - engineering and water management training, publishing and specialist consulting for water systems treatment, management and engineering.

A1.6 Further Detail on Level 2 sub-sectors within the Environmental Sub-sector

District Heat Networks includes 3 Level 2 sub-sectors, divided into 30 Level 13 activity groupings, Level 2 sub-sectors are:

DHNW Construction and Maintenance sub-sector measures the infrastructure for Heat Networks but excludes the heat source. It includes all activities involved in connecting properties to a DHNW and maintaining the infrastructure, both underground and aboveground assets. It includes:

- Consumer side heat network connections – manufacture, supply, services, installation and maintenance of consumer connections and consumer heat equipment such as heat distribution systems, interface units, heating controls, energy monitoring and consumer interfaces
- Grid connections – manufacture, supply, services, installation and maintenance for communications network connection, electricity connection and gas connection, includes network design services and sub-station equipment
- Ground Works – manufacture, consulting, supply, services, installation and maintenance involved in groundwork main and specialist contracting, groundworks equipment, tools, supplies and consumables, groundworks site management and underground asset installation and testing
- Project consulting services – consulting services involved in commercial legal and land services, opportunity identification and appraisal, project feasibility consulting services, financial, services, project management services, marketing and publicity and project planning and approvals
- Underground DHNW assets – manufacture, supply, installation and maintenance of heat pipework and associated insulation, private communications network cabling and private electrical network cabling

DHNW Energy Centres sub-sector measures the infrastructure and maintenance of Energy Centres and includes all activities involved in the construction or re-modelling of energy centres and sub-station buildings and energy centre equipment. It includes:
- Energy Centre and sub-statin buildings – manufacture, supply, services, installation and maintenance for the construction or re-modelling including building equipment and consumables, external envelope building materials, other trades material; and building site management involved in health and safety, access and traffic management, security etc.
- Energy Centre Equipment – manufacture, supply, installation and maintenance of equipment including water pumping equipment, backup and top-up boiliers, black-start generation sets,

cooling systems, electrical switchgear and controls and heat generation equipment (for biomass, energy from waste, Gas CHP or heat only systems)

DHNW Operation sub-sector measures the operation of Heat Networks includes all activities involved in the operation of DHNWs. It includes:
- DHNW ownership and operational management – R&D, services, supply and training for DHNW customer sales and services operations, includes HR, recruitment etc, DHNW energy centre operations including data analytics and real-time decision making, DHNW financial management operations, education and training, marketing & PR, asset portfolio management and R&D into total systems
- DHNW System energy measurement and monitoring – manufacture, supply, installation and maintenance of asset condition monitoring and safety sensors, including electricity cable sensor, fuel sensors, heat sensors etc.; energy and fuel meters, including gas sub-meters, electricity sub-meters, heat sub-meters, fuel meters, main electricity meters, main gas meters and main heat meters; and non-domestic energy monitoring and control systems, including automated energy meter reading services, data loggers, real-time energy monitors etc.
- DHNW-supplied energy sales – supply of electricity or heat to the commercial, public sector or residential customers
- Energy storage for the DHNW – manufacture, supply, installation and maintenance of equipment for electricity storage via batteries and thermal storage via thermal stores
- Fuel supply and storage at DHNW Energy Centres – manufacture, supply, installation and maintenance of equipment for fuel storage, including biomass stores, compressed hydrogen storage systems, LPG and Diesel storage tanks and safety and security control systems; and Fuel supply (of fuels used to general heat for DHNWs in dedicated energy centres only), these are separate to fuel supply of biomass etc. within Alternative Fuels
- Heat Supply (sales of waste heat from industrial and commercial processes) – supply of waste heat from private sector sources (Waste commercial heat (e.g. Cooling operations related to life sciences, food and IT sectors, or Waste light industrial heat e.g. Waste heat from light industrial processes such as paper production); and public sector sources (Waste Operators / Energy from Waste Plants and Water Utilities/Anaerobic Digestion)

A1.7 Further Detail on Level 2 sub-sectors within the Green Infrastructure & Nature Based Solutions Sub-sector

Green Infrastructure & Nature Based Solutions includes 2 Level 2 sub-sectors, divided into 30 Level 3 activity groupings, Level 2 sub-sectors are:

Green Infrastructure sub-sector includes the R&D, consulting, supply, installation, engineering services, training, services and maintenance of different classifications of Green Infrastructure, where work is intended to improve biodiversity, mitigate flooding, improve habitat use, reduce bank erosion, re-wiggle rivers etc. Classifications of Green Infrastructure form Level 3 sub-sectors and include:
- Agricultural Land including cropland and grassland
- Coastal habitats including lagoons and sand-dunes
- Forest and Woodland including ancient woodland and timber plantations
- Freshwater systems (fish ladders etc) including lakes/reservoirs, ponds, stream and wetland/peatlands
- Green linkages including country parks, golf courses, hedgerows, local wildlife sites, nature reserves, regionally important geological sites and Sites of special scientific interest (SSSI)

Nature Based Building sub-sector includes the R&D, consulting, manufacture, supply, installation, engineering services, training, services and maintenance of green roofing and green walls, which can form an important part of floodwater management (reducing/slowing rainwater runoff) and increasing biodiversity. It includes:

- Green Roofing including hard infrastructure and planting material
- Green Walls including hard infrastructure and planting material

A1.7   Further Detail on Level 2 sub-sectors within the Sustainable Food Production Sub-sector

Sustainable Food Production includes 5 Level 2 sub-sectors, divided into 10 Level 3 activity groupings, Level 2 sub-sectors are:

Low Carbon Agriculture sub-sector includes R&D, manufacture, consulting, supply, installation, engineering services, training, services and maintenance of low carbon vehicles and agricultural machinery. It includes:

- Low Carbon Agricultural Vehicles split by Biogas Agricultural Vehicles (Biogas Large Farm Vehicles, Biogas Off-road Utility Vehicles and Biogas Tractors); Electric Agricultural Vehicles (Electric Large Farm Vehicles, Electric Off-road Utility Vehicles, Electric Tractors, Hybrid Large Farm Vehicles, Hybrid Off-road Utility Vehicles and Hybrid Tractors) and Hydrogen Agricultural Vehicles (Hydrogen Large Farm Vehicles, Hydrogen Off-road Utility Vehicles and Hydrogen Tractors)
- Low Carbon Farming Equipment split by Low Carbon Grain Dryers (Biomass, LPG and others); specialist low carbon farming equipment such as Agri-robots, bulk hoppers, cultivation and seeding, milking machinery, mixers and trolleys, potting and filling machines, remote imaging for farming, specialist horticultural machinery and vertical farming systems
- Low Carbon Farming Consultancy and Related Services including specialist consultancy to the farming sector and training and education

Low Carbon Meat Alternatives sub-sector includes R&D, manufacture, consulting, supply, installation, engineering services, training, services and maintenance of meat alternative production equipment and meat alternative products, including meat replacements, protein powders and plant-based protein source, and is segmented by protein source. It includes:

- Low Carbon Meat Alternatives Production Equipment for the following protein sources: Mycoprotein, Pea-based, Soy-based, Wheat-based and other low carbon meat alternative production equipment
- Low Carbon Meat Alternatives Products for the following protein sources: Mycoprotein, Pea-based, Soy-based, Wheat-based and other low carbon meat alternative products

Low Carbon Milk Alternatives sub-sector includes R&D, manufacture, consulting, supply, installation, engineering services, training, services and maintenance of milk alternative production equipment and milk alternative products, it does not include protein powders and plant-based protein sources and is segmented by protein source. It includes:

- Low Carbon Milk Alternatives Production Equipment for the following protein sources: Mycoprotein, Pea-based, Soy-based, Wheat-based and other low carbon milk alternative production equipment
- Low Carbon Milk Alternatives Products for the following protein sources: Mycoprotein, Pea-based, Soy-based, Wheat-based and other low carbon milk alternative products

Food Waste Reduction Activities sub-sector includes R&D, manufacture, consulting, supply, installation, engineering services, training, services and maintenance of equipment for reducing food

waste, alongside the sale of close to shelf-life food in designated premises, food waste reduction apps, food recycling etc. It includes:

- Zero Waste Catering such as food recycling of unsold food produced in restaurants, recycling into other meal (e.g. soup kitchens), or recycling into non-food products (e.g. coffee grounds to brickettes); unsold food apps from cafes and restaurants where clients purchase unsold meals at the end of opening hours at significantly reduced prices to divert unsold food to landfill; zero waste cafes and restaurants, often associated with larger charitable endeavors, these cafes either operate under usual trading terms, with a set price for food produced, or can operate on a 'pay what you can' basis, often using food donated from supermarkets etc.
- Zero Waste Food Retail including end of shelf life food and drink sales from designated clearance online, retail or wholesales stores, for products close to either the use-by date or best before date (but not past either); Past best before date online, retail and wholesale stores, for products past their best before (but no past use by dates); Unsold food apps associated with supermarkets and other retailers, these apps provide detail of unsold food which can be purchased at a discount, some include detail of which meals are available, others provide a mystery bag of mixed goods, listing the full price vs discount; extended shelf life R&D includes research into packaging, storage, ingredients etc. to extend shelf life of products

Biodegradable food Packaging sub-sector includes R&D, manufacture, consulting, services, supply and training for the development and production of biodegradable products. It is not split into further levels of segmentation

Appendix 2: The kMatrix Methodology

A2.1   Introduction

The methodology works beyond standard industrial and market classifications and looks for multiple sources of industrial-based evidence to quantify market values. kMatrix is unique in how it identifies, assembles, evaluates, monitors and develops rules for the use of those sources to quantify 'difficult-to-measure' markets.

Market activities are only included when there are multiple data sources. These sources are screened to remove duplicate references to any single source and then shortlisted by removing outliers and unreliable sources. This shortlist is then screened again until some consistency in value is achieved.

Market values created in this way are then "reality tested" by comparing these values within and across sectors, against known national/regional industrial specialism, across nations, against known trade flows and recognised industry benchmarks.

This methodology is quantitative and data intensive. Its uniqueness resides in the ability to manage and select reliable sources that are specific to each market activity. The data sources are global in nature and derive from government, private sector, institutional, industrial, trade, advertising, HR, financial, investor, academic and other (unpublished) sources. Up to 900 sources are used to compile the national LCEGS data set.

Sources are carefully managed. kMatrix measure and rate their sources' accuracy and reliability over time and exclude sources that are outdated or without a measurable track record. They use no less than seven qualified sources showing some consistency in results for deriving any values that they print. They create a mean value from these selected values and then assign a confidence level (generally of about 85%) based upon the spread of selected values around the mean

In contrast to most research or consulting reports kMatrix do not identify, copy and then acknowledge single data sources for specific tables or analytical comments. This is impossible for them to do because they multi-source every aspect of their data and then "transform" it into a new value. This makes single source attribution meaningless.

A2.2 Data Triangulation – the Cornerstone of kMatrix

kMatrix uses a propriety data triangulation methodology to calculate over 100 metrics for many sectors including Domestic Retrofit, Space, Climate Services, Green Economy, Marine, Security, Cybersecurity, Adaptation & Resilience, Water, Design and others.

The methodology for sector analysis is definition and source-driven. The definition determines WHAT gets measured and the source model determines HOW it gets measured.

All of the data measures are multi-sourced, and the process starts by defining the financial value of the sector (based upon our inclusive definition) from a wide variety of sources.

When kMatrix create a sector definition they always check that multiple sources of economic data exist for each included activity. This financial value is checked against existing sector values and also against the value of other economic sectors.

This is an iterative process that continues until they arrive at robust values and comparisons for all activities within the sector (comparative values of Wind vs. Photovoltaic vs. Biomass) that can then be meaningfully compared across global economies (UK vs. US vs. China etc.) and across different sectors (environmental consultancy vs. other specialist consulting activities). It is important that the methodology triangulates economic values in this way so that they:

a) Can exclude the research bias that often occurs from focusing on a single sector in a single country and

b) Ensure that they are effectively monitoring a sector that is still evolving by absorbing activities often included in other sectors.

The same general research methodology is used across all sectors and metrics, while the requirements for each industrial sector research project vary, the methodology and process always follow the same five key stages:

1. Define – Identify, select and group the target market activities, whilst conducting an initial check for the right volume and quality of data sources

2. Assemble – Populate the data measures for each market activity, carefully filtering the core data sources to ensure that confidence levels are within bounds

3. Check – Apply quality assurance checks to ensure data accuracy/consistency across market activities and different countries and, in some cases, cross-check with different sector values

4. Validate – Sense-check and spot-check market data values against specific projects/authoritative sources/expert knowledge/customers or clients

5. Publish – Recalculate, update confidence levels and publish research data set

This process is illustrated in more detail by the Sector Research Model (Figure 1), where the numbers correspond to the process stages above.

Sector Research Model

The research model used by kMatrix comprises distinct but iterative phases. This is because kMatrix needs to "create" its own data before it can analyse it. This is fundamentally different from any SIC-based sector analysis that takes its data as a "given."

Within the above model a range of different research methods are employed. Some aspects of the research system are semi-automated (necessary when dealing with large volumes of data), but the rulesets and software algorithms are based upon 35+ years' experience in compiling and

reporting complex markets and all final decisions about reported outputs are subject to intense analyst scrutiny.

The research methods employed include:

- Desk research to define sector content and determine sector boundaries

- Industrial templates that identify core and supply chain activities in detail for inclusion in sector definition

- Data discovery tools to identify new data and sources relating to the defined sector activities

- Data coding systems to ensure that sector, company-level data and other classification systems are aligned for analysis and reporting purposes

- Data management techniques and systems to maintain existing source libraries and integrate them with new source materials

- Software systems with defined (but flexible) rulesets to filter source content

- Semi-automated processes for modelling and calculating data values from selected source lists

- Knowledge base of case study materials that can be accessed to help fill data gaps and provide industrial performance benchmarks

- Quality assurance processes and tools that check all values against a range of international, national and industrial comparators

- Data management and visualisation tools for presenting and reporting data

A2.3   Measures

Throughout this dataset the focus is on a small number of key measures. To summarise, these are:

- **Sales** – This is the estimate (in £m) of economic activity by identified companies in a defined region within the supply/value chain for market products and services. The estimate is based upon where sales activity takes place rather than where it is reported.

- **Companies** – This is a measure of the total number of companies in a defined region that match, or fit within, the market activity headings.

- **Employment** – This is a measure of the estimated employment numbers across all aspects of the supply/value chain. National, regional and other economic data sources have been used to estimate current employment levels for each area of market activity.

- **Growth** – This is a multi-year measure that includes historical AND forecast growth. The growth measure is derived from live, rapidly changing and multi-sourced data links and is specifically based upon growth in Sales. Growth is generally a measure of increased market opportunity and can be used for trend analysis, comparison across different markets or as a moving indicator of market confidence (growth time series).

- **Exports** – This is a measure of products and services sold overseas and is calculated using in-country/out-of-country data and additional data from the logistics and freight forwarding industry.

Sales

The key measure that is used for financial value is Sales i.e., the value of sector products and services sold either to other businesses or directly to consumers from the geographically located company base, whether it be national, regional, sub-regional or Local Authority. This means that the analysis only includes activities where there is a measurable economic footprint. It does not include publicly-funded research or pre-commercial consumption of funds, except where those activities result in the purchase of product and services from third parties

As they derive the financial value for the sector they also assemble and assess the UK company base that is contributing to this value. In the first case they identify all "significant" or "specialist" companies, these are companies where LCEGS account for over 80% of company sales, and then the supply/value chain companies where LCEGS sales is an

important and measurable component of their overall sales - (over 20%). These percentages are indicative and vary for different LCEGS activities.

Companies

The company count acts as a further reality check on the financial value of the sector by comparing company turnover values in this and other sectors and also assists in the geographical analysis of where LCEGS value is created. For company counts and company listings we use standard data sources, international sources, industry/trade sources, the advertising industry and, with caution, company-published information.

One important fact about the methodology is that in a typical SIC approach to sector analysis, a company is counted once and the value of its activities are very often assigned to a single category (which may or may not reflect what a company actually sells now), within a single sector and from a single geographical location.

This approach is to identify and assign value to different activities within a company that may fall within the same sector and to exclude values associated with different sectors. Where possible, they also break the reported activity down within larger multi-site companies so that only the value created within a region/LA is reported for that region/LA.

By analysing a sector in this way, they are able to capture the economic value generated by all "specialist" and supply/value chain companies, without any double counting of value. However, the methodology does mean that a single company may contribute value to multiple activities, and we have to be careful not to double-count companies. To avoid this we assign portions of a company, for counting purposes, to the activities that account for most of its sector sales. This does mean that on some occasions some of the smaller activities in our analysis may have a financial value in the sales column but a zero in the company column.

Employment

When financial values and company numbers have been calculated the methodology then looks at the employment base for the sector. The analysis of employment includes HR/Recruitment industry data, trade/industry data, government statistics, company reported employment levels and a variety of industry benchmarks that show employee input ratios into different products and processes. They do not survey companies directly for this information.

From these different sources we calculate employment numbers for LCEGS sector activities, taking into account how staff can operate processes that produce products for different markets. We, therefore, measure our employment numbers in Full Time Equivalents (FTE), equivalent to a standard 40 hour week.

Growth

Sales Growth is both an historical and a forecast measure and the methodology applies the same multi-source rigour to assessing growth that has already occurred as to growth that may occur. Growth forecasting shows the importance of both multi sourcing AND tracking the historical reliability/accuracy of sources used. It is based upon continuous monitoring of forecast "opinions" that are constantly being updated and re-evaluated, as a result "in-year" measurements of predicted growth can vary depending on when the sample is taken and change as sources respond to events like recession.

For this reason, we measure annual growth as a) a value frozen at a point in time and b) a time series (monthly or quarterly) measured throughout the year. In this file we include only the single (frozen) forecast. Separate files with detailed time series forecasts and trend analysis for the LCEGS sector are available.

Annual growth figures are useful in calculating and comparing the future contribution of sector activities beyond the current baseline. The percentage growth shows the RATE of change, the application of growth rates to the current sales baseline shows the IMPACT of change. Measuring the impact of change in financial terms shows how the ranking and importance of existing activities to the region/local authority may change over time and suggests when and where action may need to be taken to accommodate changes in the employment and company base.

The quoted growth rates in this dataset apply specifically to sales value. A growth in sales is indicative of changes in company numbers/employment but 5% sales growth does not necessarily equate to 5% employment growth. Companies can achieve growth in different ways and the recession has shown that companies will consume any "slack" before creating new jobs.

Geography

The methodology is designed to locate and measure economic activity at various geographical levels. The smallest unit of measurement is the Local Authority, but it can analyse data at county, sub-regional, LEP, regional and UK level.

When the methodology calculates and measures economic activity at the local authority level it takes into account existing local government boundaries, local GDP calculations and demographics, the postcode location of companies in the sector and any other local data that is available and relevant to the sector. When we measure sales and employment, therefore, our numbers are based upon where the business is located, rather than where people live.

There are some limits to what economic measures can be meaningfully or accurately applied at the local level. This is due to the range and specificity of data sources. Most of the economic development measures within this dataset can be accurately represented at a local level.

A2.4 Data Confidence Levels

All kMatrix datasets incorporate a measure of data Confidence Level. This is partly a mathematical function of the historic hit-rate of sources in terms of their previous forecasting accuracy for each metric and activity being measured. Confidence levels vary by activity, measure, geography and forecast year. Typically a confidence level of above 90% is achievable, meaning corroborative sources may vary from the mean value by +/-10%. The focus in the research process is to obtain an across-the board level of data confidence rather than attempt to achieve 100% confidence in any one set of numbers. As each data point has its own set of sources, so each data point has its own level of data confidence. Data confidence levels can vary according to how mature or emergent a product or service is, and how mature the reporting systems may be or for any given country. Developed nations typically have a wider range of

robust sources to choose from.

kMatrix tracks the accuracy of sources over a period of time, with Confidence Levels being built up from the history of the accuracy of a source for a specific metric. The history or 'hit-rate' of a source is held for each metric, with some sources accepted for some metrics and rejected for other metrics, dependent on how accurate they have been in the past. Hit-rates are 'live' and the hit-rate of a source can change over time, as their performance changes over time, with some sources hit-rates being tracked over the last 35 years. The ability to select, reject and assess the validity of the extensive source list, for different markets, metrics and geographies is a fundamental aspect of the kMatrix process.

The bubble graph below plots the confidence values for 5,133 data points for County Durham. The bubbles are not sized, they are only markers representing the percentage data confidence for each datapoint. Here we can see than confidence varies between 80-95% confidence, with most data points concentrated between 84-92%.

A2.5 Difference Between Data Confidence Levels and Data Confidence Intervals

Data Confidence Intervals are often used within survey data, where they give an indication of the degree of uncertainty of an estimate within a sample, specifying the range of values likely to contain the unknown population value, by defining upper and lower limits within a data sample.

The difference between this and the Confidence Level above, is it provides the variance, but it weights all data as being equally valid and does not factor in the likely validity of each data source.

In summary, Data Confidence Levels are different to Data Confidence Intervals:

- *Data Confidence Levels* estimate the accuracy of a triangulated data point, based on the likely accuracy of each of the multiple sources of data that are used in the triangulation process, through tracking historical accuracy
- *Data Confidence Intervals* provide a range of values where the true number could lie, but do not provide detail on the validity of the values used within the production of the range

Confidence Intervals are not provided within the dataset because the data sources within the triangulation process for each datapoint are varied, created for many different reasons and will

each have an individual hit-rate.

A2.6 "Deep Dive" Example – Employment for Private Sector Contracts of Insulation

This example provides an illustration of how the multi-source approach has been used to calculate labour values. This worked example would give a figure for total number of insulation installers in England (separate study).

The multi-source approach includes six stages:

1. Select the data point
2. Identify the source data
3. Select sources for further analysis
4. Triage the sources to achieve a more consistent range of values
5. Calculate the mean value from the sources
6. Calculate the confidence level

Stage 1 involves selecting the data point. In this example, the data point is England employment for "Insulation".

Stage 2 involves identifying the data sources that are relevant to the calculation of the data point and is the source list that is used to calculate the value, for this datapoint, it would run to over 4,000 sources.

Stage 3 involves an initial sort and selection from the full list of sources to identify those of the most direct relevance to the data point. They are rejected if they are duplicates, i.e., using 3rd party data, if their hit rate is too low or if the value is excessively high or low with no evidence for deviation.

Stage 4 of the process involves "smoothing" the results by excluding the outlier values from the final calculation. In this case, 75 sources were ultimately selected and these are shown at Table A.1 and are labelled Source 1 through to Source 75. Their selection depends upon several factors stored within our source management system (columns 4-8 of Table A.1). These are:

- Value reported (Employees) – only sources showing value that are proximate to other values are included

- Year of data – ideally sources should be current, in this case all are 2021

- Hit rate over the past 5 years – level of assessed accuracy for this source over 5 years

- Number of times accessed – number of times this source has been used previously for this purpose i.e., same data point different years, identical data point different country etc.

- Triangulated – is the data extracted from a larger data set for the purposes of comparison?

Table A2.1 shows that the 75 sources were all current, with employment values between 68,584 and 102,534, hit rates of between 72.3% and 94.8% and had been accessed previously between 34 and 155 times each. The source list is split (52/23) between sources used for triangulation and those that are not.

All the values in the data set are unique, which means that multiple sources that may quote the same value (possibly from an identical source) are eliminated from the final selection.
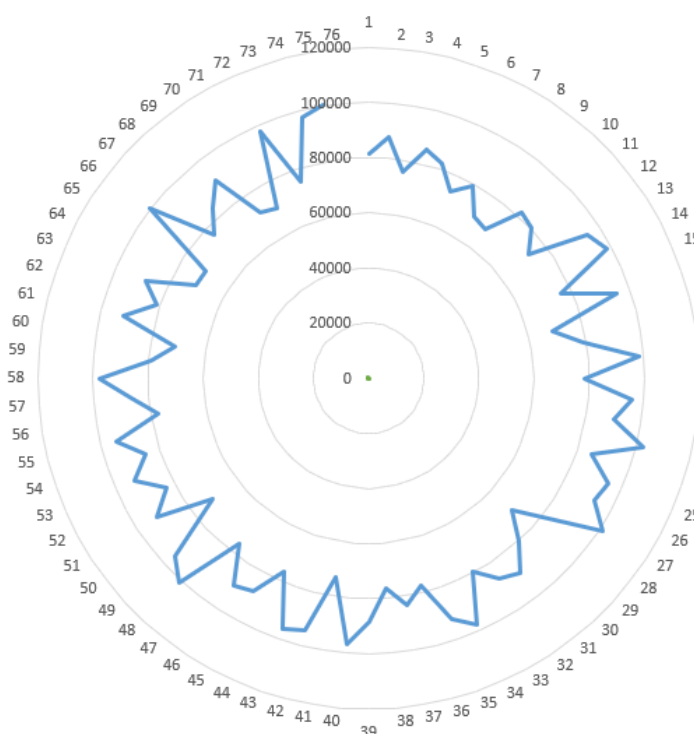
Table A2.1: Short List of Sources

No	DATA Source	Employees	Country	Year of Data	Hit Rate History %	Times Accessed	Triangulated	Accept Reject
1	Advanced Portfolio Technologies	81,325.7	England	2021	92.2	119	YES	accept
2	Advanced Technologies Inc	87,653.9	England	2021	94.7	130	YES	accept
3	Advantage Capital Limited	75,767.2	England	2021	85.7	76	YES	accept
4	Advantage Early Growth Limited	85,430.5	England	2021	73.4	88	NO	accept
5	Advent Venture Partners LLP	82,437.4	England	2021	82.4	57	YES	accept
6	Alliance for Climate Protection	73,971.3	England	2021	89.5	88	YES	accept
7	Alliance to Save Energy	79,444.4	England	2021	76.9	34	NO	accept
8	Alternative Investment Solutions	69,952.1	England	2021	86.4	96	YES	accept
9	Aluminium Federation	68,583.8	England	2021	91.8	77	NO	accept
10	Applied Environmental Research Foundation - AERF	81,753.3	England	2021	84.6	46	YES	accept
11	Architectural & Specialist Door Manufacturers Association	80,385.0	England	2021	82.3	58	YES	accept
12	Architectural Association (AA) School of Architecture	73,458.2	England	2021	72.3	64	YES	accept
13	Architectural Cladding Association	95,008.3	England	2021	76.1	94	YES	accept
14	Architectural Engineering Institute	98,257.9	England	2021	86.3	123	NO	accept
15	Architecture and Design Scotland	76,280.3	England	2021	76.8	126	YES	accept
16	Association for Environment Conscious Building	95,093.8	England	2021	92.7	49	NO	accept
17	Association for Project Management	68,669.3	England	2021	79.6	83	YES	accept
18	Association for Specialist Fire Protection	78,760.2	England	2021	83.4	121	YES	accept
19	Association for the Conservation of Energy	98,514.4	England	2021	90.6	57	YES	accept
20	Association for solar thermal industry	78,503.7	England	2021	77.9	123	NO	accept
21	Association of Average Adjusters	95,863.4	England	2021	75.6	56	NO	accept
22	Association of Builders' Hardware Manufacturers	89,962.8	England	2021	89.7	53	NO	accept
23	Association of Building Component Manufacturers Ltd	102,533.7	England	2021	92.0	133	NO	accept
24	Association of Building Engineers	85,516.0	England	2021	74.6	50	YES	accept
25	Association of Consulting Engineers	94,922.8	England	2021	76.1	108	YES	accept
26	Association of Environmental and Resource Economists (AERE)	93,126.9	England	2021	94.7	61	YES	accept
27	Association of Facilities Engineers	101,165.4	England	2021	78.6	50	YES	accept
28	Association of Rooflight Manufacturers	82,779.5	England	2021	81.0	124	YES	accept
29	Association of Tank & Cistern Manufacturers	70,379.7	England	2021	77.7	73	YES	accept
30	Biomass - Biomass Thermal Energy Council (BTEC)	80,299.5	England	2021	83.2	93	YES	accept
31	Biomass - Pellet Fuels Institute	89,791.8	England	2021	74.2	55	NO	accept
32	Biomass Energy Research Association (BERA)	86,713.2	England	2021	74.1	54	YES	accept
33	Blomberg	79,615.4	England	2021	79.1	85	YES	accept
34	BLT Financial Group	97,830.3	England	2021	76.9	92	YES	accept
35	BNP	92,357.3	England	2021	93.2	114	NO	accept

36	British Architectural Library	77,392.0	England	2021	85.0	102	YES	accept
37	British BioGen	83,292.6	England	2021	77.3	148	YES	accept
38	British Blind & Shutter Association	76,536.8	England	2021	89.4	67	NO	accept
39	British Board of Agreement	88,338.0	England	2021	91.9	127	YES	accept
40	British Cement Association	97,060.7	England	2021	87.5	69	NO	accept
41	British Computer Society	73,201.7	England	2021	79.4	155	YES	accept
42	British Concrete Masonry Association	94,153.1	England	2021	73.3	62	NO	accept
43	British Constructional Steelwork Association	96,120.0	England	2021	77.2	132	NO	accept
44	British Fire Protection Systems Association	76,622.3	England	2021	84.4	62	YES	accept
45	British Floor Covering Manufacturers Association	88,081.5	England	2021	85.3	138	YES	accept
46	British Foundry Association	89,535.3	England	2021	78.5	137	YES	accept
47	British Glass Manufacturers Association	76,023.7	England	2021	75.9	79	YES	accept
48	British Hard Metals Association	101,079.9	England	2021	81.8	36	YES	accept
49	British Hydropower Association - UK	95,435.9	England	2021	79.1	38	NO	accept
50	British Institute of Architectural Technologists	71,662.4	England	2021	81.9	97	NO	accept
51	British Institute of Non-Destructive Testing	91,844.2	England	2021	88.7	105	NO	accept
52	British Laminate Fabricators Association Ltd.	83,207.1	England	2021	94.8	116	YES	accept
53	British Marine Equipment Association (BMEA),	92,613.8	England	2021	81.3	71	YES	accept
54	British Metals Castings Association	85,601.5	England	2021	86.3	112	YES	accept
55	British Metals Federation	94,153.1	England	2021	81.8	69	YES	accept
56	British Non-Ferrous Metals Federation	77,563.0	England	2021	86.3	136	YES	accept
57	British Photovoltaic Association	86,200.1	England	2021	93.1	87	YES	accept
58	British Plastics Federation	97,659.3	England	2021	82.2	91	NO	accept
59	British Precast Concrete Federation	78,931.3	England	2021	94.2	154	YES	accept
60	British Pump Manufacturers Association	71,149.3	England	2021	77.0	60	YES	accept
61	British Quality foundation	91,758.7	England	2021	90.8	44	YES	accept
62	British Resilient Flooring Manufacturers Association	81,411.2	England	2021	84.0	35	NO	accept
63	British Stainless Steel Association	88,338.0	England	2021	79.7	151	YES	accept
64	British Steel Corporation	70,978.3	England	2021	73.0	97	YES	accept
65	British Steel Strip Products	70,807.2	England	2021	84.0	136	YES	accept
66	British Urethane Foam Contractors Association	100,310.3	England	2021	89.5	49	YES	accept
67	British Wind Energy Association	76,451.3	England	2021	76.1	150	NO	accept
68	British Wood Preserving & Damp Proofing Association	83,805.7	England	2021	79.7	124	YES	accept
69	British Institute of Employment Studies	90,732.5	England	2021	90.6	130	YES	accept
70	Polo Tweed	71,747.9	England	2021	87.6	132	YES	accept
71	The Recruitment and Employment Confederation	70,123.1	England	2021	88.3	139	NO	accept
72	Ranstad Education	97,573.8	England	2021	93.7	105	YES	accept
73	Robert Half	75,339.6	England	2021	79.3	106	YES	accept
74	Blue Care	97,573.8	England	2021	77.2	56	NO	accept

75	A O C Jobs			100,395.8	England	2021	92.5	78	YES	accept

Typically, the process for deciding which sources to include/exclude as part of the final calculation is visualised using radar charts. These charts are a key feature of the QA system and provide a rapid insight into the variation in source values. A radar showing sharp and frequent spikes is due for radical surgery, while a radar with a more consistent pattern (representing a degree of consensus in the sources) is subject to judicious pruning. An example of an outlier would be a good which is usually £10, but someone is selling for £90 on Amazon, this would be considered an outlier and removed from the dataset. These are removed from the dataset because an overpriced good can distort a dataset. This process is undertaken by an analyst (not an algorithm) and can take several iterations before a satisfactory final selection of sources is achieved. The final radar chart based upon the final selection of sources is shown at Figure A.1.

Figure A2.1 Radar Chart for Final 75 Sources

Stage 5 involves the calculation of the mean value from the final list of 75 sources, now ranging between 68,584 and 102,534 employees. The adjusted mean value from this range is 85,106.

Stage 6 calculates the confidence level for the data point, which is an indication of the validity, based on the historic hit-rate of the sources used to triangulate the data point, in this case the confidence level is 83%.

Each data point that progresses through this process is then subject to further checks that ensure that the data point value is consistent with:

- Values in previous year's data
- Comparative values of UK employment compared with employment levels of same service in other countries
- Comparative analysis of UK employment values when related to other Installation services in the same category or family of services
- Consistency in employment trends over time
- Consistency in confidence levels over time

Where any uncertainty about the final data point remains, this may be due to either market uncertainty or data uncertainty. In the case of market uncertainty, the value remains unchanged, but in the case of data uncertainty, then Stages 1-6 are repeated, but this time with additional or alternative data sources.

Appendix 3: LCEGS and Office of National Statistics Environmental Goods and Services Sector Comparison

The purpose of this appendix is to provide a brief description of some of the differences between the Office of National Statistics (ONS) Environmental Goods and Services Sector (EGSS) data and the LCEGS data provided by kMatrix. The two methodologies differ in the way data is collected, their methodologies, and in terms of their sector definitions.

kMatrix is a data house that specialises in providing evidential data for business modelling and analysis on a multi-sectoral basis. We provide back-room services to the likes of Deloitte and PWC amongst others in the UK, New Zealand, Australia, US and the EU for sectoral analysis and due diligence for sectoral development and investment. We also provide our business and technology profiling services through these channels to market, as well as direct to universities for technology spinouts and individual businesses for development purposes. Further customers include government departments such as BEIS, Home Office and various local and regional government departments.

The ONS EGSS data is produced primarily for the purpose of national accounting. It is sector-specific, using narrow sector definitions and takes no account of the value or supply chains in a sector. In contrast, the kMatrix methodology was originally designed to help companies by measuring technologies or activities using small taxonomies, to assist with investment and developmental planning. This capability was expanded to provide market data for a number of economic sectors, by creating larger taxonomies to capture as much of the market as possible, including the supply and value chains. Each taxonomy for a sector will draw relevant activities from many other sectors, to fully capture all activity. In this way, the LCEGS taxonomy captures activities across multiple sectors and down the value and supply chains. This difference in *what* is being measured is the fundamental reason why the definitions used by ONS and LCEGS do not align.

The kMatrix methodology uses a unique process of 'triangulation' to measure metrics such as employment and other characteristics of a sector at varying levels of detail. This process has been developed over 30 years and has been adopted by various governments, universities and major corporates to provide economic industry data for hard to measure sectors. It is similar in concept to the triangulation of satellites to work GPS satellite navigation systems. The methodology uses multiple data points which can be economic or non-economic in origin, from a number of different sources to 'triangulate' the value of a product or service in question.

This process is different to the methodology used by the ONS to produce the EGSS data, predominantly because the ONS data relies on self-certification of companies into SIC codes, whereas the kMatrix methodology calculates values based on multiple sources of data. The ONS data is based on where companies choose to classify themselves. kMatrix data looks at the activities of companies and attributes those activities to different sub-sectors. In effect, the ONS system is limited to the ability or willingness of companies to list which sectors their products or services are used in, this method is likely to produce both over and underestimates of market size as companies will attribute more or less of their activities to relevant SIC codes. The kMatrix methodology does

not rely on company cooperation but looks at their activities and breaks them down into the levels or sub-sectors they are relevant to.

The kMatrix process operates on a 'bottom up' basis, meaning we look at products and services delivered, rather than company classifications and turnover, which is classed as 'top down' (SIC system). The bottom up process was developed to assist individual companies based on sectoral analysis findings and provide evidential data and advice. By looking at the sector from the bottom up (by each activity, product or service), the sector can be determined in accordance with the relevant sector definition, whilst allowing the flexibility to 'add in' or 'opt out' of various activities depending on the purpose of the reporting. ONS data itself is not used to produce kMatrix figures, but the kMatrix values can be reported out through the ONS classification system if required.

Table 1 shows a comparison between employment analysis for the London region using the SIC classification methodology and the kMatrix methodology for the Manufacturing sector and the Construction sector.

Table 1: Comparison of 2011 - 2016 Employment Data for SIC and kMatrix in London

Methodology	Sector	2011 Jobs	2012 Jobs	2013 Jobs	2014 Jobs	2015 Jobs	2016 Jobs
SIC based	Manufacturing	106,750	108,250	106,750	112,000	108,000	105,250
SIC based	Construction	133,250	150,500	146,500	146,250	145,250	155,750
kMatrix	Manufacturing	137,351	135,943	138,951	141,873	140,308	131,230
kMatrix	Construction	166,629	195,334	177,915	184,022	184,317	199,038
Indexed numbers for the rows above show that growth in the manufacturing and construction sectors is similar for both the SIC and kMatrix definitions		100	101.4	100.0	104.9	101.2	98.6
		100	112.9	109.9	109.8	109.0	116.9
		100	99.0	101.2	103.3	102.2	95.5
		100	117.2	106.8	110.4	110.6	119.4

Sector - LCEGS is made up of elements from many different traditional sectors (including manufacturing, finance, construction, consulting and energy) therefore as a grouping it includes products and services from those sectors that together amount to the total value of the LCEGS grouping.

Scale - The ONS system only produces estimates of the sector size at the country level, whereas the LCEGS data can be provided by Country, Region, City, Local Authority etc.

Table 2 shows a summary of the main differences between the kMatrix data and the ONS EGSS data.

Table 2: kMatrix and ONS – EGSS Comparison Summary Table

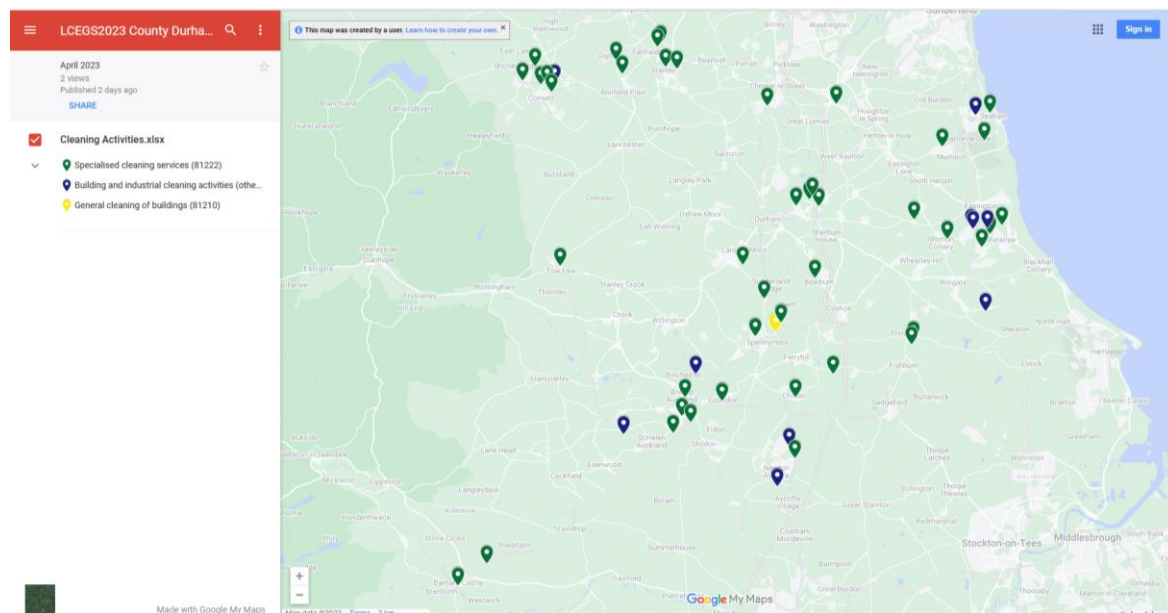|	kMatrix - LCEGS	ONS - EGSS
Sector definition	The LCEGS sector includes the EGSS definition but expands it to include all activities that contribute and enable growth in the sector. Those elements which are excluded from EGSS which are produced for	The environmental goods and services sector is made up of areas of the economy engaged in producing goods and services for environmental protection purposes, as well as those

	purposes that, while beneficial to the environment, primarily satisfy technical, human and economic needs or that are requirements for health and safety are included in LCEGS if they contribute to the sector. For more information, please see Appendix 3 and Appendix 4 of this report.	engaged in conserving and maintaining natural resources. Excluded from the scope of EGSS are goods and services produced for purposes that, while beneficial to the environment, primarily satisfy technical, human and economic needs or that are requirements for health and safety.
Sector size measurement	Triangulation of data from multiple sources	Company surveys via company self-certification
Sector sales coverage	Full value of sales for the sector, including supply and value chain	Only sector sales, not including supply or value chains
Geographic range of coverage	Global, Country, Regional, City & Local Authority	Country
Available data includes	Sales, number of employees, number of companies, exports, growth rates (historical and forecast) & 60+ more metrics	Output, GVA, employee count and exports
For further information and detail on the ONS – EGSS definition: https://www.ons.gov.uk/economy/environmentalaccounts/bulletins/ukenvironmentalaccounts/2010to2015		

Appendix 4: Maps of LCEGS2023 County Durham Companies by SIC Code

This appendix provides maps of LCEGS2023 companies within County Durham within the top 10 SIC codes, which account for 907 of the 952 LCEGS2023 companies identified within the study.
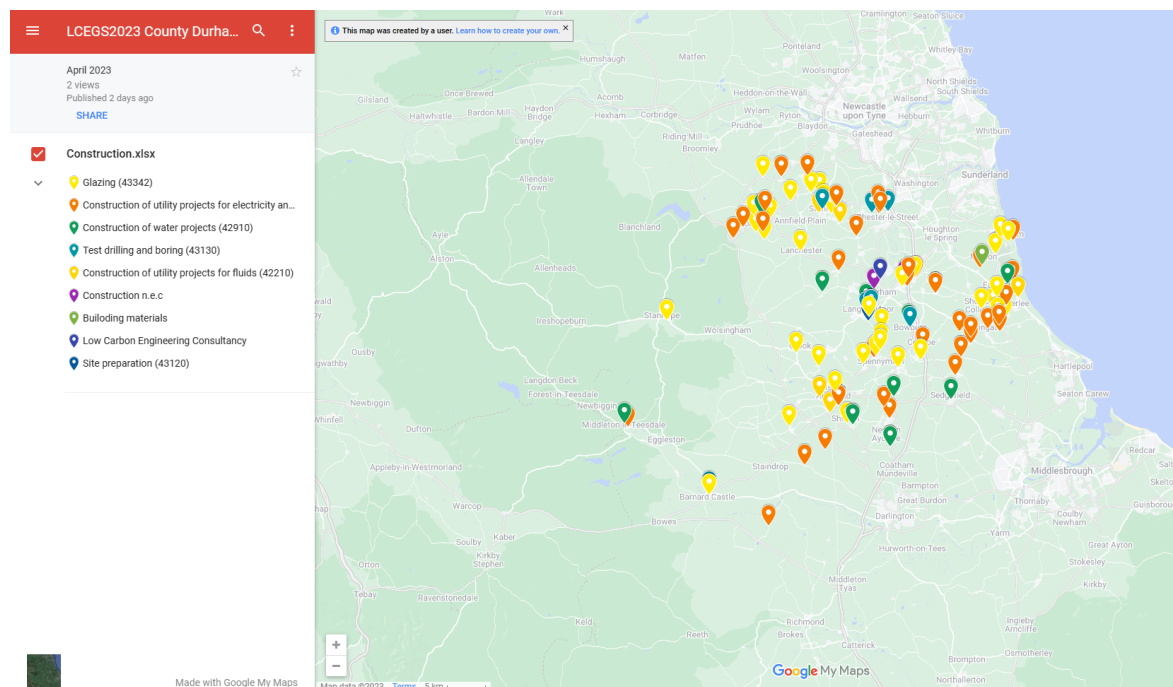
A4.1   County Durham Companies with SIC Code Cleaning Activities

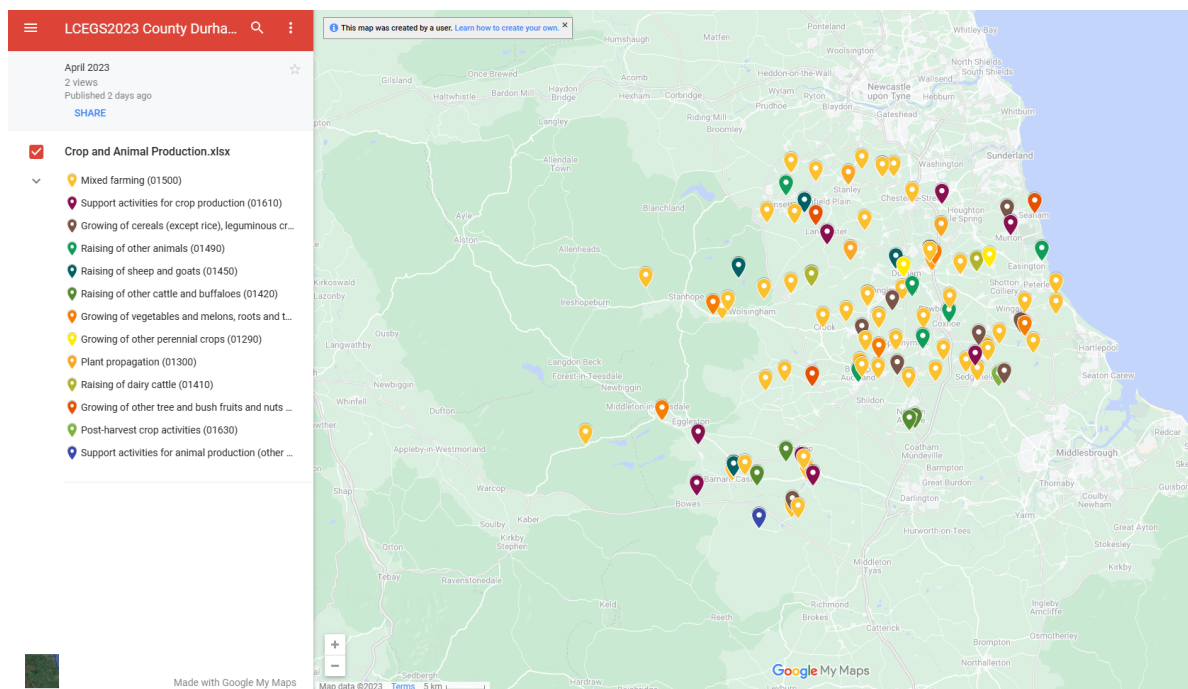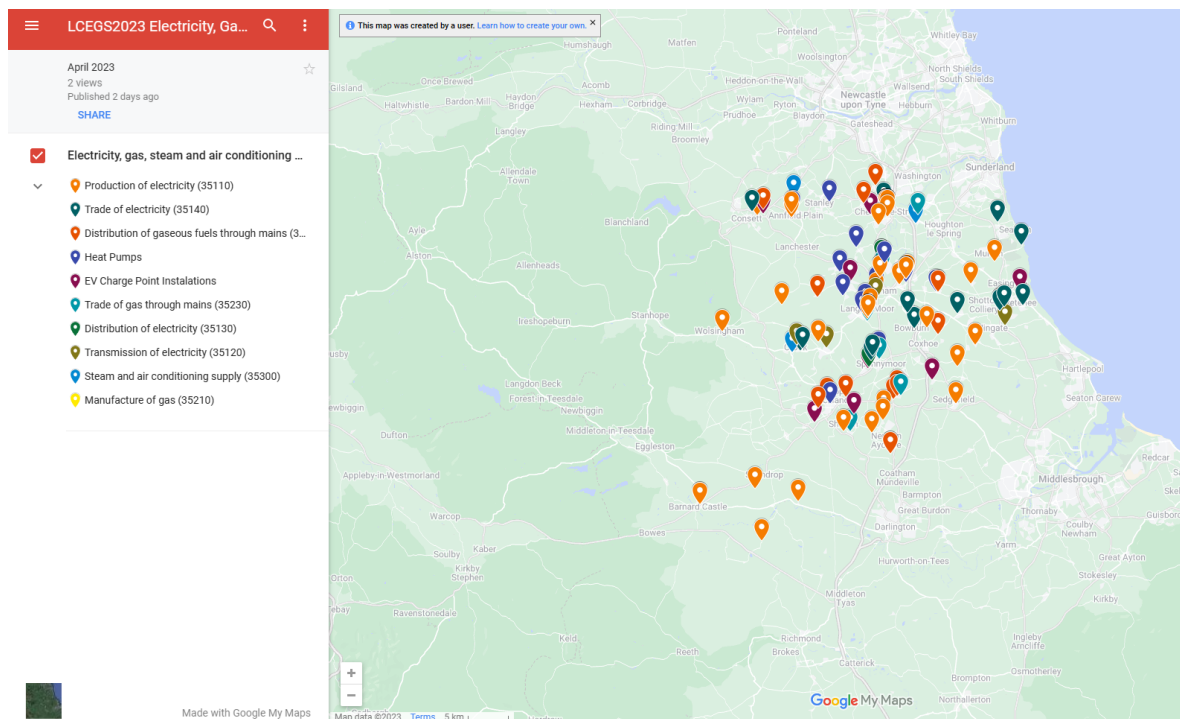The Hyperlink for Map A4.1 is: LCEGS2023 County Durham Cleaning Activities – Google My Maps

A4.2   County Durham Companies with SIC Code Construction Activities

The Hyperlink for Map A4.2 is: LCEGS2023 County Durham Construction Activities – Google My Maps

A4.3 County Durham Companies with SIC Code Crop and Animal Production

The Hyperlink for Map A4.3 is: LCEGS2023 County Durham Crop and Animal Production Activities – Google My Maps

A4.4 County Durham Companies with SIC Code Electricity, Gas, Steam and Air Conditioning Supply Activities

The Hyperlink for Map A4.4 is: LCEGS2023 Electricity, Gas, Steam and Air Conditioning Supply Activities – Google My Maps
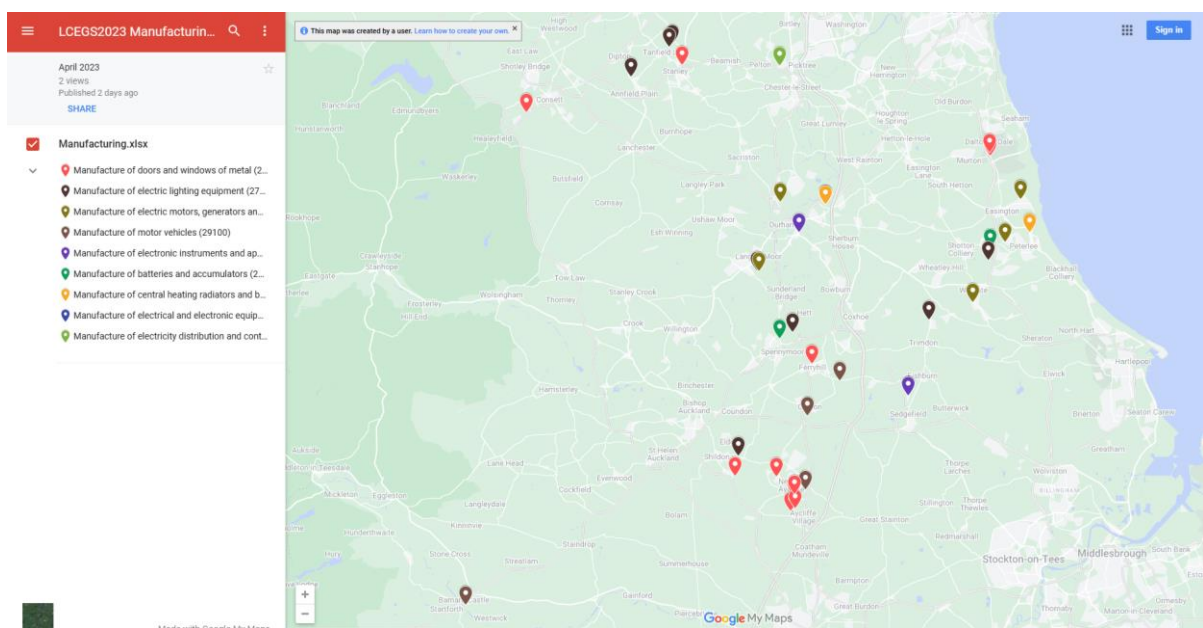
A4.5   County Durham Companies with SIC Code Forestry and Logging Activities

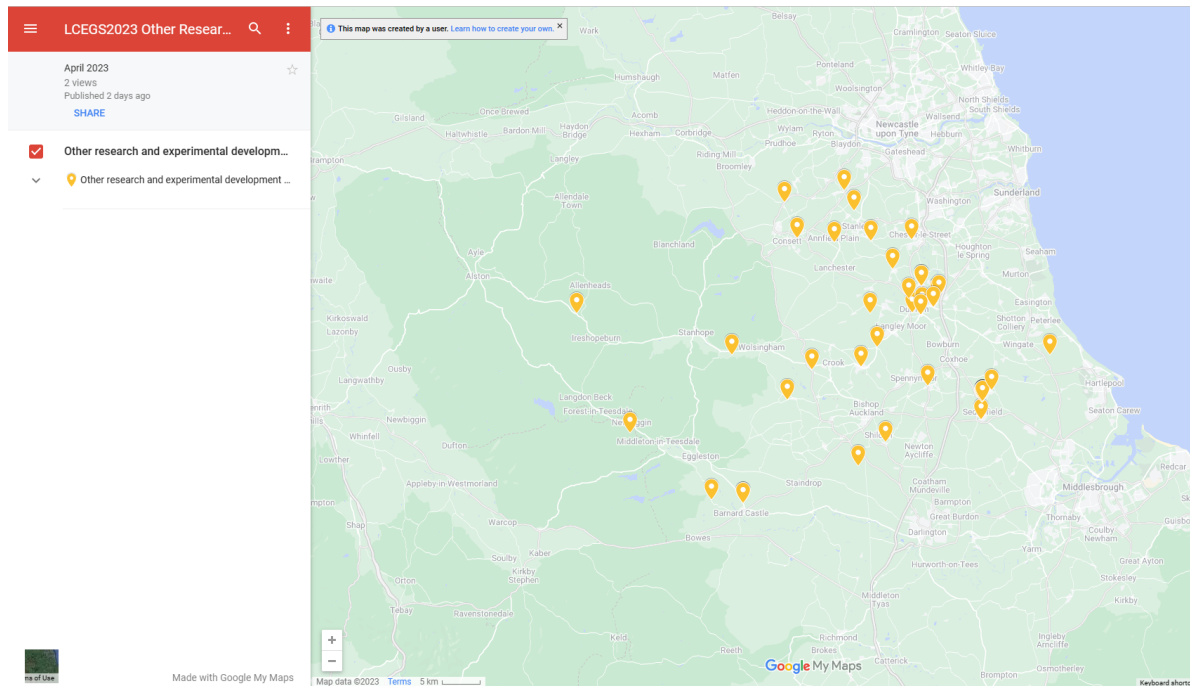The Hyperlink for Map A4.5 is: LCEGS2023 Forestry and Logging Activities – Google My Maps

A4.6   County Durham Companies with SIC Code Manufacturing Activities

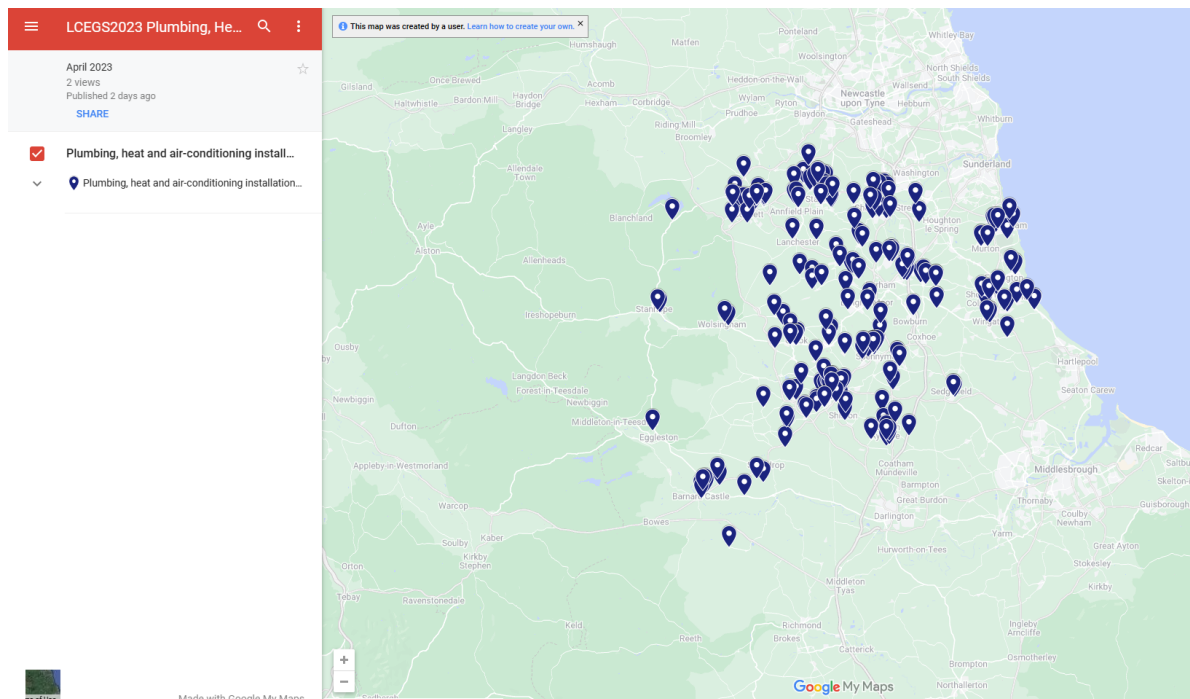The Hyperlink for Map A4.6 is: LCEGS2023 Manufacturing Activities – Google My Maps

A4.7   County Durham Companies with SIC Code Other Research and Experimental Development on Natural Sciences and Engineering

The Hyperlink for Map A4.7 is: LCEGS2023 Other Research and Experimental Development on Natural Sciences and Engineering – Google My Maps
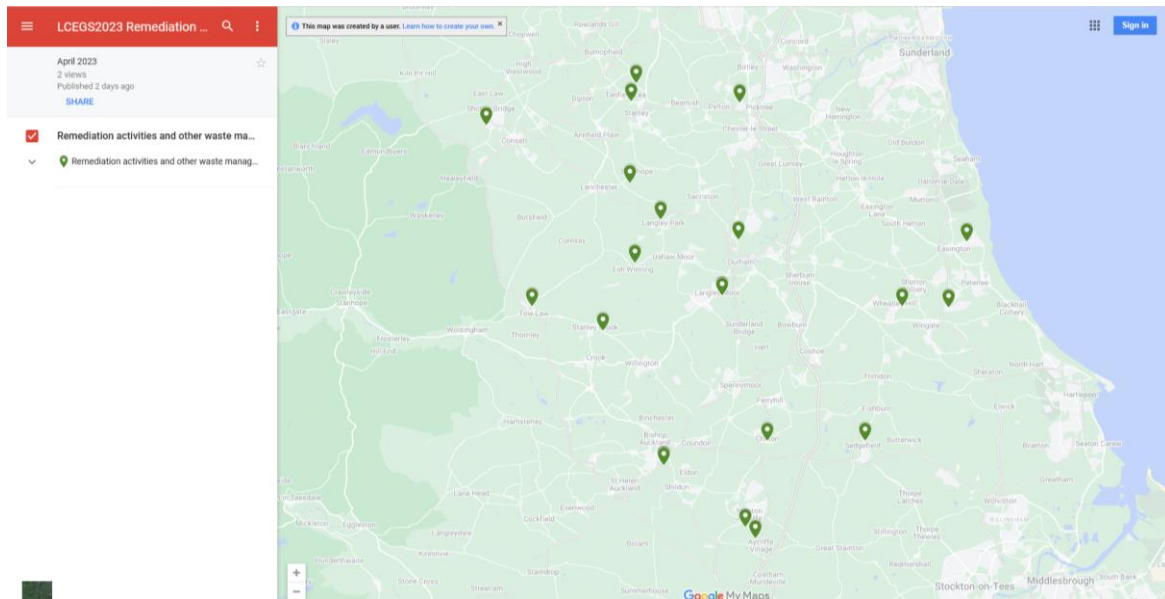

A4.8   County Durham Companies with SIC Code Plumbing, Heating and Air Conditioning Installation

The Hyperlink for Map A4.8 is: LCEGS2023 Plumbing, Heating and Air Conditioning Installation – Google My Maps

A4.9 County Durham Companies with SIC Code Remediation Activities and Other Waste Management Services

The Hyperlink for Map A4.9 is: LCEGS2023 Remediation Activities and Other Waste Management Services – Google My Maps

A4.10 County Durham Companies with SIC Code Waste Collection, Treatment and Disposal Activities, Materials Recovery

The Hyperlink for Map A4.10 is: LCEGS2023 Waste Collection, Treatment and Disposal Activities, Materials Recovery – Google My Maps