EM3's Low Carbon Economy

Market Snapshot for LCEGS 2015/16 to 2017/18

With Core vs. Non-Core Activity Analysis

Report November 2019

By kMatrix

Disclaimer

kMatrix

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Enterprise M3 Local Enterprise Partnership

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Introduction

This is a companion report to the shorter "Enterprise M3's Low Carbon Environmental Goods and Services (LCEGS) Sector Highlights", produced for the Enterprise M3 Local Enterprise Partnership in November 2019.

The purpose of this report is to provide the evidence-based market intelligence data for the LCEGS sector, from which the information from the Sector Highlights report were drawn. In contrast, the shorter companion report provides highlight information regarding the shape and nature of the LCEGS sector in the EM3 LEP, drawn from the data outlined in this report.

This report is split into two parts:

- Section 1 provides the full LCEGS sector report for the Enterprise M3 LEP
- Section 2 is a detailed analysis of the split between the core and non-core activities within the sector

The LCEGS sector report in section 1 is an in-depth study of the market within the EM3 LEP, addressing the whole market (both core and non-core activities) and making comparisons with the UK, the UK less London and with the Coast to Capital and South East LEPs. Growth rates and export trends are also discussed.

The core vs. non-core analysis in section 2 of the report is a bespoke piece of analysis performed for this LEP. The EM3 LEP has been traditionally considered to have a limited LCEGS sector, which is true if only the core activities of the sector are measured. Measuring core activities are important and can be insightful, however they cannot operate in isolation and require non-core activities. The purpose of the LCEGS dataset in its original form, is to provide a standardized measure of the complete LCEGS sector and has measured the UK market for over a decade. 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 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. The EM3 LEP is unusually strong in the non-core portion of the market, due to exceptionally strong mid-chain activities and as such, it was decided to split the core and non-core activities to further explore what is happening in the market. This exercise has been enlightening in several areas, for example the EM3 LEP is generally not regarded as being strong in the Wind sub-sector and it isn't in core activities. However, when you explore the vital mid-chain wind activities which are needed for the sub-sector to operate, you find that Wind is the largest Renewable Energy sub-sector in the LEP. In fact, the Wind sub-sector in the EM3 LEP is only 7% core activities, 93% non-core. Section 2 explores the shape of the EM3 LCEGS sector when core and non-core activities are separated.

Section 1

Low Carbon Environmental Goods and Services EM3 and UK Full Report

Executive Summary

EM3's Low Carbon and Environmental Goods and Services (LCEGS) sector was worth £18.2bn to EM3's economy in 2017/18, as indicated by the value of sales in the sector. These sales were generated by over 7,100 businesses that employed over 126,800 people in the sector in 2017/18.

The total EM3 economy is worth £54.3bn, making the LCEGS 33.5% of the economy. The whole LCEGS sector (core and non-core activities) in the EM3 LEP is proportionally larger than for other LEPs in the UK. This is because the EM3 LEP is exceptionally strong in mid-chain activities. In fact, the LCEGS sector as a proportion of the economy of the EM3 LEP is 17.2% higher than the UK average across LEPs (excluding London).

Sales and growth
The Low Carbon and Environmental Goods and Services sector in EM3 has grown year on year for the last 3 years. In 2015/16 total sales in the sector were worth £15.9bn and sales have now reached £18.2bn in 2017/18.

The sector in EM3 grew by 6.9% during the financial year 2015/16 to 2016/17 and 6.7% during 2016/17 to 2017/18. This rate of growth is slower than the UK averages of 7.2% and 7.4% for the same period. The difference between the growth rates is less indicative of slow growth in EM3, but rather the strong growth in the large London LCEGS sector inflating the UK average. Sales Growth in EM3 is expected to increase to 10.0% by 2021/22.

The sector showed great resilience during the challenges of the economic downturn and it has continued to achieve annual growth rates greater than the UK economy as a whole. This reflects the increasing market opportunities that are being created by regulation, policy and customer demand for businesses operating in the Low Carbon and Environmental Goods and Services sector.

Employment
Employment in EM3's Low Carbon and Environmental Goods and Services sector in 2017/18 was 126,824, up from 111,095 in 2015/16. Annual growth rate in employment was 6.8% between 2015/16 and 2016/17 and 6.9% between 2016/17 and 2017/18. This rate of growth was slower than the UK average of 8.4% between 2015/16 and 2016/17 and the same as the UK average between 2016/17 and 2017/18.

There is a marked characteristic within the EM3 LEP, particularly within the higher tech businesses, of strong business resilience. This refers not only to the ability of a company to achieve longevity, but also the length of contracts and other factors that provide stability. This can explain why employment and company growth in the LEP may be slower than the UK average.

Companies
The number of companies in EM3's Low Carbon and Environmental Goods and Services sector in 2017/18 was 7,169, up from 6,489 in 2015/16. Annual growth rate in the number of companies was 3.4% between 2015/16 and 2016/17 and 6.9% between 2016/17 and 2017/18. This rate of growth is slower than the UK average for the same period.

EM3's sub-sectors
In 2017/18 EM3's Low Carbon and Environmental Goods and Services sector was made up by the following proportions: Low Carbon 49%, Renewable Energy 35% and Environmental 17%. This is similar to the composition in 2015/16 when it was: Low Carbon 48%, Renewable Energy 34% and Environmental 14%.

EM3's sub-sector strengths
The five largest sub-sectors in the Low Carbon and Environmental Goods and Services sector by sales account for 64% of the EM3 total sales and are made up of:

- Alternative Fuels (£2.94bn) this includes R&D functions, alternative fuel providers and process implementation accounting.
- Building Technologies (£2.65bn) - this includes head office functions, building systems design and consultancy and building systems providers and installers
- Wind (£2.54bn) – this includes control systems development and manufacture, drive train development, manufacture and systems integration and consulting houses
- Alternative Fuel Vehicle (1.83bn) – this includes process designers and consultancy, process implementation and sales and application development specialists
- Geothermal (£1.63bn) - this includes head office functions, systems and design and international consultancy

The next six largest sub-sectors by sales account for a further 30% of EM3's total sales and are made up of:

- Biomass (£1.16bn) - this includes systems development and implementation and R&D
- Water Supply and Waste Water Treatment (£0.99bn) - this includes systems implementation, maintenance and development
- Recovery and Recycling (£0.97bn) – this includes waste collection, glass stock processing and paper feedstock processing
- Photovoltaic (£0.88bn) - this includes head office functions and providers and installers
- Energy Management (£0.74bn) - this includes manufacturers, agents and installers alongside LED array developers.
- Waste Management (£0.66bn) - this includes process development and new process implementation and consulting

UK Comparison
London accounts for 20% of the UK's LCEGS sector sales, but also has a very different LCEGS landscape to the rest of the UK. It was removed from part of the analysis looking at the proportionality of sub-sectors in order to give a more accurate view of what was happening in the rest of the UK.

Removing London from the UK figures showed that EM3 is more in line with the rest of the UK, when London is excluded from the analysis. Only the top four sub-sectors show variation between EM3 and the UK, with Building Technologies having more prominence and Wind slightly less.

LEP Comparison

The EM3 LEP has close ties with Coast to Capital LEP and South East LEP. For the purposes of this study, we have compared the LCEGS market in all three LEP's at a high level of analysis.

The Low Carbon and Environmental Goods and Services sector for the three LEP's combined (£67.75bn) accounts for 37% of UK Sales (£184.75bn). Individually, EM3 accounts for 9.8%, Coast to Capital accounts for 9.6% and South East accounts for 17.2% of total UK Sales.

Looking at the three LEP's combined, EM3 accounts for 27% of sales, 27% of companies and 27% of employees. Coast to Capital accounts for 26% of sales, 27% of companies and 27% of employees. South East accounts for 47% of sales, 46% of companies and 46% of employees.

While the South East holds 47% of the LCEGS sales for the three combined LEP's and holds the largest market share for 19 of 24 level 2 sub-sectors, EM3 holds the largest share in 4 level 2 sub-sectors: Energy Management (42%), Geothermal (40%), Air Pollution (39%) and Noise and Vibration Control (35%).

EM3 has the second highest share of the market in 10 sub-sectors: Additional Energy Sources (34%), Environmental Consultancy (34%), Marine Pollution Control (33%), Alternative Fuel Vehicle (29%), Alternative Fuels (28%), Renewable Energy General Consultancy (28%), Biomass (27%), Waste Management (27%), Water & Waste Water Treatment (27%) and Carbon Finance (22%).

The larger the percentage share of a sub-sector in a region, the higher the degree of supply chain localization in that sub-sector within that region. Highly localized supply chains offer a stronger opportunity for the development of the sub-sector along with closer partnerships and regional cooperation.

Patterns in sales activities in the three LEP's varies for Low Carbon and Renewable Energy. Within the Low Carbon level 1 sub-sector, Alternative Fuels has a higher percentage of sales than Building Technologies, whereas South East and Coast to Capital have the opposite pattern. Within the Renewable Energy sub-sector, Wind is less dominant in EM3 than in the other two LEP's, whereas Geothermal holds significantly more market in EM3 (26%) than either Coast to Capital (21%) or South East (11%).

Available sales are the portion of the market penetrable under usual cost of sales, not locked by long term contracts or aggressive marketing strategies. They represent the size of market realistically available to new entrants to the market. All three have good available sales, the EM3 has 23%, Coast to Capital 22% and South East 24%.

Sub-sector growth

EM3's five largest sub-sectors by sales have all enjoyed high levels of growth in sales, number of employees and number of companies between 2015/16 and 2017/18:

- Alternative Fuels – sales have grown from £2.51bn to £2.94bn (17%), number of employees by 15% and number of companies by 7%
- Building Technologies – sales have grown from £2.29bn to £2.65bn (16%), number of employees by 13% and number of companies by 12%
- Wind – sales have grown from £2.12bn to £2.54bn (20%), number of employees by 22% and number of companies by 25%
- Alternative Fuel Vehicle – sales have grown from £1.63bn to £1.83bn (12%), number of employees by 13% and number of companies by 4%

- Geothermal – sales have grown from £1.46bn to £1.63 (12% increase), number of employees by 13% and number of companies also by 8%

Exports

The value of exports in EM3's Low Carbon and Environmental Goods and Services sector in 2017/18 was £1.3bn, an increase from £1.1bn in 2015/16. This accounted for 9.8% of the UK's LCEGS exports in 2017/18 and is in line with EM3's 9.8% share of the overall UK LCEGS market.

EM3's LCEGS exports grew by 10.9% and 5.7% over the last three years which was significantly higher than the UK average of 6.0% for the first year and slightly slower than the UK average of 6.8% for the second year.

The percentage of EM3's exports which were available for penetration under usual cost of sales were 16.5% in 2017/18, which is an increase from 15.1% in 2015/16 and 13.8 in 2016/17. Two sub-sectors have a combination of large export value and high available exports as a percentage of exports in 2017/18: Building Technologies with 19.4% available exports and Geothermal 18.4% available exports.

EM3's Low Carbon and Environmental Goods and Services (LCEGS) 3-Year Snapshot 2015/16 to 2017/18

This section of the report provides a full analysis of the Low Carbon and Environmental Goods and Services (LCEGS) sector for both the UK and the EM3 area.

1. Introduction to the Low Carbon and Environmental Goods and Services (LCEGS)

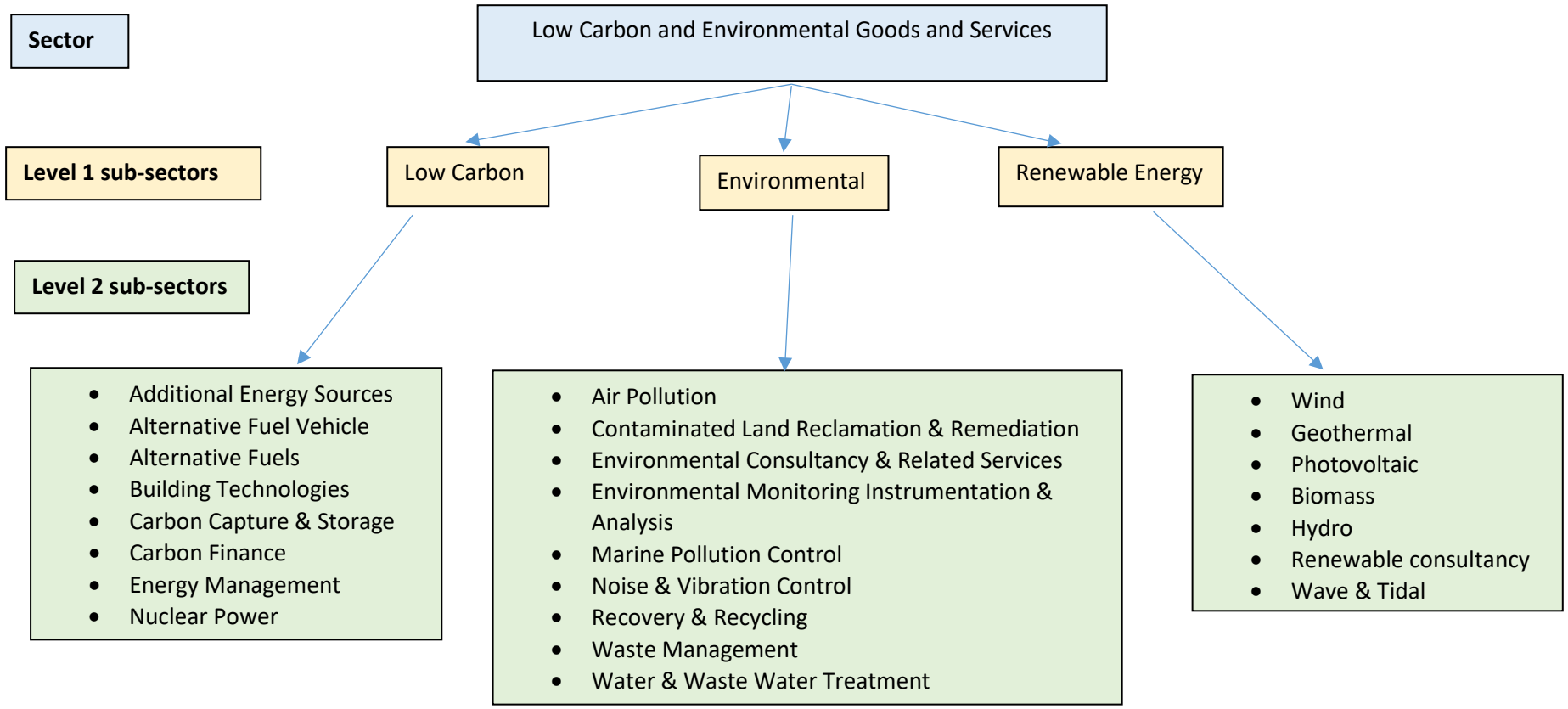
This report presents data for the fiscal years 2015/16 to 2017/18. It provides an overview of the EM3's Low Carbon and Environmental Goods and Services (LCEGS) sector for the three years reporting, allowing 3-year trend analysis.

The data used in this report is based upon the work and methodology used by kMatrix to provide datasets on the UK's LCEGS Sector for UK Government and that was reported annually by the Department for Business, Innovation and Skills (BIS) from 2008/09 to 2011/12. The sector has continued to be measured and reported by London providing data from 2007/08 to 2017/18, the latest dataset.

The LCEGS sector has been defined using 24 sub-sectors (or Level 2 markets). These are grouped into three broad categories - Environmental, Renewable Energy and Low Carbon - the addition of the Renewable Energy and Low Carbon groupings illustrates the evolution of the current LCEGS sector definition from its original Environmental roots and reflects developments in the market as sectors evolve to address the environmental challenges that the world is facing.

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 itself.

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. As an illustration, the sector is LCEGS, which is then broken down into three Level 1 sub-sectors, one of which is Renewable Energy, which is in turn broken down into seven Level 2 sub-sectors, one of which is Wind that is then broken down into a further three Level 3 sub-sectors and so on:



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 LCEGS sector definition, used in this report, includes 2,800 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 LCEGS 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.

Available Sales and Available Exports

The metrics looking at available sales and exports refer to that portion of the market that is realistically available for penetration by new market entrants under normal cost of sales. It highlights that portion of either sales or exports that is not 'locked' by long term contracts or aggressive marketing strategies and can be accessed without the need for aggressive or unusual trading practices.

They are useful metrics, providing information regarding the likelihood of accessing market in different circumstances and what the potential size of that market could be and whether companies wishing to move into those markets might need to adjust sales strategies etc.

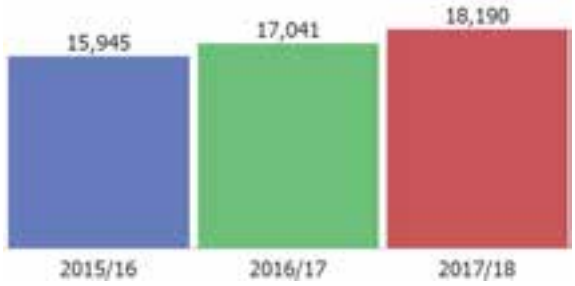
2. EM3's Low Carbon and Environmental Goods and Services (LCEGS) Analysis

This section of the report analyses EM3's LCEGS at Level 1 and Level 2. It also provides information at Level 3 to show the type of activities included in these sub-sectors.

2.1 LCEGS Compared by Year

In this section of the report EM3's LCEGS performance is compared for the last three years for the three key measures of Sales, Employment and Growth.

Figure 1: Sales 2015/16 to 2017/18 in £m



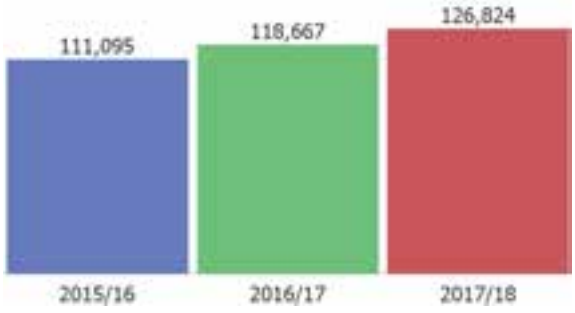
EM3's LCEGS sales in 2017/18 were £18.2bn, up from £15.9bn in 2015/16.

Annual sales growth in EM3's LCEGS was 6.9% from 2015/16 to 2016/17 and 6.7% from 2016/17 to 2017/18.

In comparison UK sales growth in LCEGS was 7.2% and 7.4% respectively, higher than EM3's growth due to very strong growth in London.

Available sales were around 22% of Sales for each year.

Figure 2: Employment 2015/16 to 2017/18

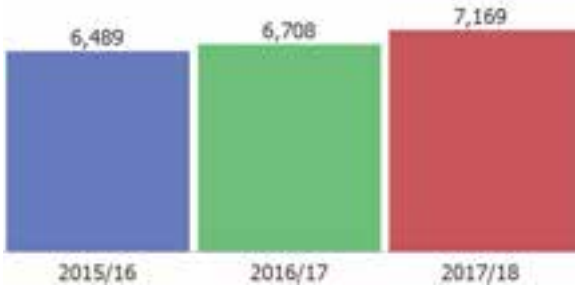


EM3's LCEGS employment in 2017/18 was 126,824, up from 111,095 in 2015/16.

Annual employment growth in EM3's LCEGS was 6.8% from 2015/16 to 2016/17 and 6.9% from 2016/17 to 2017/18.

In comparison UK employment growth in LCEGS was 8.4% and 6.9% respectively.

Figure 3: Companies 2015/16 to 2017/18



EM3's LCEGS company count in 2017/18 was 7,169, up from 6,489 in 2015/16.

Annual company growth in EM3's LCEGS was 3.4% from 2015/16 to 2016/17 and 6.9% from 2016/17 to 2017/18.

In comparison UK company growth in LCEGS was 6.7% and 6.9% respectively.

Growth in EM3 has been slower or comparable to the UK average across each of the three parameters between 2015/16 and 2017/8, however business resilience is particularly good and continues to consolidate due to the strength in technical capabilities in early and mid-

chain high tech sectors. This particularly the case in aerospace and defense as well as motorsport, fine electronics and design.

2.2 EM3's LCEGS at Level 1

The analysis in this section of the report focuses on the Level 1 and Level 2 split of LCEGS in EM3 for each of the last three years.

Figure 4: Sales 2015/16 to 2017/18 in £m (Level 1)

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

In 2015/16 the split was 48% Low Carbon, 34% Renewable Energy and 18% Environmental. By 2017/18 this had changed slightly to 49%, 35% and 17% respectively.

Available sales varied between level 1 sub-sectors and by up to 2.2% variation between years. Environmental averaged 22.5% of sales, Renewable Energy averaged 21.6% and Low Carbon 22.6% of sales.

Figure 5: Employment 2015/16 to 2017/18 (Level 1)

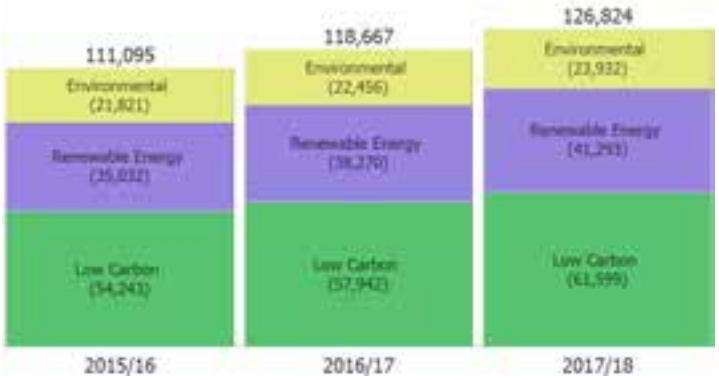


Figure 5 shows the three-year employment split by Level 1.

In 2015/16 the split was 49% Low Carbon, 32% Renewable Energy and 20% Environmental. By 2017/18 this had slightly changed to 49%, 33% and 19% respectively.

Figure 6: Companies 2015/16 to 2017/18 (Level 1)

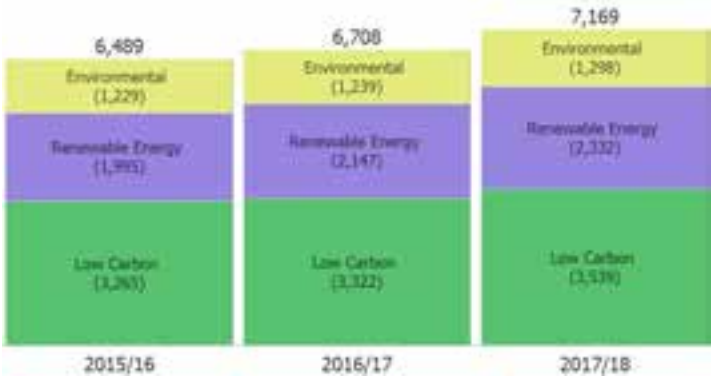


Figure 6 shows the three-year company split by Level 1.

In 2015/16 the split was 50% Low Carbon, 31% Renewable Energy and 19% Environmental. By 2017/18 this had also slightly changed to 49%, 33% and 18% respectively.

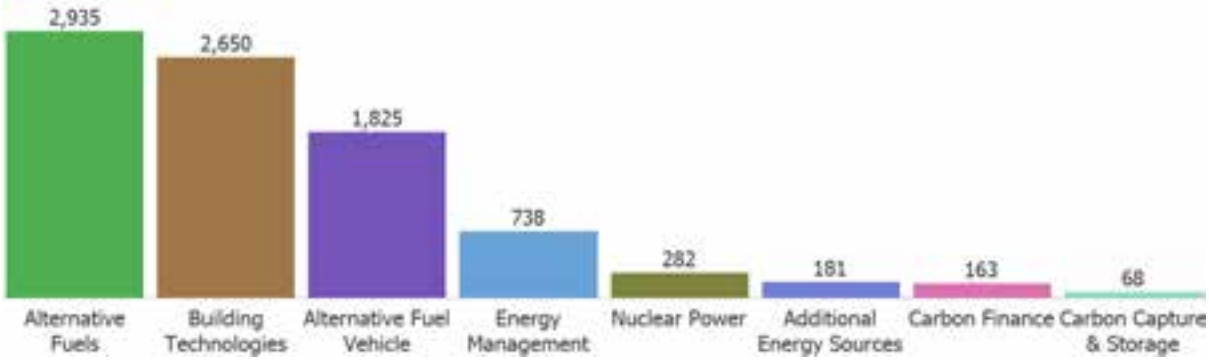
In 2017/18 UK LCEGS sales was split - Low Carbon 50%, Renewable Energy 33% and Environmental 16%. Although the UK average is similar in composition to the EM3, Renewable Energy is holding more of the LCEGS market than the UK as a whole.

2.3 EM3's LCEGS Level 1 - Low Carbon Market

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.

2.3.1 Low Carbon Market (Level 2)

Figure 7: Sales 2017/18 in £m (Level 2)

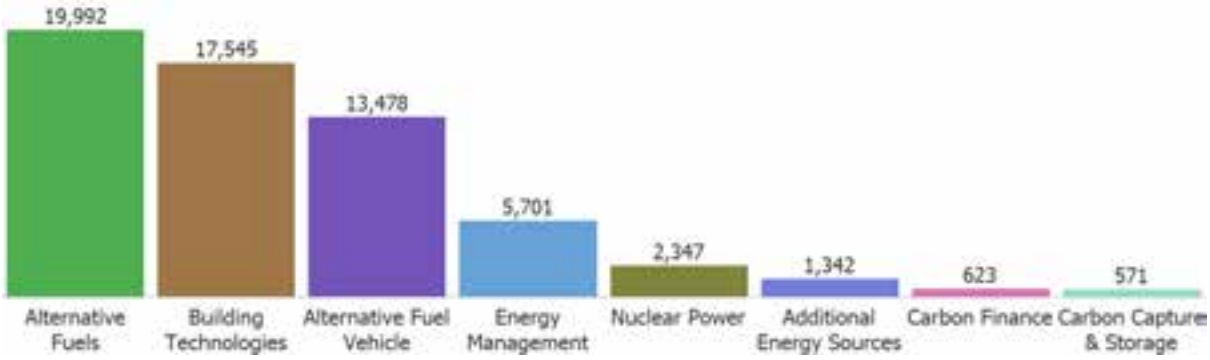


Low Carbon is further sub-divided into eight sub-sectors, of which four account for 92% of sales (Figure 7). These four are made up of Alternative Fuels 33%, Building Technologies 30%, Alternative Fuel Vehicles 21% and Energy Management 8%.

Each of these four sub-sectors grew between 2015/16 and 2017/18: Alternative Fuels from £52.51bn to £2.94bn; Building Technologies from £2.29bn to £2.65bn; Alternative Fuel Vehicles from £1.63bn to £1.83bn and Energy Management from £688m to £738m.

Available sales as a percentage of sales for the largest four sub-sectors were: Alternative Fuels 22.1%, Building Technologies 21.7%, Alternative Fuel Vehicle 23.3% and Energy Management 21.1%, in line with the overall 2017/18 Low Carbon Available sales of 22.9%.

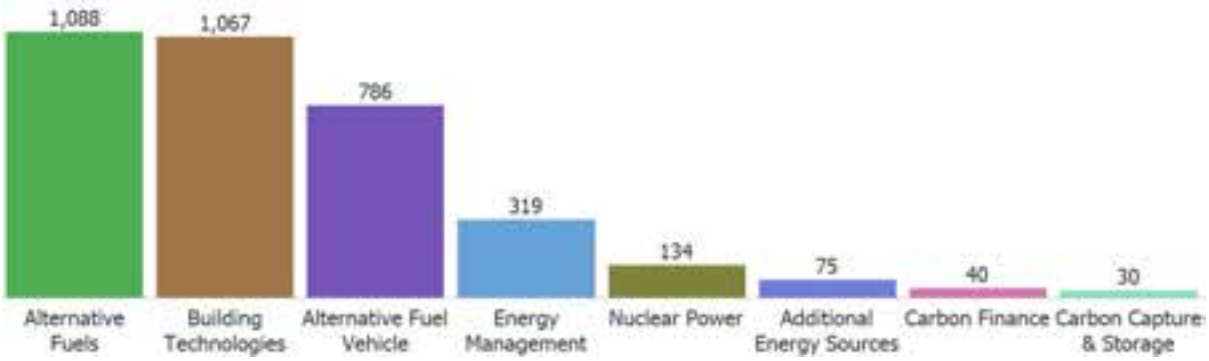
Figure 8: Employment 2017/18 (Level 2)



The same four sub-sectors account for 92% of employment (Figure 8). They are Alternative Fuels 32%, Building Technologies 28%, Alternative Fuel Vehicles 22% and Energy Management 9%.

Each of these four sub-sectors grew between 2015/16 and 2017/18: Alternative Fuels from 17,438 to 19,992; Building Technologies from 15,531 to 17,545, Alternative Fuel Vehicles from 11,934 to 13,478 and Energy Management from 4,882 to 5,701.

Figure 9: Companies 2017/18 (Level 2)

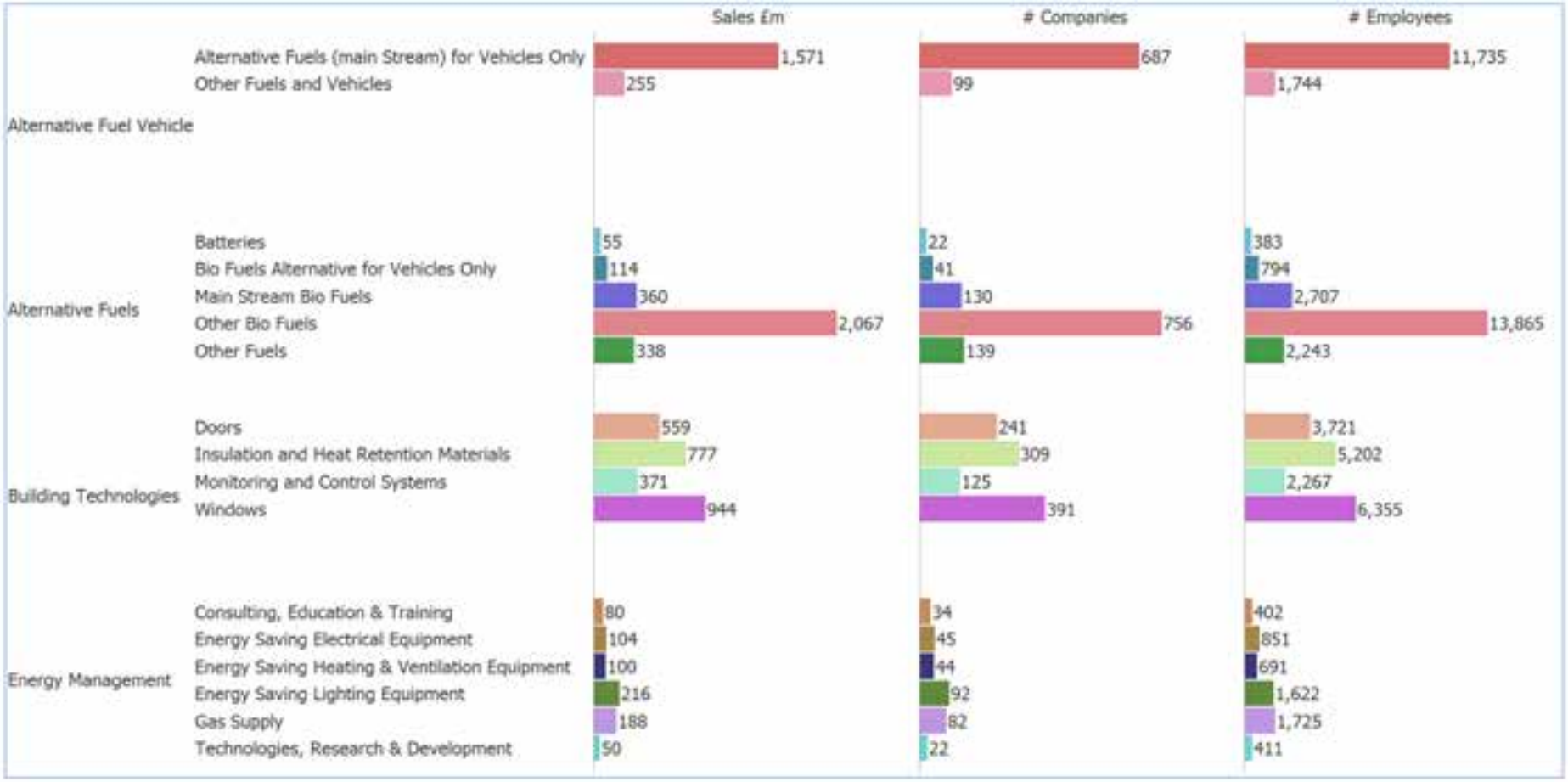


The same four sub-sectors again account for 92% of companies (Figure 9). They are Alternative Fuels 31%, Building Technologies 30%, Alternative Fuel Vehicles 22% and Energy Management 9%.

Each of these four sub-sectors grew between 2015/16 and 2017/18: Alternative Fuels from 1,021 to 1,088; Building Technologies from 956 to 1,067; Alternative Fuel Vehicles from 754 to 786 and Energy Management from 284 to 319.

2.3.2 Low Carbon Market at Level 3

Figure 10: Summary of selected metrics for 2017/18 for selected Low Carbon Level 2 sub-sectors at Level 3



The top four Level 2 sub-sectors for Low Carbon are Alternative Fuel Vehicle, Alternative Fuels, Building Technologies and Energy Management, making up 92% of the Low Carbon market in the EM3 area. Figure 10 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 is the largest Level 2 sub-sector and Other Bio Fuels is the largest of the five Level 3 sub-sectors, with 70% of sales. Example companies of this sub-sector would include process designers and consultancy, process implementation, sales and application development specialists and technical engineering.

Building Technologies has four sub-sectors at Level 3, with the largest being Windows, making up 36% of the market. Example companies in this sub-sector would include window manufacturers, agents and installers.

Alternative Fuel Vehicles has only two sub-sectors at level 3, with Alternative Fuels (main stream) for Vehicles Only holding 86% of the market share. Example companies in this sub-sector would include selling agencies, alternative fuel development companies and consulting and applications development for vehicle conversion specialists and the design and development of specialist power trains.

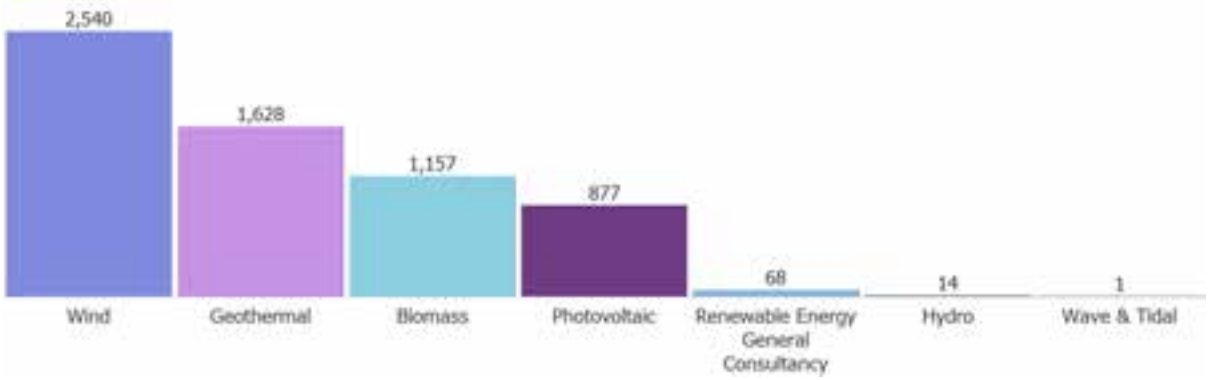
Energy Management has six sub-sectors at level 3, with Energy Saving Lighting Equipment being the largest with 29% of the market. Example companies in this sub-sector would include manufacturers, agents and installers alongside LED array developers.

2.4 EM3's LCEGS Level 1 - Renewable Energy Market

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.

2.4.1 Renewable Energy Market at Level 2

Figure 11: Sales 2017/18 in £m (Level 2)

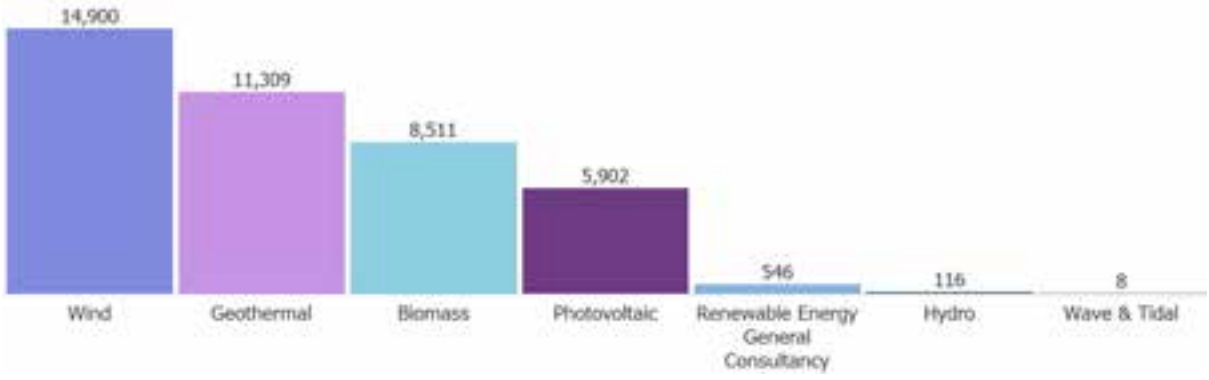


Renewable Energy is then split into seven sub-sectors, of which four account for 99% of sales (Figure 11). These four are made up of Wind 40%, Geothermal 26%, Biomass 18% and Photovoltaic 14%.

Each of these four sub-sectors have grown between 2015/16 and 2017/18: Wind from £2.12bn to £2.54bn; Geothermal from £1.46bn to £1.63bn; Biomass from £1.00bn to £1.16bn and Photovoltaic from £751m to £877m.

Available sales as a percentage of sales for the largest four sub-sectors were: Wind 20.4%, Geothermal 25.6%, Biomass 25.2% and Photovoltaic 22.2%. The overall 2017/18 Renewable Energy Available sales as a percentage of sales were 22.9%. Geothermal and Biomass showed a higher proportion of available market than the average for the sub-sector.

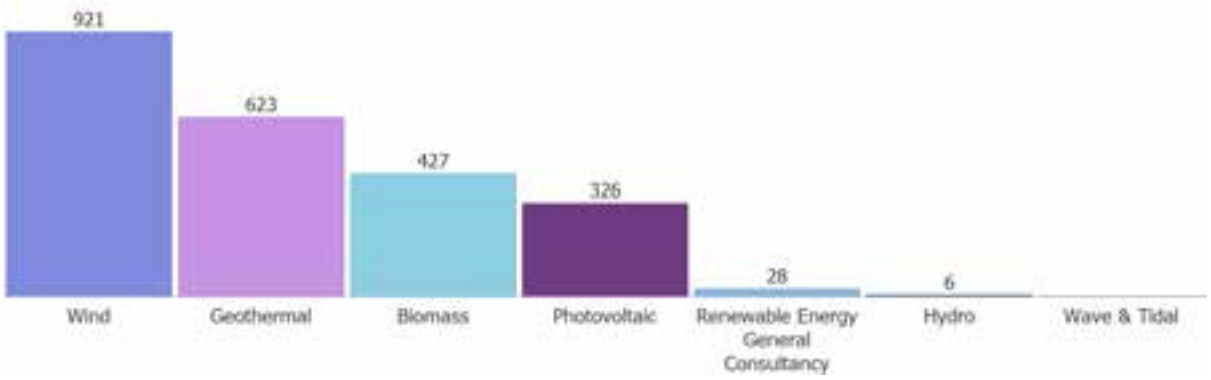
Figure 12: Employment 2017/18 (Level 2)



The same four sub-sectors account for 98% of employment (Figure 12). They are made up of Wind 36%, Geothermal 27%, Biomass 21% and Photovoltaic 14%.

Each of these four sub-sectors have grown between 2015/16 and 2017/18: Wind from 12,208 to 14,900; Geothermal from 9,969 to 11,309; Biomass from 7,400 to 8,511 and Photovoltaic from 4,829 to 5,902.

Figure 13: Companies 2014/ 15 (Level 2)

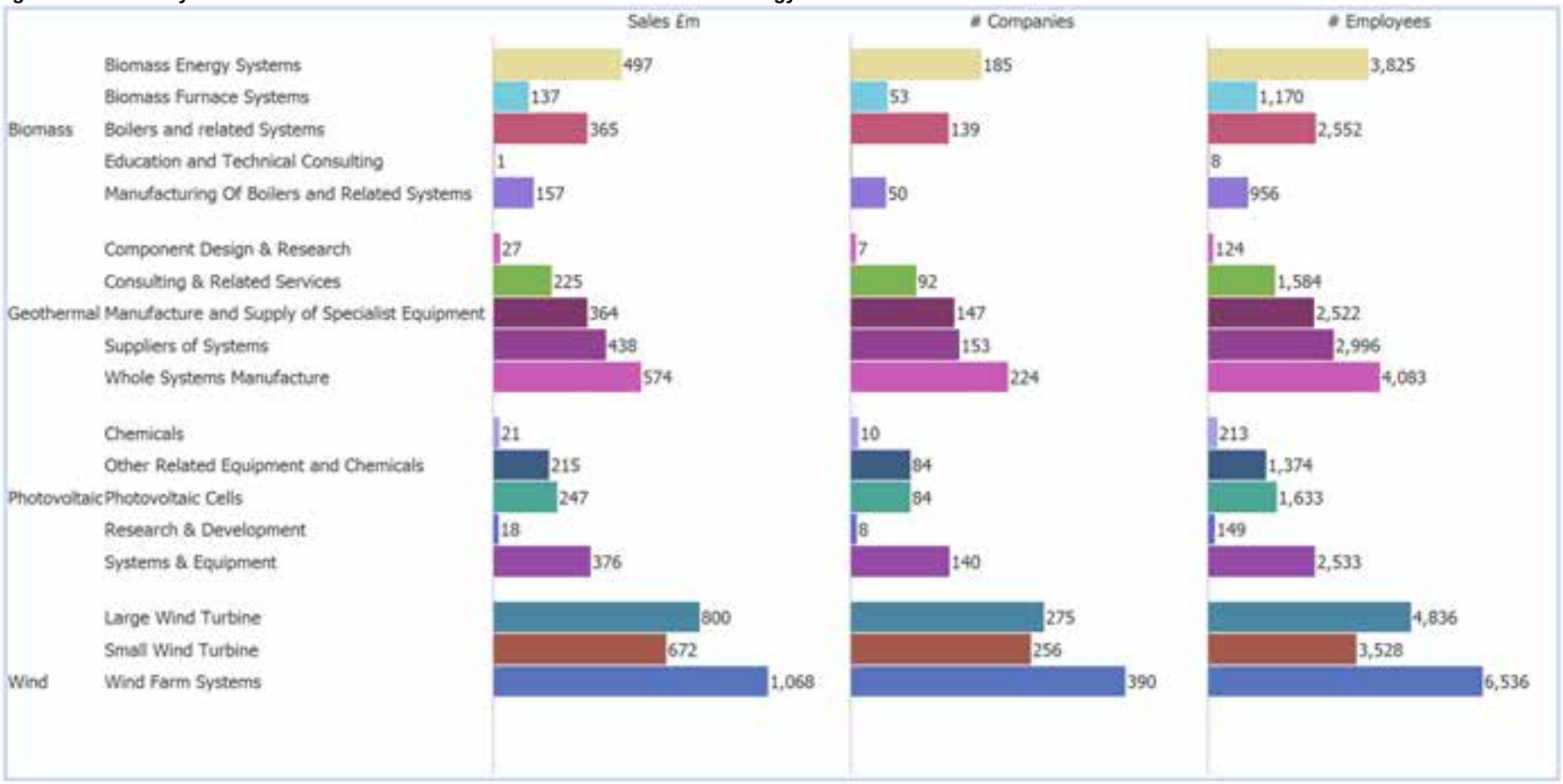


And the same four sub-sectors also account for 98% of companies (Figure 13). They are made up of Wind 39%, Geothermal 27%, Biomass 18% and Photovoltaic 14%.

Each of these four sub-sectors have grown between 2015/16 and 2017/18: Wind from 737 to 921; Geothermal from 579 to 623; Biomass from 384 to 427 and Photovoltaic from 264 to 326.

2.4.2 Renewable Energy Market at Level 3

Figure 14: Summary of selected metrics for 2017/18 for selected Renewable Energy Level 2 sub-sectors at Level 3



The top four Level 2 sub-sectors for Low Carbon are Wind, Geothermal, Biomass and Photovoltaic, making up 99% of the Renewable Energy market in EM3. Figure 14 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 40% of sales and has three sub-sectors at Level 3, the largest being Wind Farm Systems which makes up 42% of sales in this market. Example companies include maintenance services, systems integration services, power firming services and grid regulation.

Geothermal has five sub-sectors at Level 3, the largest being Whole Systems Manufacture which makes up 35% of the sales in this market. Example companies include lateral geothermal systems providers and installers at the domestic and small commercial level.

Biomass has five sub-sectors at level 3, the largest being Biomass Energy Systems which makes up 43% of the sales in this market, example companies include developers, installers and consultancies.

Photovoltaic has five sub-sectors at level 3, the largest being Systems & Equipment which makes up 43% of sales in this market. Example companies include systems developers, suppliers and installers.

Available sales as a percentage of sales was higher for Geothermal (25.6%) than the average for the Renewable Energy sub-sector (22.9%). The level 3 sub-sectors that show high available sales as a percentage of sales are Suppliers of Systems (25.6%) and Whole Systems Manufacture (28.7%).

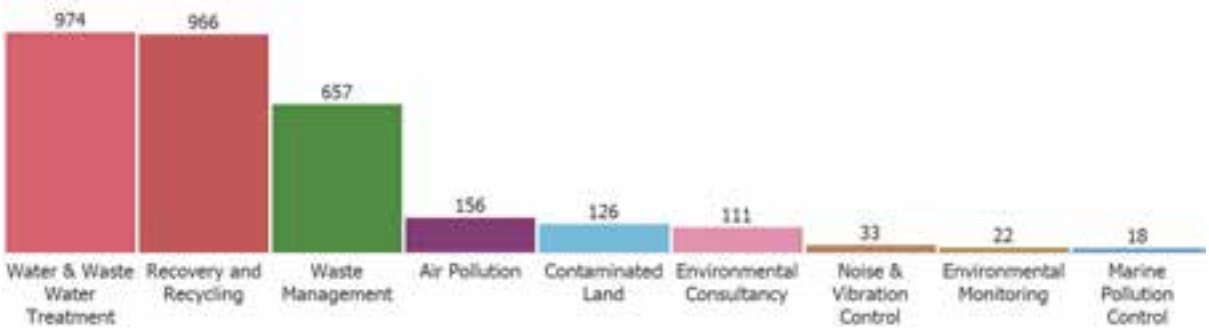
Available sales as a percentage of sales was also higher for Biomass (25.2%). The level 3 sub-sectors that show high available sales as a percentage of sales are Biomass Energy Systems (27.0%) and Manufacture of Boilers and Related Systems (28.0%).

2.5 EM3's LCEGS Level 1 - Environmental Market

In this section we look at the Environmental 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 the activity happening within them at Level 3.

2.5.1 Environmental Market at Level 2

Figure 15: Sales 2017/18 in £m (Level 2)

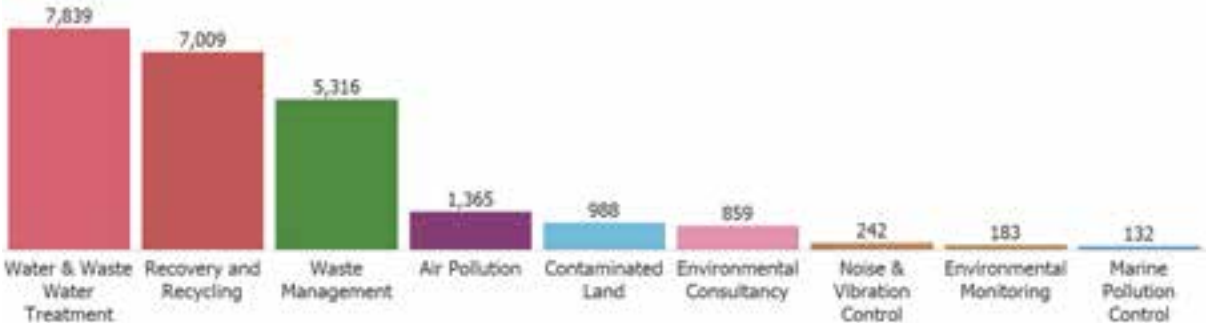


Environmental is split into nine sub-sectors, of which three account for 85% of sales (Figure 15). These three are made up of Water Supply & Waste Water Treatment 32%, Recovery & Recycling 32% and Waste Management 21%.

Each of these three sub-sectors have grown between 2015/16 and 2017/18: Water Supply and Waste Water Treatment from £907m to £966m; Recovery and Recycling from £884m to £966m and Waste Management from £584m to £657m.

Available sales as a percentage of sales for the largest three sub-sectors were: Water Supply & Waste Water Treatment 22.4%, Recovery and Recycling 20.5% and Waste Management 26.6%. The overall 2017/18 Environmental available sales as a percentage of sales were 22.7%, therefore Recovery & Recycling had a lower available sales as a percentage of sales and Waste Management showed a higher proportion than average for the sub-sector.

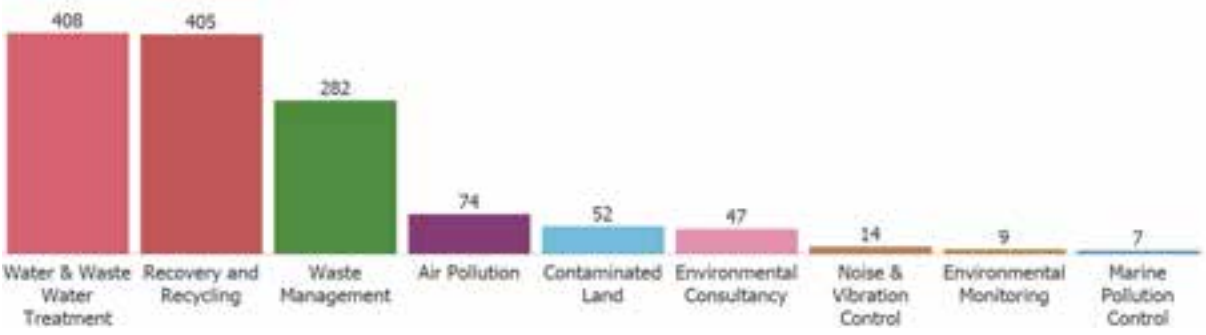
Figure 16: Employment 2017/18 (Level 2)



The same three sub-sectors account for 84% of employment (Figure 16). They are made up of Water Supply & Waste Water Treatment 33%, Recovery & Recycling 29% and Waste Management 22%.

Each of these three sub-sectors have grown between 2015/16 and 2017/18: Water & Waste Water Treatment from 7,470 to 7,839; Recovery and Recycling from 6,185 to 7,009 and Waste Management from 4,693 to 5,316.

Figure 17: Companies 2017/18 (Level 2)



The same three sub-sectors also account for 84% of companies (Figure 17). They are made up of Water Supply & Waste Water Treatment 31%, Recovery & Recycling 31% and Waste Management 22%.

Two of these three sub-sectors have grown between 2015/16 and 2017/18: Recovery and Recycling from 372 to 405 and Waste Management from 257 to 282. Water & Waste Water Treatment has reduced slightly from 410 to 408.

2.5.2 Environmental Market at Level 3

Figure 18: Summary of selected metrics for 2017/18 for Waste Management and Water & Waste Water Treatment sub-sectors at Level 3

Figure 18 shows the Sales, Companies and Employees for the Waste Management and Water & Waste Water Treatment Level 2 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. 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 sales more evenly distributed across them than for the Water and Waste Water Treatment market. The largest Level 3 sub-sector is Construction & Operation of Waste Treatment Facilities which makes up 39% of sales). 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 34% of sales in the market. Example companies are those involved in development, manufacture and supply.

Available sales as a percentage of sales was higher for Waste Management (26.6%) than the average for the Environmental sub-sector (22.7%). The level 3 sub-sectors that show high available sales as a percentage of sales are Construction & Operation of Waste Treatment Facilities (25.9%), Equipment for Waste Treatment (28.0%) and Technologies, Research & Development (30.0%).

Figure 19: Summary of selected metrics for 2017/18 for Recovery and Recycling at Level 3

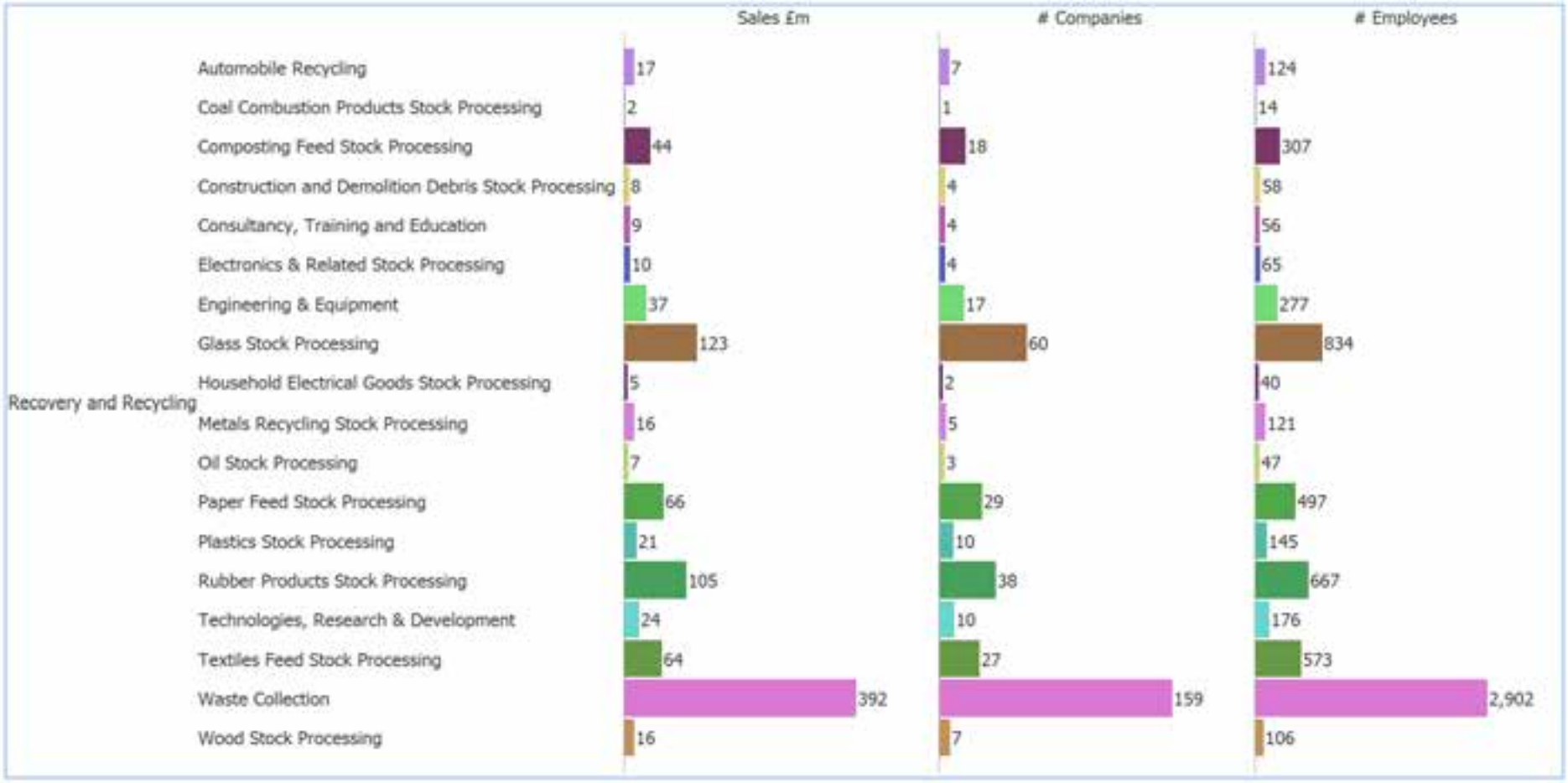


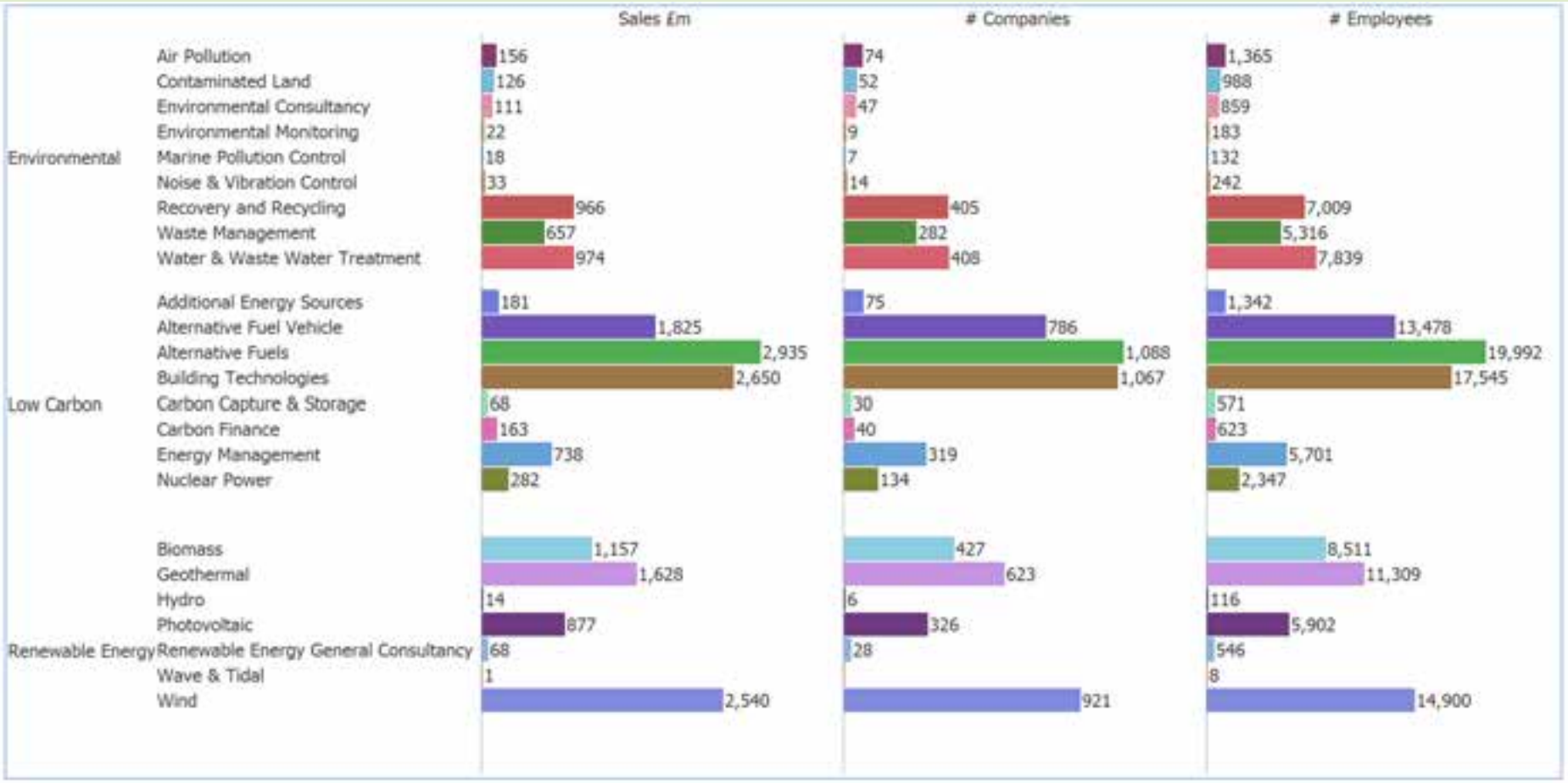
Figure 19 shows the Sales, Companies and Employees for the Level 2 Recovery & Recycling sub-sector broken down into its Level 3 sub-sectors. There are eighteen Level 3 sub-sectors and Waste Collection, including the collection of all waste, both municipal and commercial (landfill and recyclates), is clearly the largest sub-sector making up 41% of all sales in the Recovery and Recycling sub-sector. There are then a number of waste stream stock processing sub-sectors with the largest ones being Glass, Rubber Products, Textiles, Paper and Composting.
-

Available sales as a percentage of sales was lower for Recovery and Recycling (20.5%) than the average for the Environmental sub-sector (22.7%). Some of the larger level 3 sub-sectors had available sales as a percentage of sales in line with the sub-sector as a whole, including Glass Stock Processing (21.6%), Rubber Products Stock Processing (22.9%) and Waste Collection (21.9%). The sub-sectors that show low available sales as a percentage of sales are Composting Feed Stock Processing (18.2%), Paper Feed Stock Processing (19.7%) and Textiles Feed Stock Processing (15.6%).

2.6 EM3's LCEGS Level 2 Summary

Figure 20 compares all 24 sub-sectors of LCEGS and shows that the five leading sub-sectors: Alternative Fuels (16%), Building Technologies (15%), Wind (14%), Alternative Fuel Vehicle (10%) and Geothermal (9%) have the largest share in terms of sales, company numbers and employment and accounted for 64% of EM3's LCEGS sector activity in 2017/18. There is then a second grouping of six sub-sectors that are: Biomass 6%, Water and Waste Water Treatment 5%, Recovery and Recycling 5%, Photovoltaic 5%, Energy Management 4% and Waste Management 4%; that make up a further 30% of the LCEGS sector sales in 2017/18. These 11 sub-sectors dominate the LCEGS sector sales and together made up 93% of its overall sales in 2017/18.

Figure 20: LCEGS Summary 2017/8 for Sales, Number of Companies and Number of Employees


Sales £m
Companies
Employees
Environmental
Air Pollution 156 74 1,365
Contaminated Land 126 52 988
Environmental Consultancy 111 47 859
Environmental Monitoring 22 9 183
Marine Pollution Control 18 7 132
Noise & Vibration Control 33 14 242
Recovery and Recycling 966 405 7,009
Waste Management 657 282 5,316
Water & Waste Water Treatment 974 408 7,839
Low Carbon
Additional Energy Sources 181 75 1,342
Alternative Fuel Vehicle 1,825 786 13,478
Alternative Fuels 2,935 1,088 19,992
Building Technologies 2,650 1,067 17,545
Carbon Capture & Storage 68 30 571
Carbon Finance 163 40 623
Energy Management 738 319 5,701
Nuclear Power 282 134 2,347
Renewable Energy
Biomass 1,157 427 8,511
Geothermal 1,628 623 11,309
Hydro 14 6 116
Photovoltaic 877 326 5,902
Renewable Energy General Consultancy 68 28 546
Wave & Tidal 1 8
Wind 2,540 921 14,900

2.7 LCEGS comparison between the EM3, the UK and selected LEPs

In this section, we compare the EM3 LCEGS sector with the UK, with the UK when London is excluded and with selected LEP's. London accounts for 20% of the UK's LCEGS sector sales, being such an outlier, we have excluded the London LEP from some of the analysis so we can see what is happening in the UK outside of the City, providing a more realistic comparison with UK figures.

Figure 21: EM3 Measures 2017/18.

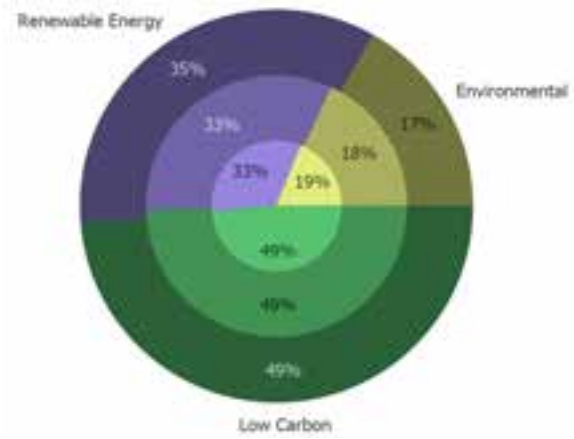


Figure 22: UK Measures 2017/18.

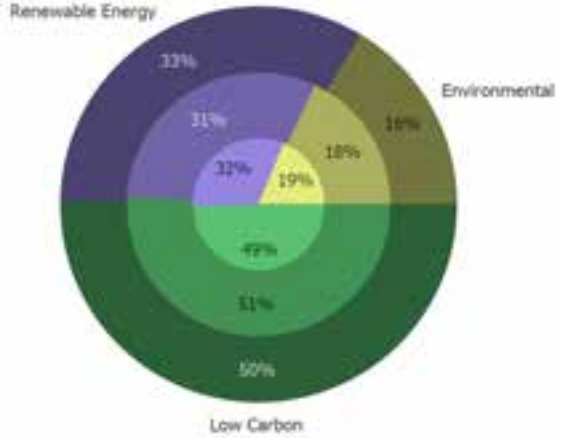
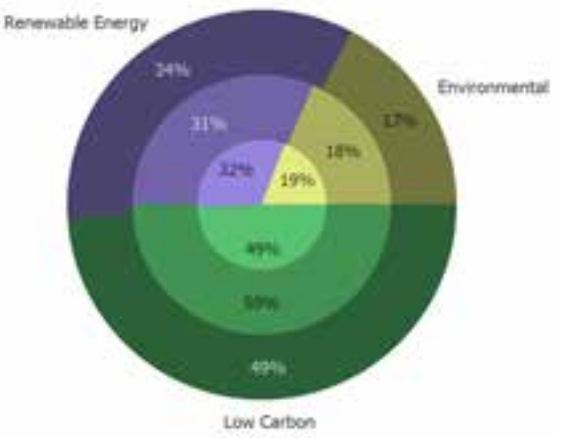


Figure 23: UK (minus London) Measures 2017/18



Figures 21, 22 and 23 compare the profile of EM3 and UK's LCEGS activities at Level 1 for sales (outer circle), companies (middle circle) and employment (inner circle). EM3 is stronger in Renewable Energy for all three measures.

Figure 24: EM3's LCEGS sub-sectors for 2017/18 at Level 2

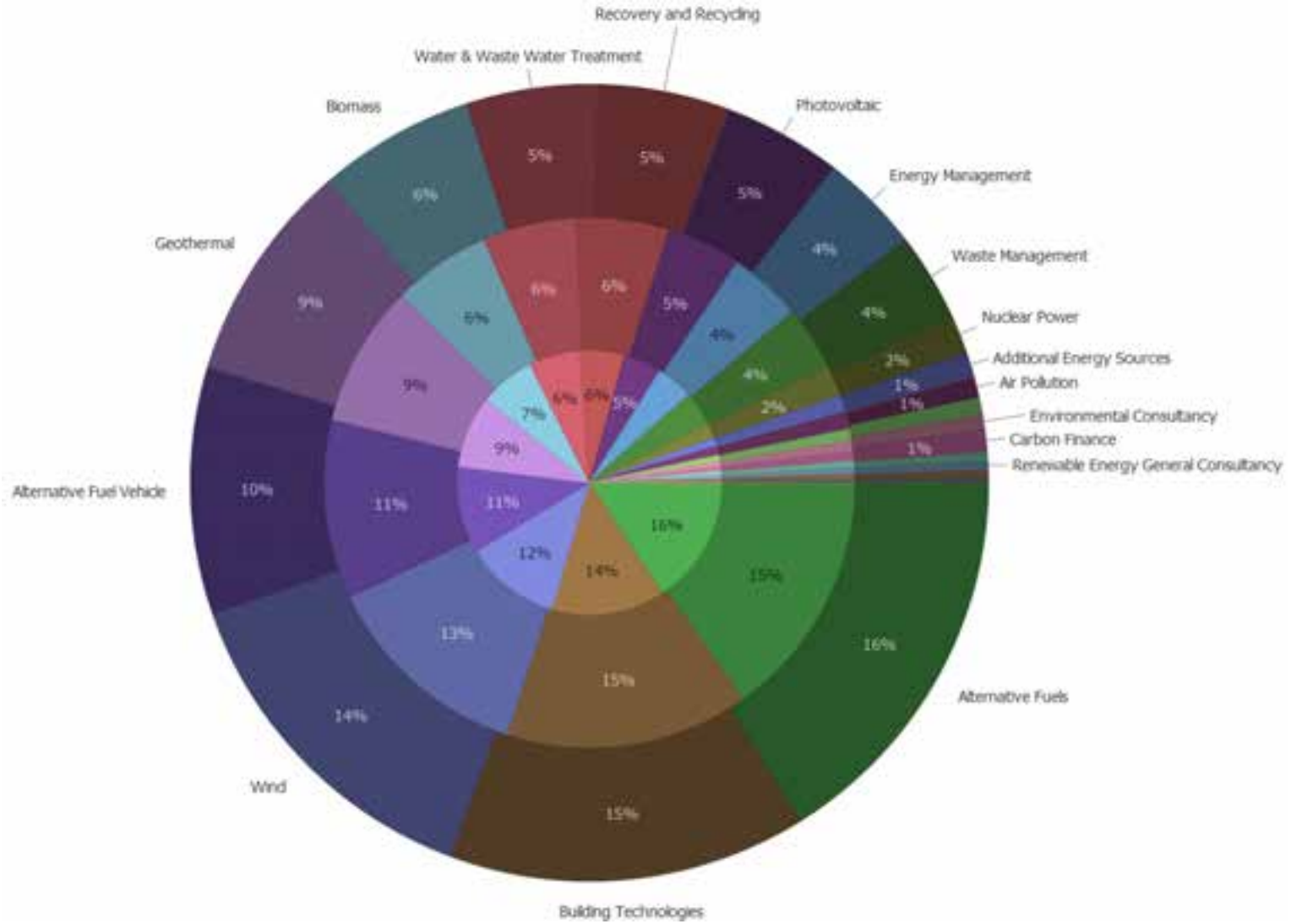
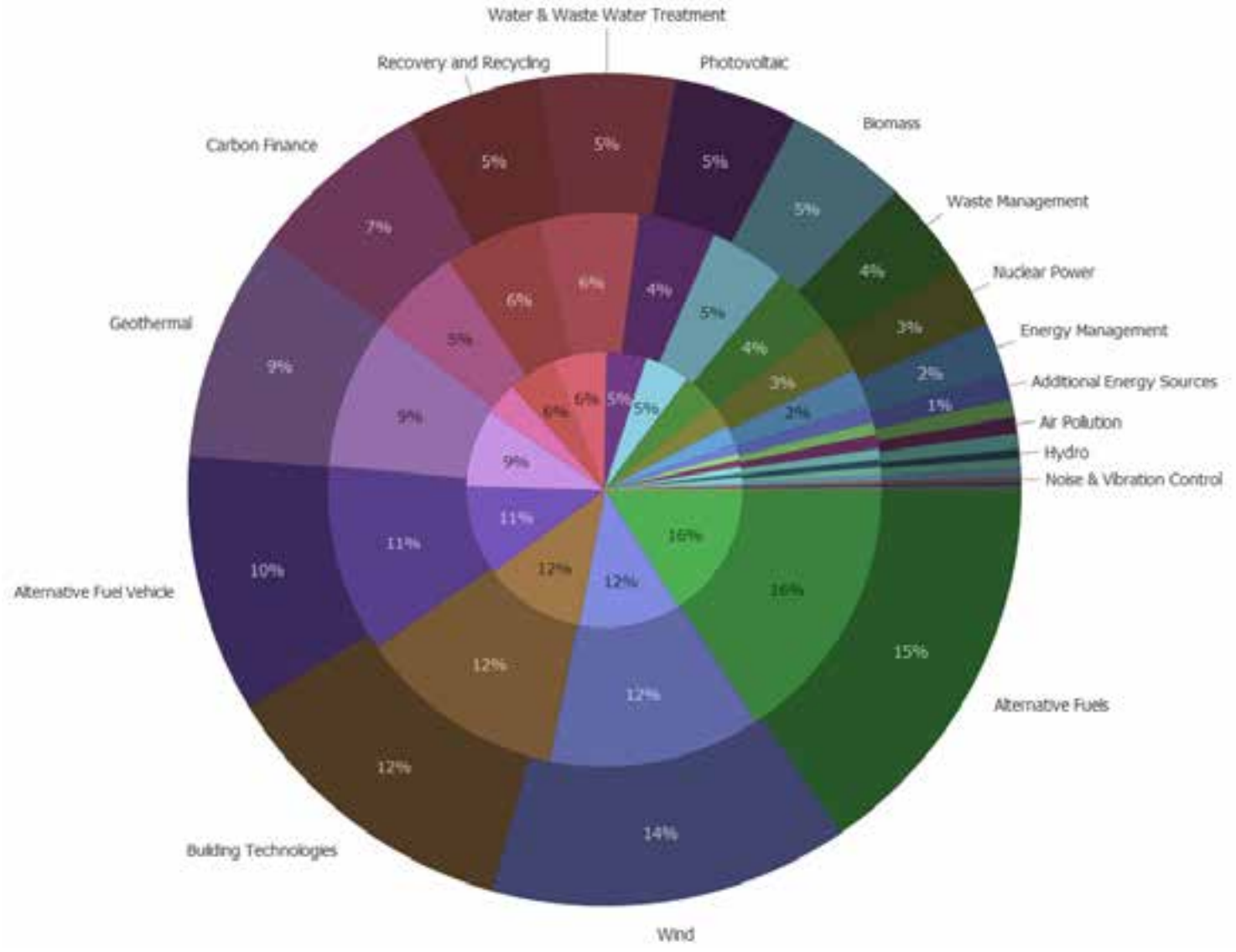


Figure 25: UK's LCEGS sub-sectors for 2017/18 at Level 2



Figures 24 and 25 extends the analysis by comparing the profile of EM3 and UK's LCEGS activities at Level 2 for sales (outer circle), companies (middle circle) and employment (inner circle). There are subtle differences between the two that gives EM3 a distinctive LCEGS profile compared to the overall UK profile. These differences are mainly accounted for by the fact that Carbon Finance is not present in the EM3 graph, this is because it is the largest LCEGS sub-sector in London and a function of the financial services sector in the City and Canary Wharf and shows negligible activity outside of London. Conversely Building Technologies is a strength of the region.

Figure 26: UK (Excluding London) LCEGS sub-sectors for 2017/18 at Level 2

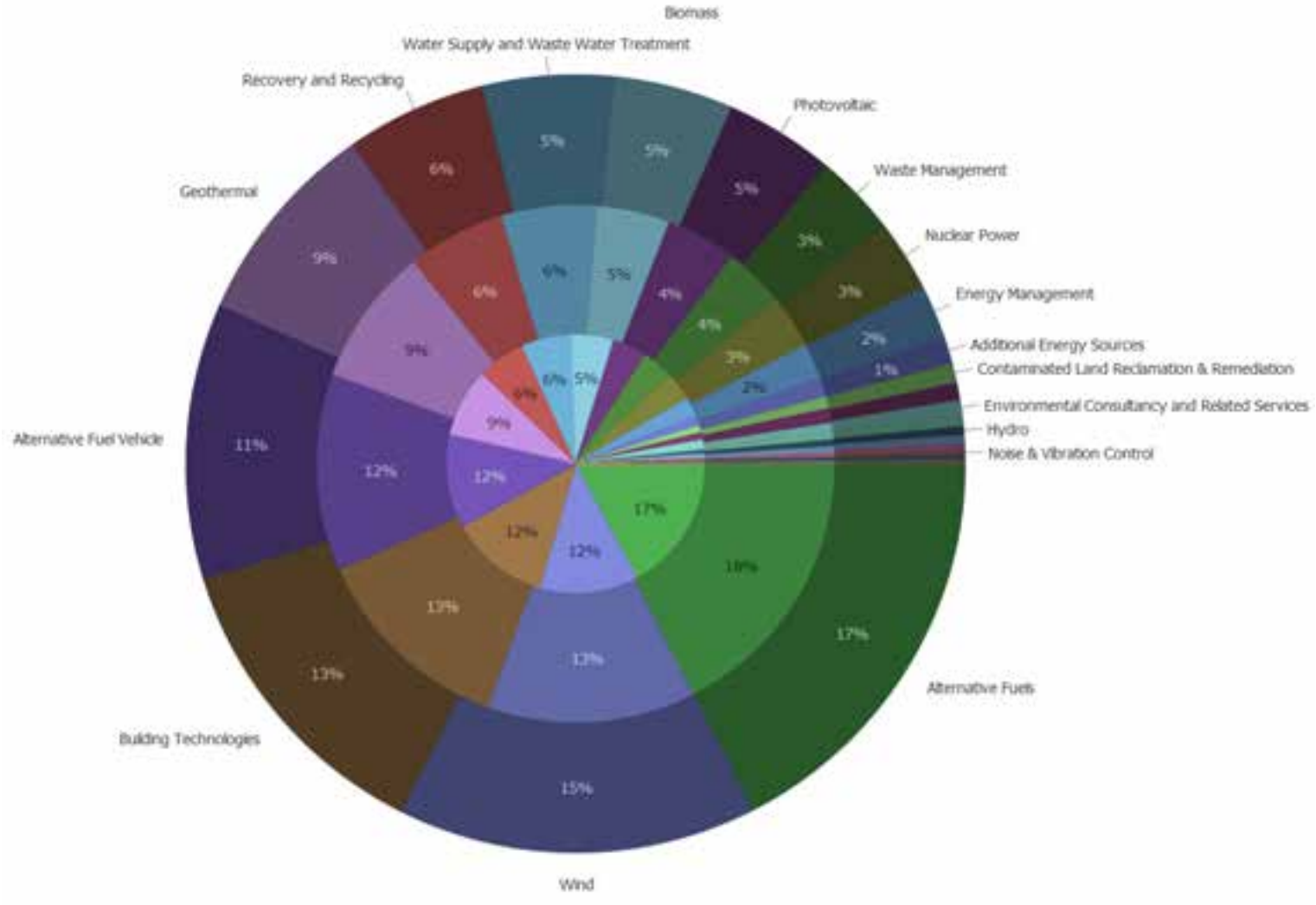


Figure 26 gives the profile of the UK's LCEGS activities, when London is excluded, at Level 2 for sales (outer circle), companies (middle circle) and employment (inner circle).

Here we can see that EM3 is more in line with the rest of the UK, when London is excluded from the analysis. Only the top four sub-sectors show variation between EM3 and the UK, with Building Technologies having more prominence and Wind slightly less.

Figure 25: Total LCEGS sales, companies and employees for selected LEP's

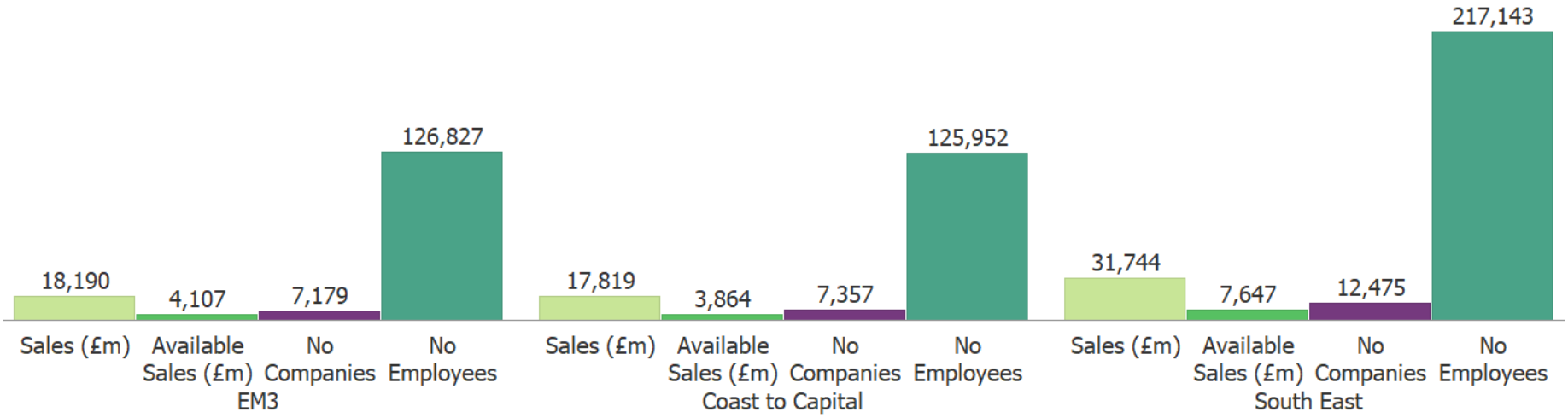


Figure 25 illustrates the relative sizes of the three selected LEP's. Overall, these three LEP's account for £67.8bn in sales, accounting for 37% of the UK total (£184.7bn). EM3 alone accounts for 9.8%, Coast to Capital 9.6% and South East 17.2% of UK sales.

The South East is significantly larger than the other two LEPs, accounting for 47% of sales, 46% of companies and 46% of employees.

EM3 and Coast to Capital are comparable in size in all three metrics.

A key characteristic of the EM3 LEP is their early to mid-supply chain and network of supply (network of supply includes untraded activities e.g. intellectual). Coast to Capital and South East are more prevalent in end product activities.

Available sales are the portion of the market penetrable under usual cost of sales, not locked by long term contracts or aggressive marketing strategies. They represent the size of market realistically available to new entrants to the market. All three have good available sales, the EM3 has 23%, Coast to Capital 22% and South East 24%.

Figure 26: Sales, Employment and Companies 2017/18 for selected LEP's

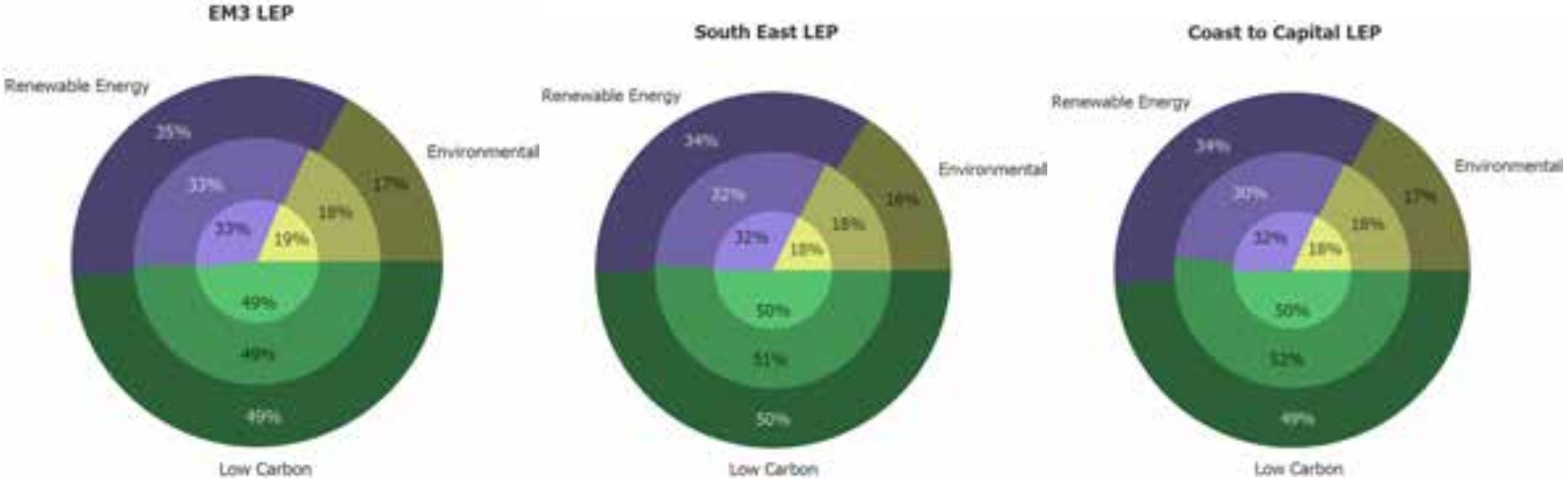


Figure 26 compares the EM3, South East and Coast to Capital LEP's for sales (outer circle), companies (middle circle) and employment (inner circle) for level 1. At this level of detail, the three LEP's have a similar pattern of LCEGS activity.

Figures 23, 27 and 28 compare the EM3, South East and Coast to Capital LEP's at level 2 for sales (outer circle), companies (middle circle) and employment (inner circle). At this level of detail we can see that the patterns of LCEGS activity are quite different between the different LEP's. The top four sub-sectors for all three LEP's are Alternative Fuels, Building Technologies, Wind and Alternative Fuel Vehicle, however the relative importance of each varies, for example, Building Technologies holds 16% of sales for the EM3 and Coast to Capital LEPS and 19% of the South East LEP. Likewise, Wind varies in importance, holding 14% of sales in the EM3 and Coast to Capital LEP's and 18% in the South East. Geothermal holds 9% of EM3 sales, 7% of Coast to Capital and 4% of South East.

Figure 27: Sales, Employment and Companies 2017/18 for the South East LEP

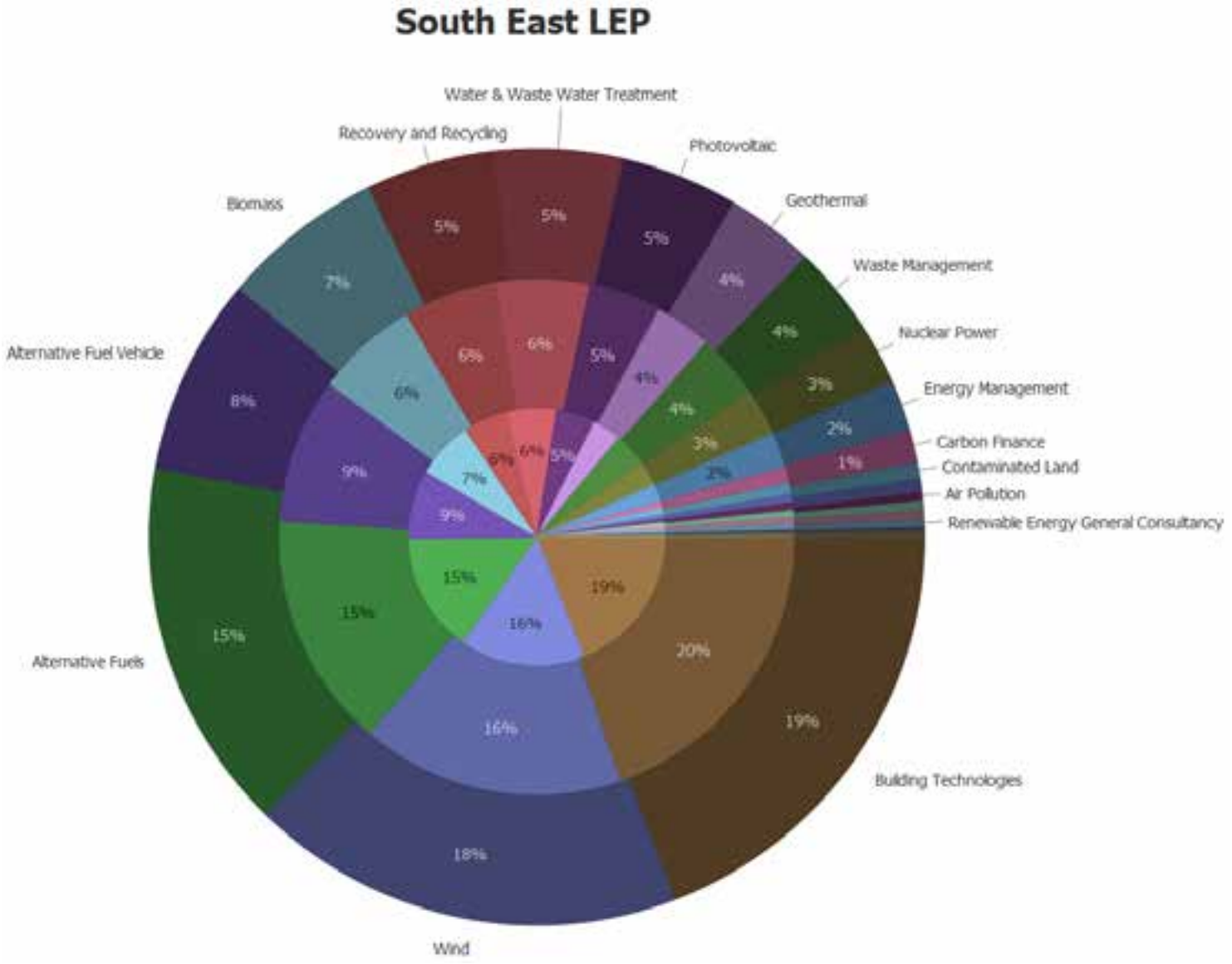


Figure 28: Sales, Employment and Companies 2017/18 for the Coast to Capital LEP

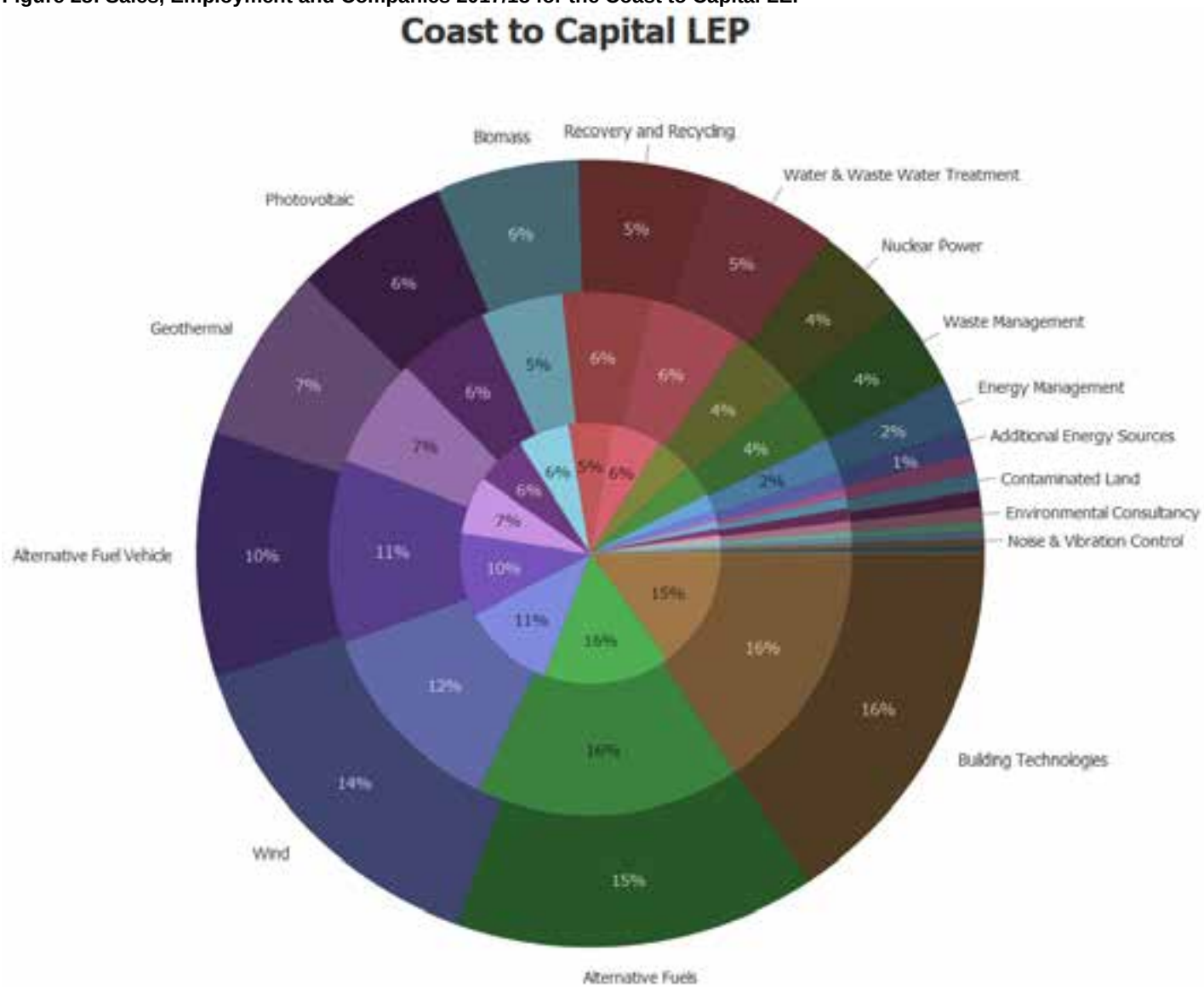
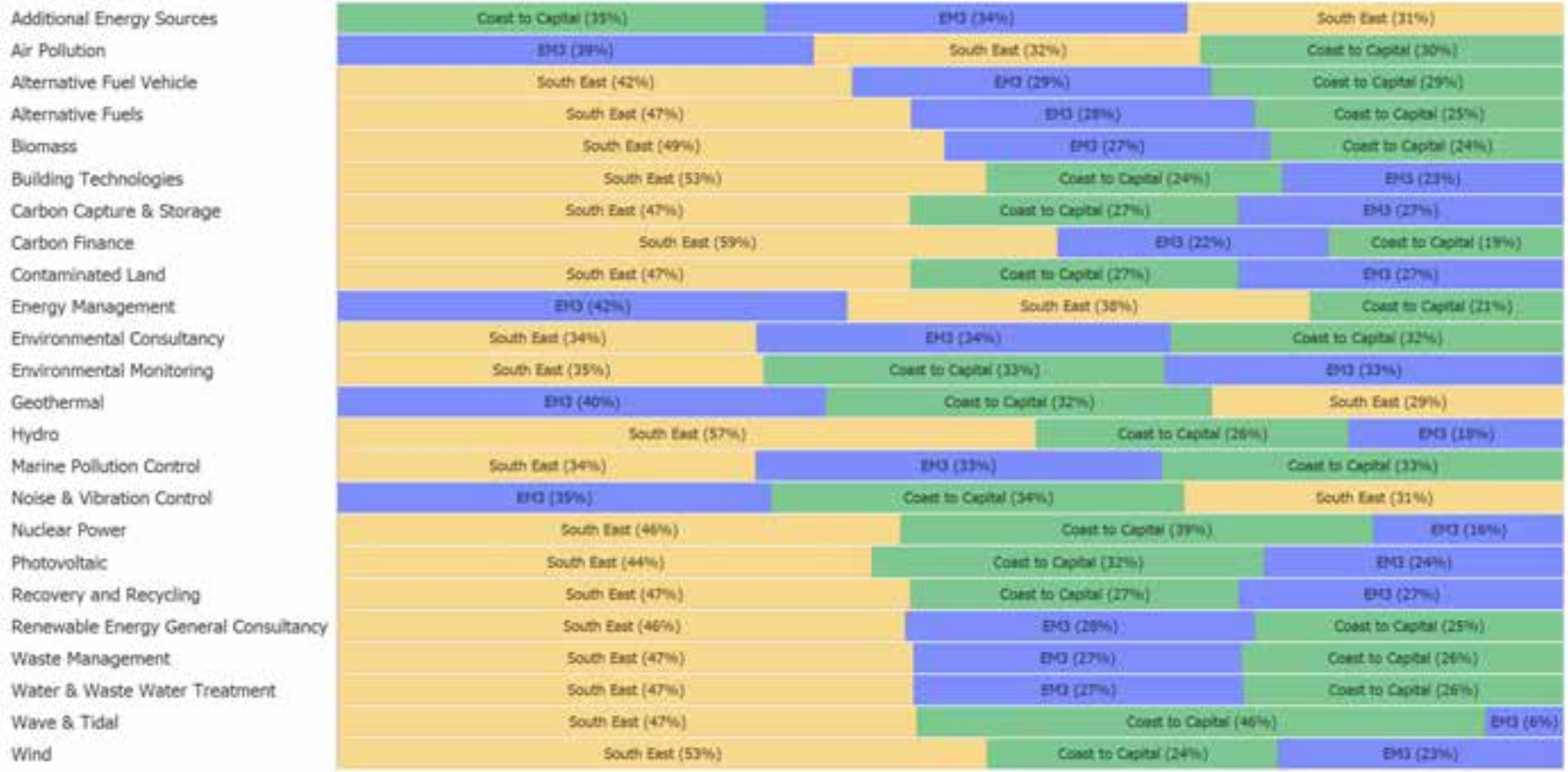


Figure 29 then compares the same LEP's, but this time by all the Level 2 sub-sectors. The percentages indicated the proportion of the total combined LCEGS market for the three LEP's. The South East holds 47% of sales (EM3 holds 27%) so it is not surprising that it also holds the largest share of the market for 19 of the 24 level 2 sub-sectors. With this in mind, we can see that the EM3 LEP is performing particularly well in Energy Management (42%), Geothermal (40%) and Air Pollution (39%). The larger the percentage share of a sub-sector in a region, the higher the degree of supply chain localization in that sub-sector, in that region. The higher the degree of localization, the bigger the opportunity for the development of partnerships and regional cooperation.

Figure 29: Sales 2017/18 for EM3, Coast to Capital and South East LEP's as a % of the total for all three, at Level 2



EM3 has the highest share of the market in 4 sub-sectors: Energy Management (42%), Geothermal (40%), Air Pollution (39%) and Noise and Vibration Control (35%).

EM3 has the second highest share of the market in 10 sub-sectors: Additional Energy Sources (34%), Environmental Consultancy (34%), Marine Pollution Control (33%), Alternative Fuel Vehicle (29%), Alternative Fuels (28%), Renewable Energy General Consultancy (28%), Biomass (27%), Waste Management (27%), Water & Waste Water Treatment (27%) and Carbon Finance (22%).

Figure 30 shows the patterns of level 2 sales for each level 1 category in each of the three LEP's. Each bar represents the total activity for the LEP in the level 1 sub-sector, split between the top level five 2 sub-sectors.

Figure 30: Sales patterns in 2017/18 for EM3, Coast to Capital and South East LEP's, at Level 2 arranged by L1

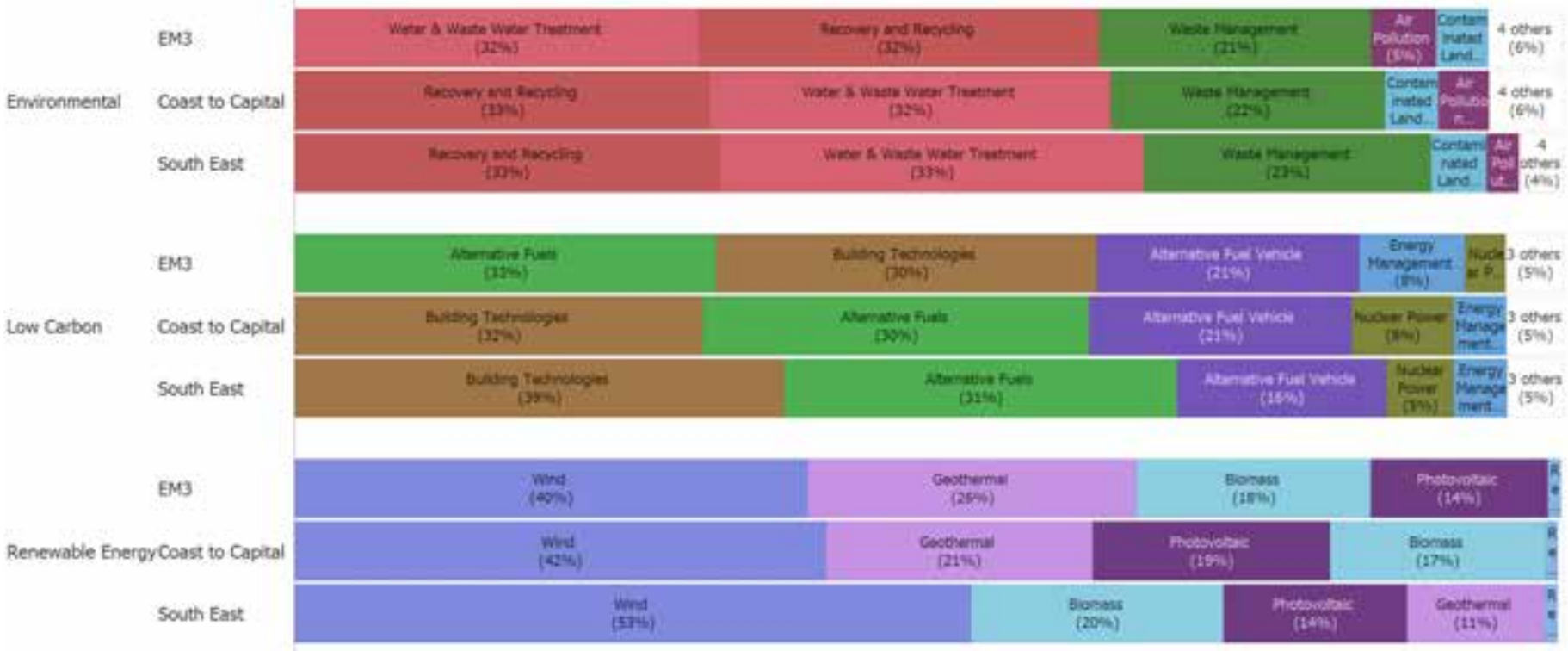


Figure 30 illustrates the different patterns in sales activities between the three LEP's. Environmental shows very similar patterns in all three, whereas EM3 differs from the other two in Low Carbon, with a higher percentage of sales in Alternative Fuels (33%) than Building Technologies (30%). The sales pattern for Renewable Energy is different between the three LEP's, with Wind holding less of the market in EM3, at 40% compared with 43% for Coast to Capital and 53% in South East. In contrast, Geothermal holds a much larger portion of the market in EM3, with 26% compared to Coast to Capital at 21% and South East at 11%.

2.8 EM3's LCEGS Growth

In Section 2.1 annual growth in EM3's LCEGS sales, companies and employment was broadly compared with growth in the UK's LCEGS sector as a whole for 2015/16 to 2017/18. Table 1 shows the EM3 annual growth in more detail by breaking it down into sub-sectors for each of the three years. Growth between one year and the next is shown in red.

While annual growth in the LCEGS sector as a whole has varied between 3.4 and 6.9% for each of the three parameters, Table 1 shows that there is considerable variation in growth between the Level 2 sub-sectors. This reflects EM3's strengths and its share of these sub-sector markets all of which are growing at different rates.

The higher growth rates for some sub-sectors in EM3 are generally a reflection of higher growth rates in the whole UK market and the opportunities that are being created by drivers of growth including policy, regulation and consumer choices. Most sub-sectors in EM3 have growth rates within 2-3% of the UK growth rates. The main exceptions are:

- Environmental Consultancy, where EM3 grew by 5.5% between 2015/16 and 2016/17 and 8.9% between 2016/17 and 2017/18 and the UK growth rates were 4.7% between 2015/16 and 2016/17 and 4.8% between 2016/17 and 2017/18
- Environmental Monitoring, where the EM3 growth rates were 1.3% between 2015/16 and 2016/17 and 3.9% between 2016/17 and 2017/18 and the UK growth rates were 4.8% between 2015/16 and 2016/17 and 4.9% between 2016/17 and 2017/18
- Marine Pollution Control, where the EM3 growth rates were 1.6% between 2015/16 and 2016/17 and 9.5% between 2016/17 and 2017/18 and the UK growth rates were 5.3% between 2015/16 and 2016/17 and 5.4% between 2016/17 and 2017/18
- Noise & Vibration Control, where the EM3 growth rates were 5.7% between 2015/16 and 2016/17 and 8.8% between 2016/17 and 2017/18 and the UK growth rates were 5.7% between 2015/16 and 2016/17 and 5.8% between 2016/17 and 2017/18
- Alternative Fuel Vehicle, where the EM3 growth rates were 14.8% between 2015/16 and 2016/17 and -2.6% between 2016/17 and 2017/18 and the UK growth rates were 5.3% between 2015/16 and 2016/17 and 5.4% between 2016/17 and 2017/18
- Building Technologies, where the EM3 growth rates were 3.6% between 2015/16 and 2016/17 and 11.6% between 2016/17 and 2017/18 and the UK growth rates were 6.8% between 2015/16 and 2016/17 and 7.0% between 2016/17 and 2017/18
- Biomass, where the EM3 growth rates were 2.6% between 2015/16 and 2016/17 and 12.0% between 2016/17 and 2017/18 and the UK growth rates were 7.3% between 2015/16 and 2016/17 and 7.5% between 2016/17 and 2017/18

- Geothermal, where the EM3 growth rates were 4.4% between 2015/16 and 2016/17 and 6.8% between 2016/17 and 2017/18 and the UK growth rates were 7.5% between 2015/16 and 2016/17 and 7.7% between 2016/17 and 2017/18
- Photovoltaic, where the EM3 growth rates were 10.6% between 2015/16 and 2016/17 and 5.5% between 2016/17 and 2017/18 and the UK growth rates were 8.9% between 2015/16 and 2016/17 and 9.1% between 2016/17 and 2017/18
- Renewable Consultancy, where the EM3 growth rates were -0.4% between 2015/16 and 2016/17 and 12.7% between 2016/17 and 2017/18 and the UK growth rates were 3.7% between 2015/16 and 2016/17 and 3.7% between 2016/17 and 2017/18
- Wind, where the EM3 growth rates were 12.3% between 2015/16 and 2016/17 and 6.7% between 2016/17 and 2017/18 and the UK growth rates were 10.7% between 2015/16 and 2016/17 and 11.0% between 2016/17 and 2017/18
- Carbon Finance, where the EM3 growth rates were 0.0% between 2015/16 and 2016/17 and 33.2% between 2016/17 and 2017/18 and the UK growth rates were 13.3% between 2015/16 and 2016/17 and 13.7% between 2016/17 and 2017/18 – however, this market is so small it is not relevant

Table 1 shows that the highest levels of actual growth in EM3 LCEGS between 2015/16 and 2017/18 occurred in Wind, Photovoltaics, Wave & Tidal and Biomass (Renewable Energy), Alternative Fuels, Building Technologies and Carbon Finance (Low Carbon) and Noise & Vibration Control and Environmental Consultancy (Environmental).

Table 1: EM3's LCEGS Sales (£m), Company and Employment Growth 2015/16 to 2017/18

		Sales					Companies					Employees				
Level 1	Level 2	2015/16	Growth % for 2016/17	2016/17	Growth % for 2017/18	2017/18	2015/16	Growth % for 2016/17	2016/17	Growth % for 2017/18	2017/18	2015/16	Growth % for 2016/17	2016/17	Growth % for 2017/18	2017/18
Environmental	Air Pollution	150.3	1.5	152.6	2.2	155.8	69	2.5	71	4.3	74	1,261	4.4	1,316	3.7	1,365
Environmental	Contaminated Land	117.4	2.3	120.0	4.7	125.7	50	3.2	52	0.6	52	920	3.1	949	4.1	988
Environmental	Environmental Consultancy	97.1	5.5	102.4	8.9	111.4	44	4.1	46	1.9	47	787	4.6	824	4.3	859
Environmental	Environmental Monitoring	20.6	1.3	20.9	3.9	21.7	8	6.2	9	7.7	9	164	2.4	168	9.3	183
Environmental	Marine Pollution Control	16.6	1.6	16.9	9.5	18.5	7	3.7	7	4.1	7	117	3.4	121	9.3	132
Environmental	Noise & Vibration Control	28.6	5.7	30.2	8.8	32.9	12	3.1	13	6.2	14	225	4.6	235	2.9	242
Environmental	Recovery and Recycling	883.9	3.1	911.1	6.0	966.2	372	2.1	380	6.6	405	6,185	4.6	6,470	8.3	7,009
Environmental	Waste Management	584.2	6.2	620.3	5.9	656.6	257	3.4	265	6.4	282	4,693	3.7	4,868	9.2	5,316
Environmental	Water & Waste Water Treatmen	906.5	4.8	949.7	2.5	973.7	410	-3.1	397	2.6	408	7,470	0.5	7,506	4.4	7,839
Low Carbon	Additional Energy Sources	163.6	6.8	174.7	3.8	181.3	67	7.1	71	5.0	75	1,275	5.6	1,346	-0.3	1,342
Low Carbon	Alternative Fuel Vehicle	1,632.8	14.8	1,874.3	-2.6	1,825.4	754	0.9	760	3.4	786	11,934	11.9	13,357	0.9	13,478
Low Carbon	Alternative Fuels	2,508.0	7.0	2,684.6	9.3	2,934.8	1,021	-1.2	1,008	7.9	1,088	17,438	4.6	18,243	9.6	19,992
Low Carbon	Building Technologies	2,291.6	3.6	2,374.1	11.6	2,650.3	956	3.5	990	7.7	1,067	15,531	5.2	16,341	7.4	17,545
Low Carbon	Carbon Capture & Storage	61.6	2.2	63.0	7.4	67.6	28	1.3	28	5.9	30	515	0.0	515	11.0	571
Low Carbon	Carbon Finance	122.3	0.0	122.3	33.2	163.0	39	13.1	44	-7.5	40	436	20.0	523	19.0	623
Low Carbon	Energy Management	688.4	2.3	704.5	4.8	738.4	284	3.3	294	8.7	319	4,882	11.9	5,465	4.3	5,701
Low Carbon	Nuclear Power	260.5	6.0	276.0	2.1	281.7	117	8.3	127	5.9	134	2,233	-3.6	2,153	9.0	2,347
Renewable Energy	Biomass	1,006.4	2.6	1,032.5	12.0	1,156.6	384	1.7	391	9.3	427	7,400	7.2	7,934	7.3	8,511
Renewable Energy	Geothermal	1,459.6	4.4	1,524.2	6.8	1,628.1	579	0.3	581	7.3	623	9,969	9.4	10,906	3.7	11,309
Renewable Energy	Hydro	12.9	6.4	13.7	3.3	14.2	6	4.6	6	7.9	6	114	-4.5	109	6.3	116
Renewable Energy	Photovoltaic	751.5	10.6	831.5	5.5	877.3	264	14.3	302	8.0	326	4,829	12.5	5,431	8.7	5,902
Renewable Energy	Renewable Consultancy	60.4	-0.4	60.1	12.7	67.7	25	4.6	26	7.8	28	505	4.3	526	3.8	546
Renewable Energy	Wave & Tidal	1.1	10.7	1.3	6.2	1.3	0	5.0	0	10.4	0	7	7.4	7	12.9	8
Renewable Energy	Wind	2,119.2	12.3	2,380.5	6.7	2,539.9	737	14.1	841	9.5	921	12,208	9.4	13,356	11.6	14,900
Total		**15,944.9**	6.9	**17,041.4**	6.7	**18,190**	**6,489**	3.4	**6,708**	6.9	**7,169**	**111,095**	6.8	**118,667**	6.9	**126,824**

Table 2 shows sales growth forecasts (annual percentage growth from the previous year) for 2017/18 through to 2021/22. Forecast growth for the majority of sub-sectors is generally consistent with levels of historical growth, but as forecasts stretch out beyond 2021/22, they inevitably tend to be less robust.

Sub-sectors where growth is stronger than the historical figures, with double digit growth expected, include photovoltaic and wind, with others such as building technologies alternative fuels, geothermal and wave and tidal seeing double digit growth during the forecast period.

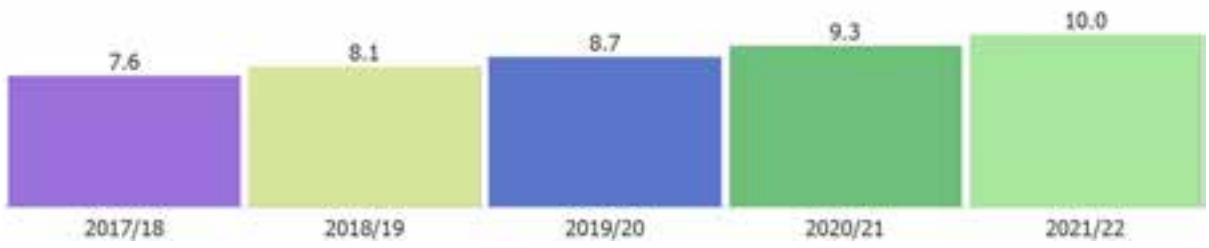
These are consistent with activity required to address some of the main environmental challenges that EM3 and the UK are facing such as decarbonising energy supply through renewable energy, reducing energy demand through Building Technologies and addressing air quality through alternative fuels and alternative Fuel Vehicles.

Table 2: EM3's LCEGS Forecast Sales (£m) Growth 2017/18 to 2021/22

Level 1	Level 2	2018/19	2019/20	2020/21	2021/22	2022/23
Environmental	Air Pollution	5.0	5.3	5.7	6.1	6.5
Environmental	Contaminated Land	6.1	6.5	7.0	7.5	8.0
Environmental	Environmental Consultancy	6.5	6.9	7.4	7.9	8.5
Environmental	Environmental Monitoring	6.5	7.0	7.4	8.0	8.5
Environmental	Marine Pollution Control	6.9	7.3	7.8	8.4	9.0
Environmental	Noise & Vibration Control	7.1	7.6	8.1	8.7	9.3
Environmental	Recovery and Recycling	6.7	7.2	7.7	8.2	8.8
Environmental	Waste Management	5.9	6.3	6.8	7.2	7.8
Environmental	Water & Waste Water Treatment	4.0	4.2	4.5	4.8	5.1
Low Carbon	Additional Energy Sources	7.6	8.1	8.7	9.3	10.0
Low Carbon	Alternative Fuel Vehicle	9.5	10.1	10.9	11.7	12.5
Low Carbon	Alternative Fuels	10.3	11.1	11.9	12.8	13.7
Low Carbon	Building Technologies	10.7	11.4	12.2	13.1	14.1
Low Carbon	Carbon Capture & Storage	6.7	7.2	7.7	8.2	8.8
Low Carbon	Carbon Finance	15.4	16.5	17.7	19.0	20.4
Low Carbon	Energy Management	7.0	7.5	8.0	8.6	9.2
Low Carbon	Nuclear Power	7.7	8.2	8.8	9.4	10.1
Renewable Energy	Biomass	9.2	9.9	10.6	11.4	12.2
Renewable Energy	Geothermal	10.3	11.1	11.9	12.7	13.6
Renewable Energy	Hydro	7.3	7.8	8.3	8.9	9.5
Renewable Energy	Photovoltaic	11.6	12.4	13.4	14.3	15.4
Renewable Energy	RenewableConsultancy	5.7	6.1	6.5	7.0	7.4
Renewable Energy	Wave & Tidal	10.6	11.4	12.2	13.1	14.1
Renewable Energy	Wind	13.3	14.3	15.4	16.5	17.7

Figure 31 shows the annual forecast growth for EM3's LCEGS to 2021/22 based upon the values in Table 15.

Figure 31: EM3's LCEGS Forecast Sales Growth 2017/18 to 2021/22

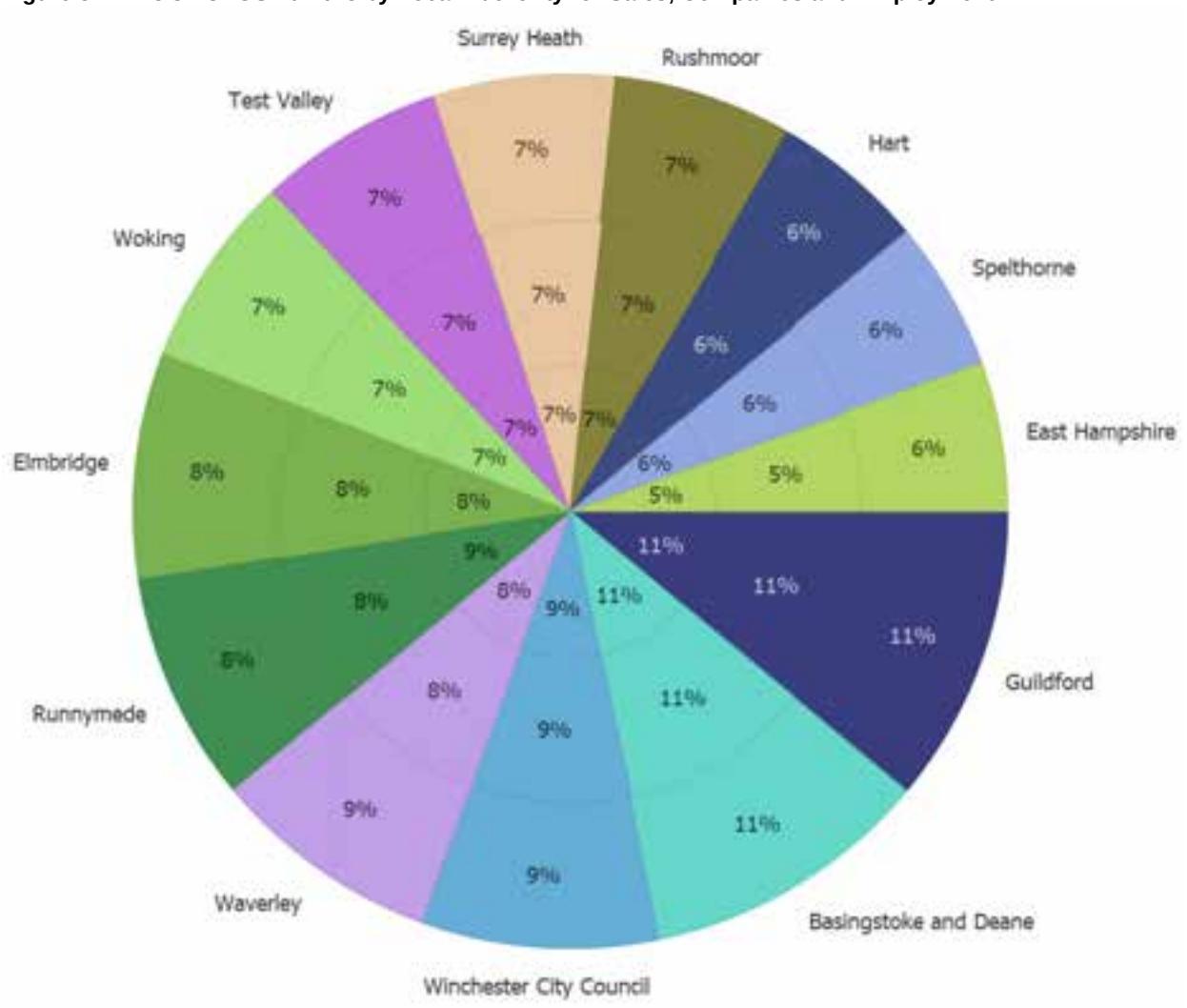


3. EM3's LCEGS by Local Authority

3.1 LCEGS by Local Authority

This section of the report continues the analysis of EM3's LCEGS sector by looking at the Local Authorities within the LEP. Figure 32 shows LCEGS for 2017/18 split by Local Authority for sales (outer circle), companies (middle circle) and employment (inner circle). Guildford is the largest Local Authority, with 11% of the LEP's LCEGS sales, companies and employment. Overall there is a similar pattern between the three metrics, with less than one percent difference between metrics within each Local Authority.

Figure 32: EM3's LCEGS 2017/18 by Local Authority for Sales, Companies and Employment



Local Authorities are analysed in more detail, by year, by economic measure and by LCEGS activity in the following section.

3.2 Local Authority Analysis by Year and Sub-Sector

Table 3 shows the three years of data for Local Authorities for sales, companies and employment. Growth between years is shown in red. Growth between years and across all three measures has been variable, with different Local Authorities seeing significantly different growth, predominantly in the growth for companies. An example is Test Valley, where growth in sales and employment 6-7%, whereas growth in companies was 2.1% followed by 8.0%, a pattern repeated in Elmbridge. Other Local Authorities such as Hart saw a less conspicuous difference in growth between the three metrics.

Table 3: Local Authorities Sales, Companies and Employment from 2015/16 to 2017/18

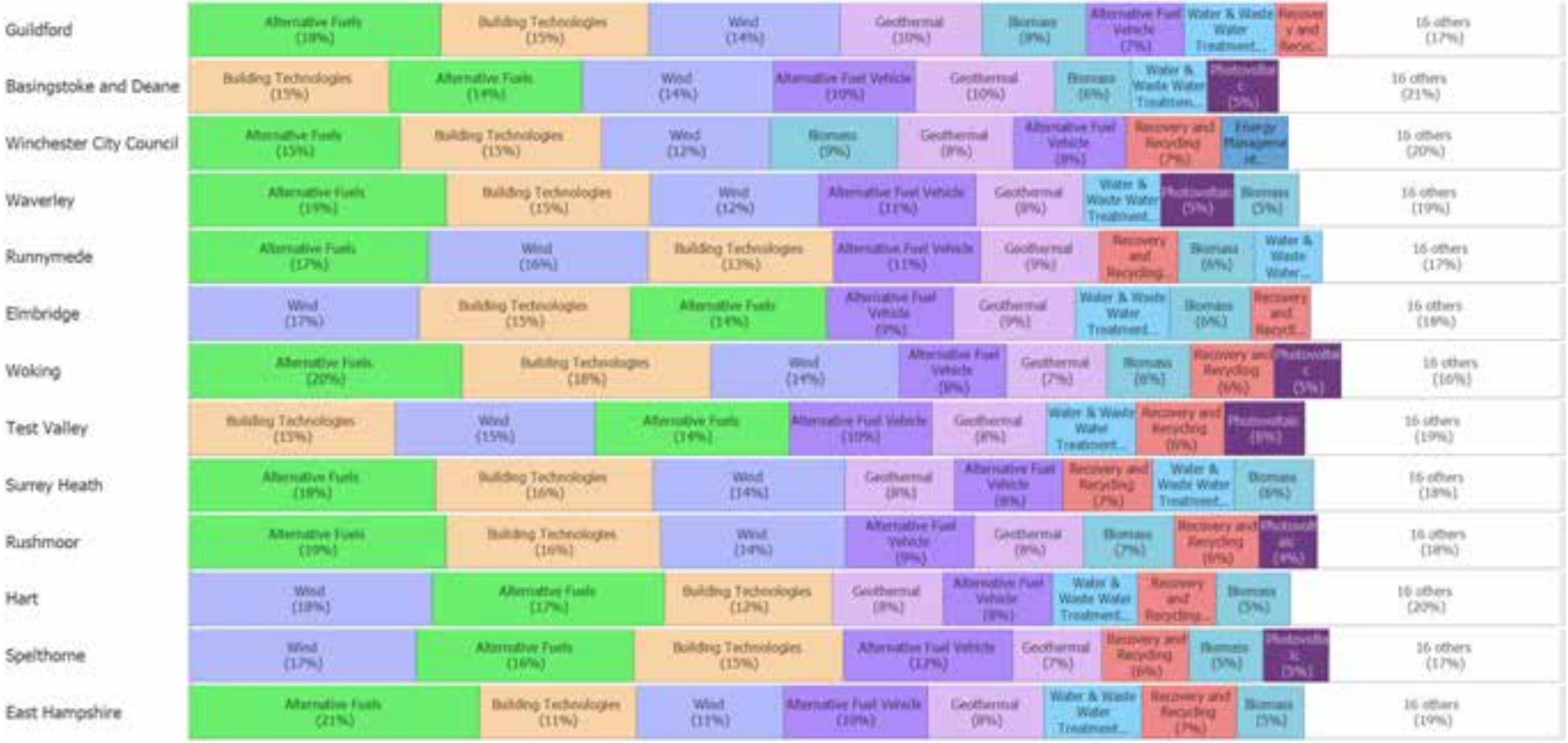
	Sales £m					Companies					Employment				
Local Authority	2015/16	Growth % for 2016/17	2016/17	Growth % for 2017/18	2017/18	2015/16	Growth % for 2016/17	2016/17	Growth % for 2017/18	2017/18	2015/16	Growth % for 2016/17	2016/17	Growth % for 2017/18	2017/18
Basingstoke and Deane	1,706.5	7.3	1,830.5	7.1	1,959.9	688.7	4.9	722.8	5.8	764.9	11,891.6	6.9	12,712.1	7.2	13,628.1
East Hampshire	874.6	6.1	928.0	8.6	1,008.0	356.7	3.0	367.2	6.1	389.8	6,102.3	7.9	6,583.9	5.5	6,947.3
Elmbridge	1,347.8	6.3	1,433.0	6.7	1,528.6	547.5	2.6	561.7	8.4	608.7	9,428.7	6.7	10,063.9	7.1	10,776.1
Guildford	1,755.9	7.2	1,881.6	7.2	2,017.4	713.2	2.5	731.0	8.2	791.2	12,204.4	6.8	13,035.0	7.9	14,062.8
Hart	924.0	6.6	984.7	5.8	1,042.3	366.3	4.0	381.1	7.5	409.5	6,306.6	6.5	6,719.7	8.0	7,255.1
Runnymede	1,352.0	8.3	1,464.7	6.0	1,553.3	555.6	2.9	571.6	6.3	607.7	9,371.5	8.0	10,119.8	7.1	10,839.4
Rushmoor	1,051.4	6.9	1,124.1	7.5	1,208.0	428.5	3.7	444.5	6.3	472.4	7,329.8	6.2	7,786.1	7.5	8,372.2
Spelthorne	891.9	6.7	951.7	6.3	1,011.4	361.2	3.1	372.4	6.9	398.1	6,159.8	7.3	6,609.7	7.7	7,121.7
Surrey Heath	1,074.4	7.5	1,154.7	6.1	1,225.3	435.9	2.6	447.4	8.0	483.3	7,543.1	4.2	7,860.3	7.7	8,465.6
Test Valley	1,108.3	6.9	1,184.5	6.0	1,255.7	454.4	2.1	463.8	8.0	501.0	7,703.6	6.7	8,223.0	6.7	8,773.7
Waverley	1,343.7	7.6	1,445.6	7.6	1,555.3	549.1	3.2	566.5	7.8	610.5	9,364.5	7.2	10,041.2	7.5	10,798.1
Winchester City Council	1,403.0	6.0	1,487.8	7.8	1,603.5	568.6	4.3	593.2	7.1	635.5	9,822.9	7.3	10,542.0	6.4	11,217.3
Woking	1,154.5	5.9	1,222.5	7.2	1,310.6	463.3	3.5	479.5	7.1	513.5	7,974.4	5.9	8,443.6	7.0	9,035.6

Figure 33 shows the different profiles of the EM3 Local Authorities when sales is split at Level 1. The Local Authorities show significant variations in Environmental (15-21%), Low Carbon (46-53%) and Renewable Energy (28-36%). This highlights that EM3's Local Authorities are not a homogeneous market, but they actually show subtle regional variations in activity within the LCEGS sector. This is further confirmed by Figure 34 below.

Figure 33: EM3's Local Authorities LCEGS Sales 2017/18 (Level 1)

Figure 34 extends the analysis to include the Top 8 sub-sectors for each of EM3's Local Authorities. Typically, five sub-sectors account for over 60% of the total value, but the sub-sectors and their rankings do differ across the 13 Local Authorities. But there are some consistent sub-sectors, with Alternative Fuels, Building Technologies and Wind in the top three for all Local Authorities. Geothermal and Alternative Fuel Vehicle sit in either 4th or 5th place for 11 of the Local Authorities, with the exception of Guildford and Winchester City Council, where Biomass holds more market.

Figure 34: EM3's Local Authorities LCEGS Sales 2017/18 at Level 2

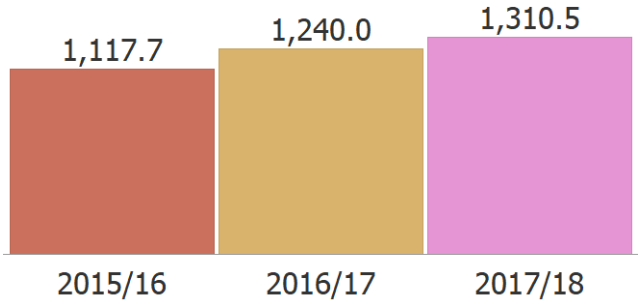


4. EM3's LCEGS and International Trade

4.1 EM3's LCEGS Exports

This section of the report addresses EM3's LCEGS Exports over the past three years when compared with UK totals and then identifies leading LCEGS export products and services and their destination markets.

Figure 35: EM3's Exports (£m) 2015/16 to 2017/18



The value of EM3's LCEGS Exports in 2015/16 was £1.1bn and has grown to £1.3bn in 2017/18.

Growth between 2015/16 and 2016/17 was 10.9% and growth between 2016/17 and 2017/18 was 5.7%. This is compared with UK growth of approximately 6.0% and 6.8% respectively.

Figure 36: EM3's Exports (%) by Sub-Sector 2017/18

EM3 represented 9.8% of all UK LCEGS exports in 2017/18. This is in line with EM3's 9.8% of overall UK Sales. This means that EM3's companies have a similar share of the export market as the UK market, indicating that the export market is robust.

Available exports for EM3 are 16.5% of total exports, this represents the proportion of exports not locked by long term contracts or aggressive marketing techniques etc and are available at usual cost of exports.

By comparison, Coast to Capital holds 8.5% of the UK exports market, 9.6% of UK sales and has available exports of 15.0%. South East holds 16.4% of the UK export market, 17.2% of UK sales and has available exports of 15.1%.

This compares with available exports of 31.6% for the UK. The UK figure is elevated by London, which holds 19.8% of the UK export market and has available exports of 38.5% of total exports.

Figure 36 shows the proportion of EM3 LCEGS exports by Level 2 sub-sector, with Building Technologies (15%), Wind (14%), Alternative Fuels (12%), Alternative Fuel Vehicle (10%) and Geothermal (9%) being the leading sub-sectors and accounting for 60% of all EM3 LCEGS exports.

In Table 4 EM3's LCEGS exports are shown 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 2017/18 is 7.2%, which shows an overall increase in exports as a percentage of sales across the three years. The sub-sectors with highest increase in exports between 2015/16 and 2017/18 were Carbon Finance (72.6%), Photovoltaic (45.3%), Carbon Capture & Storage (44.5%), Noise & Vibration Control (36.9%) and Waste Management (36.3%).

Table 4: EM3's LCEGS Exports as a % of Sales 2015/16 to 2017/18

		2015/16			2016/17			2017/18		
Level 1	**Level 2**	**Sales (£m)**	**Exports (£m)**	**Exports as % of Sales**	**Sales (£m)**	**Exports (£m)**	**Exports as % of Sales**	**Sales (£m)**	**Exports (£m)**	**Exports as % of Sales**
Environmental	Air Pollution	150.3	10.3	6.9	152.6	10.1	6.6	155.8	12.0	7.7
Environmental	Contaminated Land	117.4	8.1	6.9	120.0	8.7	7.3	125.7	10.4	8.3
Environmental	Environmental Consultancy	97.1	7.0	7.2	102.4	7.2	7.0	111.4	8.8	7.9
Environmental	Environmental Monitoring	20.6	1.5	7.1	20.9	1.4	6.8	21.7	1.6	7.3
Environmental	Marine Pollution Control	16.6	1.2	7.0	16.9	1.1	6.5	18.5	1.5	7.9
Environmental	Noise & Vibration Control	28.6	1.9	6.8	30.2	2.0	6.6	32.9	2.6	8.0
Environmental	Recovery and Recycling	883.9	64.1	7.3	911.1	63.8	7.0	966.2	73.9	7.6
Environmental	Waste Management	584.2	39.6	6.8	620.3	43.2	7.0	656.6	54.1	8.2
Environmental	Water & Waste Water Treatment	906.5	65.4	7.2	949.7	66.0	7.0	973.7	78.9	8.1
Low Carbon	Additional Energy Sources	163.6	12.5	7.6	174.7	12.6	7.2	181.3	15.6	8.6
Low Carbon	Alternative Fuel Vehicle	1,632.8	126.8	7.8	1,874.3	107.4	5.7	1,825.4	132.4	7.3
Low Carbon	Alternative Fuels	2,508.0	173.9	6.9	2,684.6	259.3	9.7	2,934.8	157.8	5.4
Low Carbon	Building Technologies	2,291.6	153.7	6.7	2,374.1	150.5	6.3	2,650.3	195.2	7.4
Low Carbon	Carbon Capture & Storage	61.6	3.8	6.2	63.0	4.6	7.3	67.6	5.5	8.1
Low Carbon	Carbon Finance	122.3	8.2	6.7	122.3	7.9	6.4	163.0	14.2	8.7
Low Carbon	Energy Management	688.4	45.4	6.6	704.5	47.9	6.8	738.4	54.9	7.4
Low Carbon	Nuclear Power	260.5	20.2	7.8	276.0	19.7	7.1	281.7	21.6	7.7
Renewable Energy	Biomass	1,006.4	69.6	6.9	1,032.5	83.2	8.1	1,156.6	83.4	7.2
Renewable Energy	Geothermal	1,459.6	103.2	7.1	1,524.2	107.2	7.0	1,628.1	122.1	7.5
Renewable Energy	Hydro	12.9	0.9	7.3	13.7	1.0	7.5	14.2	0.9	6.2
Renewable Energy	Photovoltaic	751.5	47.8	6.4	831.5	61.2	7.4	877.3	69.5	7.9
Renewable Energy	Renewable Consultancy	60.4	4.4	7.3	60.1	3.4	5.7	67.7	5.8	8.6
Renewable Energy	Wave & Tidal	1.1	0.1	6.8	1.3	0.1	6.7	1.3	0.1	6.9
Renewable Energy	Wind	2,119.2	148.1	7.0	2,380.5	170.4	7.2	2,539.9	187.9	7.4
Total		**15,944.9**	**1,117.7**	**7.0**	**17,041.4**	**1,240.0**	**7.3**	**18,190.2**	**1,310.5**	**7.2**

The sub-sectors with the highest export to sales ratio in 2017/18 are: Carbon Finance 8.7%; Renewable Consultancy 8.6%; Additional Energy Sources 8.6% and Contaminated Land 8.3%.

These percentages are inconsistent across the three-year period, which is indicative of the market experiencing fluctuation and change.

In Table 5 EM3's LCEGS available exports are shown 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 exports. The overall average for 2017/18 is 16.5%, which is an increase from 15.1% in 2015/16 and 13.8 in 2016/17. Two sub-sectors have a combination of large export value and high available exports as a percentage of exports in 2017/18: Building Technologies with 19.4% available exports and Geothermal 18.4% available exports.

Table 5: EM3's LCEGS Available Exports as a % of Exports 2015/16 to 2017/18

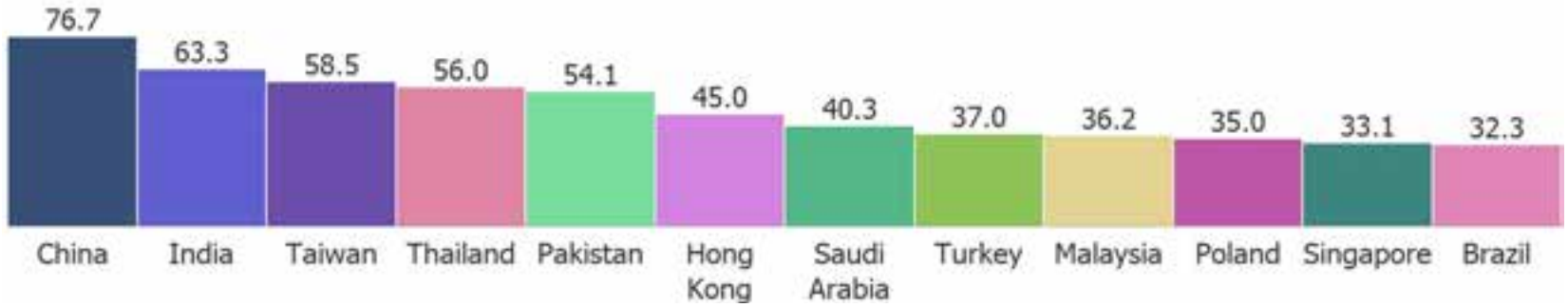
		2015/16			2016/17			2017/18		
Level 1	**Level 2**	**Exports (£m)**	**Available Exports (£m)**	**Available Exports as % of Exports**	**Exports (£m)**	**Available Exports (£m)**	**Available Exports as % of Exports**	**Exports (£m)**	**Available Exports (£m)**	**Available Exports as % of Exports**
Environmental	Air Pollution	10.3	1.5	14.6	10.1	1.5	14.5	12.0	2.0	16.9
Environmental	Contaminated Land	8.1	1.1	13.7	8.7	1.3	14.4	10.4	1.8	16.8
Environmental	Environmental Consultancy	7.0	1.0	14.5	7.2	1.2	16.4	8.8	1.6	18.1
Environmental	Environmental Monitoring	1.5	0.2	14.3	1.4	0.2	15.3	1.6	0.3	17.7
Environmental	Marine Pollution Control	1.2	0.2	14.4	1.1	0.2	15.7	1.5	0.2	16.7
Environmental	Noise & Vibration Control	1.9	0.2	12.8	2.0	0.3	15.2	2.6	0.4	17.0
Environmental	Recovery and Recycling	64.1	9.3	14.6	63.8	9.2	14.5	73.9	12.4	16.8
Environmental	Waste Management	39.6	6.2	15.6	43.2	6.0	13.9	54.1	9.0	16.6
Environmental	Water & Waste Water Treatment	65.4	9.7	14.8	66.0	10.7	16.1	78.9	12.5	15.8
Low Carbon	Additional Energy Sources	12.5	2.0	15.9	12.6	2.0	15.7	15.6	2.7	17.3
Low Carbon	Alternative Fuel Vehicle	126.8	20.1	15.9	107.4	17.6	16.4	132.4	18.0	13.6
Low Carbon	Alternative Fuels	173.9	32.6	18.8	259.3	25.6	9.9	157.8	25.0	15.9
Low Carbon	Building Technologies	153.7	21.2	13.8	150.5	20.8	13.8	195.2	37.8	19.4
Low Carbon	Carbon Capture & Storage	3.8	0.6	16.3	4.6	0.7	14.4	5.5	0.9	15.9
Low Carbon	Carbon Finance	8.2	0.8	9.2	7.9	1.1	13.4	14.2	2.8	19.4
Low Carbon	Energy Management	45.4	6.7	14.7	47.9	7.0	14.7	54.9	9.4	17.1
Low Carbon	Nuclear Power	20.2	3.3	16.5	19.7	2.8	14.1	21.6	4.0	18.5
Renewable Energy	Biomass	69.6	9.9	14.2	83.2	12.1	14.5	83.4	13.3	15.9
Renewable Energy	Geothermal	103.2	13.7	13.2	107.2	15.2	14.2	122.1	22.4	18.4
Renewable Energy	Hydro	0.9	0.1	10.9	1.0	0.2	16.4	0.9	0.1	15.7
Renewable Energy	Photovoltaic	47.8	7.1	14.9	61.2	9.6	15.7	69.5	10.9	15.7
Renewable Energy	Renewable Consultancy	4.4	0.7	15.4	3.4	0.5	13.9	5.8	1.0	17.3
Renewable Energy	Wave & Tidal	0.1	0.0	16.7	0.1	0.0	16.2	0.1	0.0	15.3
Renewable Energy	Wind	148.1	20.8	14.0	170.4	25.5	14.9	187.9	27.4	14.6
Total		**1,117.7**	**169.1**	**15.1**	**1,240.0**	**171.0**	**13.8**	**1,310.5**	**215.9**	**16.5**

The sub-sectors with the highest available export to export ratio in 2017/18 are: Carbon Finance 19.4%; Building Technologies 19.4%; Nuclear Power 18.5%, Geothermal 18.4% and Environmental Consultancy 18.1%.

The Top 12 destinations for EM3's LCEGS exports are shown in Figure 37. China is the top destination, followed by India, Taiwan, Thailand, Pakistan, Hong Kong, Saudi Arabia, Turkey, Malaysia, Poland, Singapore and Brazil.

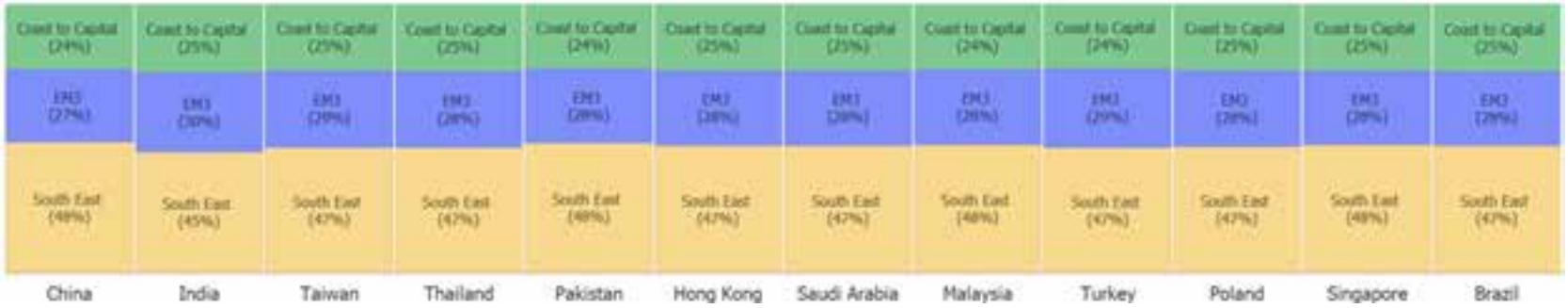
The USA, Germany and France, who are three of the UK's largest trading partners, are conspicuously absent from the Top 12 destinations for LCEGS and this has been a feature of international trade in LCEGS since 2007/08 when the analysis first began. The LCEGS sector has a very different trading pattern to other mainstream UK sectors, predominantly due to long term, historic trading relationships within this sector.

Figure 37: Top 12 EM3 LCEGS Export Destinations 2017/18



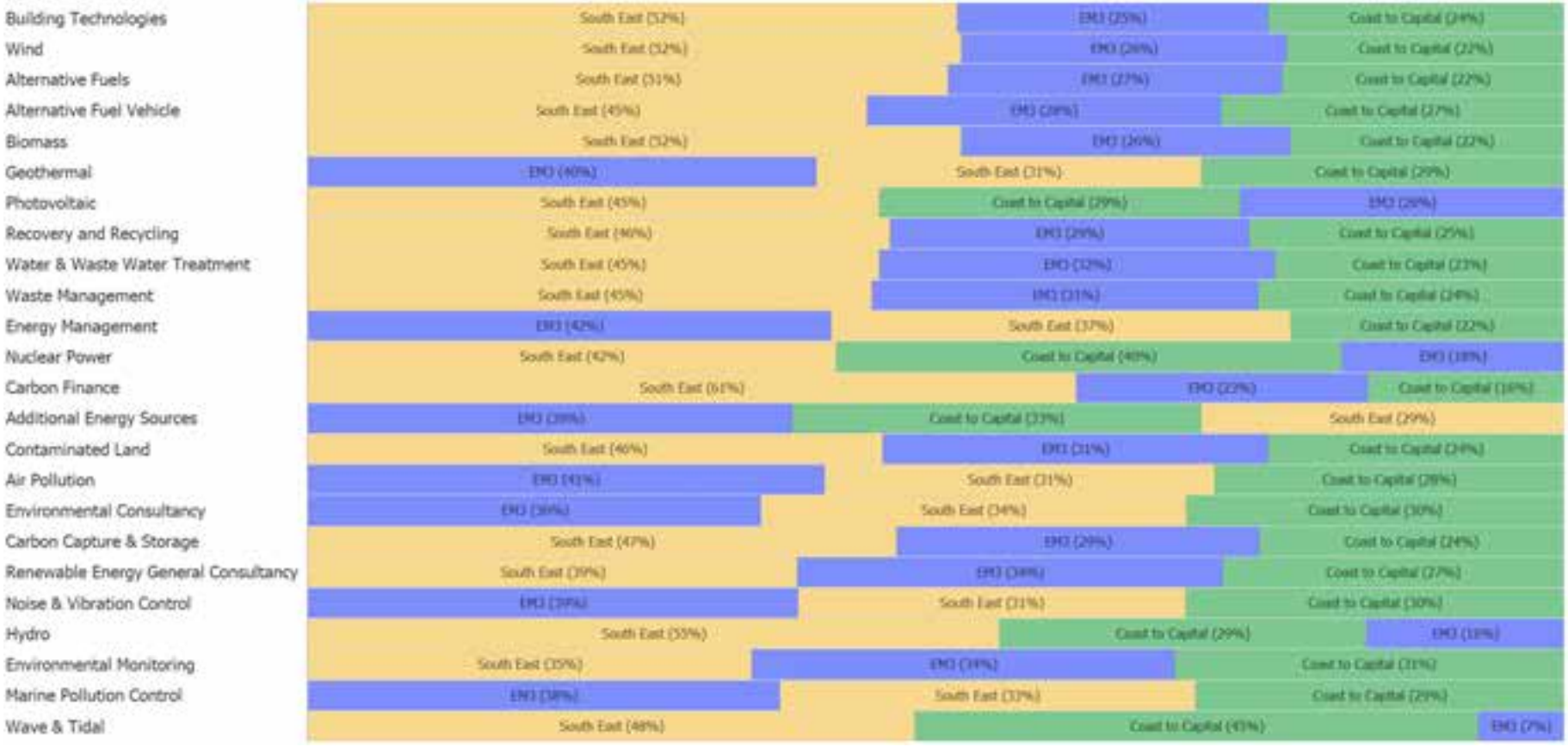
In Figure 38 EM3's exports to each of the Top 12 countries are shown in relation to exports from the other two LEPs in this study. EM3 consistently represents the second largest exporting region and makes up between 27-30% of the combined exports to each country.

Figure 38: Top 12 EM3 LCEGS Export Destinations Compared with Coast to Capital LEP and South East LEP 2017/18



In Figure 39 EM3's total exports are shown in relation to exports from the other two LEPs in this study. Here we can see that although the total EM3 exports to each country are consistently lower than the South East LEP, when looking at Level 2 sub-sectors, we can see that EM3 leads exports in 7 sub-sectors, Energy Management 42%, Air Pollution 41%, Geothermal 40%, Additional Energy Sources 39%, Noise & Vibration Control 39%, Marine Pollution Control 38% and Environmental Monitoring 36%.

Figure 39: LCEGS Exports by Level 2 sub-sectors, split by EM3, Coast to Capital and South East, 2017/18



4.2 EM3's LCEGS Priority Markets

Table 6 combines analysis of EM3's LCEGS product and service exports with destination countries using a heat map. The table shows the value of exports in £m and then colour codes the values - Green for higher values and Red for lower values. The table has been simplified by excluding the lowest value destination countries and lowest value products/services. The results show the top 32 export destinations and the top 12 (out of 24) sub-sectors.

Table 6: EM3's Level 2 Exports by Country for 2017/18 in £m

Level 1	Level 2	Australia	Brazil	Canada	Chile	China	Denmark	France	Germany	Hong Kong	Hungary	India	Indonesia	Italy	Japan	Malaysia	Mexico
Environmental	Recovery and Recycling	0.8	2.0	1.4	0.2	4.5	1.1	0.9	1.1	2.6	1.4	3.6	0.8	0.9	1.0	2.0	0.5
Environmental	Waste Management	0.6	1.4	1.0	0.2	3.3	0.7	0.7	0.8	1.9	1.0	2.7	0.6	0.6	0.8	1.5	0.4
Environmental	Water & Waste Water Treatment	0.9	2.0	1.6	0.2	4.9	1.2	1.0	1.1	2.9	1.5	3.5	0.9	1.0	1.1	2.2	0.6
Low Carbon	Alternative Fuel Vehicle	1.8	3.2	2.4	0.3	7.7	1.5	1.4	1.7	5.0	2.6	7.3	1.6	1.7	1.8	3.2	1.0
Low Carbon	Alternative Fuels	1.8	4.0	3.4	0.4	8.4	2.3	2.2	2.2	5.1	3.0	7.7	1.9	2.1	2.7	4.3	1.0
Low Carbon	Building Technologies	2.3	4.7	4.1	0.5	10.7	2.9	2.5	2.8	6.4	3.8	9.3	2.1	2.3	2.8	5.5	1.4
Low Carbon	Energy Management	0.7	1.4	1.1	0.2	3.2	0.8	0.7	0.8	2.1	1.0	2.5	0.6	0.7	0.8	1.4	0.4
Low Carbon	Nuclear Power	0.3	0.5	0.5	0.1	1.3	0.3	0.3	0.3	0.8	0.4	0.9	0.2	0.3	0.3	0.7	0.1
Renewable Energy	Biomass	0.9	2.0	1.6	0.2	5.0	1.2	1.1	1.1	2.8	1.6	4.6	0.9	1.0	1.1	2.5	0.6
Renewable Energy	Geothermal	1.2	3.2	2.6	0.3	7.1	1.6	1.7	1.8	3.8	2.1	6.0	1.4	1.5	1.6	3.4	0.8
Renewable Energy	Photovoltaic	0.7	1.6	1.5	0.2	4.5	1.0	0.8	0.9	2.5	1.3	3.3	0.8	0.9	1.0	1.9	0.5
Renewable Energy	Wind	2.1	4.3	3.7	0.6	11.5	2.9	2.3	2.5	6.0	3.7	8.5	2.3	2.5	2.6	5.5	1.2

Level 1	Level 2	Netherlands	Pakistan	Poland	Portugal	Romania	Russia	Saudi Arabia	Singapore	S Africa	S Korea	Sweden	Taiwan	Thailand	Turkey	UAE	US
Environmental	Recovery and Recycling	1.2	3.2	2.0	0.8	1.2	1.0	2.3	1.9	1.0	1.0	0.7	3.2	3.4	2.1	1.8	0.7
Environmental	Waste Management	0.9	2.5	1.5	0.6	0.9	0.7	1.7	1.4	0.6	0.8	0.5	2.4	2.1	1.4	1.3	0.5
Environmental	Water & Waste Water Treatment	1.2	3.3	2.2	0.9	1.3	1.0	2.2	2.0	1.0	1.1	0.7	3.6	3.5	2.4	1.8	0.7
Low Carbon	Alternative Fuel Vehicle	2.2	5.4	3.4	1.5	2.0	1.7	3.5	3.6	1.6	1.9	1.3	6.6	5.0	3.4	2.9	1.1
Low Carbon	Alternative Fuels	2.1	6.3	4.6	1.6	3.0	2.0	4.7	4.1	1.9	1.9	1.3	7.5	6.2	4.9	3.5	1.4
Low Carbon	Building Technologies	3.1	7.5	5.2	2.2	3.1	2.4	6.2	4.9	2.4	2.8	1.8	8.8	8.8	5.3	4.8	1.6
Low Carbon	Energy Management	1.0	2.3	1.5	0.6	0.9	0.7	1.6	1.3	0.7	0.7	0.5	2.3	2.5	1.5	1.3	0.5
Low Carbon	Nuclear Power	0.4	1.0	0.5	0.2	0.4	0.3	0.7	0.5	0.3	0.3	0.2	0.8	1.0	0.6	0.5	0.2
Renewable Energy	Biomass	1.4	3.5	2.2	1.0	1.2	1.1	2.5	2.1	1.1	1.2	0.7	3.6	3.4	2.3	2.0	0.8
Renewable Energy	Geothermal	2.0	5.3	3.2	1.5	2.1	1.5	4.0	3.3	1.5	1.7	1.1	5.5	5.2	3.5	2.6	1.2
Renewable Energy	Photovoltaic	1.1	2.8	1.7	0.7	1.2	1.0	2.1	1.6	0.8	0.9	0.6	3.0	3.2	2.0	1.8	0.7
Renewable Energy	Wind	3.0	7.7	4.9	2.1	3.1	2.6	6.2	4.3	2.3	2.5	1.4	7.6	8.2	5.4	4.4	1.7

Table 6 can be read horizontally to identify the strongest exporting sub-sectors i.e. Building Technologies, vertically to identify the strongest trading partners i.e. China, and using both vertical and horizontal you can identify strong niches like Geothermal to Taiwan and Alternative Fuels to India.

Tables 7a, 7b and 7c apply the same conventions as Table 6, but this time broken down to Level 3, which reveals EM3's priority exports in more detail. The tables show the same 32 destination countries but for 31 out of a total of 126 Level 3 market activities.

Table 7a: EM3's Level 3 Exports by Country for 2017/18 in £m

Level 2	Level 3	Australia	Brazil	Canada	Chile	China	Denmark	France	Germany	Hong Kor	Hungary	India
Recovery and Recycling	Waste Collection	0.4	1.0	0.6	0.1	2.1	0.5	0.4	0.5	1.2	0.7	1.7
Waste Management	Construction & Operation of Waste Treatment Facilities	0.3	0.5	0.4	0.1	1.3	0.3	0.3	0.3	0.8	0.4	1.0
Waste Management	Equipment For Waste Treatment	0.2	0.6	0.3	0.1	1.2	0.3	0.3	0.3	0.7	0.4	1.1
Water & Waste Water Treatment	Engineering	0.2	0.5	0.5	0.1	1.3	0.3	0.3	0.4	0.7	0.4	1.0
Water & Waste Water Treatment	Water Treatment and Distribution	0.6	1.4	1.1	0.1	3.4	0.8	0.7	0.8	2.1	1.1	2.4
Alternative Fuel Vehicle	Alternative Fuels (main Stream) for Vehicles Only	1.6	2.8	2.1	0.3	6.6	1.3	1.2	1.4	4.3	2.3	6.4
Alternative Fuel Vehicle	Other Fuels and Vehicles	0.2	0.4	0.4	0.0	1.1	0.2	0.2	0.2	0.7	0.3	0.8
Alternative Fuels	Main Stream Bio Fuels	0.4	0.8	0.8	0.1	2.5	0.5	0.5	0.5	1.1	0.6	1.6
Alternative Fuels	Other Bio Fuels	0.8	2.2	1.6	0.2	3.3	1.3	1.2	1.1	2.7	1.4	3.6
Alternative Fuels	Other Fuels	0.4	0.7	0.7	0.1	1.9	0.4	0.3	0.4	0.9	0.6	1.9
Building Technologies	Doors	0.5	1.1	0.9	0.1	2.3	0.6	0.5	0.6	1.5	0.6	2.1
Building Technologies	Insulation and Heat Retention Materials	0.7	1.4	1.2	0.2	3.4	0.9	0.6	0.8	2.0	1.2	2.5
Building Technologies	Monitoring and Control Systems	0.3	0.6	0.5	0.1	1.5	0.4	0.4	0.4	1.0	0.6	1.3
Building Technologies	Windows	0.8	1.6	1.5	0.2	3.4	1.0	0.9	1.1	2.0	1.4	3.4
Carbon Finance	Carbon Credits Trading	0.1	0.2	0.3	0.0	0.7	0.1	0.2	0.2	0.6	0.1	0.6
Energy Management	Energy Saving Lighting Equipment	0.2	0.4	0.3	0.0	1.1	0.3	0.2	0.3	0.8	0.3	0.8
Energy Management	Gas Supply	0.2	0.4	0.3	0.0	0.8	0.2	0.2	0.2	0.5	0.2	0.6
Biomass	Biomass Energy Systems	0.4	0.7	0.6	0.1	2.0	0.5	0.5	0.5	1.2	0.7	2.0
Biomass	Biomass Furnace Systems	0.1	0.2	0.2	0.0	0.7	0.1	0.1	0.1	0.3	0.2	0.6
Biomass	Boilers and related Systems	0.3	0.7	0.5	0.1	1.5	0.4	0.4	0.3	0.9	0.6	1.4
Biomass	Manufacturing Of Boilers and Related Systems	0.1	0.3	0.3	0.0	0.8	0.2	0.2	0.2	0.4	0.2	0.6
Geothermal	Consulting & Related Services	0.2	0.4	0.4	0.1	1.0	0.3	0.2	0.2	0.6	0.3	0.7
Geothermal	Manufacture and Supply of Specialist Equipment	0.2	0.8	0.5	0.1	1.4	0.3	0.3	0.4	0.9	0.4	1.2
Geothermal	Suppliers of Systems	0.3	0.9	0.6	0.1	1.6	0.5	0.4	0.5	1.0	0.6	1.4
Geothermal	Whole Systems Manufacture	0.4	1.1	1.0	0.1	3.0	0.6	0.7	0.8	1.3	0.8	2.6
Photovoltaic	Other Related Equipment and Chemicals	0.2	0.3	0.3	0.0	0.8	0.2	0.2	0.2	0.4	0.3	0.6
Photovoltaic	Photovoltaic Cells	0.2	0.4	0.5	0.1	1.4	0.3	0.3	0.3	0.9	0.4	1.0
Photovoltaic	Systems & Equipment	0.3	0.8	0.7	0.1	2.1	0.4	0.4	0.4	1.1	0.6	1.6
Wind	Large Wind Turbine	0.8	1.6	1.2	0.2	3.9	0.9	0.7	0.9	1.9	1.2	2.8
Wind	Small Wind Turbine	0.5	0.9	0.8	0.1	2.3	0.7	0.4	0.6	1.2	0.8	2.2
Wind	Wind Farm Systems	0.9	1.7	1.7	0.2	5.4	1.4	1.1	1.0	2.9	1.8	3.6

At Level 3 greater levels of detail are created that reveal more niche export markets, i.e. Alternative Fuels (main stream) for Vehicles Only to China, Alternative Fuels Other Bio Fuels to India and Taiwan, Building Technologies Windows to Thailand and Wind Farm Systems to Pakistan and Saudi Arabia.

Table 7b: EM3's Level 3 Exports by Country for 2017/18 in £m

Level 2	Level 3	Indonesia	Italy	Japan	Malaysia	Mexico	Netherlands	Pakistan	Poland	Portugal	Romania	Russia
Recovery and Recycling	Waste Collection	0.4	0.4	0.5	0.9	0.2	0.5	1.4	0.9	0.4	0.5	0.4
Waste Management	Construction & Operation of Waste Treatment Facilities	0.2	0.2	0.3	0.6	0.1	0.4	0.9	0.5	0.3	0.3	0.3
Waste Management	Equipment For Waste Treatment	0.2	0.2	0.4	0.6	0.2	0.3	1.1	0.6	0.2	0.3	0.2
Water & Waste Water Treatment	Engineering	0.3	0.2	0.3	0.6	0.2	0.3	1.0	0.7	0.2	0.4	0.3
Water & Waste Water Treatment	Water Treatment and Distribution	0.6	0.7	0.8	1.5	0.4	0.9	2.2	1.5	0.6	0.9	0.7
Alternative Fuel Vehicle	Alternative Fuels (main Stream) for Vehicles Only	1.4	1.5	1.6	2.7	0.9	1.9	4.5	2.9	1.3	1.7	1.5
Alternative Fuel Vehicle	Other Fuels and Vehicles	0.2	0.2	0.2	0.5	0.1	0.3	0.8	0.5	0.2	0.3	0.2
Alternative Fuels	Main Stream Bio Fuels	0.5	0.4	0.6	1.0	0.2	0.5	1.5	1.0	0.4	0.6	0.5
Alternative Fuels	Other Bio Fuels	1.0	1.1	1.5	2.1	0.4	1.0	2.9	2.3	0.7	1.7	0.9
Alternative Fuels	Other Fuels	0.3	0.5	0.4	0.9	0.2	0.4	1.4	1.0	0.4	0.5	0.5
Building Technologies	Doors	0.5	0.4	0.6	1.1	0.3	0.6	1.5	1.2	0.4	0.7	0.5
Building Technologies	Insulation and Heat Retention Materials	0.6	0.7	0.8	1.6	0.5	0.9	2.2	1.4	0.7	0.9	0.8
Building Technologies	Monitoring and Control Systems	0.3	0.3	0.4	0.7	0.2	0.5	1.1	0.7	0.3	0.4	0.4
Building Technologies	Windows	0.7	0.8	1.0	2.1	0.5	1.2	2.6	2.0	0.7	1.0	0.8
Carbon Finance	Carbon Credits Trading	0.1	0.1	0.1	0.2	0.0	0.2	0.4	0.3	0.1	0.2	0.1
Energy Management	Energy Saving Lighting Equipment	0.2	0.2	0.3	0.5	0.1	0.3	0.7	0.5	0.2	0.3	0.2
Energy Management	Gas Supply	0.1	0.2	0.2	0.3	0.1	0.2	0.6	0.3	0.1	0.2	0.2
Biomass	Biomass Energy Systems	0.3	0.4	0.5	1.0	0.3	0.6	1.6	1.0	0.5	0.5	0.4
Biomass	Biomass Furnace Systems	0.1	0.1	0.2	0.3	0.1	0.2	0.4	0.2	0.1	0.2	0.2
Biomass	Boilers and related Systems	0.3	0.3	0.3	0.8	0.2	0.5	1.1	0.6	0.3	0.4	0.3
Biomass	Manufacturing Of Boilers and Related Systems	0.2	0.2	0.1	0.4	0.1	0.2	0.5	0.4	0.1	0.2	0.2
Geothermal	Consulting & Related Services	0.2	0.2	0.2	0.5	0.1	0.3	0.8	0.5	0.2	0.3	0.2
Geothermal	Manufacture and Supply of Specialist Equipment	0.3	0.3	0.3	0.6	0.2	0.5	1.2	0.8	0.3	0.4	0.3
Geothermal	Suppliers of Systems	0.4	0.4	0.4	0.8	0.2	0.5	1.3	0.8	0.4	0.5	0.4
Geothermal	Whole Systems Manufacture	0.5	0.6	0.6	1.4	0.3	0.7	2.0	1.1	0.6	0.8	0.6
Photovoltaic	Other Related Equipment and Chemicals	0.2	0.2	0.2	0.4	0.1	0.2	0.6	0.4	0.2	0.2	0.2
Photovoltaic	Photovoltaic Cells	0.2	0.3	0.3	0.7	0.2	0.4	0.8	0.5	0.2	0.4	0.3
Photovoltaic	Systems & Equipment	0.3	0.4	0.5	0.8	0.2	0.4	1.3	0.8	0.4	0.5	0.4
Wind	Large Wind Turbine	0.7	0.8	0.9	1.7	0.4	0.9	2.8	1.7	0.7	1.0	0.9
Wind	Small Wind Turbine	0.4	0.5	0.5	1.0	0.3	0.7	1.6	1.1	0.4	0.7	0.5
Wind	Wind Farm Systems	1.1	1.2	1.2	2.7	0.5	1.4	3.3	2.1	1.0	1.4	1.1

Table 7c: EM3's Level 3 Exports by Country for 2017/18 in £m

Level 2	Level 3	Saudi Arabia	Singapore	S Africa	S Korea	Sweden	Taiwan	Thailand	Turkey	UAE	US
Recovery and Recycling	Waste Collection	1.0	0.8	0.5	0.4	0.3	1.5	1.5	0.9	0.8	0.3
Waste Management	Construction & Operation of Waste Treatment Facilities	0.6	0.6	0.3	0.3	0.2	0.9	0.9	0.6	0.5	0.2
Waste Management	Equipment For Waste Treatment	0.6	0.5	0.2	0.3	0.2	1.0	0.8	0.5	0.5	0.2
Water & Waste Water Treatment	Engineering	0.6	0.5	0.2	0.3	0.2	0.9	0.9	0.8	0.6	0.2
Water & Waste Water Treatment	Water Treatment and Distribution	1.5	1.4	0.7	0.7	0.5	2.6	2.4	1.5	1.2	0.5
Alternative Fuel Vehicle	Alternative Fuels (main Stream) for Vehicles Only	3.0	3.1	1.4	1.6	1.1	5.8	4.2	2.9	2.5	0.9
Alternative Fuel Vehicle	Other Fuels and Vehicles	0.5	0.5	0.2	0.3	0.1	0.8	0.8	0.5	0.4	0.2
Alternative Fuels	Main Stream Bio Fuels	1.1	0.8	0.5	0.5	0.3	1.6	1.4	1.0	0.9	0.3
Alternative Fuels	Other Bio Fuels	2.5	2.2	1.0	0.9	0.6	3.7	2.9	2.7	1.6	0.6
Alternative Fuels	Other Fuels	0.7	0.8	0.3	0.3	0.3	1.6	1.4	0.7	0.7	0.3
Building Technologies	Doors	1.3	1.1	0.4	0.7	0.4	1.9	2.0	1.1	0.8	0.3
Building Technologies	Insulation and Heat Retention Materials	1.7	1.4	0.7	0.8	0.6	2.7	2.5	1.6	1.5	0.5
Building Technologies	Monitoring and Control Systems	0.9	0.7	0.4	0.4	0.2	1.2	1.1	0.7	0.7	0.2
Building Technologies	Windows	2.2	1.7	0.9	0.9	0.6	3.0	3.1	1.9	1.8	0.5
Carbon Finance	Carbon Credits Trading	0.4	0.4	0.1	0.1	0.1	0.5	0.4	0.3	0.2	0.1
Energy Management	Energy Saving Lighting Equipment	0.5	0.4	0.2	0.2	0.2	0.9	0.8	0.5	0.4	0.2
Energy Management	Gas Supply	0.5	0.4	0.2	0.2	0.1	0.5	0.5	0.4	0.3	0.1
Biomass	Biomass Energy Systems	1.0	0.7	0.4	0.5	0.3	1.4	1.4	0.9	0.8	0.3
Biomass	Biomass Furnace Systems	0.3	0.2	0.1	0.1	0.1	0.5	0.4	0.3	0.2	0.1
Biomass	Boilers and related Systems	0.8	0.8	0.4	0.4	0.2	1.2	1.1	0.8	0.7	0.2
Biomass	Manufacturing Of Boilers and Related Systems	0.4	0.3	0.2	0.2	0.1	0.5	0.5	0.4	0.3	0.1
Geothermal	Consulting & Related Services	0.6	0.4	0.2	0.2	0.2	0.7	0.7	0.5	0.4	0.2
Geothermal	Manufacture and Supply of Specialist Equipment	0.7	0.6	0.3	0.3	0.2	1.1	1.3	0.6	0.6	0.2
Geothermal	Suppliers of Systems	0.9	0.7	0.4	0.4	0.3	1.4	1.2	0.8	0.6	0.3
Geothermal	Whole Systems Manufacture	1.7	1.4	0.5	0.7	0.4	2.3	1.9	1.5	1.0	0.4
Photovoltaic	Other Related Equipment and Chemicals	0.4	0.4	0.2	0.2	0.1	0.7	0.6	0.4	0.3	0.1
Photovoltaic	Photovoltaic Cells	0.6	0.5	0.3	0.3	0.2	0.9	1.0	0.7	0.5	0.2
Photovoltaic	Systems & Equipment	0.9	0.7	0.3	0.4	0.3	1.2	1.5	0.9	0.9	0.3
Wind	Large Wind Turbine	2.0	1.6	0.7	0.9	0.5	2.5	2.7	1.6	1.4	0.5
Wind	Small Wind Turbine	1.1	0.9	0.4	0.5	0.3	1.4	1.7	1.1	0.8	0.4
Wind	Wind Farm Systems	3.1	1.9	1.1	1.1	0.6	3.7	3.8	2.7	2.1	0.8

Section 2

EM3 Core vs. Non-Core LCEGS Sector Activity Analysis

The EM3 LCEGS sector is unusually strong in non-core activities, these are the mid-stream activities which are sometimes overlooked but are required for the sector to operate. An example would be the a core activity being the production of a wind turbine, which is not a strong activity in EM3, whereas the non-core activity of engineering a component within that turbine is a strength in EM3.

The EM3 LEP has a core specialty in high-end engineering, which includes mechanical, electrical and electronic engineering and the associated design, computing and software, particularly at the machine control level, which are all especially relevant in the mid-supply chain in many sectors. Indeed, analysis of other sectors in the area in the past, have shown that the EM3 LEP has a pattern of demonstrating strong mid-chain activities.

If only core activities of a sector are measured, the LEP can appear to under-represent some sectors (including motorsport and marine), however when the non-core activities are included, the reality is that the company base and skillset of the LEP are vital to supplying important aspects of the sector to other LEPs.

For this reason, this section of the report splits the core activities from the non-core activities within the LCEGS dataset, to allow the analysis of the EM3 LCEGS market through that filter.

1. EM3's LCEGS Sector

Although the Enterprise M3 LEP LCEGS sector had total sales in 2017/18 of £18.2bn, the value of sales for core activities within the sector was £4.6bn, only 25% of the total LCEGS sales. £13.7bn, or 75% of the total LCEGS sales were within non-core, midstream activities. These are illustrated in figure 40.

Figure 40: The split between core and non-core activities in LCEGS in the EM3 LEP

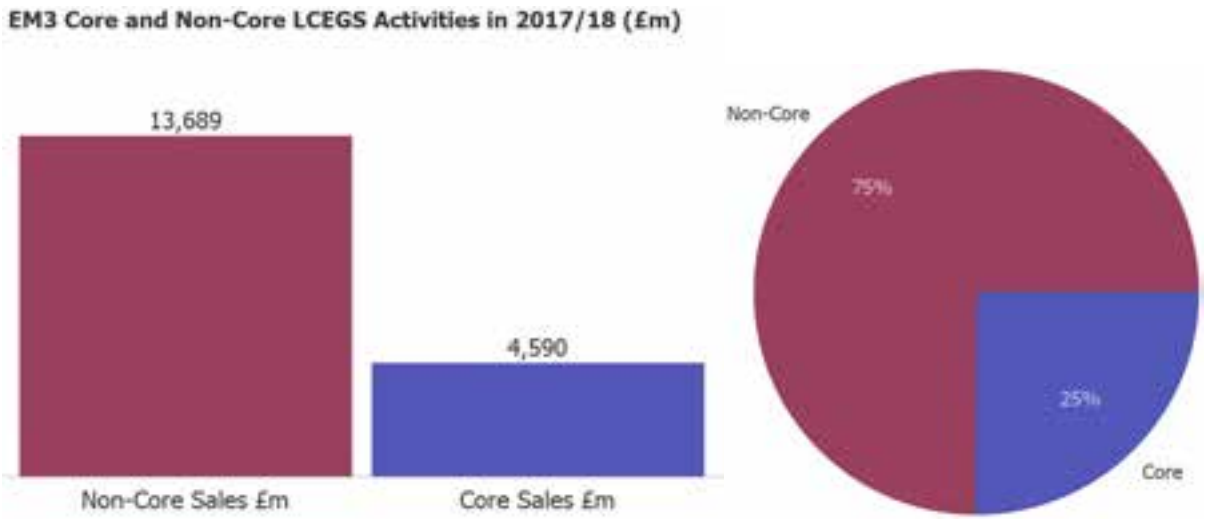


Figure 40 clearly illustrates that the LCEGS sector in the EM3 LEP is dominated by non-core activities. The vast majority of the activity in the LEP is involved in areas of the sector that are essential to the LCEGS sector but are not necessarily obvious. The split is 26% core and 74% non-core for both the number of companies and number of employees at the sector level.

The significance of this split is that it highlights how the LCEGS sector is embedded in other areas of the economy. In general LCEGS can be viewed in terms of the environmental benefit an activity can bring, alternatively the savings made through free power generation for example, here we also see the effect of the LCEGS sector in terms of direct sales across the wider economy of the EM3 LEP. These wider economy sales are present in the non-core section of the market and dominate the sector in this region.

The total EM3 economy is worth £54.3bn, making the LCEGS 33.5% of the economy. The whole LCEGS sector (core and non-core activities) in the EM3 LEP is proportionally larger than for other LEPs in the UK. This is because the EM3 LEP is exceptionally strong in mid-chain activities. In fact, the LCEGS sector as a proportion of the economy of the EM3 LEP is 17.2% higher than the UK average across LEPs (excluding London). The LCEGS sector core activities account for only 8.5% of the total EM3 economy.

2. EM3's LCEGS Level 1 Sub-sectors

The LCEGS sector consists of three Level 1 sub-sectors: Low Carbon, Renewable Energy and Environmental.

The Low Carbon sub-sector is by far the largest sub-sector, with sales of £8.8bn (48%). Renewable Energy had sales of £6.3bn (34%), with Environmental sales being £3.1bn (18%).

When we examine the split between the core and non-core activities at the first sub-sector level, we can see that the different sub-sectors have quite different compositions, as illustrated in figure 41.

Figure 41: The split between core and non-core activities for Level 1 sub-sectors

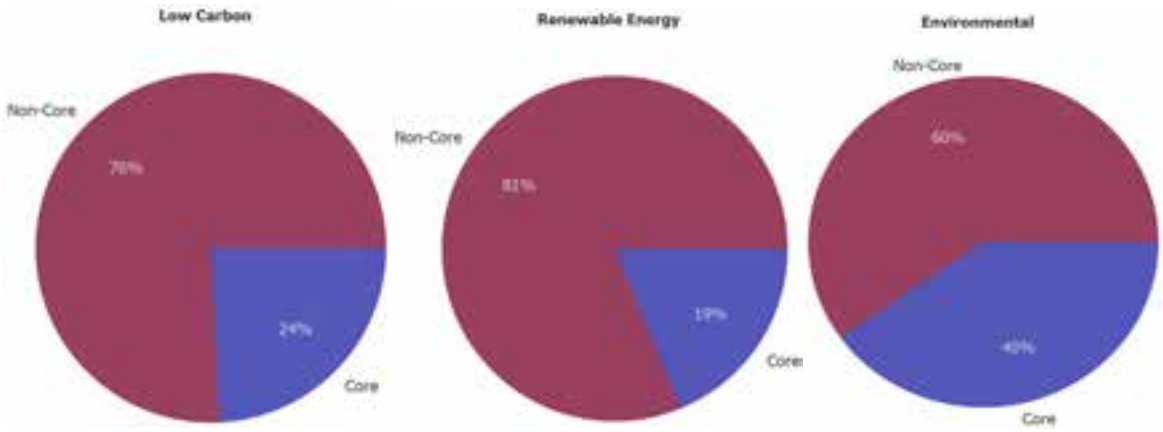


Figure 41 shows clearly that the split between core and non-core activities is very variable. The Low carbon sub-sector has a split similar to the sector as a whole, not surprising as the Low Carbon sub-sector accounts for 48% of LCEGS sector sales. By contrast the Renewable Energy sub-sector has a much smaller proportion of core activities (19%), with

Environmental having a significantly larger proportion (40%). The proportions of core and non-core for number of companies and number of employees are within 1% of those for sales.

3. EM3's LCEGS Level 2 Sub-sectors

The three Level 1 sub-sectors are split into level 2 sub-sectors. We can move down through the levels allowing us to explore areas of the sector in a 'deep dive'.

Within the Low Carbon Level 1 sub-sector, there are eight level 2 sub-sectors, with the largest being Alternative Fuels, Building Technologies and Alternative Fuel Vehicles. The largest of the seven sub-sectors within Renewable Energy are Wind, Geothermal, Biomass and Photovoltaic. The largest of the nine Environmental sub-sectors are Water & Waste Water Treatment, Recovery & Recycling and Waste Management.

London accounts for 20% of the UK total sales for LCEGS and has different characteristics to the rest of the UK, for example 98% of the Level 2 Carbon Finance sub-sector is based there. When London is removed from the UK analysis, we have a clearer comparison between the EM3 LEP and the rest of the UK. Generally the difference in percentage of market share in the EM3 LEP is within 1% of the UK average, however there are some subtle differences, for example, the EM3 LEP is:

- Stronger in Building Technologies, with 14.3% of sales vs 12.8% in the UK
- Stronger in Biomass, with 6.2% of sales vs 4.9% in the UK
- Stronger in Energy Management, with 4.2% of sales vs 2.3% in the UK
- Weaker in Alternative Fuels, with 15.9% of sales vs 17.5% in the UK
- Weaker in Nuclear Power, with 1.6% of sales vs 2.9% in the UK

With regards to Building Technologies, there appears to be some virtual clustering of companies. The Building Technologies sub-sector is long established in the EM3 LEP, with specializations including architecture and design which can be virtual, with companies designing the product within the LEP and selling it outside. This kind of specialization helps to explain why the Building Technologies sub-sector has a strong core to non-core ratio of 43% to 57%. Interestingly, the strength of the Building Technologies sub-sector is spread across the whole of its constituent activities, both core and non-core.

Strength in Energy Management is unsurprising due to specialisms in power firming, power factor control and synchronization.

Although Alternative Fuels is technically weaker than the rest of the UK, it is still the largest sub-sector in the EM3 LEP. It is not weak in as much as there are several other areas of market which are slightly stronger than the UK average, which combine to reduce the total market share of the Alternative Fuels sub-sector.

When we look at the core vs non-core split at this level of detail, we can clearly see different patterns within the different areas of the sector.

Figures 42 to 49 shows the split for Low Carbon, Renewable Energy and Environmental respectively. They clearly show that some sub-sectors at this level have move core activities than others, for example core activities account for 48% of Waste Management (Environmental), but only 7% of Wind (Renewable Energy). There is also a similar pattern in core and non-core between the sales, companies and employees figures for each Level 1 sub-sector.

Figure 42: The split between core and non-core sales (£m) for Low Carbon Level 2 sub-sectors

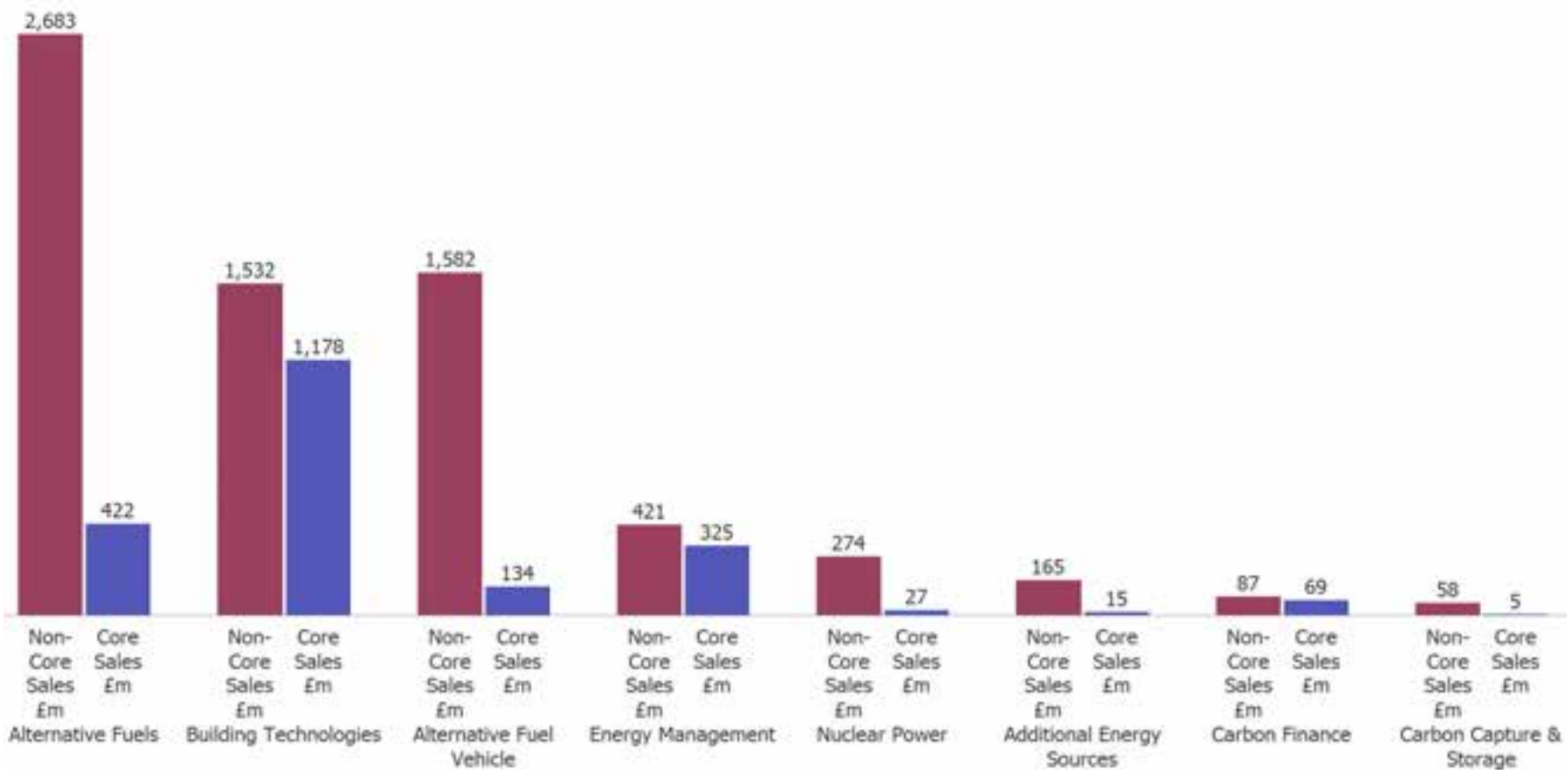


Figure 43: The split between core and non-core employees for Low Carbon Level 2 sub-sectors

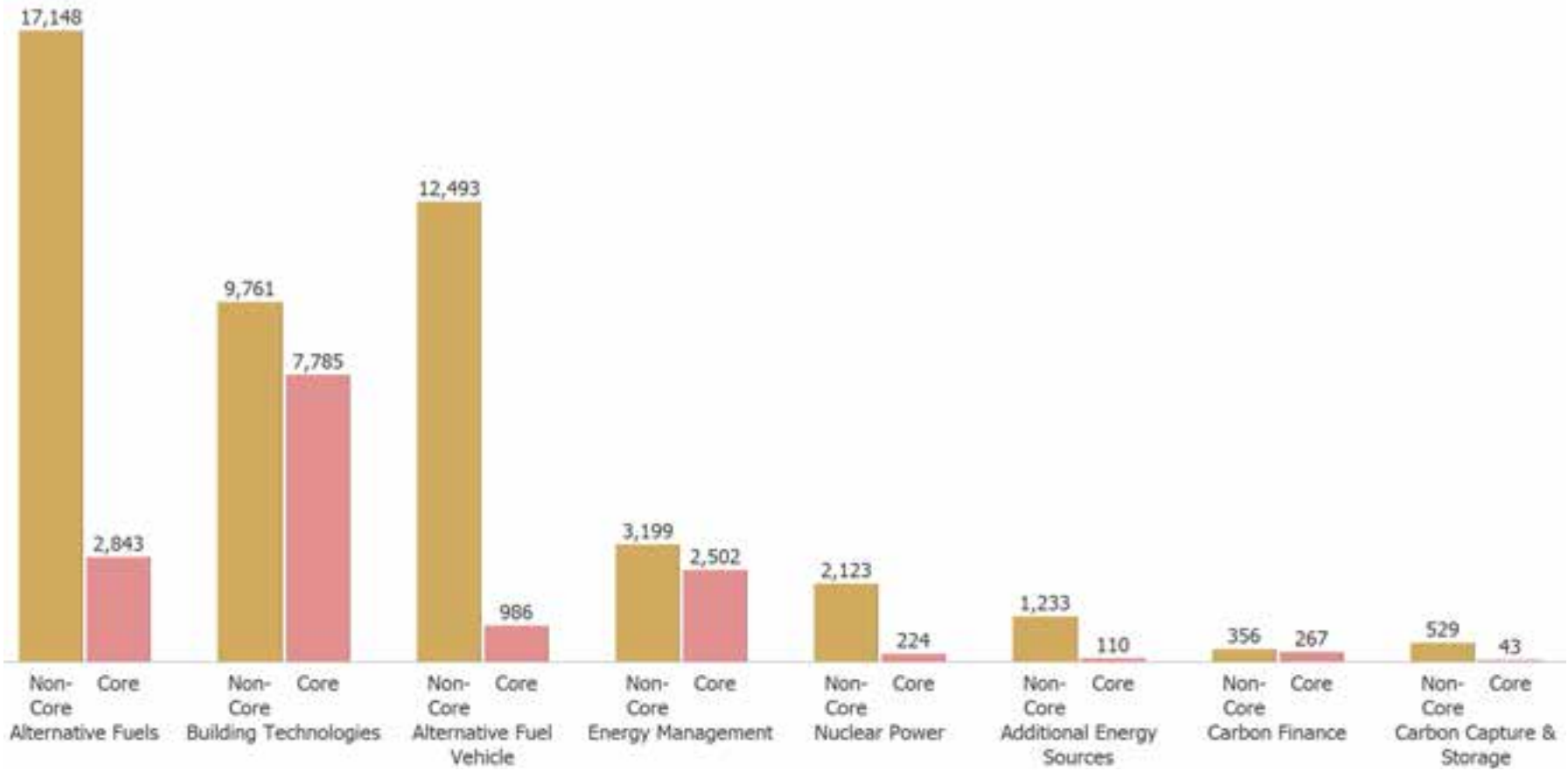


Figure 44: The split between core and non-core companies for Low Carbon Level 2 sub-sectors

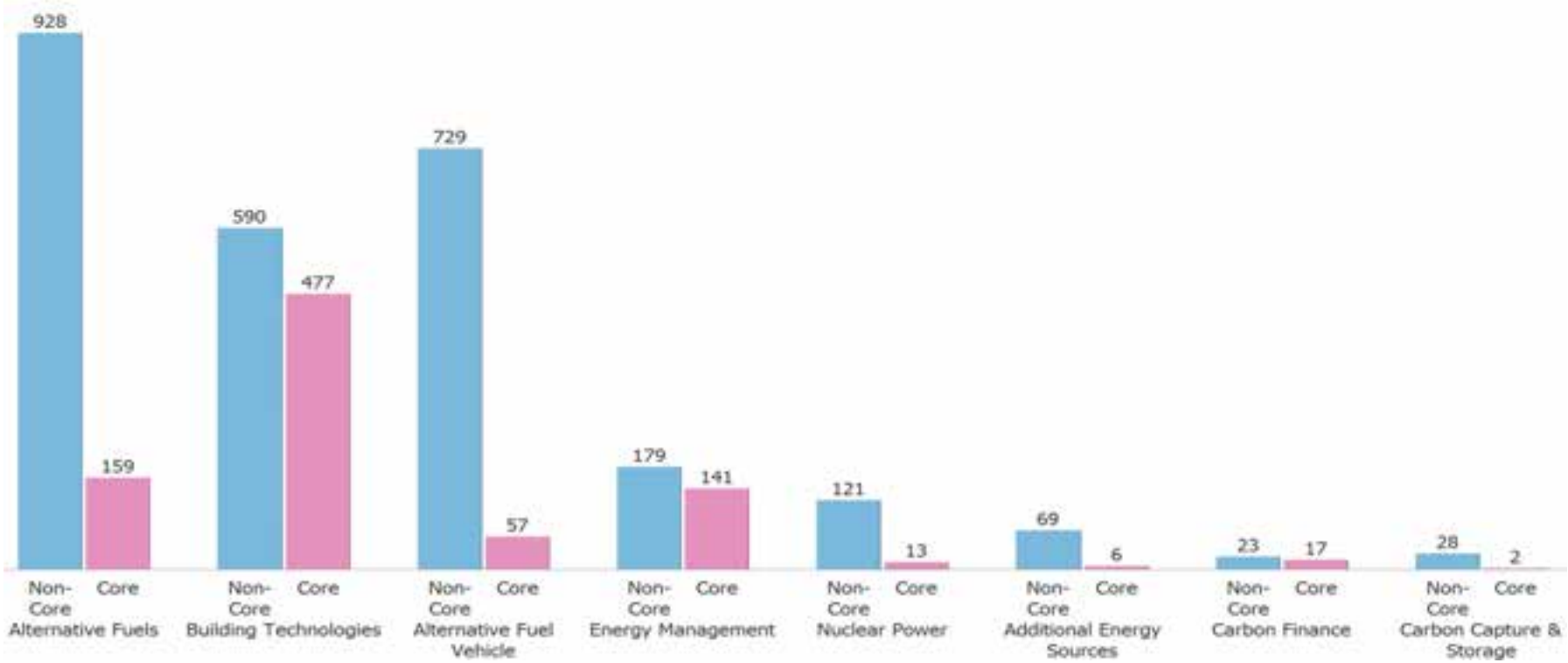


Figure 44: The split between core and non-core sales (£m) for Renewable Energy Level 2 sub-sectors

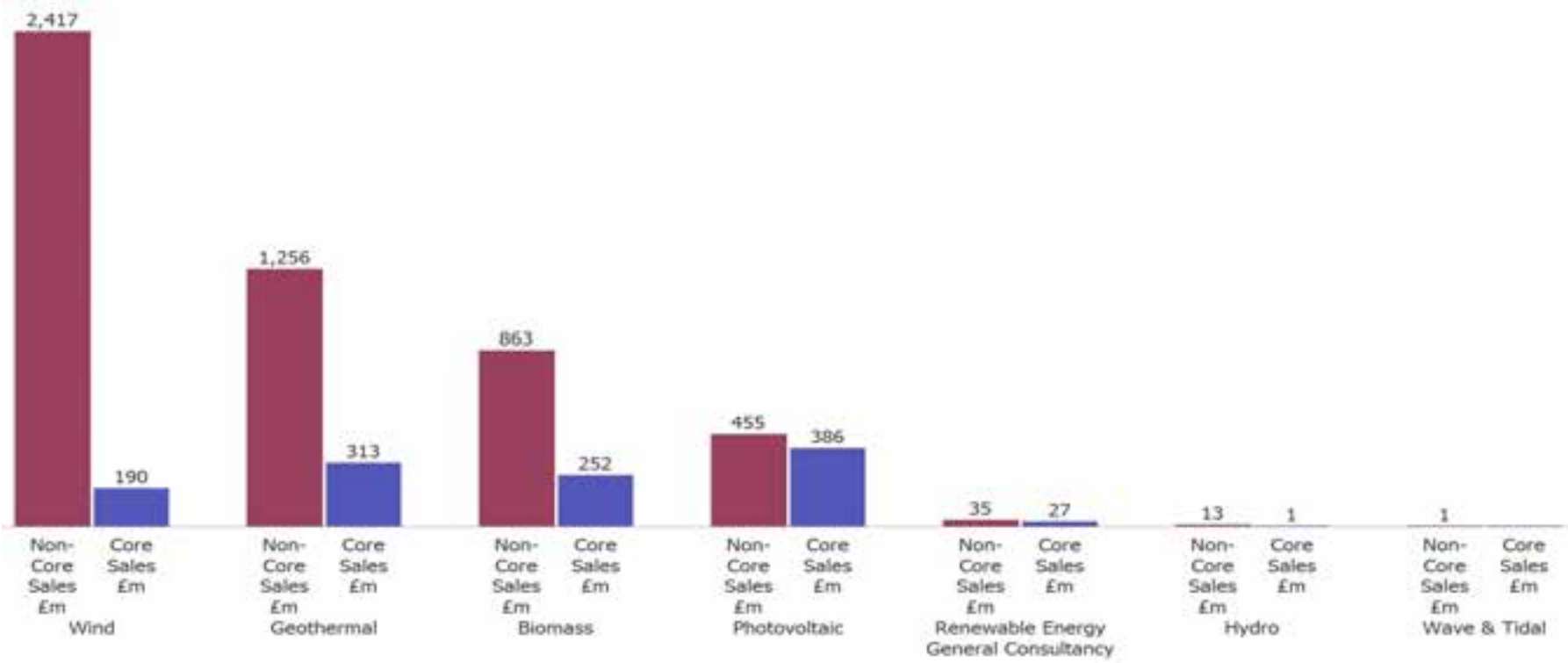


Figure 45: The split between core and non-core employees for Renewable Energy Level 2 sub-sectors

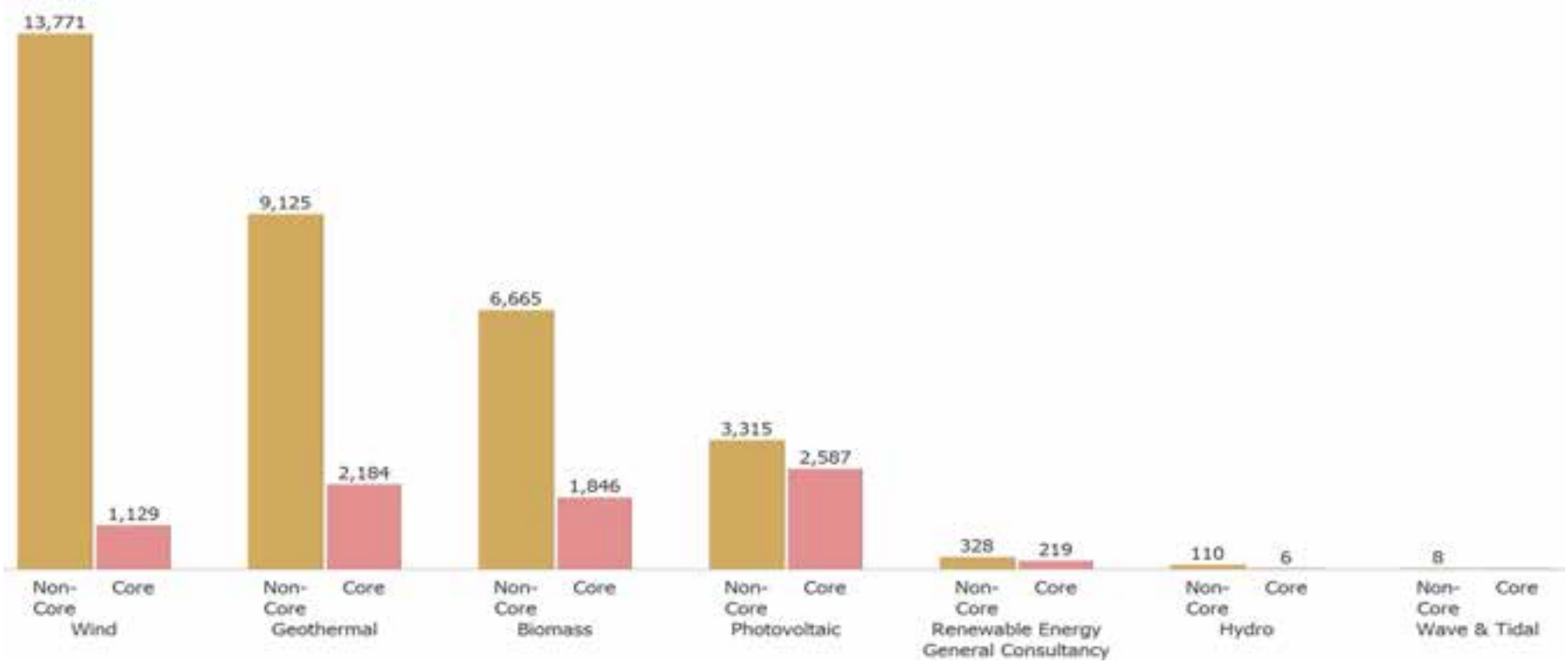


Figure 46: The split between core and non-core companies for Renewable Energy Level 2 sub-sectors

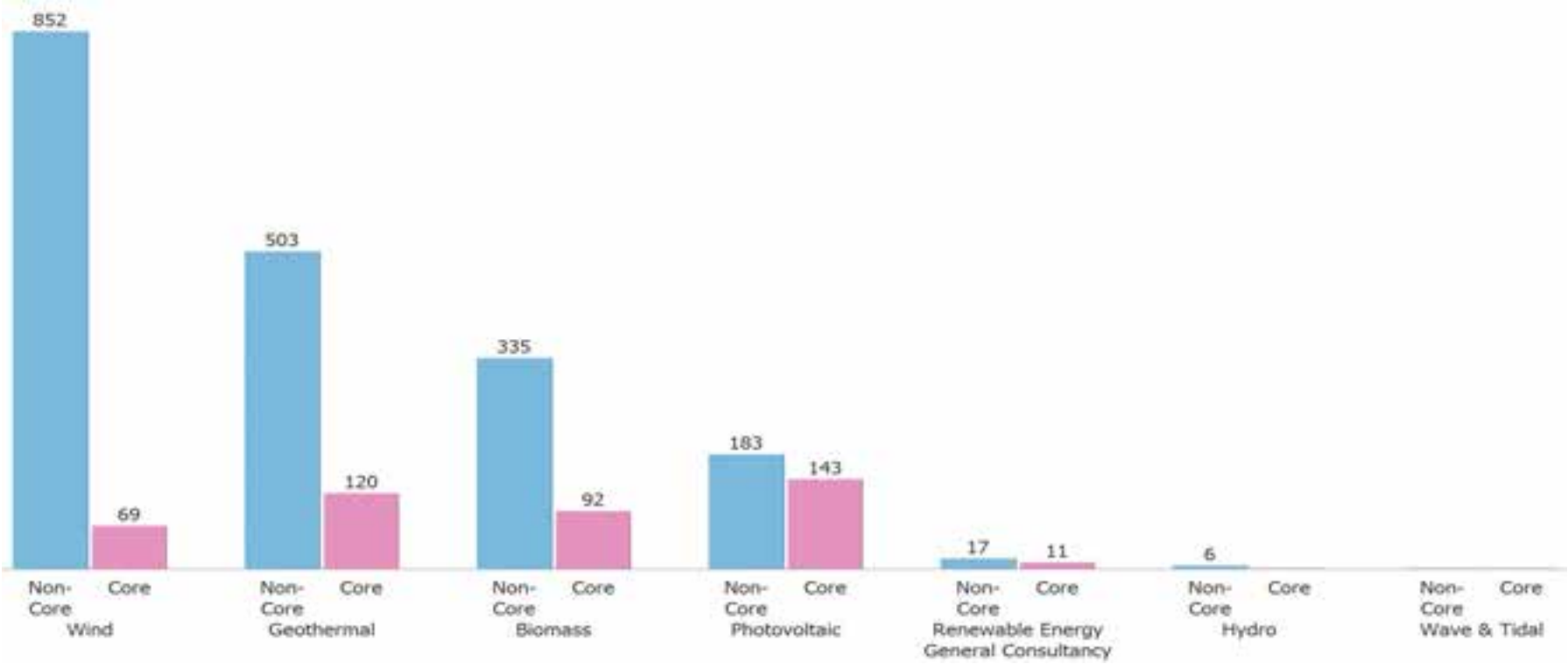


Figure 47: The split between core and non-core sales (£m) for Environmental Level 2 sub-sectors

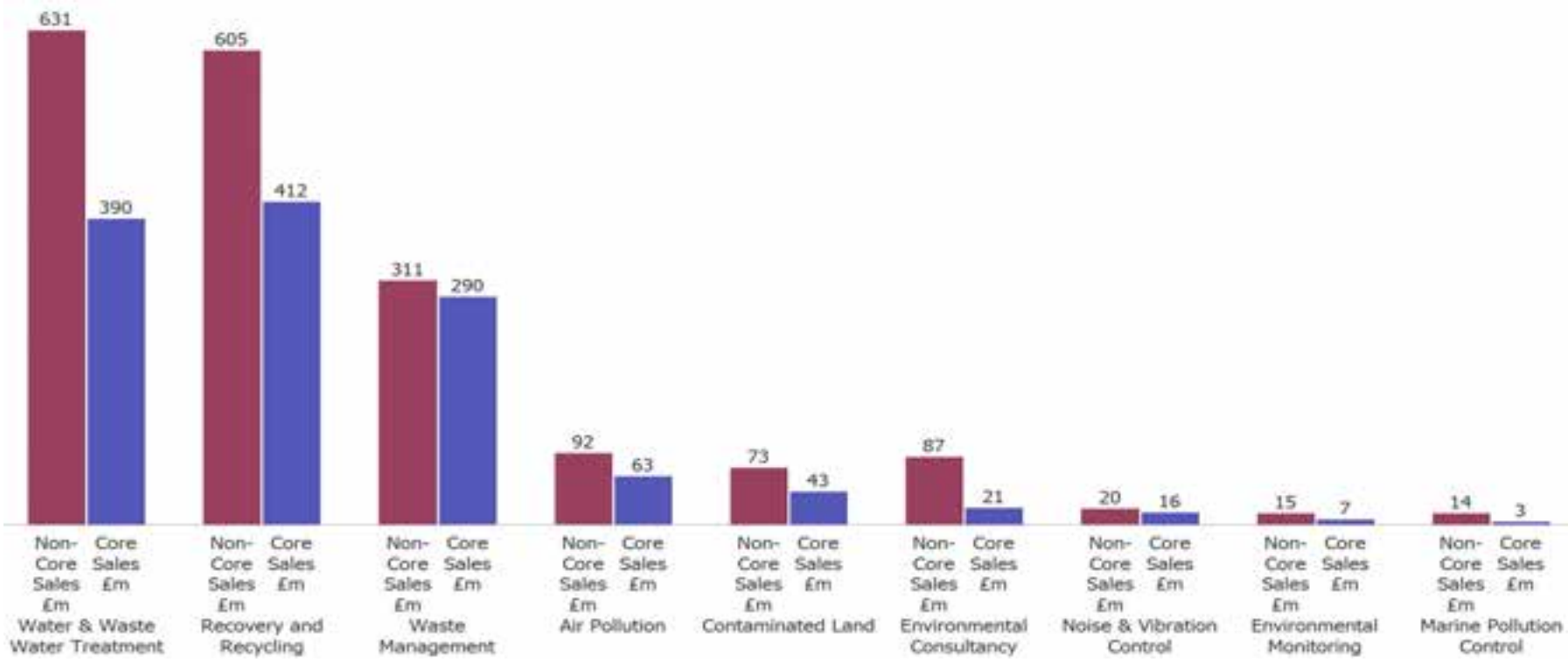


Figure 48: The split between core and non-core employees for Environmental Level 2 sub-sectors

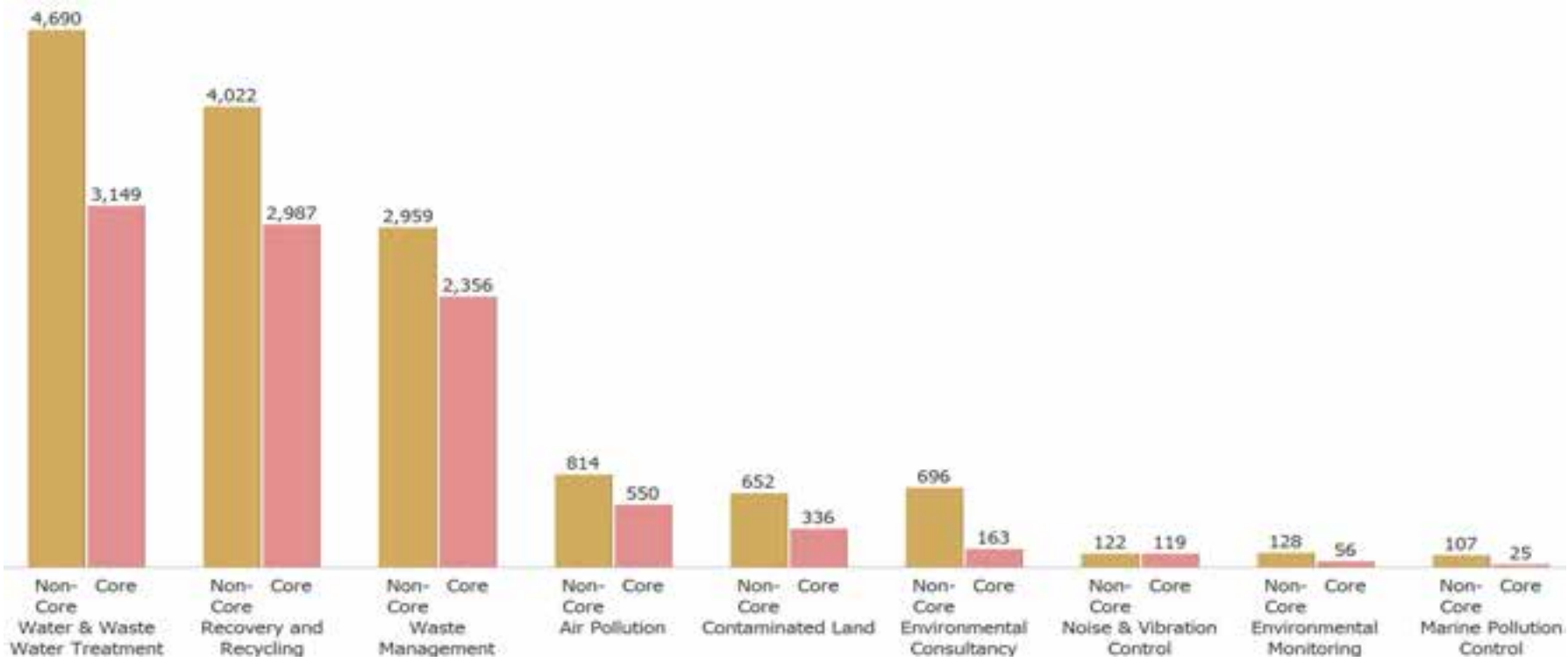
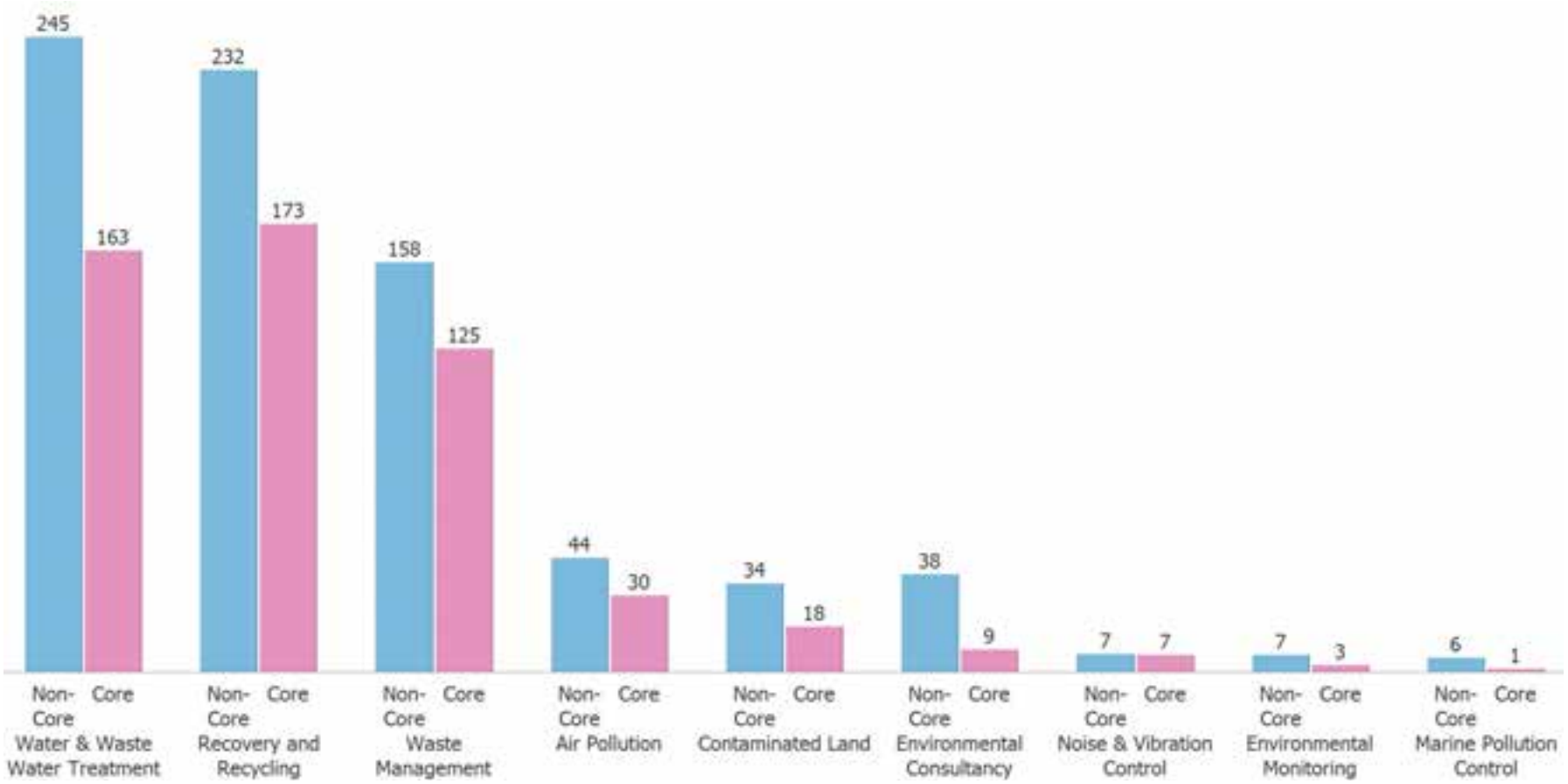


Figure 49: The split between core and non-core companies for Environmental Level 2 sub-sectors



4. EM3's LCEGS Level 3 sub-sectors

In this section we look at the highest performing Level 2 sub-sectors in more detail by highlighting activity happening within them at Level 3. This section is predominantly for reference purposes, so little explanation is offered.

Figure 50: The split between core and non-core selected Low Carbon level 3 sub-sectors for sales (£m)

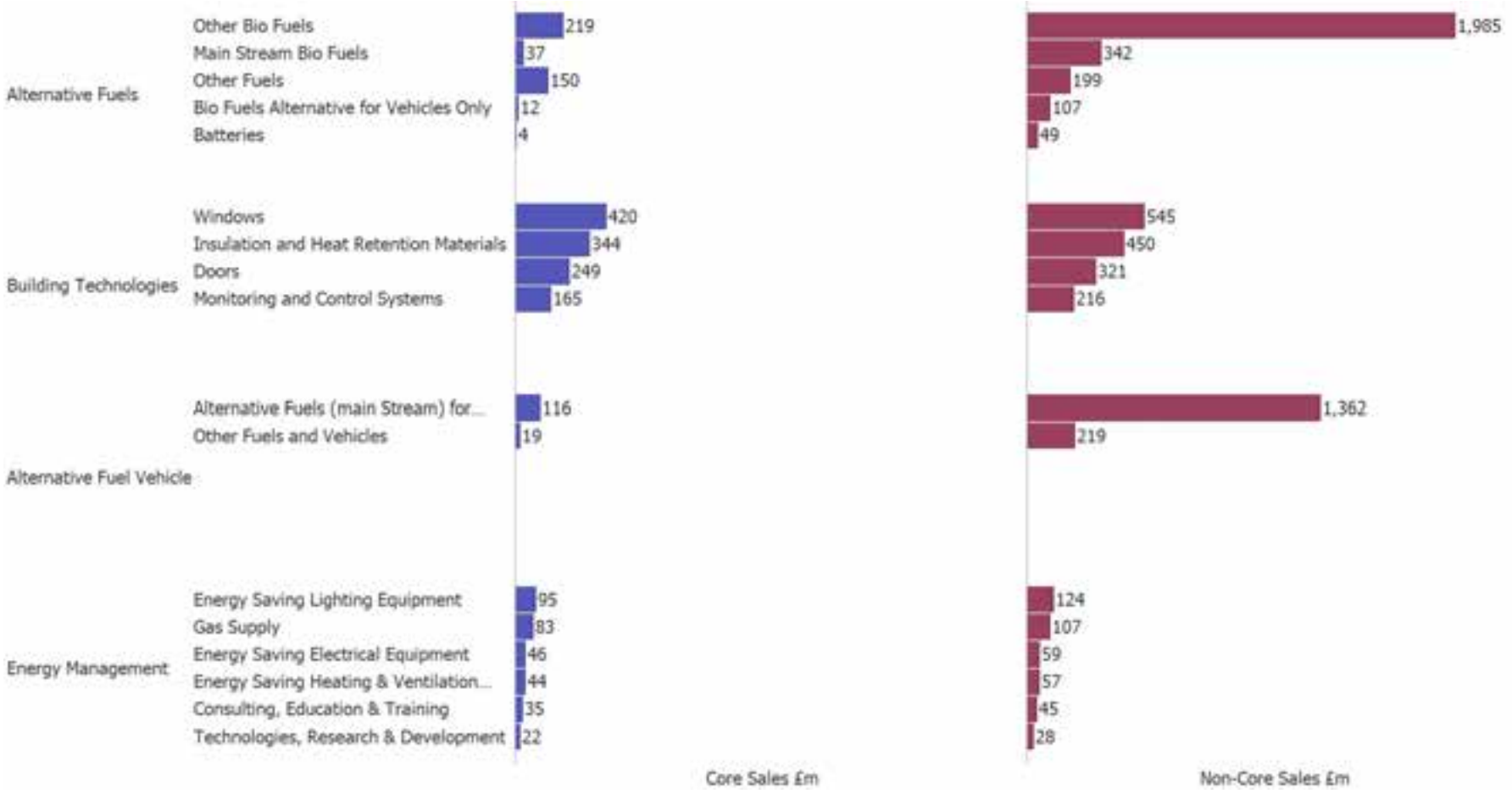


Figure 51: The split between core and non-core selected Low Carbon level 3 sub-sectors for employees

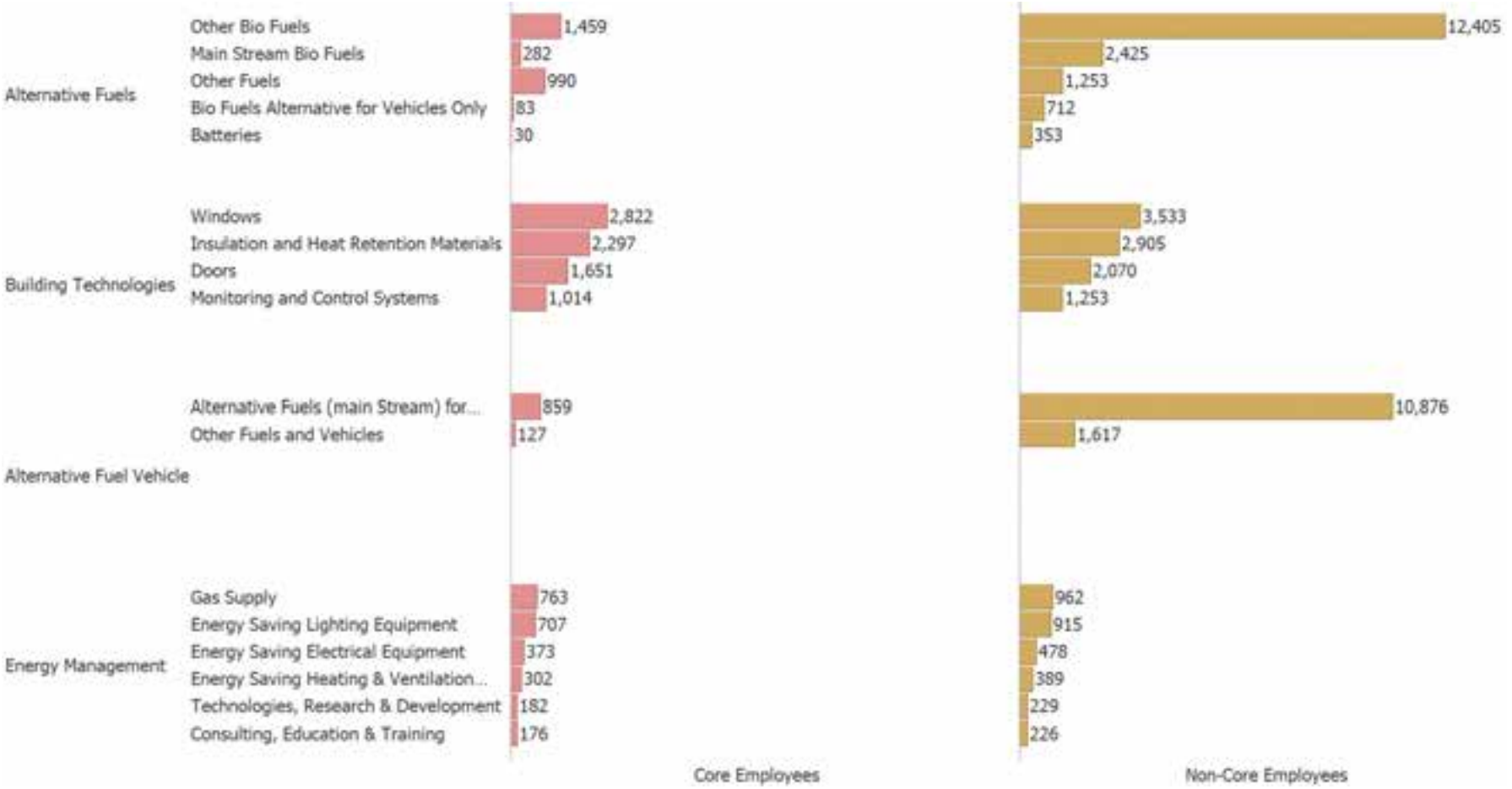


Figure 52: The split between core and non-core selected Low Carbon level 3 sub-sectors for companies

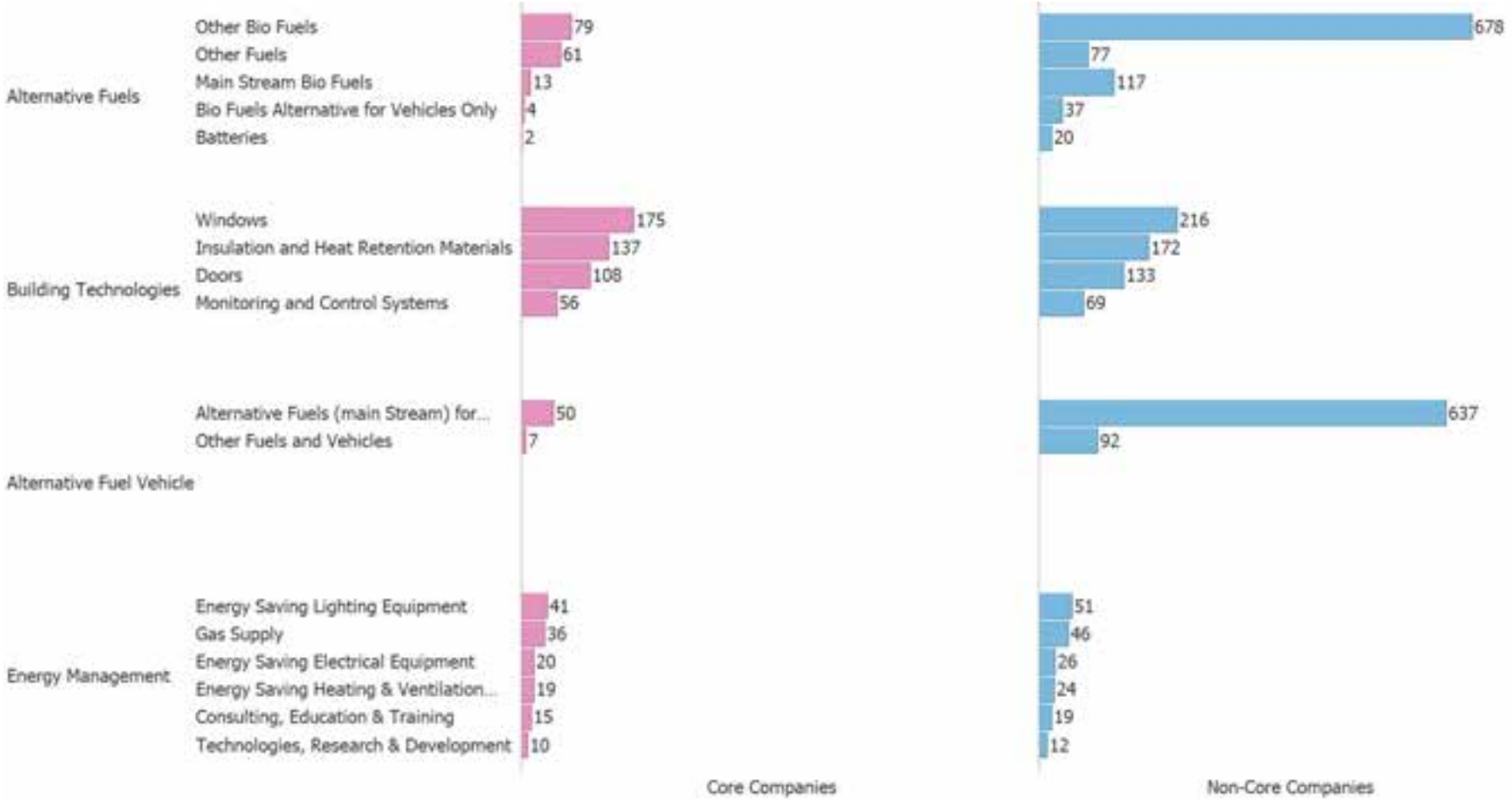


Figure 53: The split between core and non-core selected Renewable Energy level 3 sub-sectors for sales (£m)

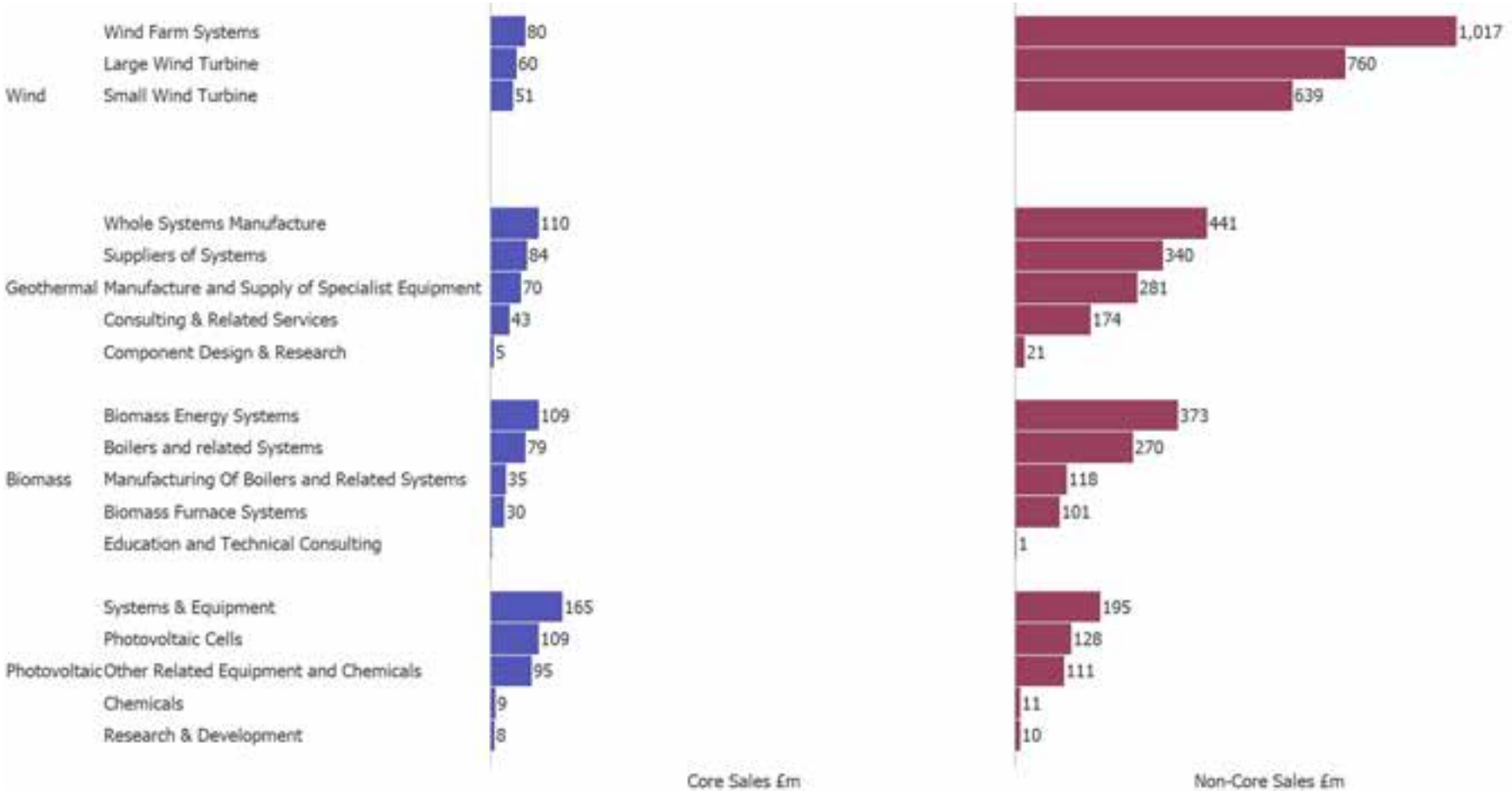


Figure 54: The split between core and non-core selected Renewable Energy level 3 sub-sectors for employees

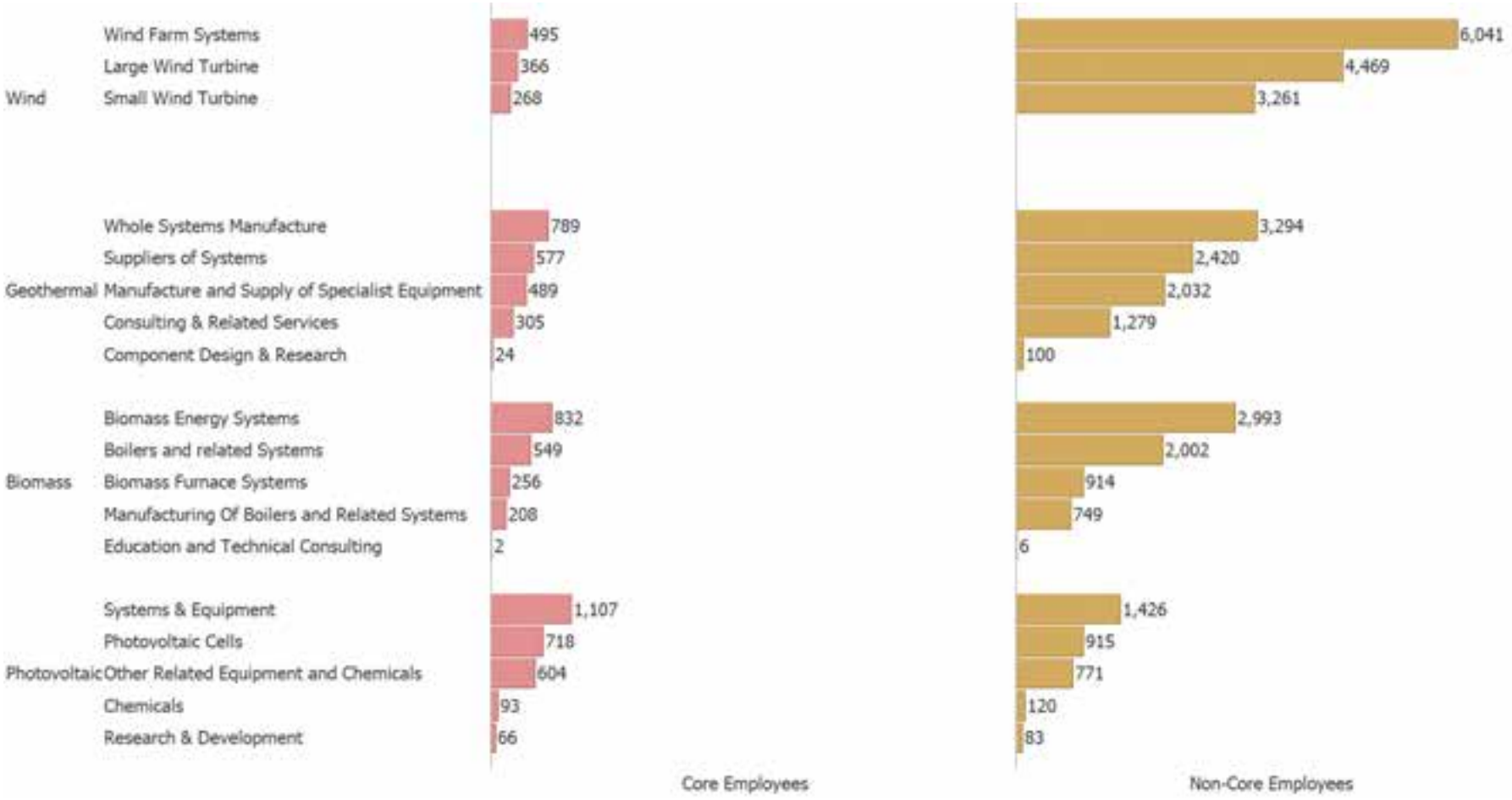


Figure 55: The split between core and non-core selected Renewable Energy level 3 sub-sectors for companies

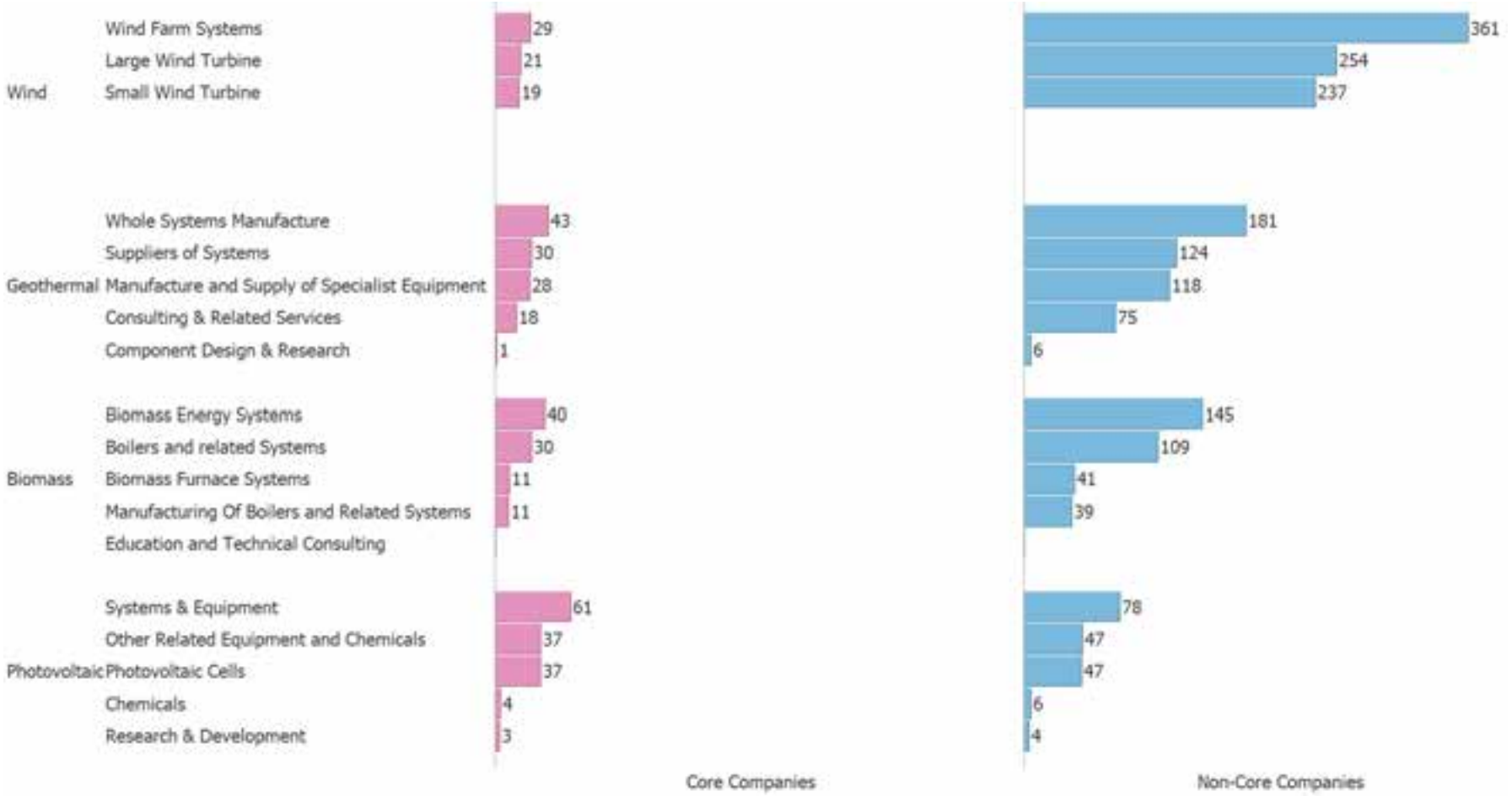


Figure 56a: The split between core and non-core selected Environmental level 3 sub-sectors for sales (£m)

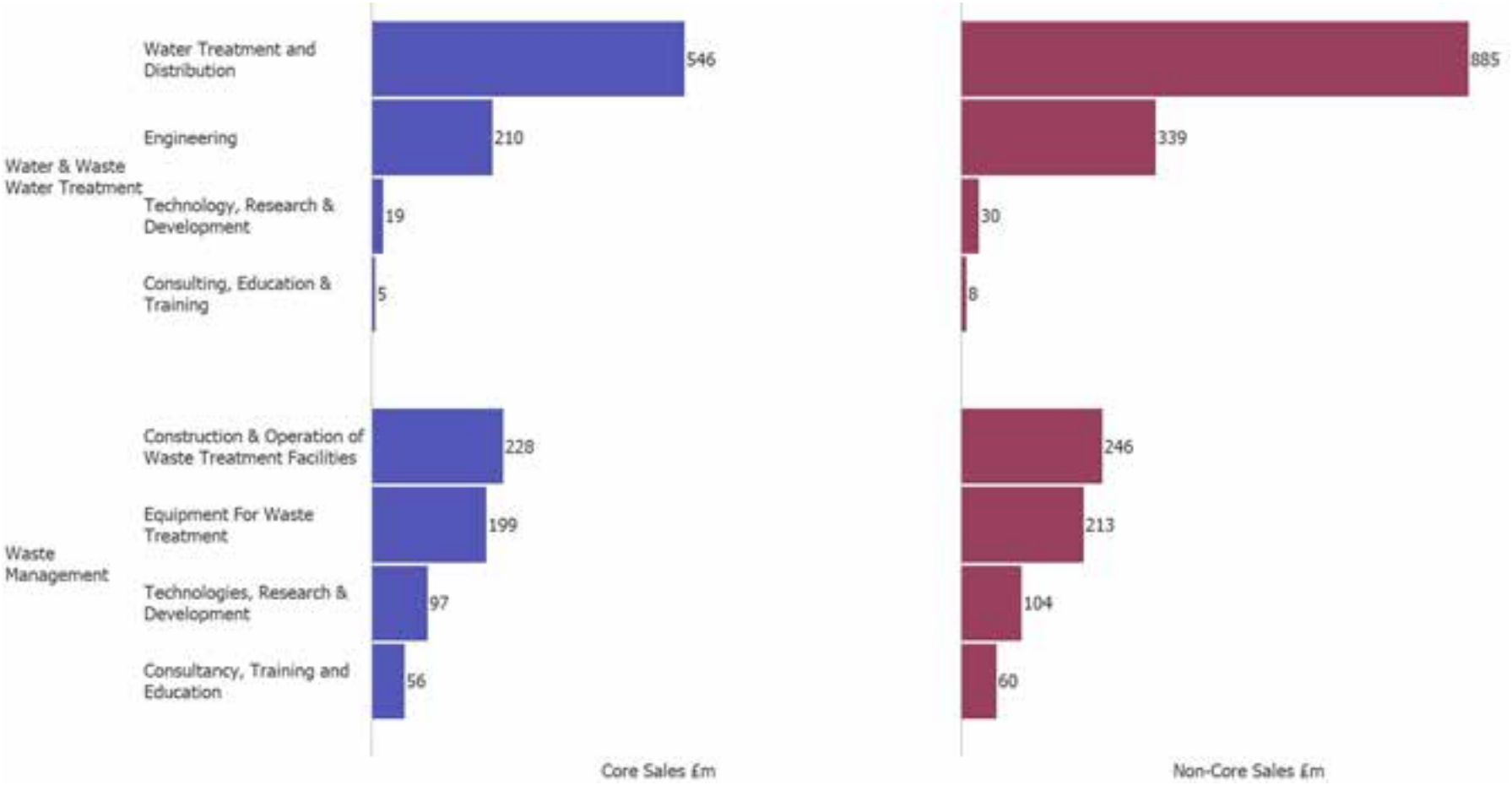


Figure 56b: The split between core and non-core selected Environmental level 3 sub-sectors for sales (£m)

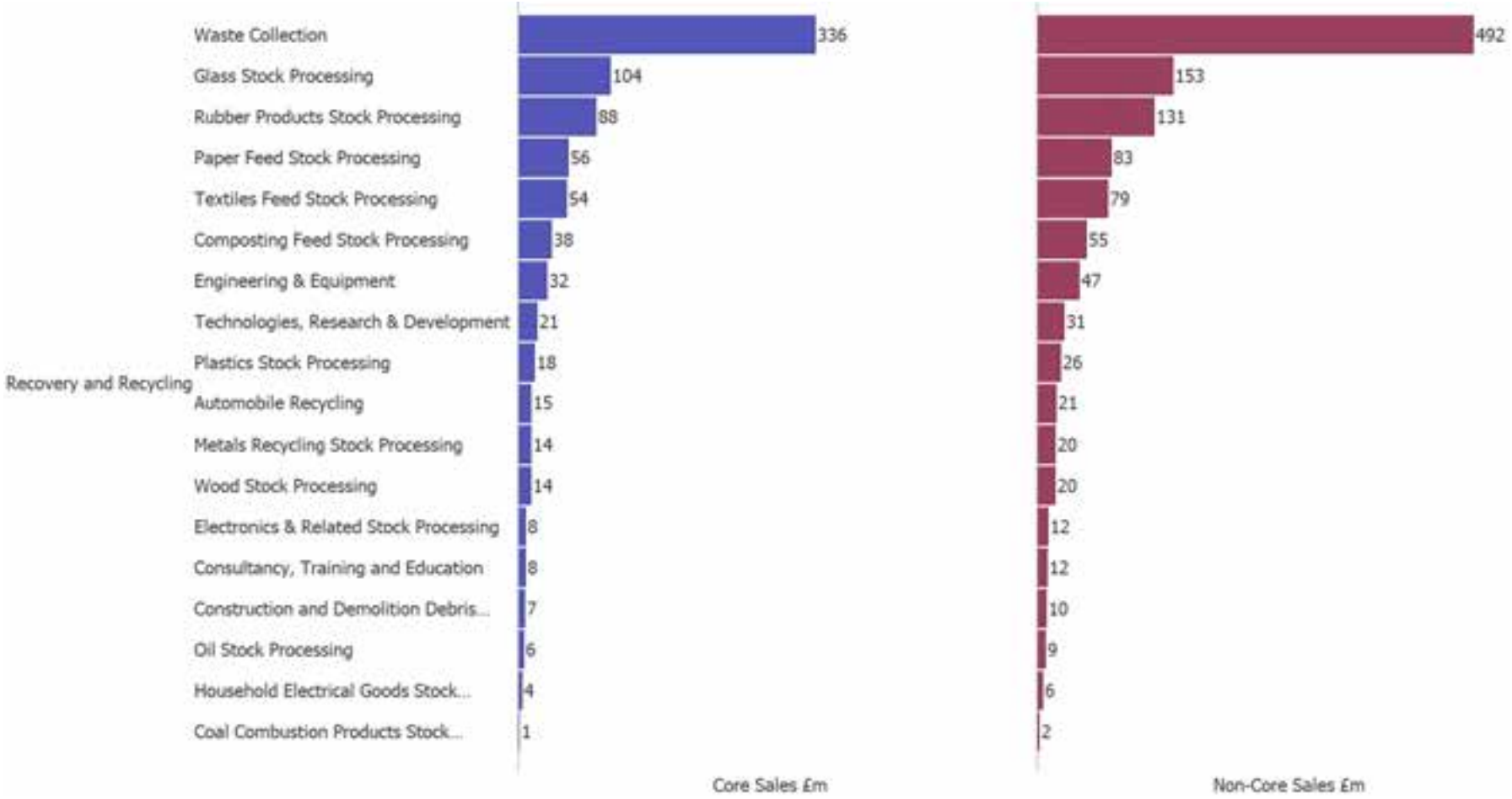


Figure 57a: The split between core and non-core selected Environmental level 3 sub-sectors for employees

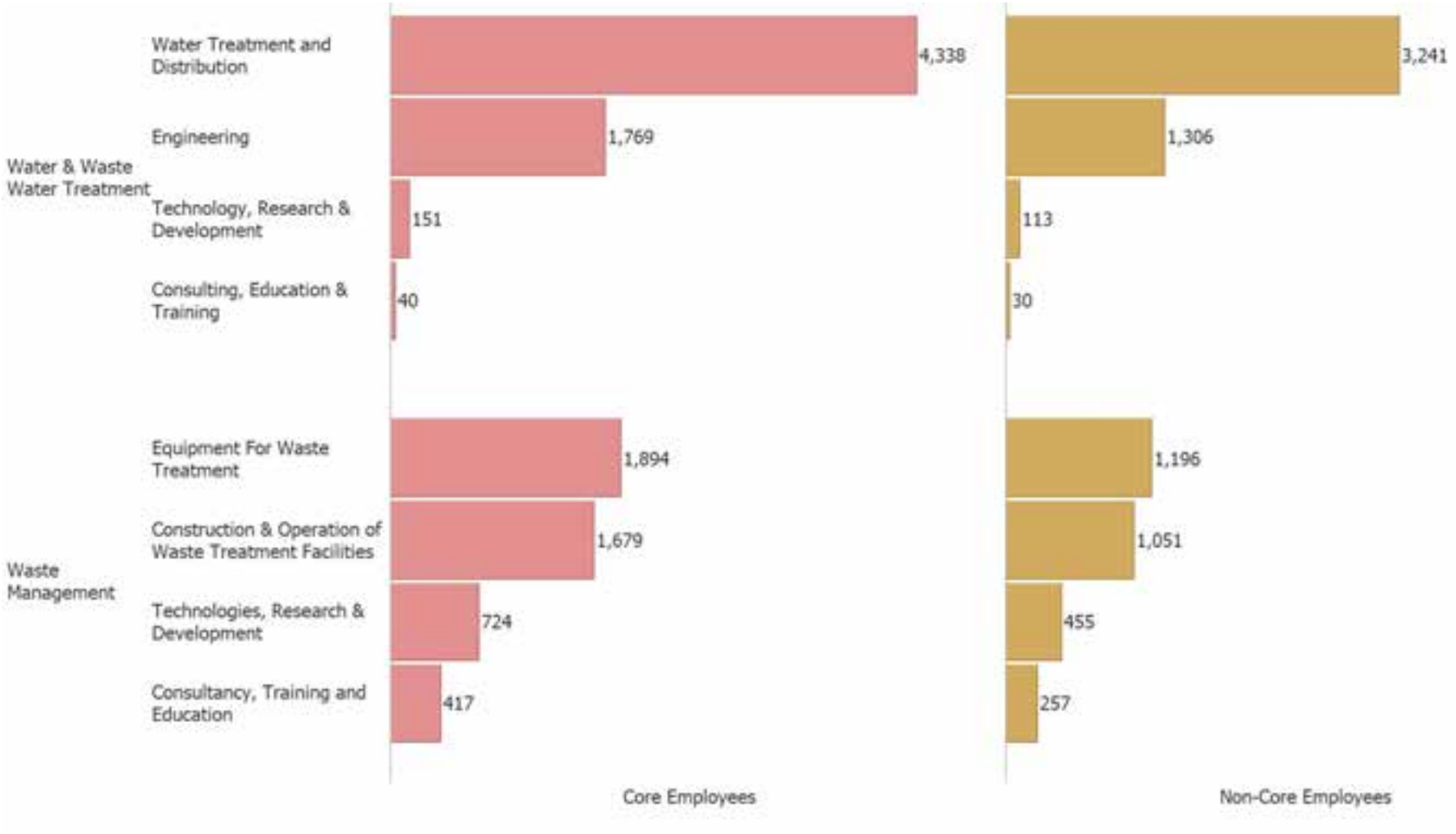


Figure 57b: The split between core and non-core selected Environmental level 3 sub-sectors for employees

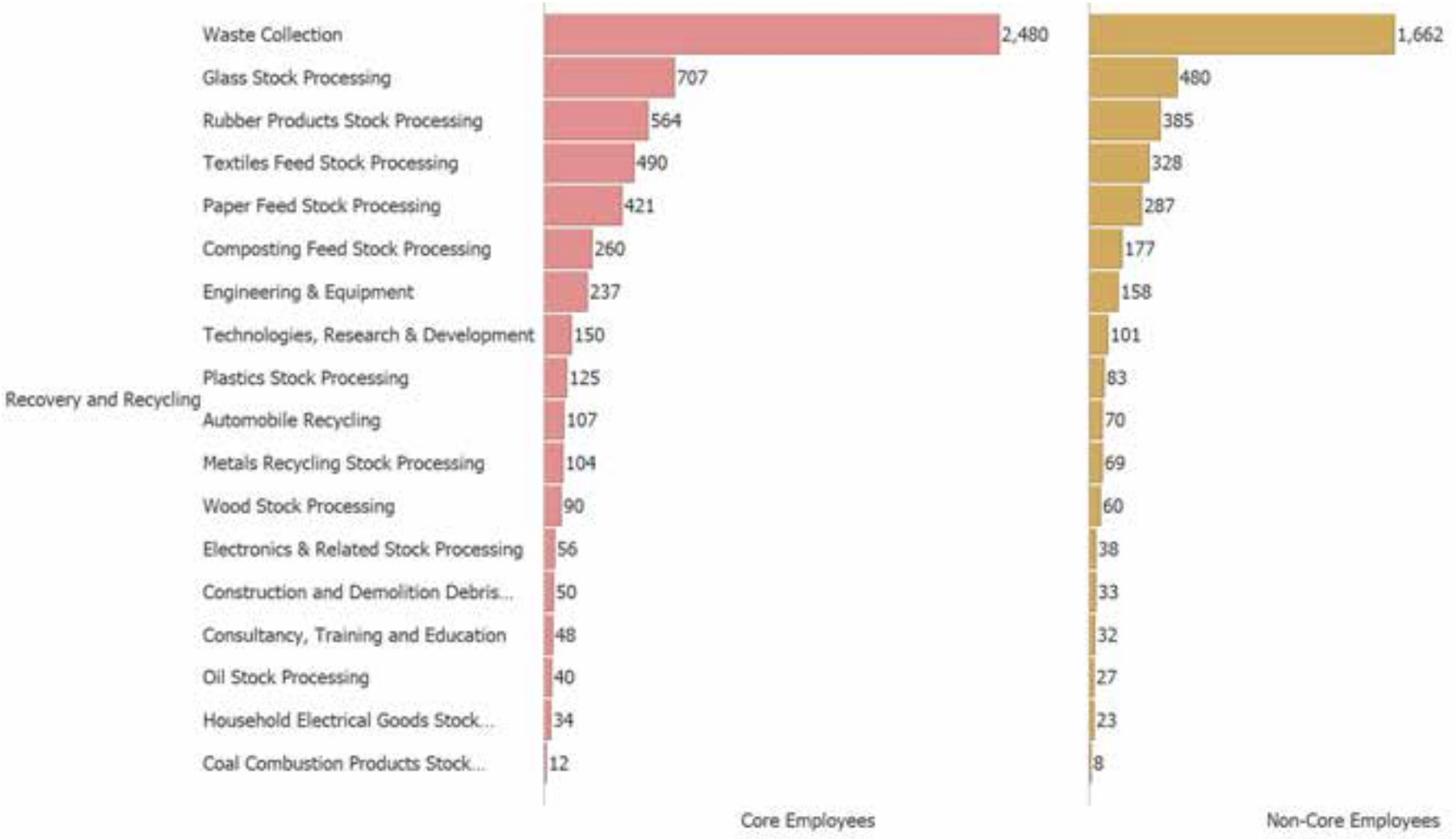


Figure 58a: The split between core and non-core selected Environmental level 3 sub-sectors for companies

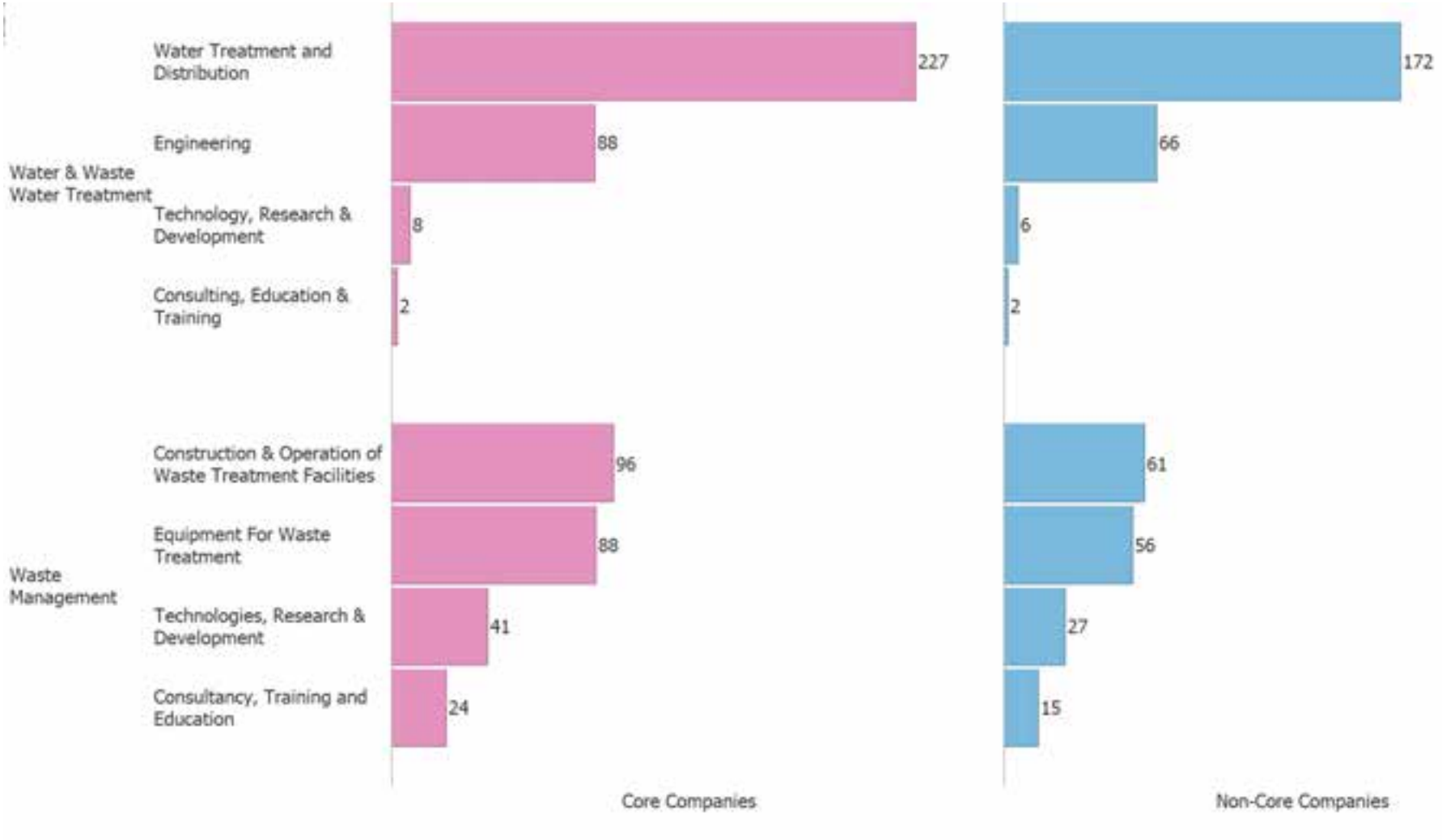
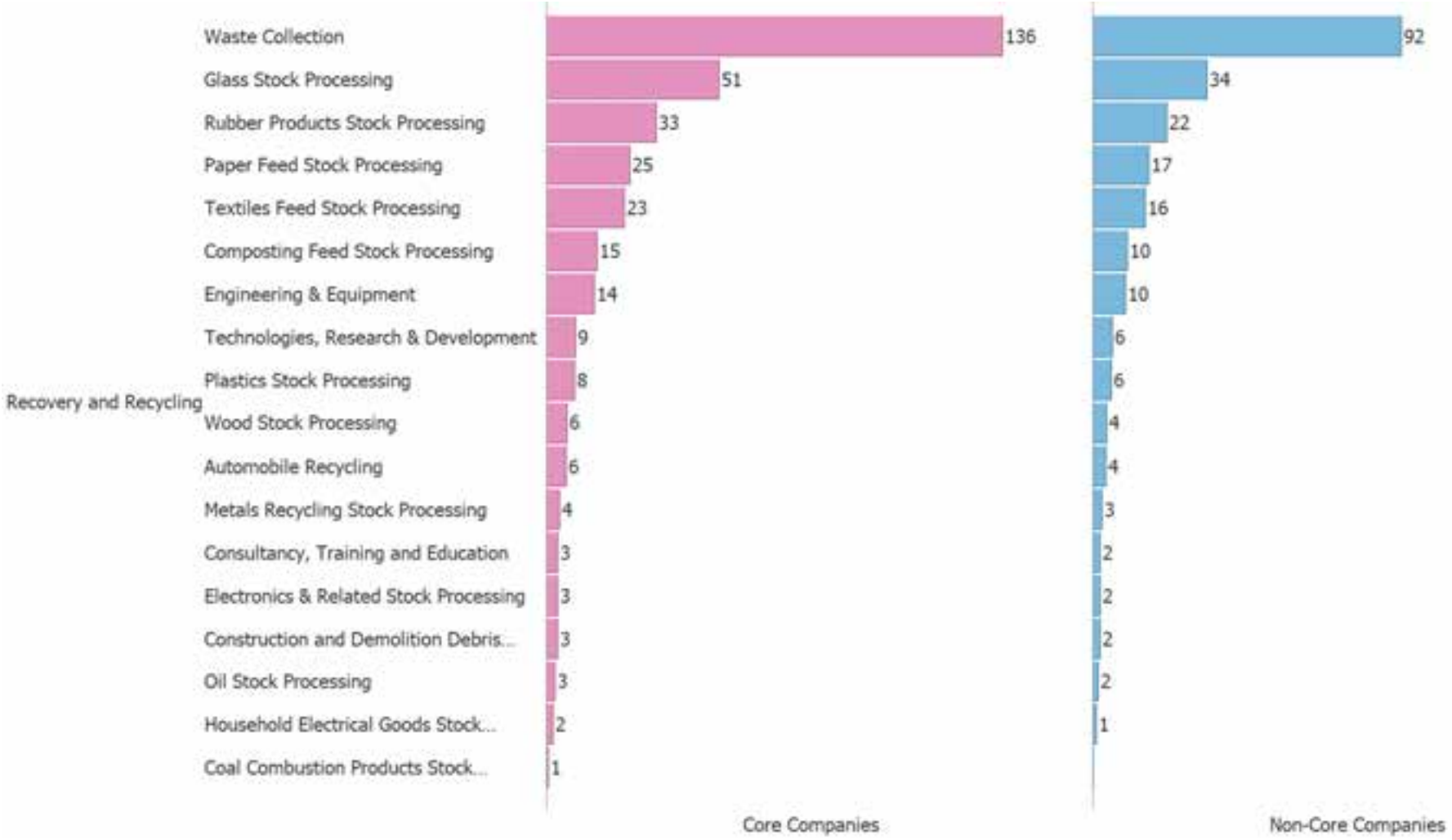


Figure 58b: The split between core and non-core selected Environmental level 3 sub-sectors for companies



Figures 50 to 58 show that the variability of core to non-core activities is similar in the level 3 sub-sectors to that seen in the level 2 sub-sectors.

There is also variability in the split between core and non-core between level 3 sub-sectors within the same Level 2 sub-sector. For example, within the Alternative Fuels level 2 sub-sector, Other Bio Fuels has only 10% core activities, while Other Fuels is more even with 43% core.

Conversely, other level 2 sub-sectors have a similar core to non-core split throughout level 3 sub-sectors, for example the Wind level 2 sub-sector has 7% core activities across all three level 2 sub-sectors.

The split between core and non-core is particularly influential in the shape of the market in the EM3 LCEGS sector. This section clearly demonstrates that not only is the non-core aspect of the LCEGS sector important to the EM3 LEP, but that it dominates it.

Appendix 1

LCEGS Sector Definition

The **Low Carbon and Environmental Goods and Services** (LCEGS) is divided into three Level 1 sub-sectors - Environmental, Renewable Energy and Low Carbon. These are in turn divided into 24 Level 2 sub-sectors:

- The Environmental sub-sector is made up of the following: Air Pollution Control, Contaminated Land Reclamation & Remediation, Environmental Consultancy, Environmental Monitoring, Marine Pollution Control, Noise & Vibration Control, Recovery & Recycling, Waste Management and Water Supply & Waste Water Treatment.

- The Renewable Energy sub-sector is made up of the following: Biomass, Geothermal, Hydro, Photovoltaic, Renewable Energy Consultancy, Wave & Tidal and Wind.

- The Low Carbon sub-sector is made up of the following: Additional Energy Sources, Alternative Fuels & Vehicles, Alternative Fuels, Building Technologies, Carbon Capture & Storage, Carbon Finance, Energy Management and Nuclear Power.

Environmental activities include 9 Level 2 sub-sectors, divided into 47 Level 3 activity groupings:

- Air Pollution includes indoor and industrial air quality and emissions control.
- Contaminated Land Reclamation/Remediation includes Decommissioning of Nuclear Sites.
- 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.

Low Carbon includes 8 Level 2 sub-sectors, divided into 49 Level 3 activity groupings:

- 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.
- Alternative Fuels & Vehicles includes main stream and other vehicle fuels.
- Alternative Fuels includes Main Stream and other Bio Fuels, Batteries and Other Fuels.
- Building Technologies includes Doors, Windows, Monitoring & Control Systems and Insulation/Heat Retention Materials.

Renewable Energy includes 7 Level 2 sub-sectors, divided into 30 Level 3 activity groupings:

- Wind includes Large Turbines, Small Turbines and Wind Farm Systems.
- Wave & Tidal includes Ebb & Flood, Pumps & Equipment, Turbine & Generation etc.
- Photovoltaic includes Systems & Equipment, Cells and Chemicals.
- Hydro includes Turbines, Pumps, Electricity Supply and Dams.
- Geothermal includes Whole Systems, Specialist Equipment, Consulting and R&D.
- Biomass includes Energy, Furnace, Boilers and Related Systems.
- Renewable Energy consulting includes specialist consulting and legal advice.

Further detail on the Level 2 sub-sectors are provided below in their Level 1 groupings:

Environmental

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.

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.

Renewable Energy

Biomass Energy sub-sector includes all activities that convert biomass into energy but excludes biomass materials (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:

- Manufacture and supply of specialist thermally enhanced equipment - grout, heat pumps, pipes, flow control valves, drilling equipment, installation rigs and ancillary equipment.
- Whole systems manufacture and supply for industrial, residential and community geothermal energy applications.
- Component design and research - design services, component research and component recycling.
- Consulting & related services - architectural, construction, systems design, consulting, engineering, installation and project development services.

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.

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.

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 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 and maintenance of photovoltaic modules, mounting systems, ancillary components, cells and cell materials.
- Other equipment & chemicals - manufacture, supply, installation 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 wind farm systems, large and small wind turbines. The sub-sector is divided by size of turbine rather than location (onshore and offshore) because it is easier to differentiate and map supply chain activities in this way. It includes:

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

Low Carbon

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 includes the production, supply and distribution of Natural Gas (Compressed or Liquefied), Synthetic Fuel and Auto Gas (LPG, LP Gas or Propane).
- Other Fuels and Vehicles includes vehicle technologies and fuel sources that are still at an early stage.
- Research, Design, Development and Prototyping activities are included for: Hydrogen fuel cells and hydrogen internal combustion, Electric, Hybrid Electric, Steam powered, Organic waste fuel, Wood gas, Solar powered and Air, Spring & Wind powered vehicles.

Alternative Fuels sub-sector includes a wide range of Low(er) carbon fuel sources that are not included under Renewable Energy. It includes the manufacture, production, supply and distribution of:

- Batteries - chemicals, chargers, controllers, cables, connectors, containers, suppliers and testing equipment.
- Bio fuels for Vehicles - 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.
- Other fuels - Hydrogen.

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 manufacture, supply, distribution, installation and development of double glazed, electro chromatic, insulated alloy, honeycomb and triple glazed units.
- Doors - the manufacture, supply, distribution, installation and development of insulated alloy and plastic doors.
- Insulation and heat retention materials - the manufacture, supply, distribution, installation and development of insulation materials, heat retention surfaces & ceramics, electronic control systems and controlled venting and ducting systems.
- 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:

- 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, supply, distribution and installation of energy saving light bulbs & tubes, lighting and control systems.
- Heating & Ventilation - manufacture, supply, distribution and installation of energy saving equipment and 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.

Appendix 2

The kMatrix Methodology

2.1 Introduction

This sector (until 2015) has not been well documented by government statistics, so 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.

2.2 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.

2.3 kMatrix's Methodology

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.

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 (FAME, Companies House etc), international sources, industry/trade sources, the advertising industry (YELL etc.) 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 a company, for counting purposes, to the activity that accounts 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 Whole Time Equivalents (WTE).

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. Growth is an exception because rates cannot meaningfully be differentiated at a local level, therefore we apply regional growth rates throughout.

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		100	101.4	100.0	104.9	101.2	98.6
that growth in the manufacturing and construction sectors is similar for both the SIC and kMatrix definitions		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 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.	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 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		