

CLIMATE CHANGE ADAPTATION OPPORTUNITIES AND THREATS TO GREATER MANCHESTER

**new
economy**

EnviroLink



AGMA
ASSOCIATION OF
GREATER MANCHESTER
AUTHORITIES

CONTENTS

1.	BACKGROUND AND INTRODUCTION.....	3
2.	GM PRIORITY SECTORS.....	4
3.	GM'S CLIMATE CHANGE ADAPTATION SECTOR.....	11
4.	SKILLS REQUIREMENTS.....	20
5.	CONCLUSIONS.....	21
6.	ANNEXES	
	A: CLIMATE CHANGE ADAPTATION DEFINITION.....	22
	B: CLIMATE CHANGE RESILIENCE, NUMBER OF COMPANIES, EMPLOYMENT AND SALES.....	24
	C: BUILDING TECHNOLOGIES, NUMBER OF COMPANIES, EMPLOYMENT AND SALES.....	27
	D: ENVIRONMENTAL CONSULTANCY SERVICES, NUMBER OF COMPANIES, EMPLOYMENT AND SALES.....	31
	E: SKILLS LEVELS PER LEVEL 4 PER BUSINESS ACTIVITY CATEGORY.....	35

1. BACKGROUND AND INTRODUCTION

The “Mini-Stern” for Manchester¹ identified that the impact of unavoidable climate change on the Greater Manchester economy could be profound, with a potential loss of £20 billion to the economy to 2020 if it fails to adapt. However, there is a significant economic opportunity for the sub region if it takes early action.

The EcoCities project seeks to help Greater Manchester to adapt to changes in its climate. Eco Cities examines how urban areas can respond to the challenges and opportunities that a changing climate presents and to provide Manchester with its first blueprint for an integrated climate change adaptation strategy.

This report seeks to complement that blueprint by:

- providing an overview of Greater Manchester’s priority sectors and summarising the potential impact of climate change on those sectors;
- identifying the size and scope of Greater Manchester’s climate change adaptation sector; and
- providing an understanding of the potential opportunities relating to job creation in that sector.

¹ Assessing the economic impact of EU and UK climate change legislation on Manchester City region and the North West, Deloitte, 2008

2. GM PRIORITY SECTORS

2.1 OVERVIEW

Greater Manchester has successfully restructured its economic base over recent decades, transforming itself into a relatively strong and diverse economy. Unlike some other major city economies, Greater Manchester's economic growth has gone hand-in-hand with the rapid expansion of private sector services, especially in some sectors such as Financial and Professional Services.

Financial and Professional Services, together with the Health sector, have now replaced Manufacturing to become the most important employment sectors in the conurbation. Financial and Professional Services now account for almost one in-six employees (16.6% of total), with the Health sector, which includes a small percentage of non-Health related Life Sciences employment, accounting for over one-in-ten employees (13.0%).

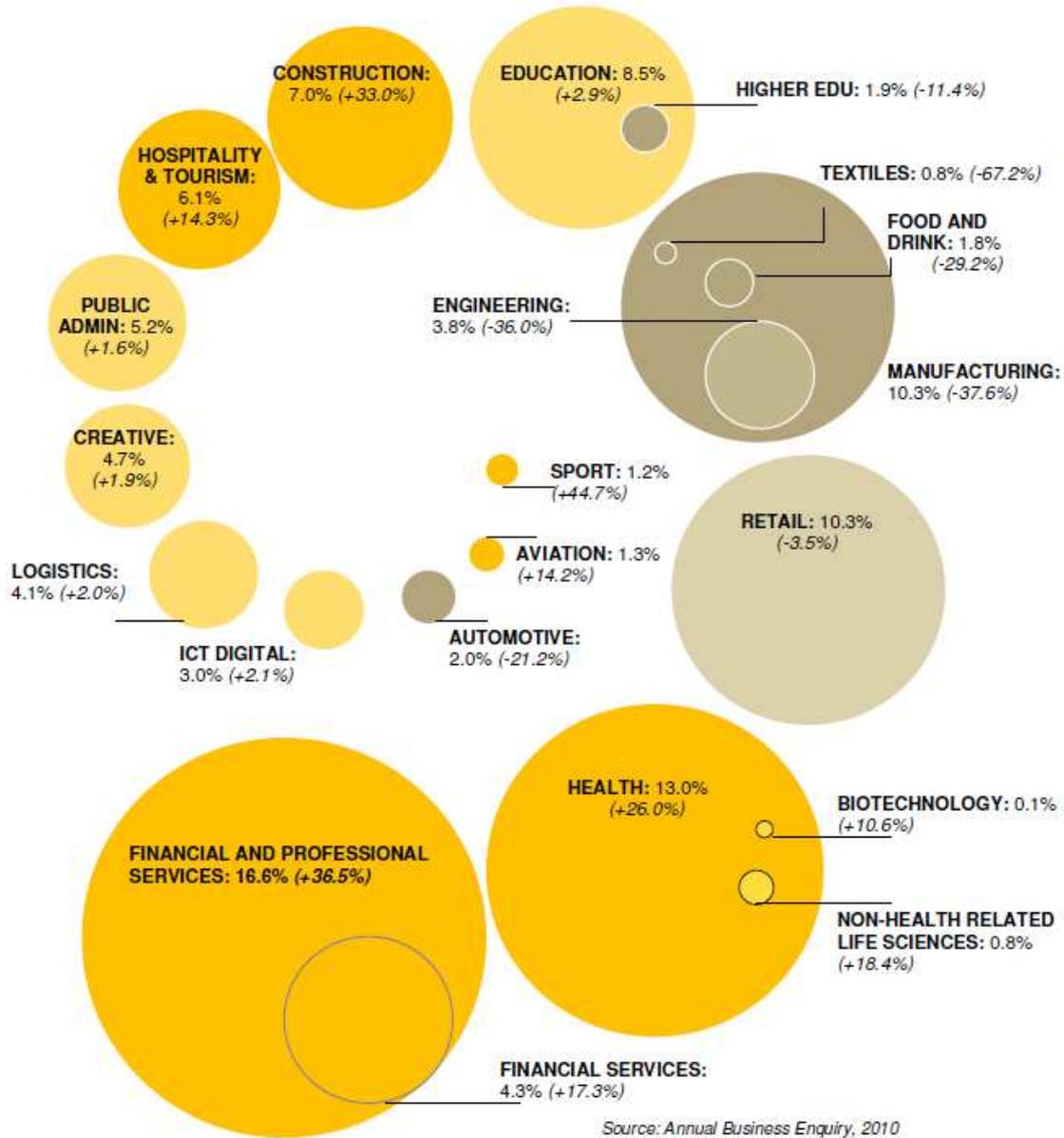
However, despite the decline of Manufacturing over recent years (over 70,000 jobs lost in Greater Manchester between 2000 and 2008), the sector remains a significant employer across the city, still accounting for over one-in-ten employees (10.3%). The percentage varies across Greater Manchester, but is as high as a fifth in some districts.

Furthermore, recent research² has shown that Greater Manchester has a strong base of advanced manufacturing activity compared to other UK cities and to national averages. This conurbation has more manufacturers engaged in high-technology manufacturing (the highest-level sub-set of advanced manufacturing) than all other comparator cities outside London, and there are over 38,000 employees working for the whole of the advanced manufacturing sector – higher than all comparator cities except for Birmingham. Our research shows that within the manufacturing sector approximately one third of all manufacturing employees work in the advanced manufacturing sector in Greater Manchester (31.2%) – defined here as high-to-medium technology manufacturing.

Further details of the sectoral breakdown in Greater Manchester are set out in Figure 1 below.

² New Economy (2011), *Manufacturing the Future? Advanced Manufacturing in Greater Manchester*, http://neweconomymanchester.com/stories/840-other_publications

Figure 1: Sectoral Breakdown



KEY			
High Growth (>10%, 98-08)	Growth (<10%, 98-08)	High Decline (>-10%, 98-08)	Decline (<-10%, 98-08)

Source: ONS, Annual Business Enquiry, 2010

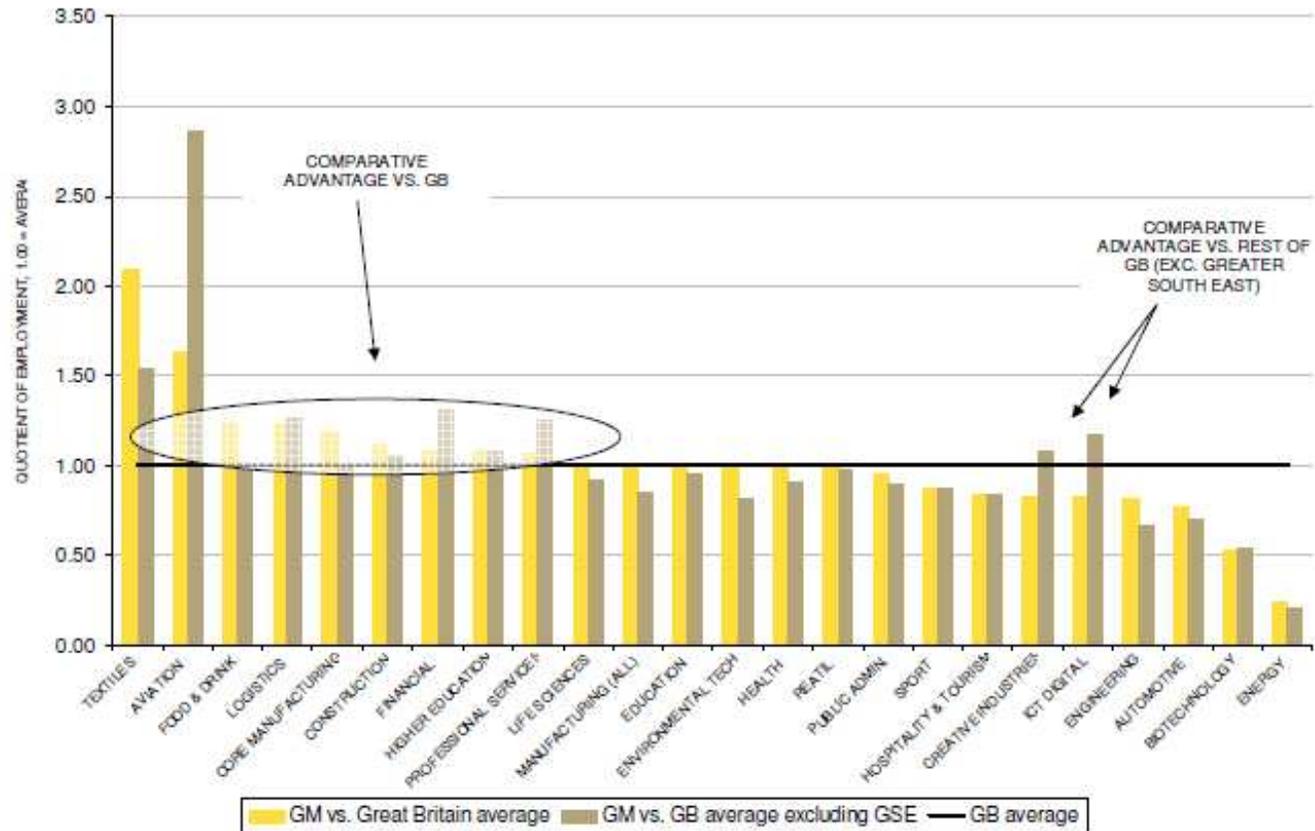
2.2 KEY SECTOR CONCENTRATIONS

Figure 2 overleaf illustrates that, despite the increasing importance of service-based industries, it remains the case that GM has concentrations of employment in sectors such as Manufacturing, Construction, Textiles, Food & Drink and Logistics, that are higher than national averages – indicated by the left-hand bar on the chart being higher than the Great Britain (GB) employment average for the sector.

The right-hand bar on the chart compares GM employment concentrations with national averages minus London and the Greater South East (Greater London, South East and East of England) and shows how comparing GM employment concentrations to GB averages can be misleading, due to disproportionate concentrations of employment in certain sectors in London and the Greater South East. Compared to averages where GSE is excluded, GM has pronounced national specialisms in sectors such as Creative Industries and ICT Digital, and an even more marked concentration of employment in Financial and Professional Services. (Where GM has a more pronounced sector specialism because London and the Greater South East are discounted from the analysis, the right-hand bar is higher than the left.)

The key trend to be taken from this analysis is that, compared to the rest of the country outside of the Greater South East, GM has clear specialisms in Creative Industries and ICT Digital. In contrast, compared to the rest of the country outside the GSE, GM has a less pronounced concentration of employment in the majority of industrial and heavy industries, such as Construction and Manufacturing (although still being above national employment averages in these sectors). The fact that GM has lower concentrations of employment in Construction and Manufacturing again serves to illustrate the structural change that has taken place across much of GM's business base in the last two decades.

Figure 2: Concentrations of Key Sub-Sector Employment, GM vs. GB, 2008



Source: Annual Business Enquiry, 2010

2.3 KEY SECTOR PRODUCTIVITY

When analysing relative sizes of sectors based on employment it is important to note that the size of a sector is not necessarily indicative of its productivity performance. Indeed, many industries with smaller levels of employment are significantly more productive. The sectors with the highest GVA per employment in Greater Manchester are sectors that employ relatively few people, notably Biotechnology (£140,500) and Environmental Technology (£65,900) – whilst larger sectors such as Retail (£20,700 GVA per employment), Public Sector (£27,000) and Construction (£35,800) have below average GVA per employment levels (GM average: £35,200, GB average: £37,500).

Despite being the conurbation's biggest sector in employment terms, F&P does not have one of the highest GVA per head figures – although still above average at £42,700 per head. The fact that the largest sector in Greater Manchester is not the most productive again points to the fact that there is a productivity gap in terms of much of the economic activity in the conurbation, and that lower-value activities predominate. (Despite this, it must be noted that Financial Services activities on their own retain a high GVA per head in Greater Manchester of £74,300.)

Manufacturing is the fifth most productive sector in GM in terms of GVA per head, at £46,600 – with Core Manufacturing and Food and Drink (a sub-sector of Core Manufacturing) remain more productive than Greater Manchester and national sector averages. This supports research showing that a significant proportion of the manufacturing activities that remain in the conurbation are advanced and high-tech manufacturing, and points to the wider trend in manufacturing, where particularly labour intensive activities have increasingly moved to lower cost economies around the world, whilst the manufacturing that has remained competitive in developed economies has tended to become more specialised and machine intensive.

2.4 RISKS AND OPPORTUNITIES OF ADAPTATION AND MITIGATION

Many of Greater Manchester's priority sectors are at risk if there is a failure to adapt to the changing climate. Sectors that use a significant amount of energy and which generate high levels of emissions, such as manufacturing, construction and textiles will be exposed to factors such as increasing energy and fuel prices, and to the effects of climate change legislation, such as the introduction of carbon pricing, trading and associated emissions reductions targets. Such sectors may also be affected by a fall in market demand for products as end users exert pressure by refusing to accept high carbon footprint goods and services.

Key service sectors, including Financial and Professional Services, Creative Industries and ICT Digital may have the ability to grow without a significant increase in direct emissions, although a failure to adapt may lead to a negative impact on productivity through, for example, damage to real estate and infrastructure caused by the changing climate. ICT infrastructure is particularly vulnerable to climate change in a number of

direct and indirect ways, with potentially significant negative knock-on effects for a large part of the service sector overall.³

A summary of some of the potential sector impacts of climate change, as well as the interdependencies between vulnerable sectors, is provided in the table below.

Sector	Dependencies on infrastructure	Dependencies on natural environment and population	Dependencies on overseas systems	Impacts on other sector
Energy	Water for cooling in power stations and fuel refining; ICT for control and management system of electricity and gas; Transport for the fuel supply chain and workforce	Substations and local distribution networks are vulnerable to flood; Coastal power stations vulnerable to flood, and most power stations are dependent on natural water supplies for cooling; Cables may be affected by extreme winds; Wind turbines may be affected by extreme weather	Dependent on interconnectors with France, the Netherlands and Ireland	ICT wholly dependent on energy; Transport dependent on fuel and increasingly electricity; Water dependent on energy for pumping and control systems
Transport	Energy infrastructure for fuel and increasingly electricity; ICT for management of services and networks; Drainage infrastructure to prevent flooding; Internally dependencies within and across modes (eg national rail dependent on connections with local rail)	Road and rail vulnerable to flood; Transport system sensitive to demographic changes and behaviour – eg, increased urban living and increased home working	Dependent on European air traffic and maritime control	All sectors depend on transport to carry workforce to sites; Food distribution depends on transport
Communications	Energy for all services; Transport for maintenance workers	ICT affected by demographic changes and user behaviour, such as increased home working	ICT is a global system, with many dependencies on systems overseas	All sectors increasingly dependent on ICT for control systems, especially the smart grid; Increasing dependence on ICT for sensing and reporting the condition of the infrastructure
Water	Energy for pumping and processing; ICT for control systems; Transport for workforce and supplies of chemicals for processing	Water infrastructure dependent on natural water and drainage systems for supply and flood defence; Water supply sensitive to changes in demographics and population numbers		All sectors vulnerable to effects of flood, either directly or via cascade; All workplaces require water for staff

Source: *The Royal Academy of Engineering (2011)*

³ The Royal Academy of Engineering (2011), Infrastructure, Engineering and Climate Change Adaptation – ensuring services in an unsure future, http://www.raeng.org.uk/news/publications/list/reports/Engineering_the_future_2011.pdf

The table below summarises how some of these scenarios might negatively impact upon Greater Manchester's priority sectors, in terms of employment and productivity (GVA), by 2032. For example, the forecasts show that a 5% reduction in manufacturing employment by 2032 – potentially caused by production being hampered through increased costs or disruptions to production – would mean the loss of 2,500 jobs in Greater Manchester. A change of up to 10% would mean the loss of 5,000 jobs. The data shows that the logistics sector could potentially also see significant job losses if employment was to be affected by 5% (600 jobs) or 10% (1,200 jobs).

Similarly, these scenarios would have a negative impact on the productivity of key sectors. For example, a 5% reduction in GVA in the ICT Communications sector – potentially caused by floods impacting on local exchanges and overhead lines or physical resources such as rare earth metals becoming increasingly scarce – would equate to £128.4m of lost productivity in this sector alone.

SECTOR	POTENTIAL EMPLOYMENT IMPACT (000's)			POTENTIAL GVA IMPACT (£m)		
	1% negative impact	5% negative impact	10% negative impact	1% negative impact	5% negative impact	10% negative impact
Manufacturing	-0.5	-2.5	-5.0	-12.5	-62.6	-125.3
Construction	0.0	-0.2	-0.4	-17.1	-85.4	-170.8
Logistics	-0.1	-0.6	-1.2	-35.4	-176.8	-353.5
Tourism	0.0	0.0	0.0	-7.1	-35.3	-70.7
ICT	-0.1	-0.4	-0.7	-25.7	-128.4	-256.8

Source: GMFM (2011), New Economy calculations

However, despite these negative scenarios, it is also the case that change can also stimulate innovation and adaptation and those sectors and organisations that embrace the challenge and seek commercial advantage are most likely to survive and prosper. The next section highlights some of the potential opportunities with regards to adapting to the climate change and catering for the changing needs of consumers and business.

3. GM'S CLIMATE CHANGE ADAPTATION SECTOR

This section of the report seeks to quantify the size and scope of the climate change adaptation sector across Greater Manchester and to identify potential opportunities to expand and diversify that sector. The analysis has been produced by Envirolink using Knowledge-Matrix data.

3.1 DEFINING THE CLIMATE CHANGE ADAPTATION SECTOR

The low carbon and environmental goods and services sector (LCEGS) is complex and diverse. Therefore the Knowledge-Matrix data has been broken down to levels of activity that provide a detailed view of how the LCEGS sector works in order to understand its multi layered and broad range of business activities.

The levels range from high rank industry groupings at Level 1 (L1) down to very specific business categories at Level 5 (L5). The analysis set out in this report has been based on the Knowledge-Matrix data Level 2 classification of "climate change and resilience", along with additional data from two additional categories; "building technologies" and the relevant parts of the "environmental consultancy" section.

The climate change adaptation definition has then been further broken down to Level 4 which results in 69 different business categories which are considered as part of the sector. A full breakdown of the services included under these headings is attached in Annex A.

The data was then interrogated to provide an assessment of:

- The total size of the climate change adaptation sector, number of businesses, number of employees, total sales;
- The distribution of the companies across the technologies broken down at level 2 (climate change resilience, building technologies and environmental consultancy) and level 4 (see appendix for details); and
- The distribution of companies across different company types: professional businesses, service businesses, manufacturers, installers, others.

3.2 THE SIZE OF THE CLIMATE CHANGE ADAPTATION SECTOR

The headline figures for the size of the climate change adaptation sector in Greater Manchester are:

- Total number of companies = 670
- Total number of employees = 11,044
- Total annual sales (turnover) = £1.212bn

The split between the three parts of the definition is:

- Adaptation and resilience = 383 companies
- Building technologies = 287 companies
- Environmental consultancy = 0 companies*

* There is activity within environmental consultancy in the climate change adaptation sector but the results have returned a 0 record for the number of companies. This is because these figures record a company's primary activity, consultancies have a wide range of activities and none have recorded climate change adaptation as a primary activity.

Some consultancies have recorded staff and turnover in the climate change adaptation sector with 56 staff employed generating £28.2m annual sales (see figures 2 and 3 for further detail). Plus, consultancy businesses are also included in some of the other sectors such as architectural, engineering services and R&D.

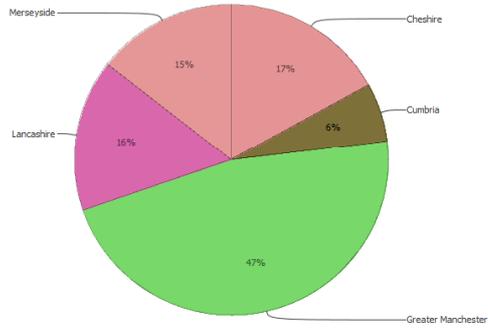
The climate change adaptation sector is approx 29% of the low carbon and environmental sector (LCEGS) in Greater Manchester. The comparative figure for the UK is 25% showing that Greater Manchester has a slightly higher than expected activity in the climate change adaptation sector.

	GM Climate Change Adaptation	GM LCEGS	UK Climate Change Adaptation	UK LCEGS
Sales (£)	£1.212bn	£5.186bn	£27.08bn	£122.2bn
Companies	670	1918	14,980	51,600
Employment	11,044	37,253	229,607	939,600

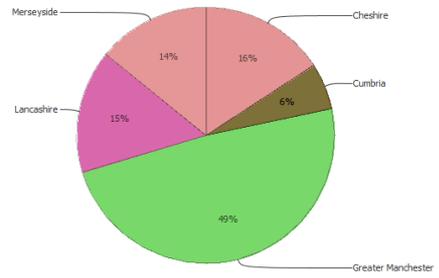
Greater Manchester has approximately 48% of the Northwest's activity in the climate change adaptation sector (Figure 3).

Figure 3: Greater Manchester's share of the climate change adaptation sector in the Northwest

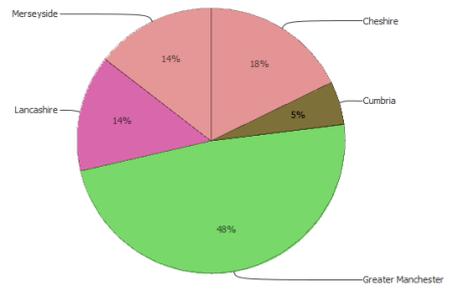
Sales £m Split by Sub Region (total 2,590.0)



Companies Split by Sub Region (total 1,377)



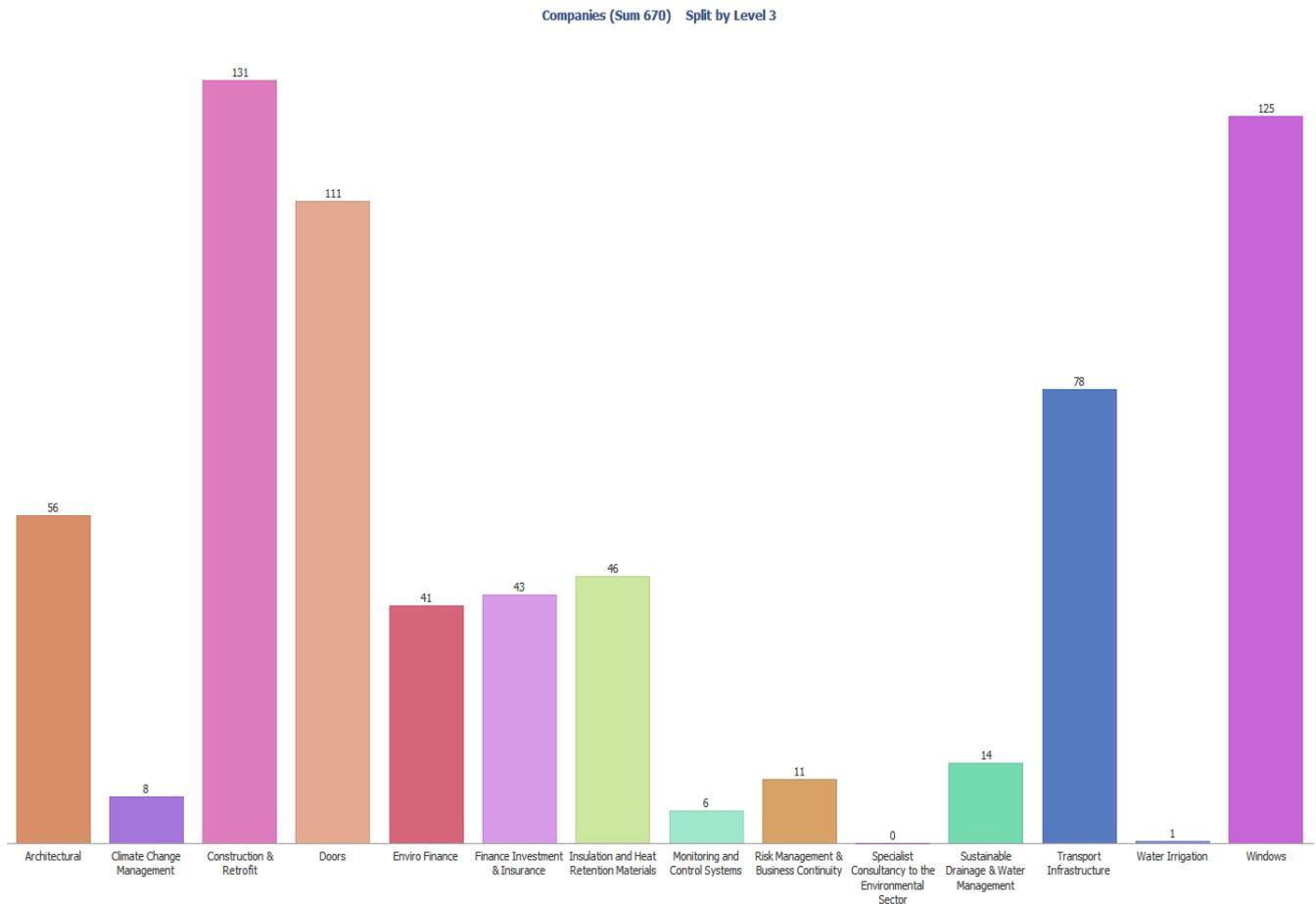
Employment Split by Sub Region (total 22,819)



3.3 FEATURES OF THE CLIMATE CHANGE ADAPTATION SECTOR

The following graph shows the distribution of the 670 climate change adaptation companies across level 3 definitions which shows in detail the technologies and services provided by these companies.

Figure 4: Distribution of climate change adaptation companies across level 3 definitions



This graph shows the largest number of companies in the construction retrofit (19.5%), windows (18.6%) and doors (16.5%) sectors but with significant activity in architectural services (8.3%), enviro-finance (6.1%), transport infrastructure (11.6%) and finance, investment and insurance (6.4%).

The strong presence of sectors in such as construction retrofit, windows and doors means that Greater Manchester is well placed to use GM companies to support the large-scale programmes of domestic and commercial retrofit now underway through Greater Manchester’s Low Carbon Economic Area status.

Figure 5: Distribution of number of employees across level 3 definitions

Employment (Sum 11,044) Split by Level 3

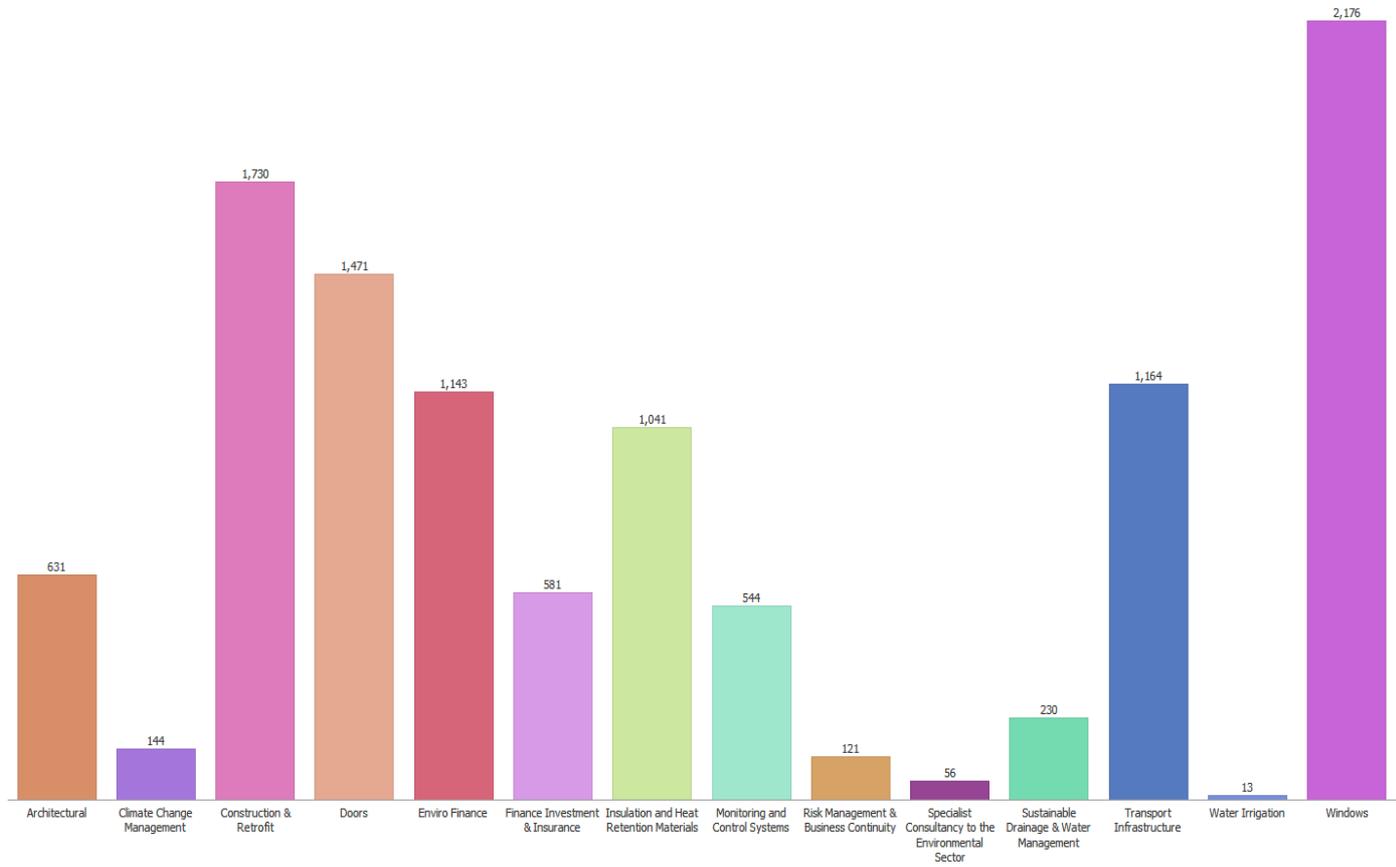
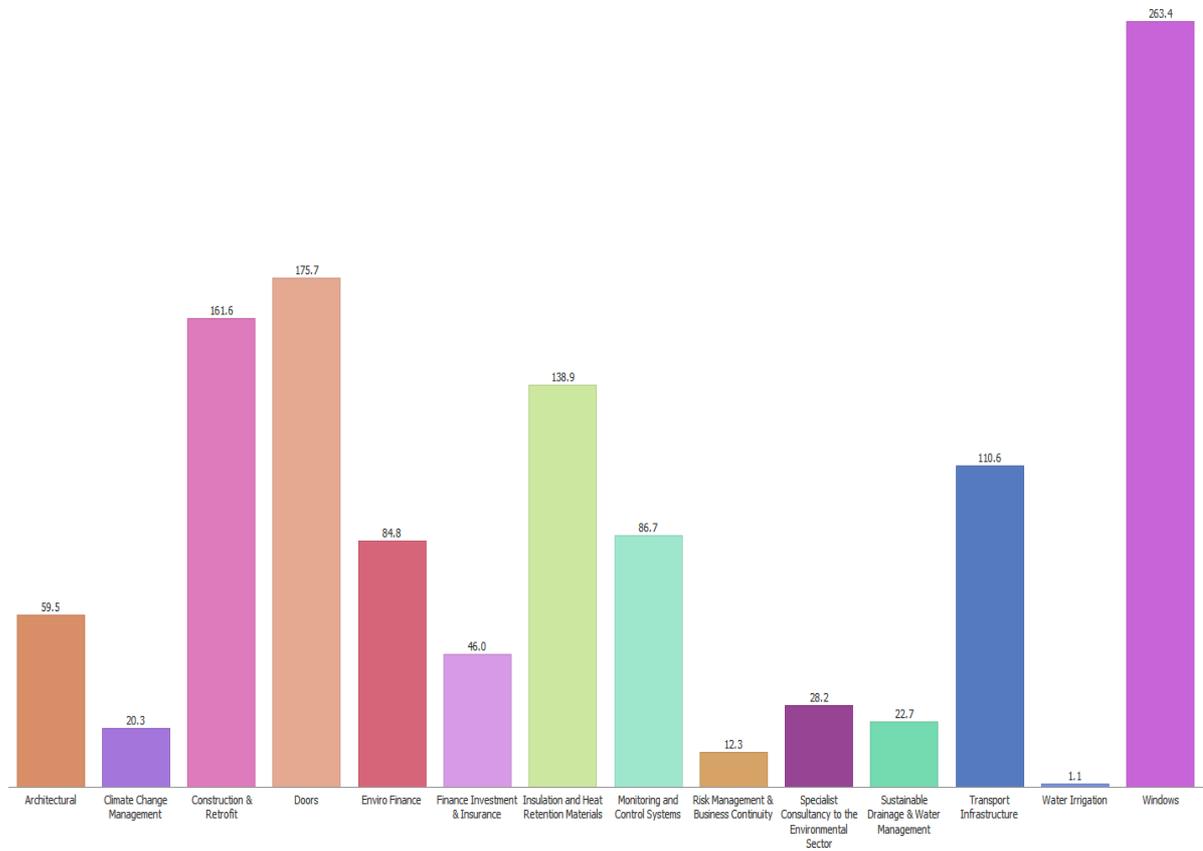


Figure 6: Distribution of number of sales across level 3 definitions

Sales £m (Sum 1,212.0) Split by Level 3



Figures 5 and 6 above show the distribution of sales and employees across the various sector definitions. Unsurprisingly, the breakdown is similar to that for the number of companies, but also shows activity under the specialist services to the environmental consultancy sector.

A more detailed breakdown of the distribution of companies, employee numbers and annual sales across the level 4 definitions is included in Annexes B, C and D.

Figure 7 shows the distribution of climate change adaptation companies geographically across Greater Manchester. Not surprisingly the largest numbers are in Manchester (23%), reflecting the fact that much of Greater Manchester's economic activity is focused at the conurbation core. However, Stockport (15%), Salford (11%), Tameside (10%) and Bolton (9%) also perform well.

Figure 7: Distribution of climate change adaption companies across the Greater Manchester local authorities

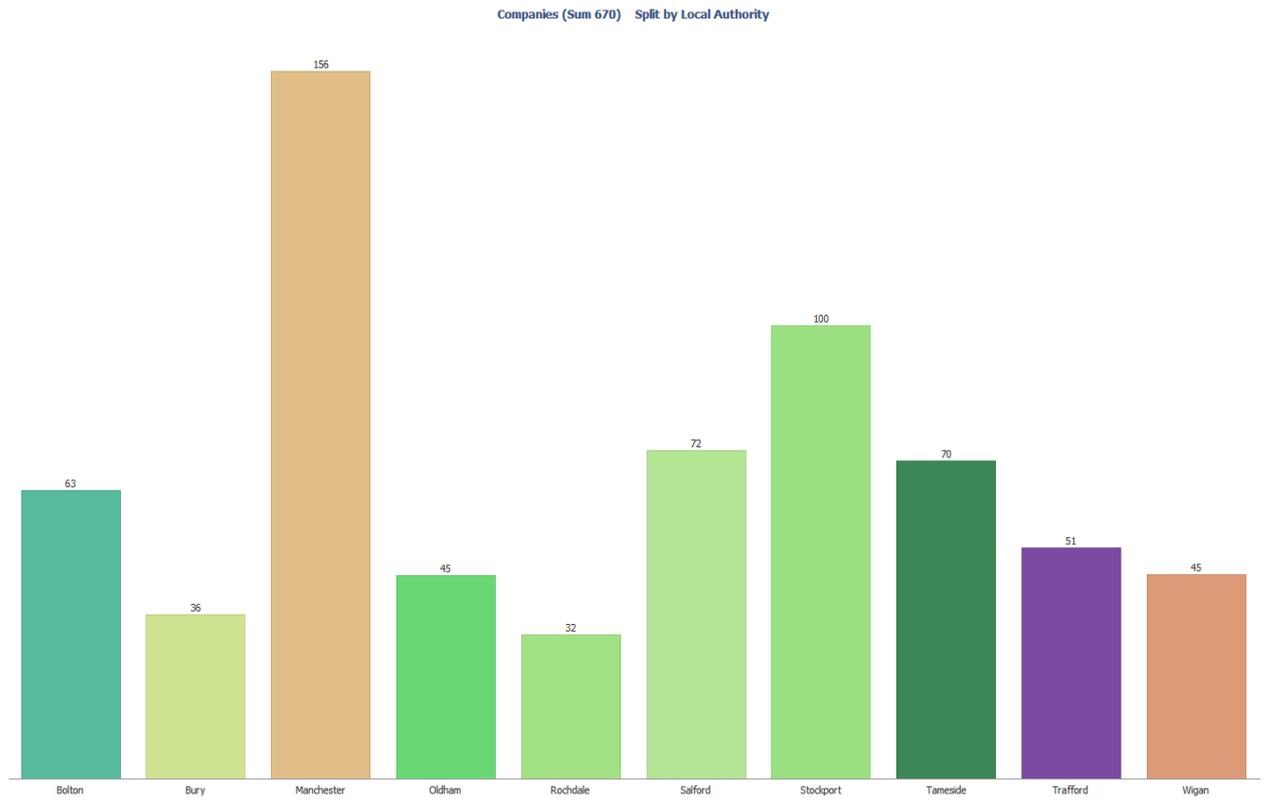
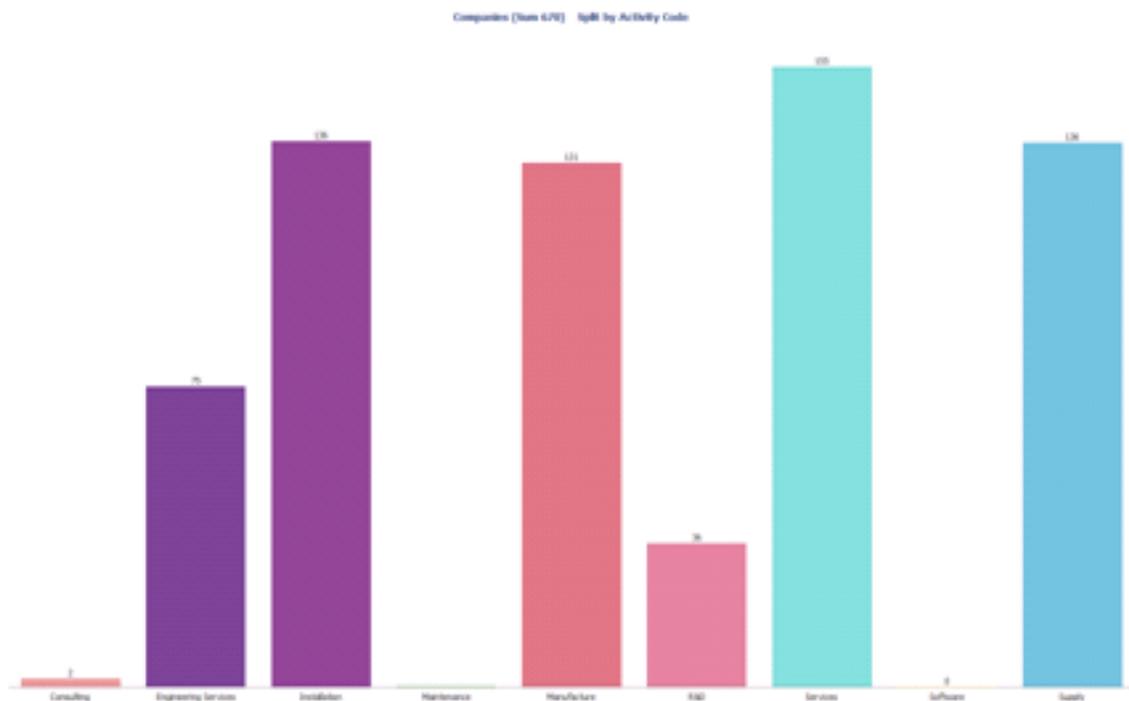


Figure 8 shows the distribution of climate change adaptation companies across different types of businesses. This shows 19.5% of companies are active in manufacturing, 20% in installation and the remaining either supply products or services.

Figure 8: Distribution of climate change adaptation companies across different company types



3.4 OPPORTUNITIES

Greater Manchester already demonstrates strength in areas such as construction retrofit, doors and windows. There is potential to support the development and expansion of these sectors through the large scale retrofit programme, currently being delivered through Greater Manchester's Low Carbon Economic Area Status and the Green Deal. By ensuring that the programme maximises opportunities to local suppliers and installers, which it explicitly sets out to do, there is the potential to promote expansion and development in these areas.

Greater Manchester also demonstrates potential in areas such as architectural services, enviro-finance, transport infrastructure and finance, investment and insurance. Manchester is currently competing with a number of other cities to be the home of the £4

billion Green Investment Bank, with a decision expected by the end of March 2012. If successful, this would have a significant positive effect on these sectors.

A further strength that is not well illustrated through an analysis of “adaptation sectors” is Greater Manchester’s performance in relation to research and the development of new technologies. The Greater Manchester universities have developed an international reputation for innovation that can be turned to economic advantage by building on Manchester’s reputation for entrepreneurship.

Businesses need to be supported as they adapt and grow and tailored support programmes need to be developed to provide this support. Specific sector strategies in support of particularly vulnerable sectors should be considered, prioritised on the basis of those sectors most at risk of over or under-adapting to legislative threats and increasing costs, or the sectors of greatest economic value to Greater Manchester, such as financial and professional services.

4. SKILLS REQUIREMENTS

To maximise the growth of the low carbon adaptation sector it will be essential to ensure that there is a labour pool available with the appropriate skills to meet the needs of the sector.

Using the Knowledge-Matrix data, an initial assessment of the range of skills required to run successful enterprises against the categories of business activities has been mapped. This analysis has been set out in Annex E below.

The tables show that a wide variety of skills will be required by the climate change adaptation sector, from specialist and professional skills to manufacturing and engineering skills and capabilities. The majority of companies in the LCEGS sector are SMEs and, drawing on the experience of Envirolink, it should also be emphasised that business management skills are also vital. SME's tend to have functional weaknesses at the senior level particularly in business management, commercial management and sales and marketing skills. This is due to the fact that many SME's tend to focus on technical capability and, due to their limited resources, often they cannot afford to employ functional management experts. There is a need to continue to support the development of such skills.

The range of opportunities available within the sector should appeal to both school leavers and graduates. However, there is an "image problem" in relation to climate change sectors and more needs to be done to encourage high calibre candidates to enter the sector. Recent research on the advanced manufacturing sector in Greater Manchester highlighted the fact that there are high-value engineering and skilled trades' jobs locally, but there is an under-supply of skilled young people coming in to the sector.⁴ The report recommended measures to increase the take-up of apprenticeships and to promote the benefits of careers in modern manufacturing and engineering amongst younger students.

Greater Manchester has the largest student population in Europe, and the courses on offer cover environmental technologies, Climate Change economics and innovation. This substantial educational infrastructure should support Greater Manchester in meeting the growing skills and capacity needs of the business and public sector. Establishing a stronger working relationship with Manchester Business School for example, will help the sector to attract the talent that it needs to grow.

⁴ New Economy (2011), Manufacturing the future? Advanced Manufacturing in Greater Manchester, http://neweconomymanchester.com/stories/840-other_publications

5. CONCLUSIONS

Many of Greater Manchester's priority sectors are at risk if there is a failure to adapt to the changing climate. Energy-hungry industries in particular will be at risk from legislative changes but all sectors, including service sectors, may suffer from a negative impact on productivity through, for example, damage to real estate and infrastructure.

However, change can also stimulate innovation and adaptation, and with a climate change adaptation sector that constitutes 48% of the North West's activity in this field, there are a number of opportunities to be pursued.

- Greater Manchester demonstrates strength in areas such as construction retrofit, doors and windows. The impact on local suppliers and installers should be maximised by ensuring that they are able to access the opportunities presented by the large scale commercial and domestic retrofit programme underway across the conurbation, through Greater Manchester's Low Carbon Economic Area status and the Green Deal.
- A massive stimulus would be provided to companies involved in enviro-finance, finance, investment and insurance, and transport infrastructure and architectural services should Manchester be successful in its bid to be the home of the £4 billion Green Investment Bank.
- Specific sector strategies in support of particularly vulnerable sectors should be considered, prioritised on the basis of those sectors most at risk of over or under-adapting to legislative threats and increasing costs, or the sectors of greatest economic value to Greater Manchester, such as financial and professional services.
- The Greater Manchester universities have developed an international reputation for innovation that can be turned to economic advantage by building on Manchester's reputation for entrepreneurship.
- Efforts should be made to attract high calibre candidates to the climate change adaptation sector, through, for example, developing stronger working relationships with Manchester Business School and through initiatives such as apprenticeships.

Annex A: Climate Change Adaptation Definition

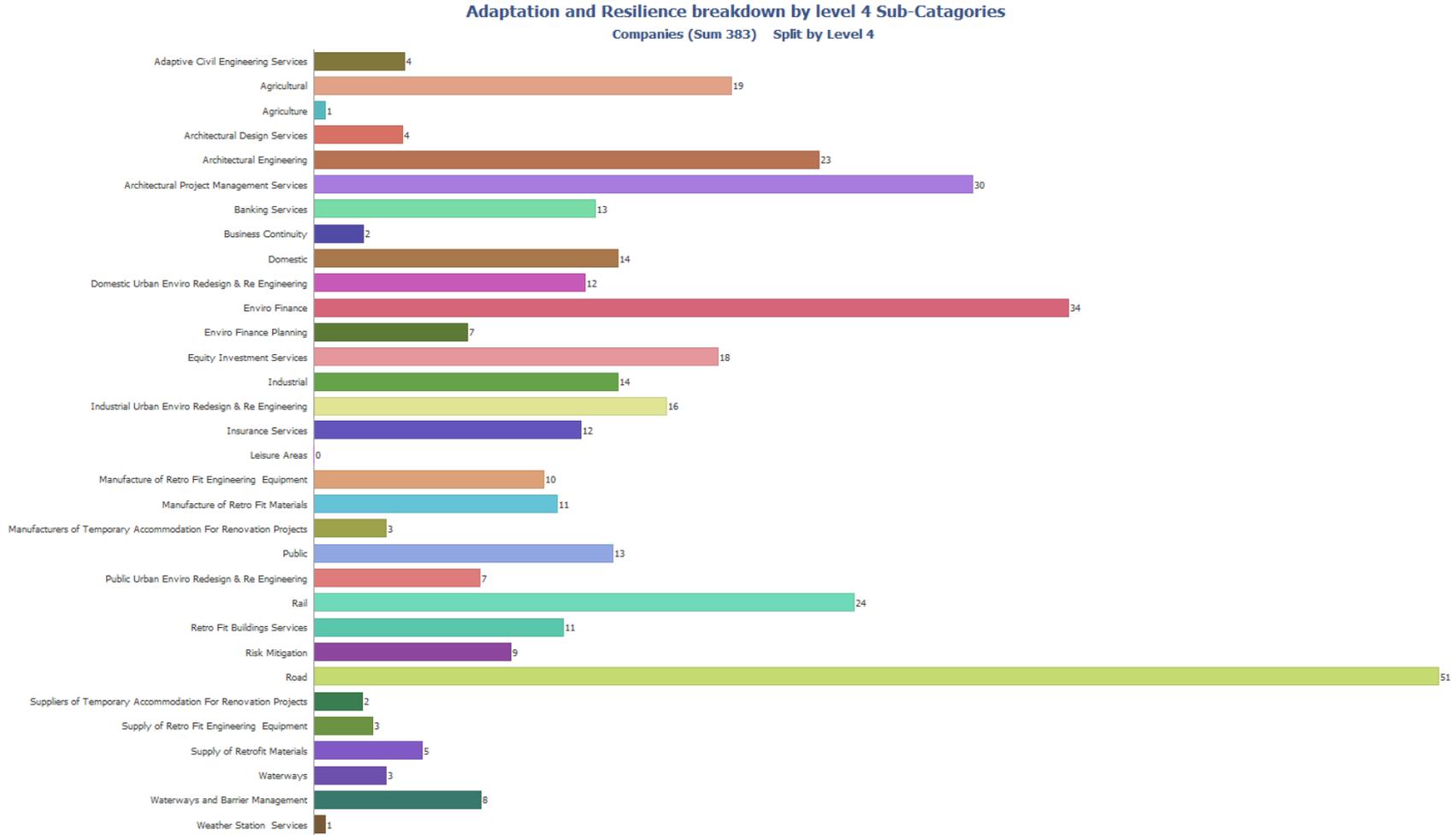
Level 2	Level 3	Level 4
Adaptation & Resilience	Architectural	Architectural Design Services
Adaptation & Resilience	Architectural	Architectural Engineering
Adaptation & Resilience	Architectural	Architectural Project Management Services
Adaptation & Resilience	Climate Change Management	Waterways and Barrier Management
Adaptation & Resilience	Climate Change Management	Weather Station Services
Adaptation & Resilience	Construction & Retrofit	Adaptive Civil Engineering Services
Adaptation & Resilience	Construction & Retrofit	Agricultural
Adaptation & Resilience	Construction & Retrofit	Domestic
Adaptation & Resilience	Construction & Retrofit	Domestic Urban Enviro Redesign & Re Engineering
Adaptation & Resilience	Construction & Retrofit	Industrial
Adaptation & Resilience	Construction & Retrofit	Industrial Urban Enviro Redesign & re Engineering
Adaptation & Resilience	Construction & Retrofit	Manufacture of Retro Fit Engineering Equipment
Adaptation & Resilience	Construction & Retrofit	Manufacture of Retro Fit Materials
Adaptation & Resilience	Construction & Retrofit	Manufacturers of Temporary Accommodation For Renovation Projects
Adaptation & Resilience	Construction & Retrofit	Public
Adaptation & Resilience	Construction & Retrofit	Public Urban Enviro Redesign & Re Engineering
Adaptation & Resilience	Construction & Retrofit	Retro Fit Buildings Services
Adaptation & Resilience	Construction & Retrofit	Suppliers of Temporary Accommodation For Renovation Projects
Adaptation & Resilience	Construction & Retrofit	Supply of Retro Fit Engineering Equipment
Adaptation & Resilience	Construction & Retrofit	Supply of Retrofit Materials
Adaptation & Resilience	Enviro Finance	Enviro Finance
Adaptation & Resilience	Enviro Finance	Enviro Finance Planning

Level 2	Level 3	Level 4
Adaptation & Resilience	Finance Investment & Insurance	Banking Services
Adaptation & Resilience	Finance Investment & Insurance	Equity Investment Services
Adaptation & Resilience	Finance Investment & Insurance	Insurance Services
Adaptation & Resilience	Risk Management & Business Continuity	Business Continuity
Adaptation & Resilience	Risk Management & Business Continuity	Risk Mitigation
Adaptation & Resilience	Sustainable Drainage & Water Management	Agricultural
Adaptation & Resilience	Sustainable Drainage & Water Management	Domestic
Adaptation & Resilience	Sustainable Drainage & Water Management	Industrial
Adaptation & Resilience	Sustainable Drainage & Water Management	Public
Adaptation & Resilience	Transport Infrastructure	Rail
Adaptation & Resilience	Transport Infrastructure	Road
Adaptation & Resilience	Transport Infrastructure	Waterways
Adaptation & Resilience	Water Irrigation	Agriculture
Adaptation & Resilience	Water Irrigation	Leisure Areas

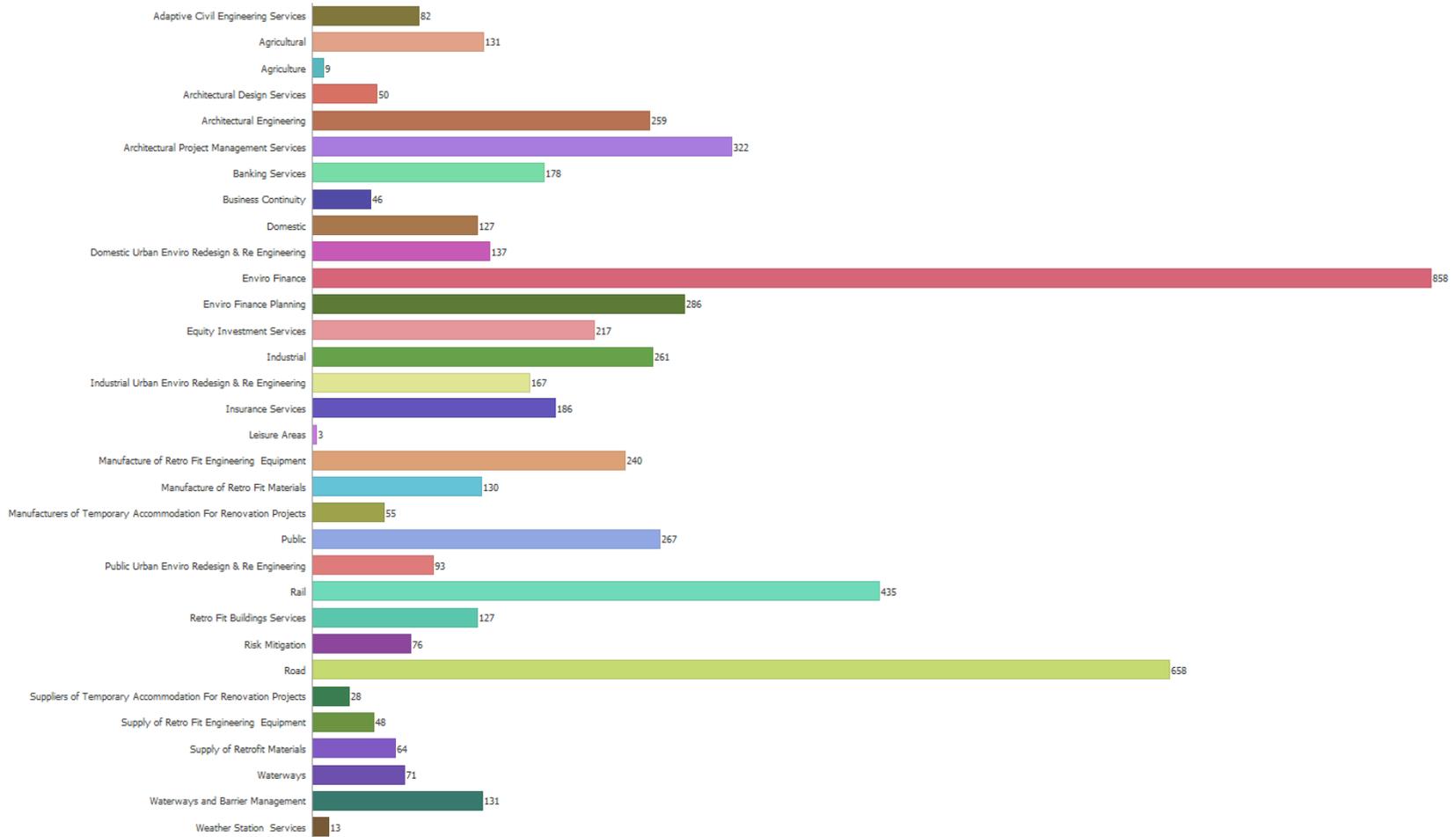
Level 2	Level 3	Level 4
Building technologies	Insulated and heat retention materials	Granular insulation material
Building technologies	Insulated and heat retention materials	Heat retention ceramics
Building technologies	Insulated and heat retention materials	Heat retention services
Building technologies	Insulated and heat retention materials	Insulation materials
Building technologies	Monitoring and control systems	Balanced inter-building heating systems
Building technologies	Monitoring and control systems	Distributed energy analysis software
Building technologies	Monitoring and control systems	Distributed energy management software
Building technologies	Monitoring and control systems	Distributed energy monitoring systems
Building technologies	Monitoring and control systems	Energy analysis software
Building technologies	Monitoring and control systems	Energy management software
Building technologies	Monitoring and control systems	Energy monitoring systems
Building technologies	Monitoring and control systems	Inter-building electronic control systems
Building technologies	Monitoring and control systems	Motorized valves and actuators
Building technologies	Monitoring and control systems	Sensing devices
Building technologies	Windows	Advanced plastic thermally insulated frames
Building technologies	Windows	Double glazed units
Building technologies	Windows	Electrochromatic window glass
Building technologies	Windows	Honeycomb systems
Building technologies	Windows	Insulated alloy frames
Building technologies	Windows	Triple glazed units

Level 2	Level 3	Level 4
Environmental Consultancy	Specialist consultancy to Environment Sector	Advice on biodiversity
Environmental Consultancy	Specialist consultancy to Environment Sector	Biodiversity assessment
Environmental Consultancy	Specialist consultancy to Environment Sector	Climate change modelling
Environmental Consultancy	Specialist consultancy to Environment Sector	Due diligence for insurance purposes
Environmental Consultancy	Specialist consultancy to Environment Sector	Eco-design
Environmental Consultancy	Specialist consultancy to Environment Sector	Habitat advice
Environmental Consultancy	Specialist consultancy to Environment Sector	Insurance activities for environmental applications
Environmental Consultancy	Specialist consultancy to Environment Sector	Stakeholder engagement activities
Building technologies	Doors	Insulated alloy doors
Building technologies	Doors	Insulated plastic doors
Building technologies	Insulated and heat retention materials	Controlled venting and ducting
Building technologies	Insulated and heat retention materials	Electronic control systems
Building technologies	Insulated and heat retention materials	Fibre insulation materials

Annex B: Climate change resilience, number of companies, employment and sales

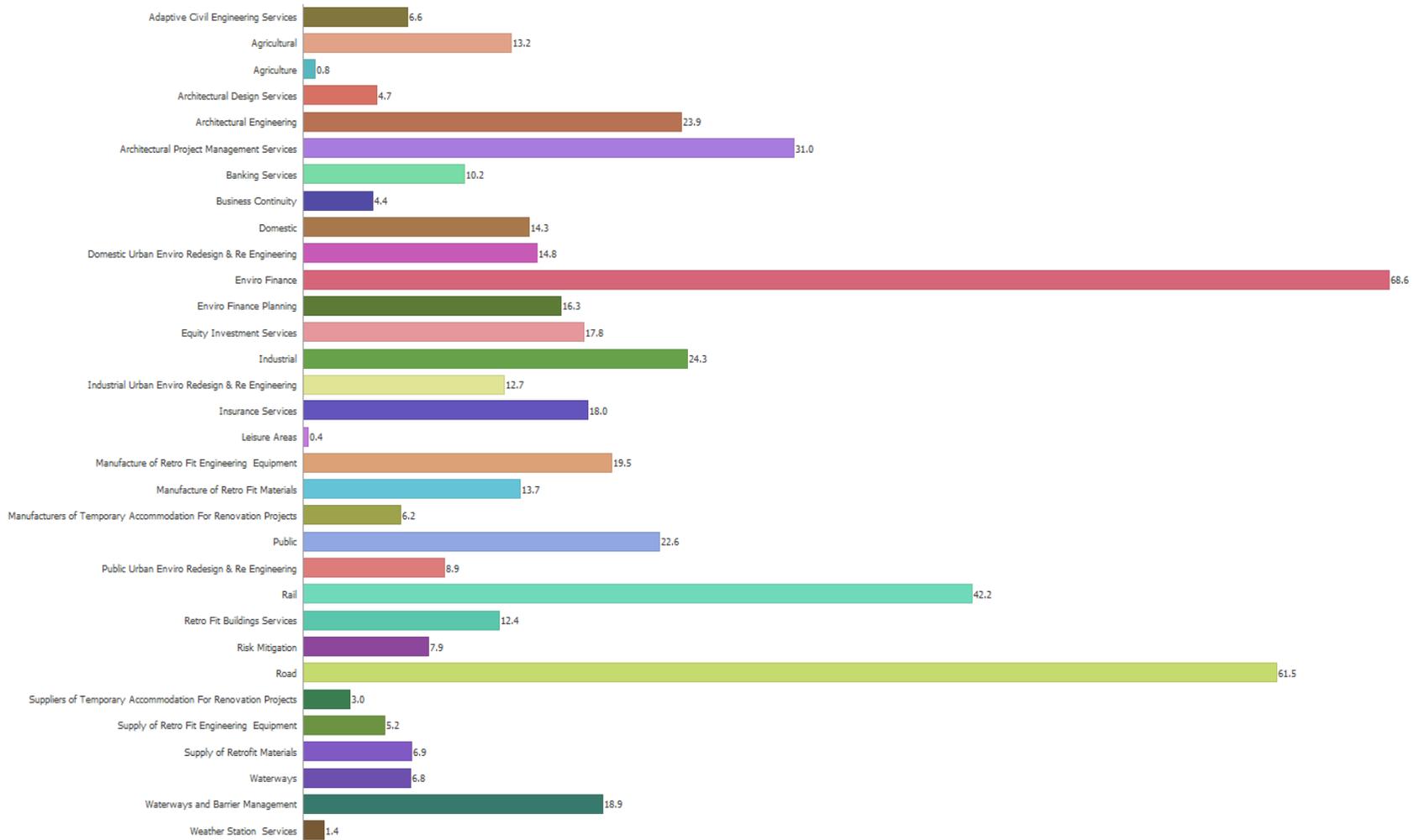


Adaptation and Resilience breakdown by level 4 Sub-Categories
 Employment (Sum 5,757) Split by Level 4



Adaptation and Resilience breakdown by level 4 Sub-Categories

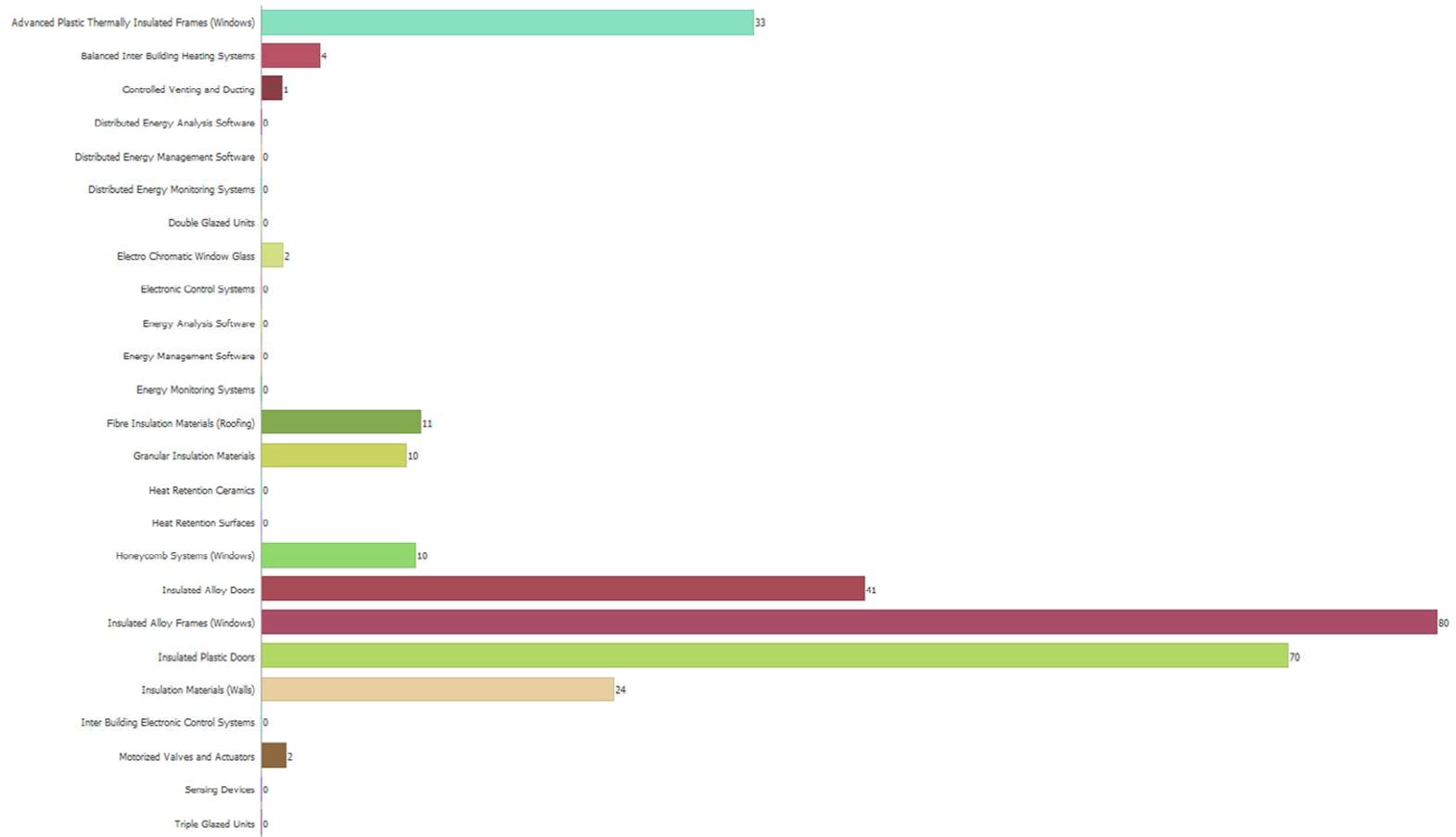
Sales £m (Sum 519.1) Split by Level 4



Annex C: Building technologies, number of companies, employment and sales

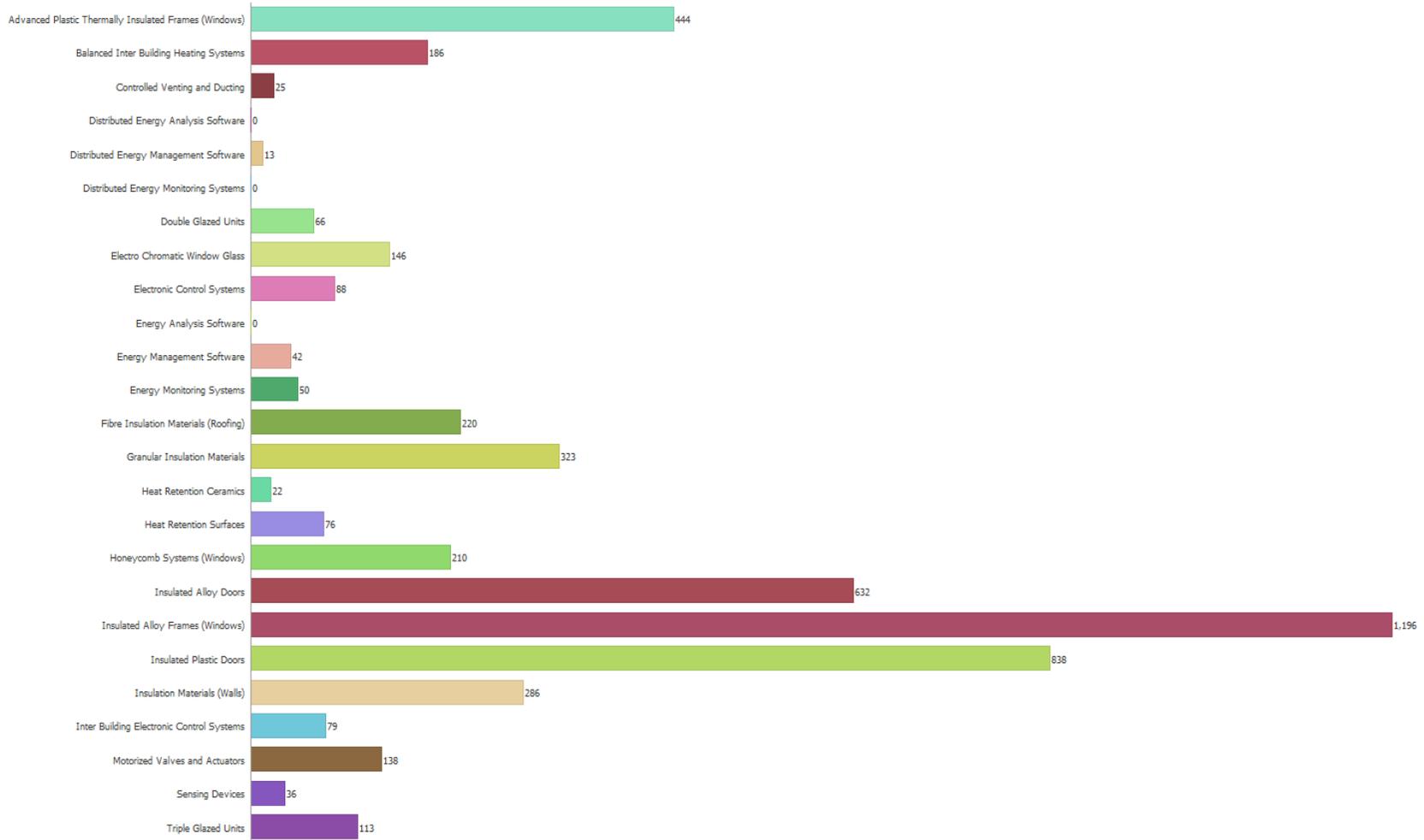
Building Technologies breakdown by level 4 Sub-Catagories

Companies (Sum 287) Split by Level 4



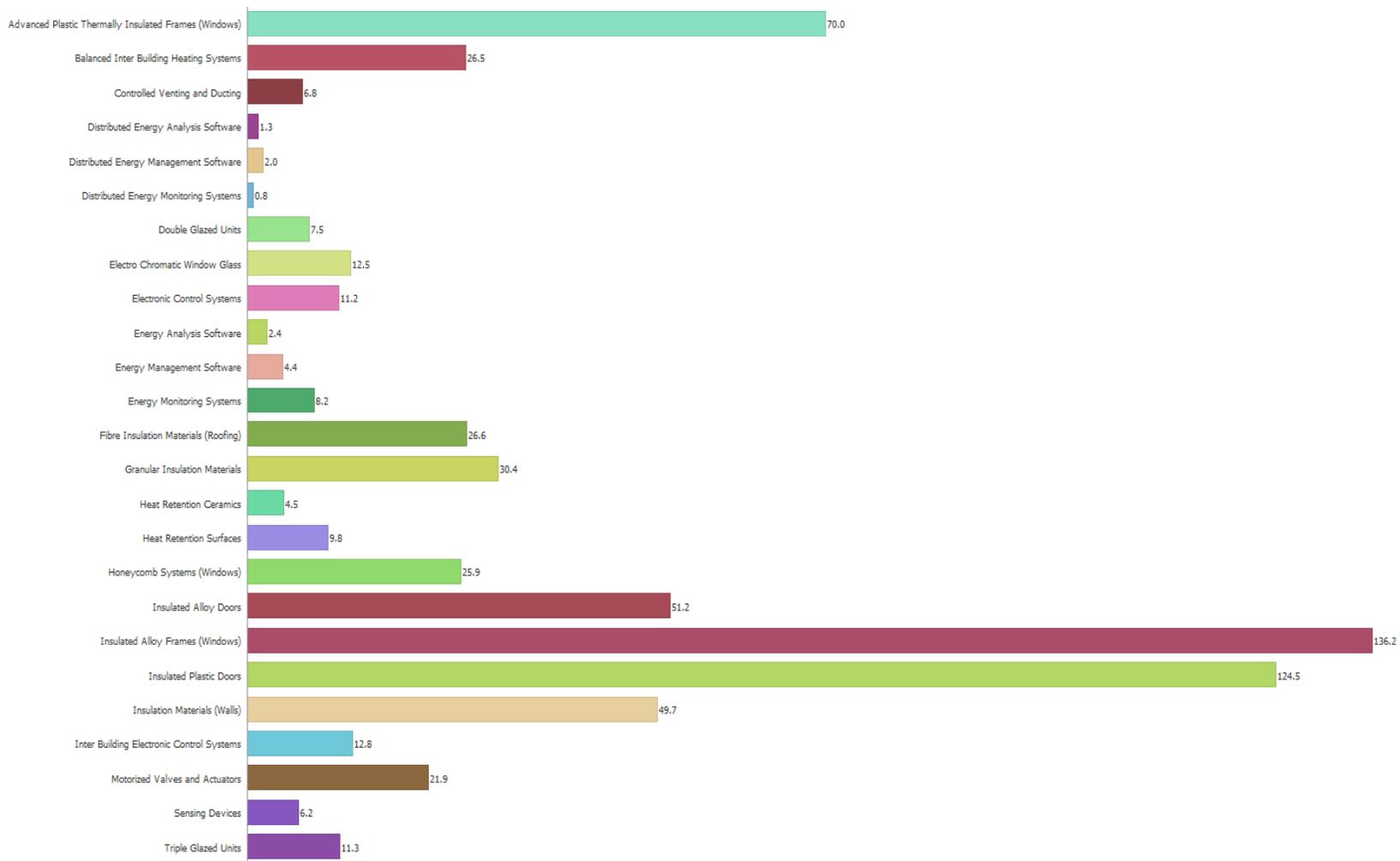
Building Technologies breakdown by level 4 Sub-Categories

Employment (Sum 5,231) Split by Level 4



Building Technologies breakdown by level 4 Sub-Categories

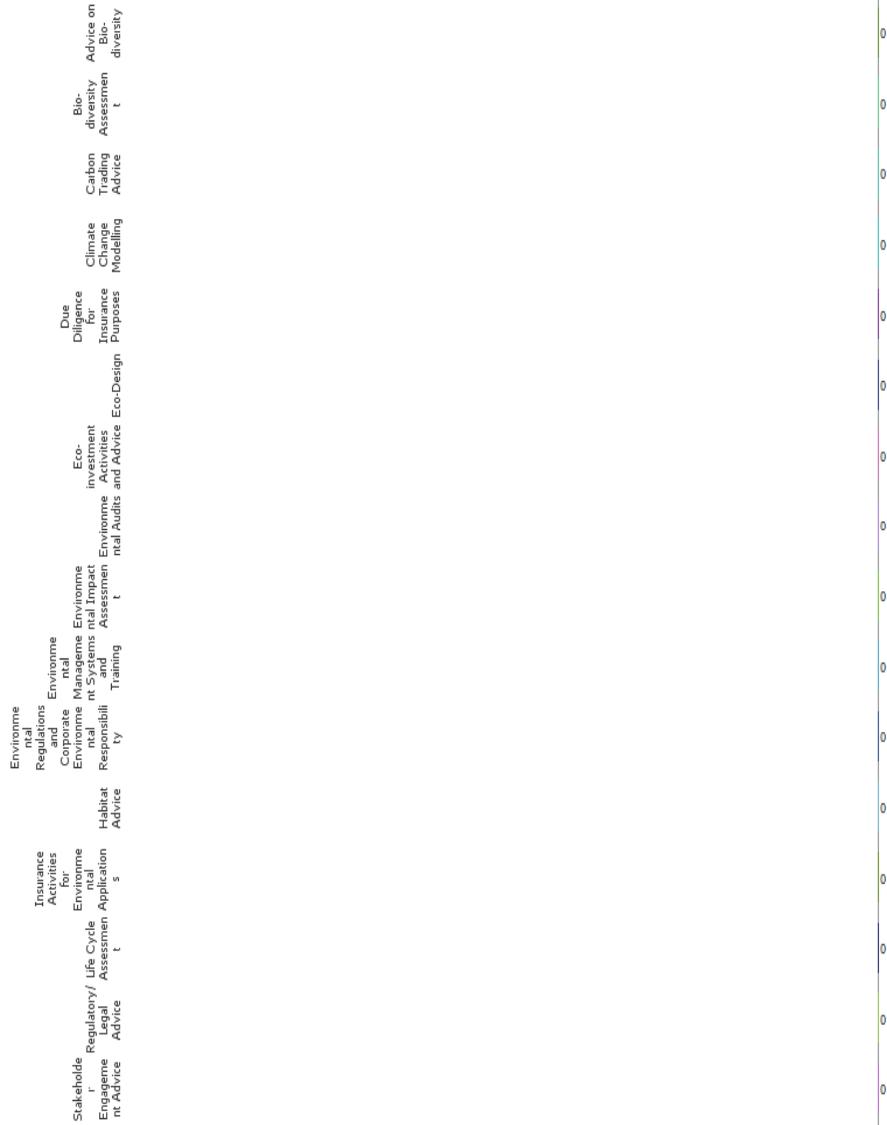
Sales Em (Sum 664.7) Split by Level 4



Annex D: Environmental consultancy services, number of companies, employment and sales

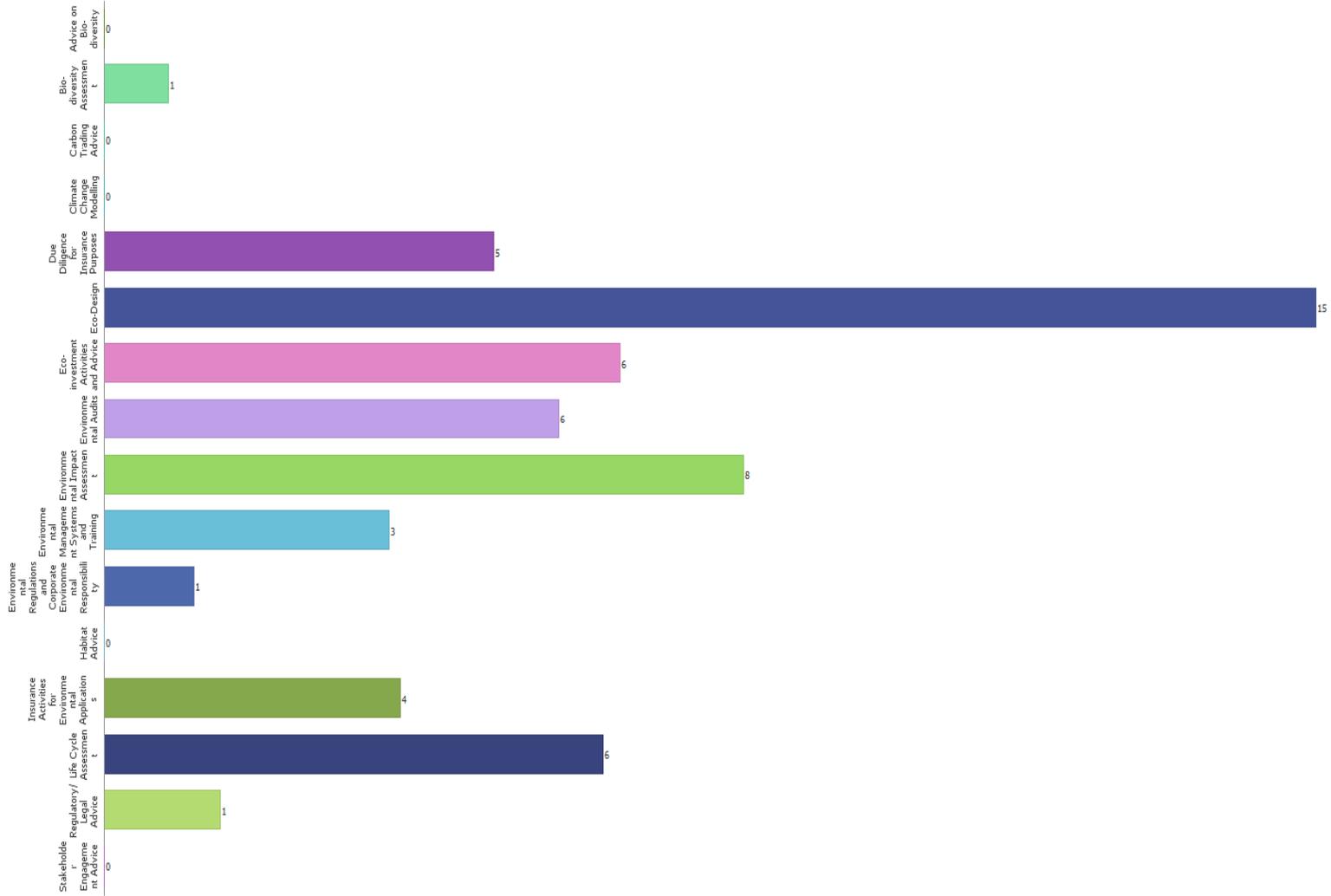
Environmental Consultancy breakdown by level 4 Sub-Categories

Companies (Sum 0) Split by Level 4



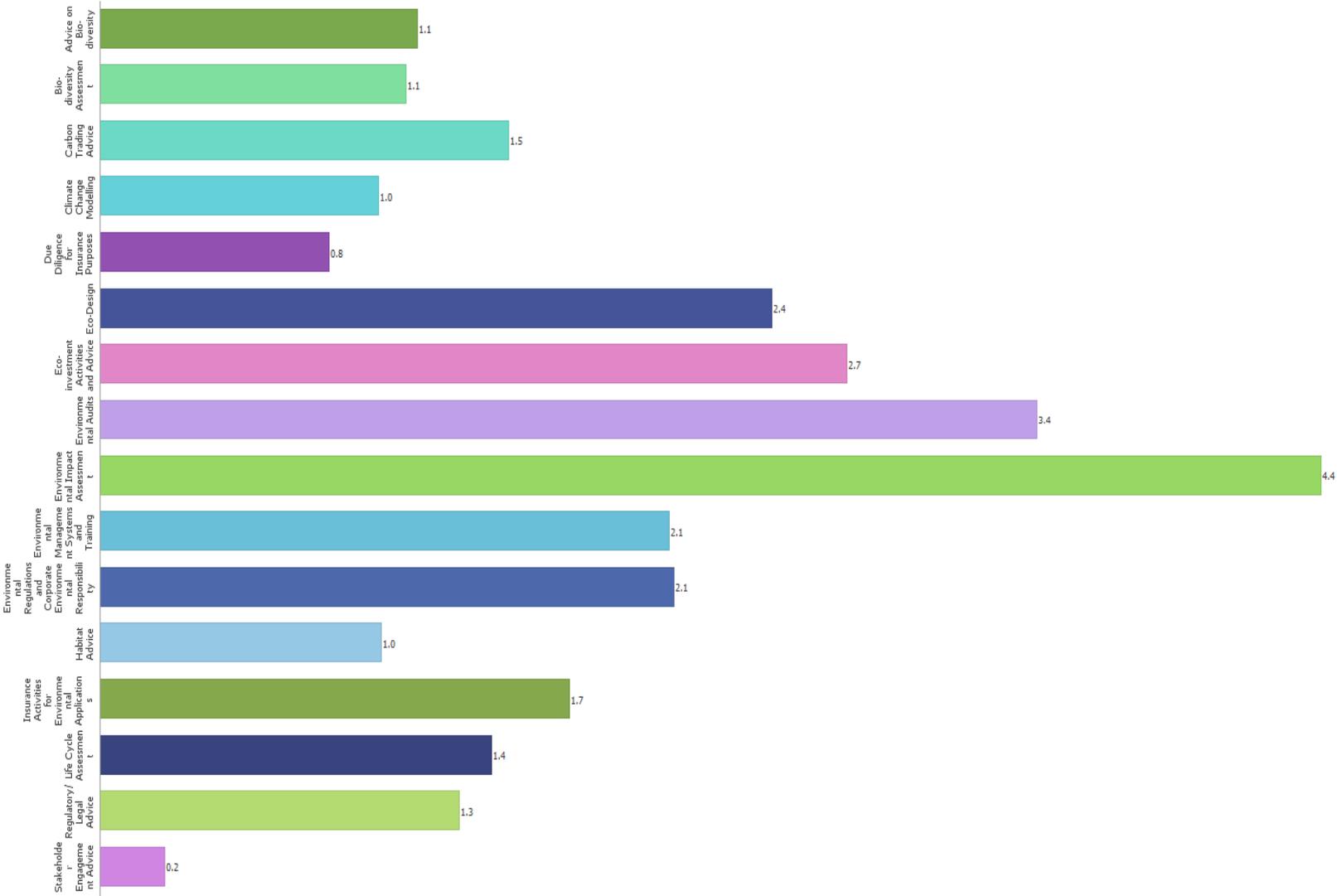
Environmental Consultancy breakdown by level 4 Sub-Categories

Employment (Sum 56) Split by Level 4



Environmental Consultancy breakdown by level 4 Sub-Categories

Sales £m (Sum 28.2) Split by Level 4



Annex E: Skills Levels per Level 4 per Business Activity Category

Level 4 Business Activity Categories	No. of companies	Professional Business Management	Professional Commercial Management	Professional Sales & Marketing	Professional Manufacturing Management	Skilled Manufacturing	Semi Skilled Manufacturing	Unskilled Manufacturing	Professional Architectural	Professional Civil Engineering	Professional Project management	Professional Construction Management	Construction Skilled	Construction Semi Skilled	Construction Unskilled	Professional Planning Spatial	Professional Environmental	Professional Meteorological	Professional Engineering	Professional Engineering Planning	Professional Design	Professional Banking	Professional Finance	Professional Insurance Brokerage	Professional Actuarial	Professional Legal / Contracts	Agricultural Skilled	Agricultural Semi Skilled	Agricultural Unskilled	Skilled Administration	
Insulated alloy window frames	80	✓		✓	✓	✓	✓					✓	✓	✓						✓											
Insulated plastic doors	70	✓		✓	✓	✓	✓					✓	✓	✓						✓											
Road	51	✓	✓						✓			✓	✓	✓						✓											
Insulated alloy doors	41	✓		✓	✓	✓	✓					✓	✓	✓						✓											
Enviro-finance	34	✓	✓	✓																		✓			✓				✓	✓	
Advance plastic windows	33	✓		✓	✓	✓	✓					✓	✓	✓						✓											
Architectural project management services	30	✓	✓						✓	✓	✓	✓	✓	✓																	
Insulated materials (walls)	24	✓		✓	✓	✓	✓					✓	✓	✓						✓											
Rail	24	✓	✓						✓	✓	✓	✓	✓	✓					✓	✓	✓										
Architectural engineering	23	✓	✓						✓	✓	✓	✓	✓	✓					✓	✓	✓										
Agricultural	20	✓	✓																							✓	✓	✓			
Equity investment services	18	✓	✓	✓																	✓	✓	✓		✓				✓	✓	
Industrial urban enviro design and re engineering	16	✓	✓						✓	✓	✓	✓	✓	✓	✓	✓	✓			✓											
Domestic	14																														
Industrial	14																														
Banking services	13	✓	✓	✓																	✓	✓	✓	✓	✓	✓				✓	✓
Public	13																														
Domestic urban enviro redesign and re engineering	12	✓	✓						✓	✓	✓	✓	✓	✓	✓	✓	✓			✓											

