The Adaptation Economy of Glasgow City Region

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The Scottish Government
Riaghaltas na h-Alba

kMatrix

ClimateReadyClyde

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Section 1: Executive Summary

1.1 Introduction

Climate Ready Clyde commissioned k-Matrix to provide a report on the Adaptation Economy of Glasgow City Region and wider Scotland. This included the relative size and distribution by Local Authority, as well as sales, employment, companies and forecast growth. Alongside this, k-Matrix was asked to provide a sectoral breakdown, as well as an assessment of the key barriers to further growth.

1.2 Defining the adaptation economy

In this report, the Adaptation Economy means:

"*measurable economic activities that can be attributed with some confidence as a reaction or planned response to extreme weather*".

These economic activities are performed within the private sector, funded either by the private sector or by government or its publicly funded agencies. The Adaptation Economy therefore includes activities for Adaptation (preparing for change) and Resilience (responding to change) - see page 9 for more detail.

Throughout the report the Adaptation Economy explores the broad Adaptation and Resilience (A&R) economy, and the sub set of A&R economic activities that can be directly related to climate change (A&RCC). This reporting convention reflects the fact that A&RCC data can only be derived from the wider A&R data.

The analysis focuses on twelve economic sectors that underpin the Adaptation Economy, namely: Agriculture & Forestry; Built Environment; Disaster Preparedness; Energy; Health; Health Care; ICT; Natural Environment; Professional Services; Transport; Waste and Water.

Measuring and demonstrating the economic benefit the city region derives from adaptation to climate change will help Glasgow City Region position and maximise the economic opportunities it offers, and more broadly, is an early step in contributing to the growth of the Adaptation Economy, as organisations seek to protect and enhance their production systems, supply chains and markets and other assets by pursuing adaptation related opportunities.

1.3 Key Findings

A number of conclusions have been drawn from the research for wider dissemination and discussion with key stakeholders with a view to developing actions to inform Glasgow City Region's Climate Change Adaptation Strategy and Action Plan. Given the emerging evidence on the Adaptation Economy, the findings should be treated as tentative and in need of on-going development and refinement to inform economic development policy.

Size and shape of the adaptation market

Overall, Glasgow City Region comprises 24% of both Scotland's A&R and A&RCC services. The total sales for A&RCC in Scotland were £604m in 2016/17, with Glasgow City Region contributing £146m.

Whilst this is lower as a proportion than Glasgow City Region's relative contribution to Scottish GVA (currently around 33%), this is closing marginally, with sector growth rates 0.3% higher per annum than Scotland overall.

Within the City Region itself, the A&RCC market is consistently between 13-14% the size of the broader A&R market. The largest Local Authorities for both markets are North Lanarkshire and Glasgow, which combined, account for 50%.

In terms of employment, Glasgow City Region is home to 78 companies employing around 8,390 people. The largest number of companies and employees are in North Lanarkshire and Glasgow, with North Lanarkshire containing 21 companies employing 2,308 people and Glasgow with 17 companies employing 1,832.

Strengths and Growth Potential

The largest numbers of sales by volume for Glasgow City Region's A&RCC sector relate to five key sub-sectors: Built Environment (£32.9m), Water (£26.9m), Transport (£19.4m), Professional Services (£18m) and Energy (£14.7m).

Glasgow City Region has a concentration of skills sets for the A&R and A&RCC sector. This is primarily driven by the localised concentration of large corporates in the sector. This makes Glasgow City Region a strong player in the sector due to a wide variety of different activities in the supply chain, all performing fairly similarly in terms of new products per annum and new products as a percentage of sales.

Although the service spread in Glasgow City Region is representative of Scotland overall, the services provided are highly localised. Data indicates the value added chains of supply for the sector are generally localised and not dependant upon national chains of supply.

South Lanarkshire and Renfrewshire lead in innovative services overall, providing both the highest amount of new products as a percentage of sales, and the number of new products per annum. However, East Dunbartonshire has a higher number of new products per annum.

In terms of projected growth, the A&R sector in Glasgow City Region is expected to grow significantly, reaching 18.9% by 2020/2021. This is underpinned with the growth of the available market to £98m, and to new products to £46m for 2020/21. The projected growth in A&R is in line with the broader trend for Scotland, though growth rates for the city region are projected to be slightly higher than the country overall.

Exports present an opportunity for the city region's key sub sectors with available exports in Built Environment, ICT, Water, Professional Services and Transport sectors totalling over £150m a year. Whilst this is small in comparison to Scotland's total exports, (£75.6Bn in 2016) it remains a positive opportunity for development.

Key barriers

Some sub-sectors, such as Agriculture & Forestry, Health Care, Waste and Built Environment have relatively even barriers to entry. Other such as Health, Transport, Disaster Preparedness and Natural Environment have higher barriers to entry in some areas than others. In general the financial barriers to market for smaller companies in the city region is relatively high. This suggests there could be possible benefits in providing assistance for smaller companies to access this market. Major competition is not yet a barrier to developing new specialisms in the sector as the sector is still in it's early stages of development.

However market awareness is limited amongst smaller companies and this may be a contributor to the apparently high financial barriers. Instead, the data indicates that sector awareness generally is limited to academia and Government. As such, sector research has so far been limited, with spend on research and development within the city region between 2.4% and 2.7% (though this is typical of a new developing sector). Therefore, for an efficient use of resources, a programme to raise awareness would be a positive step prior to providing direct financial assistance or enterprise support.

Finally kMatrix's similar work for other UK cities shows that the city region has a similar profiles and similar levels of imports and exports. This suggests that market structures are not well defined and that regional/urban "clusters" of A&/A&RCC activities are not yet formalised or operating in an consistent fashion that can be observed through the data.

Section 2: Introduction

2.1 Overview

The climate is already changing, and further changes are expected. The UK Climate Projections, along with observations highlight the need to prepare for warmer, wetter winters, hotter, drier summers and more frequent extreme weather. Timely action will not only manage the risk of climate driven impacts, but will bring positive benefits, including jobs, investment, economic security and a better quality of life.

Adapting to reduce the impacts of climate change can indirectly provide economic benefit by reducing the damage and financial losses caused by future extreme weather events[1]. Appropriate adaptation activities also create direct economic gains.

To better understand this opportunity for Glasgow City Region, Climate Ready Clyde was funded by Scottish Government to commission k-Matrix to provide an assessment of the current shape and size of the Adaptation Economy for Glasgow City Region and wider Scotland, and the short-term growth potential of this market.

2.2 Intergovernmental Panel on Climate Change WGII AR5 and IPCC Cities

The timing of this research coincided with the Intergovernmental Panel on Climate Change Cities Conference where the Scientific Steering Committee (with input from 700 researchers from 80 countries) identified six priorities for cities and climate change research, (March 2018). It also draws on previous findings of the IPCC's 5th Assessment Report (March 2014).

It is inevitable that that this report will be read in the light of the much larger and more comprehensive findings of the IPCC. Subsequently, it draws upon key statements, evidence and findings from the IPPC reports that relate directly to the economic, social, political and environmental context for the Adaptation Economy. The first two sub sections below relate to some of the challenges addressed by the research - specifically, definition and measurement of adaptation activities (outlined in detail in Section 3 and the appendices). The last three sub sections relate to the challenges and opportunities addressed as part of the Climate Ready Clyde vision. This includes ensuring people and communities benefit from actions to adapt to climate change, protecting and growing Glasgow City Region's economy and building capacity to take action together.

The term "Adaptation Economy" is not mentioned in the IPCC report, highlighting that this concept is forward thinking and innovative. The difficulty in finding economic data to support the research[2], shows that there is a significant research and implementation task ahead before the full opportunities of the Adaptation Economy are understood and exploited. This research is a small step towards that future, in helping to fully understand the scope of the Adaptation Economy.

2.3 Different Methods of Analysing Adaptation

The IPCC report offers several perspectives on adaptation and offers different options for organising the evidence base. The first is by threat type (Chapters 3-7) and these include:

- Freshwater Resources;
- Inland Water Systems;

[1] Stern Review: The Economics of Climate Change (2006)

[2] A point reinforced by the IPCC. "There is very little discussion of data gaps related to assessing the benefits of adaptation, but poor or sparse data obviously limit the accuracy of these estimates." IPCC WGII AR5 Chapter 17 p.14

- Coastal Systems and Low-Lying Areas;
- Ocean Systems; and
- Food Security and Food Production Systems.

The second is by geography - urban v. rural (Chapters 8-9) and by local region (Chapters 22- 30). The third is by key economic sectors (Chapter 10), which include: Water, Energy, Transport, Agriculture & Forestry, Construction, Insurance & Financial, Tourism & Recreation Health and Healthcare.

This report corresponds with two aspects of the IPCC analysis. The first is by concentrating on economic sectors (although the theme of this report is economic opportunity rather than the IPCC's focus on economic risk/vulnerability) and the second is by focusing on urban challenges/ opportunities (i.e. those most relevant to Glasgow City Region). Later in this report, comparisons for the Adaptation Economy (by key sector) are undertaken for the first time, both between Glasgow City Region and wider Scotland.

2.4 Differentiating Climate Changes Responses

The IPCC fifth assessment report makes many references to the complexities of separating responses to climate change from other economic activities that address extreme weather/extreme event risks. It rightly recognises that many adaptation opportunities or responses arise as ancillary benefits of actions implemented for reasons other than climate change. The report gives examples of what it refers to as "co-benefits":

- Crop varieties that are adapted to climate change have enhanced resistance to droughts and heat and so also raise productivity in non-climate change related droughts and temperature extremes.
- Better building insulation, which mitigates energy use and associated greenhouse gas emissions, also improves adaptation by protecting against heat.

So, adaptation benefits can occur directly (explicitly funded) or indirectly (an intended or unintended consequence of actions or investment occurring for a different reason). This has significant implications for any assessment of the "Adaptation Economy" because any research methodology has to be able to differentiate, isolate and then quantify adaptation activities *whatever their original purpose may have been.* Section 3 of this report outlines in more detail how the selected research methodology addresses this challenge.

The IPCC recommends integrating or mainstreaming adaptation activities into a wider range of economic, political, social, technological and environmental decisions and investments, thereby increasing the levels of "co-benefits"[3] in the future. In part this will increase the complexity of measuring the Adaptation Economy, on the other hand it will almost certainly improve the level of reporting on adaptation activities. As Section 3 points out, industries involved in delivering adaptation products and services are already beginning to capture and report this data separately.

2.5 Reducing Impacts on Urban Life

The IPCC report identifies that action in urban centres is essential to successful local climate change adaptation. This is because urban areas now hold more than half the world's population and most of its built assets and economic activities:

> "Urban climate change-related risks are increasing (including rising sea levels and storm surges, heat stress, extreme precipitation, inland and coastal flooding, landslides, drought,

[3] IPCC WGII AR5 Chapter 17 p. 6. Although the literature indicates where such co-benefits exist (i.e. crop variations, water management), it is much less clear about how the co-benefits can be defined and measured.

> increased aridity, water scarcity and air pollution) with widespread negative impacts on people (and their health, livelihoods and assets) and on local and national economies and ecosystems"[4]

Whilst elements of the city region are rural, the overall concentration of population and assets means that Glasgow City Region should broadly be considered to fall within this remit. The IPCC reports that climate change will have profound impacts on water and energy supply, sanitation and drainage, transport and telecommunication), health care and emergency services), the built environment and ecosystem services. The IPCC reports that these impacts will require improvements in systems that warn people of impending disasters; changes in land use planning; sustainable land management; improvements in health surveillance; water supplies; drainage systems; development and enforcement of building codes and better education and awareness.

The IPCC evidence base suggests, however, that well governed cities with universal provision of infrastructure and services have a strong base for building climate adaptation and resilience and that urban government is at the heart of successful urban climate adaptation because so much adaptation depends on local assessments and integrating adaptation into local investments, policies and regulatory frameworks.

Many of the opportunities for the Adaptation Economy are likely to appear where there is greater risk from climate change i.e. where there is a greater concentration of potential hazards as a result of rising heat resulting in sea rise levels and significant flooding or for example, where there is rapid urbanization and rapid growth of large cities in low- and middle-income countries.

2.6 Comparative Advantages of Cities

The IPCC report highlights the importance of protecting both the quality of life for urban residents and the urban economy:

> "Climate change can change the comparative advantages of cities and regions – for instance by influencing climate sensitive resources, water availability and flooding risks. Many case studies show how extreme weather can impede economic activities, damaging industrial infrastructure and disrupting ports and supply chains ... {highlighting the need for} resilience in distribution networks such as electric power, gas, water, food production and manufacturing supply chains. This requires absorptive capacity (to withstand extreme weather), adaptive capacity (e.g. service provision through alternative paths) and restorative capacity (quick ... recovery)."[5]

The IPCC report suggests that when urban centres fail to adapt to risks, it may discourage new investment and lead enterprises to move or expand to safer locations. Indeed, recent developments such as the Task Force on Climate-Related Financial Disclosures are seeking to accelerate this through highlighting the linkages between physical climate risks and company performance.

2.7 Initiatives between Public and Private Sectors

The IPCC report comments that:

> "Among the many actors and roles associated with successful adaptation, the evidence increasingly suggests two to be critical to progress; namely those associated with local government and those with the private sector. These two groups will bear increasing responsibility for translating the top-down flow of risk information and financing, and in

[4] IPCC WGII AR5 Chapter 8 p. 3
[5] IPCC WGII AR5 Chapter 8 p. 31

scaling up the bottom-up efforts of communities and households in planning and implementing their selected adaptation actions."[6]

The IPCC report then identifies a range of possible adaptation measures that include a mixture of public and private sector actions. These include:

- Altered patterns of management, facility investment or resource use (mainly private);
- Direct capital investments in public infrastructure (mainly public);
- Technology development through research (private and public);
- Human capital enhancement (investment in education - private and public);
- Redesign of adaptation institutions (i.e. altered forms of insurance - private and public);
- Changes in norms and regulations (i.e. altered building codes, technical standards, regulation of grids/networks/utilities, environmental regulations-mainly public); and
- Emergency response procedures and crisis management (mainly public).

The Adaptation Economy represents, therefore, an emerging but important partnership between the public and private sectors. Success relies heavily on the integration and cooperation of all parties, on an ongoing basis to ensure Glasgow City Region develops a strategic response.

This approach was recently advocated as one of the key outcomes from the IPCC Cities conference. According to Xueumi Bai and colleagues in a recent International Journal of Science article[7]:

"Researchers, policymakers, practitioners and other city stakeholders need to strengthen partnerships and produce knowledge together. Universities should support data platforms and long-term research programmes in their cities, while sharing knowledge nationally and internationally. Scientists should become more engaged with policy and practice networks such as C40 Cities, ICLEI Local Governments for Sustainability and United Cities and Local Governments."

As Glasgow City Region moves towards the development of its Adaptation Strategy and Action Plan, we would strongly advocate such an approach, especially given the low levels of awareness amongst private sector, and the evolving nature of measurement of the Adaptation Economy.

[6] IPCC WGII AR5 Chapter 14 p. 3

[7] Bai, X. et al (2018) Six research priorities for cities and climate change, *Nature Climate Change*, 555, pp. 23-25

Section 3: Defining and Measuring the Adaptation Economy

3.1 Introduction

The Adaptation Economy is an economic construct or "umbrella" term used to define a range of products and services that have a common theme, spread across a wide range of industrial and service sectors. That theme is to promote Adaptation and Resilience in response to Climate Change.

In the simplest possible terms "Adaptation" means preparing for change and "Resilience" means responding to change (see Box 1). In practice it is often very difficult to distinguish (in terms of economic activity) between the two. Adaptation and Resilience is one response to climate change. The second is "Mitigation", which is the process of reducing CO_2 emissions. The IPCC[8] spells out quite clearly why both strategies are required:

> "Even the most stringent mitigation efforts cannot avoid further impacts of climate change in the next few decades, which makes adaptation unavoidable.
>
> Without mitigation, a magnitude of climate change is likely to be reached that makes adaptation impossible for some natural systems; while for most human systems it would involve very high social and economic costs."

For the avoidance of doubt, this report does not address Climate Change Mitigation.

Box 1: Definitions of Adaptation and Resilience[9]

Adaptation: The process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects.

Resilience: The capacity of social, economic, and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity, and structure, while also maintaining the capacity for adaptation, learning, and transformation.

The climate change literature refers to two types of Adaptation activity - *incremental* adjustments to climate variability and climate change and *transformational* changes that alter the fundamental attributes of systems[10]. Both types are included in this report, although quantitative evidence for transformational economic activity is very limited, and no attempt has been made to separate the two.

The climate change literature also refers to the economic impacts of climate change i.e. the cost and consequences of extreme weather/ climate events. This report does not address economic impacts (i.e. vulnerabilities). This has been separately assessed in parallel as part of a separate study for Climate Ready Clyde as part of the Climate Risk and Opportunity Assessment for Glasgow City Region. Instead, this report focuses on *responses* to economic impacts (i.e. opportunities). The IPCC report[11] acknowledges the ancillary benefit of the *Generation of climate adaptation goods and services*:

[8] IPCC WGII AR5 Chapter 1 p.14
[9] IPCC WGII AR5 Summary for Policymakers p.5
[10] IPCC WGII AR5 Chapter 16 p.6
[11] IPCC WGII AR5 Chapter 16 p.11

> "Adaptation planning and implementation often may require additional knowledge and investment of resources. Adaptation therefore represents a potential economic opportunity for producers of goods and services used to satisfy adaptation needs ... Such services range from vulnerability assessment and risk analysis to the implementation of technology and engineering solutions."

This report is targeted at measuring the present and future economic opportunity for which, the IPCC and ClimateXChange acknowledge, there is currently very limited evidence. In contrast to the IPCC report and its predominantly governmental and public sector focus this report relates specifically to adaptation economic activities performed within the private sector that are funded either by the private sector or by *government or its* publicly funded agencies. At this time, it is not possible to clearly allocate spend to private or public sources, but this should be possible in the future.

The definition of the Adaptation Economy used for this report includes both Adaptation and Resilience. It is an emerging concept without a universally accepted definition, which has no grounding in current standard industrial classification (SIC) codes, economic measurement activities, business networks or market research. With no clear starting point for analysis, pioneering research has been required to meet the quantification challenge. This report for Glasgow City Region is the first step on the journey to defining and measuring local Adaptation activities.

3.2 Generating the Values

At the heart of the research methodology is a rigorous but flexible approach to measuring economic activity using multiple sources. This methodology has been widely applied to both existing and "new" markets and sectors but quantifying a previously unobserved or emerging market (like the Adaptation Economy) is challenging.

With no definitive sources of data or analysis, multiple sources of transactional (and other) data were identified and used to a) construct and b) populate a detailed and segmented model of the market/sector/economy that transforms the available evidence from singular and fragmented insights into structured observations. The stages for this have been outlined in Annex G, with more information on Source Selection and Management in Annex C.

Much of this transactional and other data is (as shown in Annex C) already in the public domain, although it requires the corroboration of multiple sources and triangulation between different sources (financial, legal, academic, industry, trade association, procurement, government, etc.) before it can be validated and transformed into usable data. This process (data triangulation and the use of "proxy" data) is at the heart of the research methodology that either:

- Selects from multiple sources of pre-existing data (mature sectors);
- Selects from more limited sources of pre-existing data and adds triangulated data to achieve more robust results; or
- Finds no pre-existing sources and uses triangulated data to create the sources necessary for analysis (emerging sectors).

The Adaptation Economy reflects the third case and has involved identifying, evaluating, interpreting and transforming multiple data sources into new values that can then be tested, analysed, modelled and reported.

Box 2 offers an example of how data triangulation can work to create new values. The triangulation process used after the application of the rule sets and only where data is difficult to obtain at a suitable level of provenance.

Box 2: Data Triangulation Example

Corporate governance for climate change. The consulting sector data shows that in 2010/11 250 major corporates commissioned work (the consulting data rarely shows value for commercial reasons). Investor relations and fund management sector data shows that overall £8.75m was spent on work and in addition trade associations' data reports independently that some £9.2m has been spent. *Triangulating data from the different sources makes it possible to arrive at highly accurate estimates of value and volume that are just not possible from consulting a single source, however authoritative that source may be within its own sector*	In some cases a single sub sector may require all three approaches to capture the full range of economic activities. Box 2 summarises how we achieve this by identifying, evaluating, interpreting and transforming multiple data sources into new values that can then be tested, analysed, modelled and reported. Market activities are only included within our data framework when there are multiple sources of reliable data (nothing is single sourced- ever). 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. From the remaining sources a value is then calculated and published. Values created in this way are then "reality tested" by comparing activity values within and across economic or industrial sectors, with recognised industry benchmarks and, ultimately, government statistics (if they are available)

Adaptation Economy activities are only included within the data framework when there are multiple sources of reliable data (nothing is single sourced in this analysis). 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. From the remaining sources a value is then calculated and published. Values created in this way are then "reality tested" by comparing activity values within and across economic or industrial sectors, with recognised industry benchmarks and, ultimately, government statistics (if they are available).

All research produced in this way is delivered with confidence levels assigned. Confidence levels are a mathematical function of the spread of values across the range of sources that we include in our analysis. Confidence levels vary by activity, measure, geography and by forecast year. Typically, a confidence level of above 85% is achievable, which means that corroborative sources vary around the mean value by +/- 15%. The confidence levels for the Adaptation Economy are in Annex F and vary between 80% and 88%, depending upon whether the analysis is conducted at the national, regional or city level.

3.3 General Methodology

Everything in this Section of the report has related to research activities that are specific to the Adaptation Economy. Further, more general, information about the research methodology and the economic measures used is included in the Annexes.

Section 4: Adaptation Economy for Glasgow City Region and Scotland

In this section, we look at the comparison between Glasgow City Region and Scotland as a whole. Analysis is by sector, sub-sector and sub-sub-sector, allowing the exploration of the market at varies depths.

Geographically data is provided at the levels of Scotland, Glasgow City Region and also split between the Local Authorities within the Glasgow City Region.

Analysis is by several metrics including:

- Sales;
- Employment;
- Companies; and
- Forecast Growth

Figure 1 illustrates the Total Sales values (£m) for both A&R and A&RCC for the financial year 2016/17 for Scotland and Glasgow City region. Glasgow City Region accounts for 24% of the Scottish market for both A&R and A&RCC. A&RCC accounts for 14% of the A&R market for both Glasgow City Region and the whole of Scotland.

Figure 1: A&R and A&RCC Total Sales (£m) for 2016/17

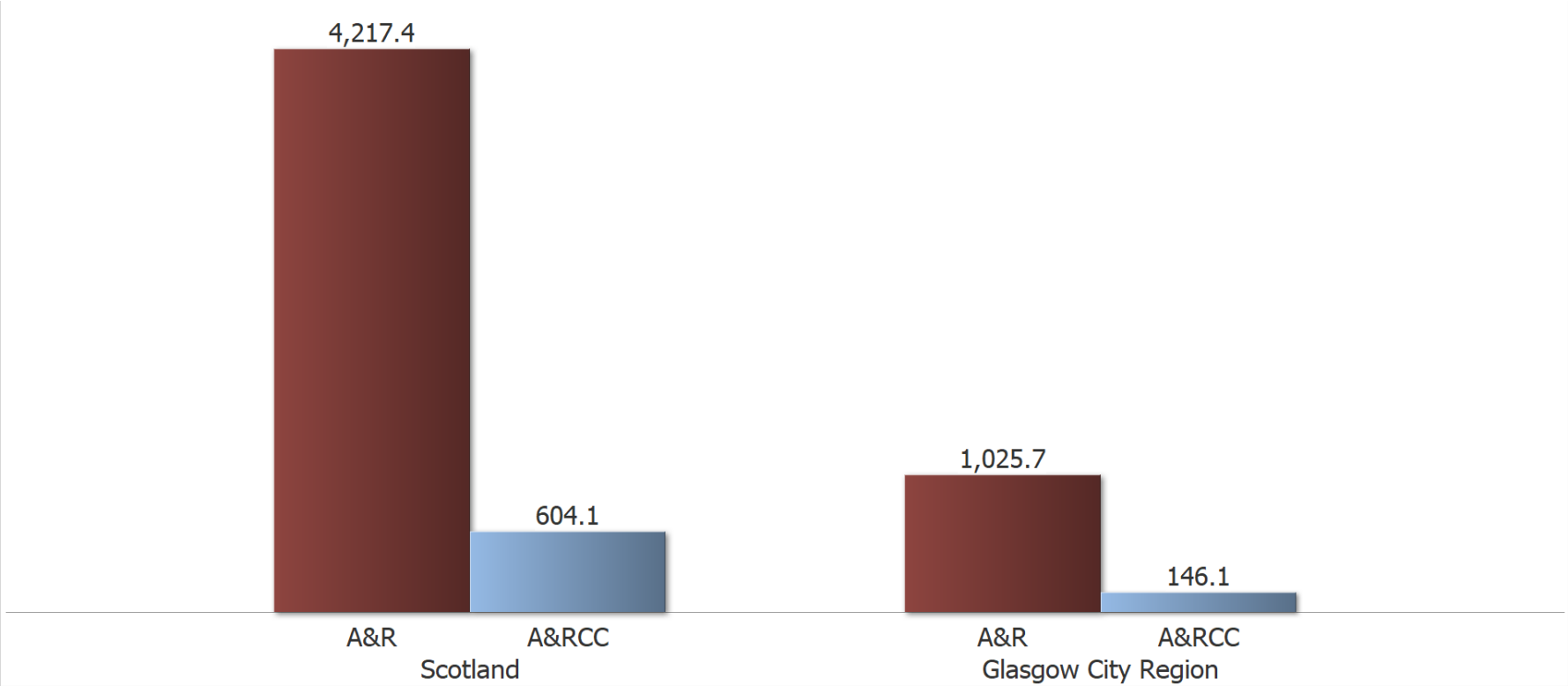


Figure 2 compares the Number of Employees and Companies for Scotland and Glasgow City Region, for 2016/17. In line with Figure 1, the number of employees in A&RCC in Glasgow City Region is 24% of the size of the whole of Scotland. In contrast, the number of companies is only 5%. This is due to a small number of large companies within Glasgow City Region with a large number of employees, as evidenced by the Scottish average company size being 21 employees, whilst the average for Glasgow City Region is 107. The employee count has decimal places because it is a measure of "heads equivalent", so the number of full-time employees.

Figure 2: Number of Companies and Employees in 2016/17 for A&RCC

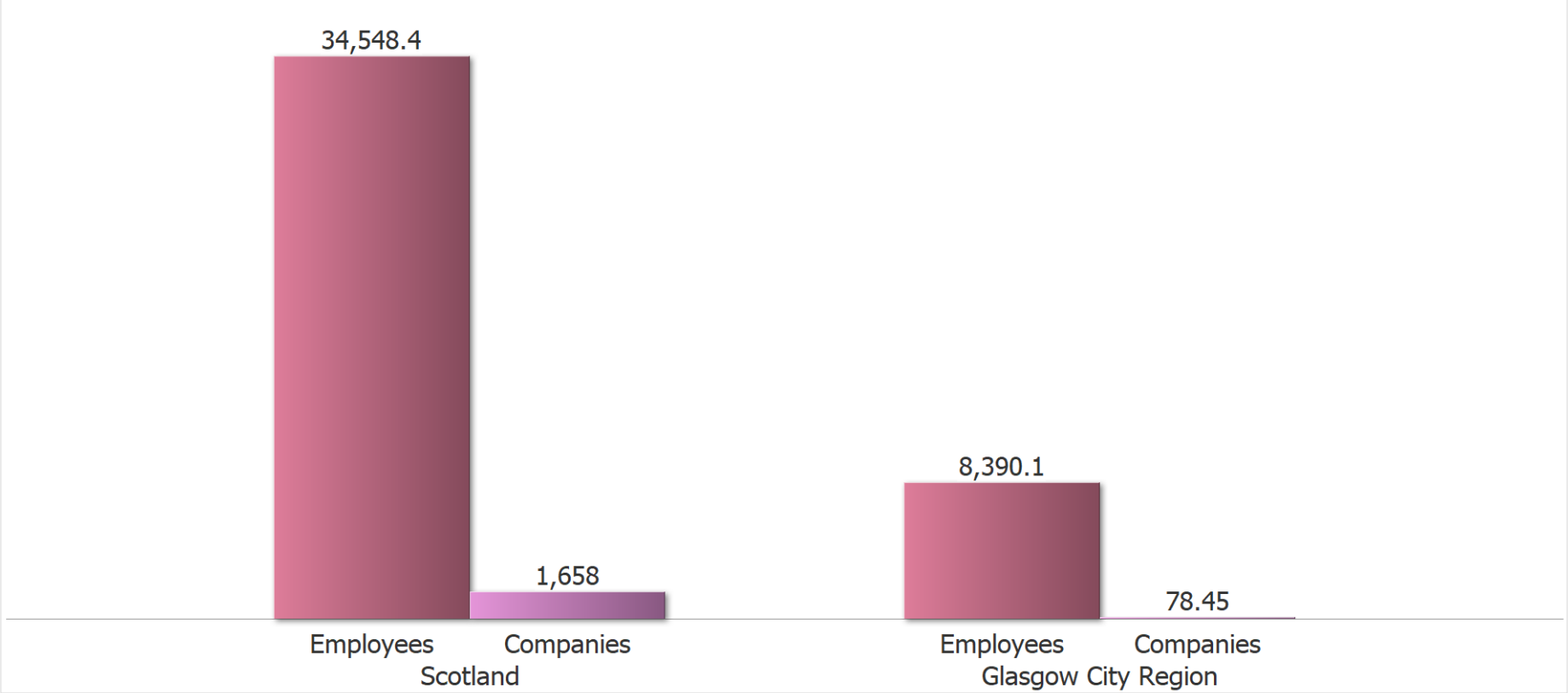


Figure 3 gives the year-on-year A&R growth rates for both Scotland and Glasgow City Region. Both show good expected growth rates from 2016/17 through to 2020/21, with Glasgow City Region expected to see slightly stronger growth than Scotland as a whole. It is not currently possible to disaggregate these figures down to the level of A&RCC, so these figures are indicative of the probable growth rates of the A&RCC market, within the A&R market. Maturation of the A&RCC market should allow separate analysis in the future.

Figure 3: Year-on-year growth rates for A&R for Scotland (top) and Glasgow City Region (bottom)

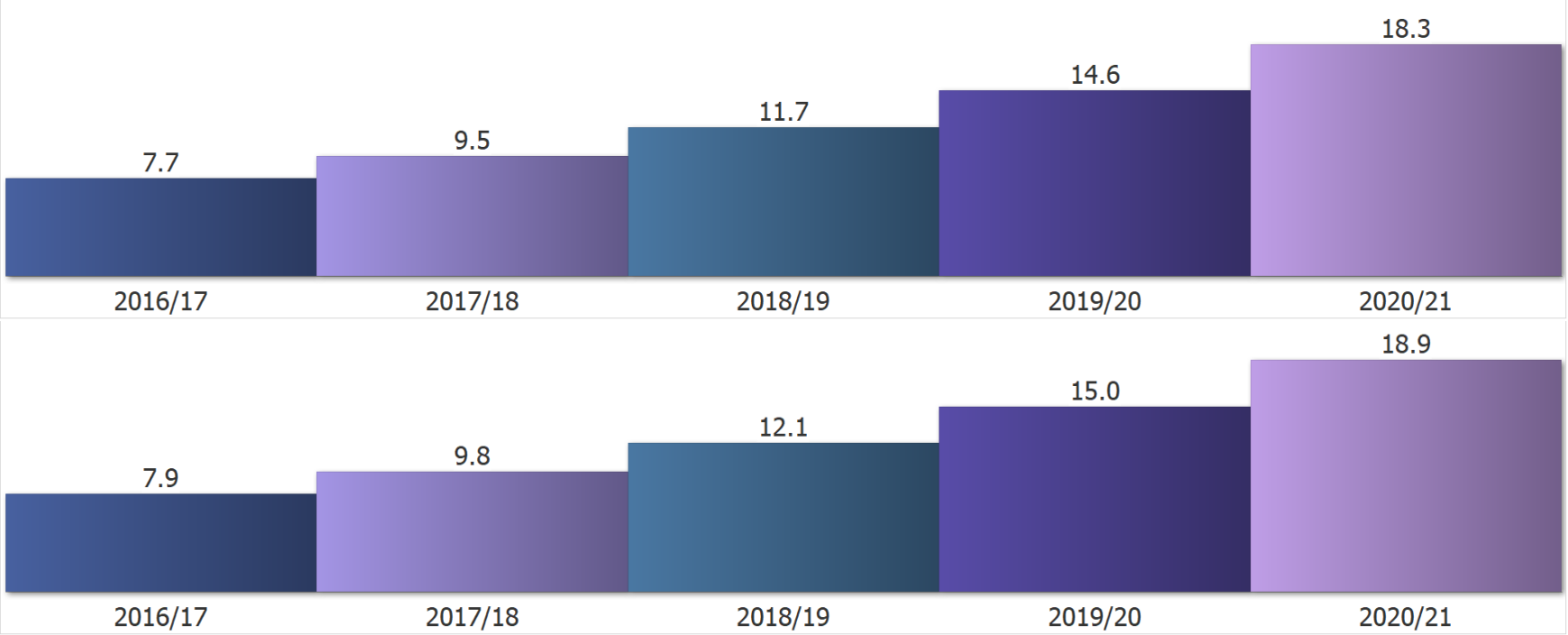


Figure 4 shows the expected year-on-year growth of Sales and Available Market for A&RCC, for Scotland. These figures have been calculated by looking at the 2016/17 Sales figures, Available Market and New Product Market sales and applying the A&R growth forecast figures to forecast the size of each metric in the market for A&RCC. Although not a perfect method, it gives the closest results achievable until the growth rates for A&RCC can be separated from the larger A&R market. Available Market is strong, at approximately 54% of Total Sales, Available Market is the proportion of the market which is available for penetration under normal market conditions. New Product Sales are also very good, accounting for approximately 30-32% of total sales.

Figure 4: A&RCC year-on-year growth of sales (top), available market (middle) and new product market (bottom) for Scotland (£m)

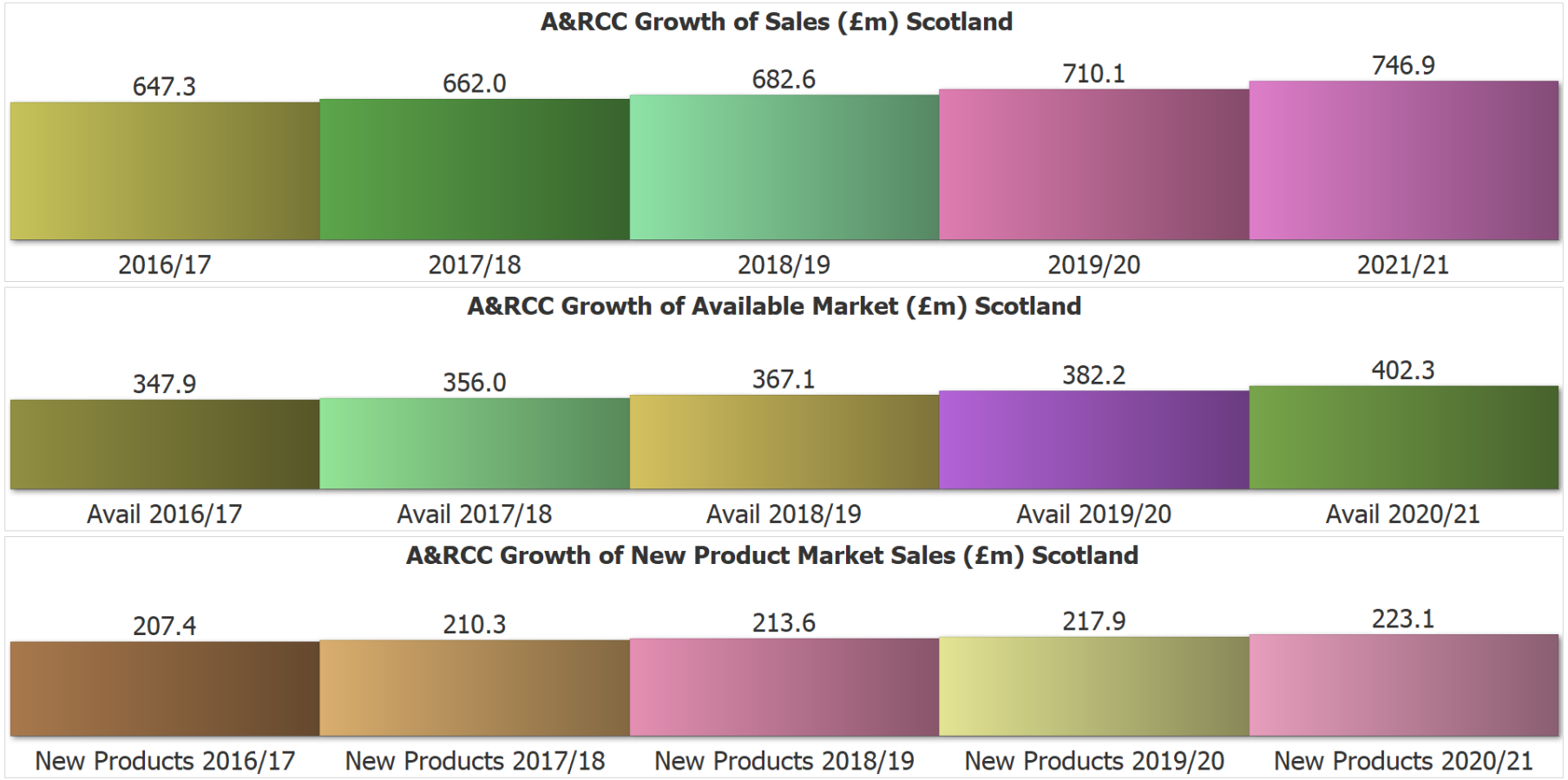


Figure 5 shows the expected year-on-year growth of Sales and Available market for A&RCC, for Glasgow City Region. The method for determining these figures is the same for Scotland above. Available Market is strong, at approximately 54% of Total Sales, Available Market is the proportion of the market which is available for penetration under normal market conditions. New Product Sales are also very good (although lower than the figures for Scotland as a whole), accounting for approximately 25-27% of total sales.

Figure 5: A&RCC year-on-year growth of sales, available market and new product market for Glasgow City Region (£m)

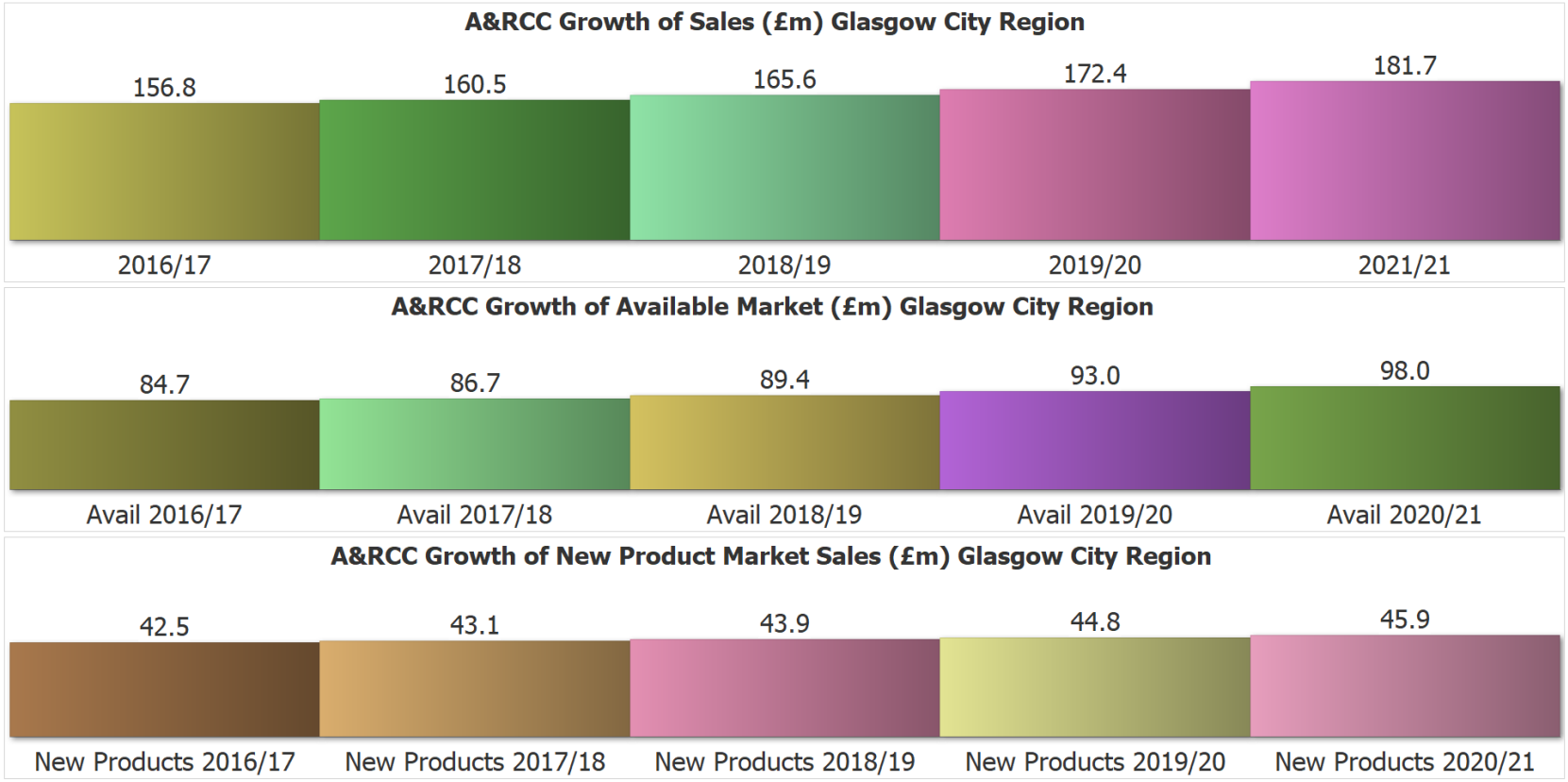
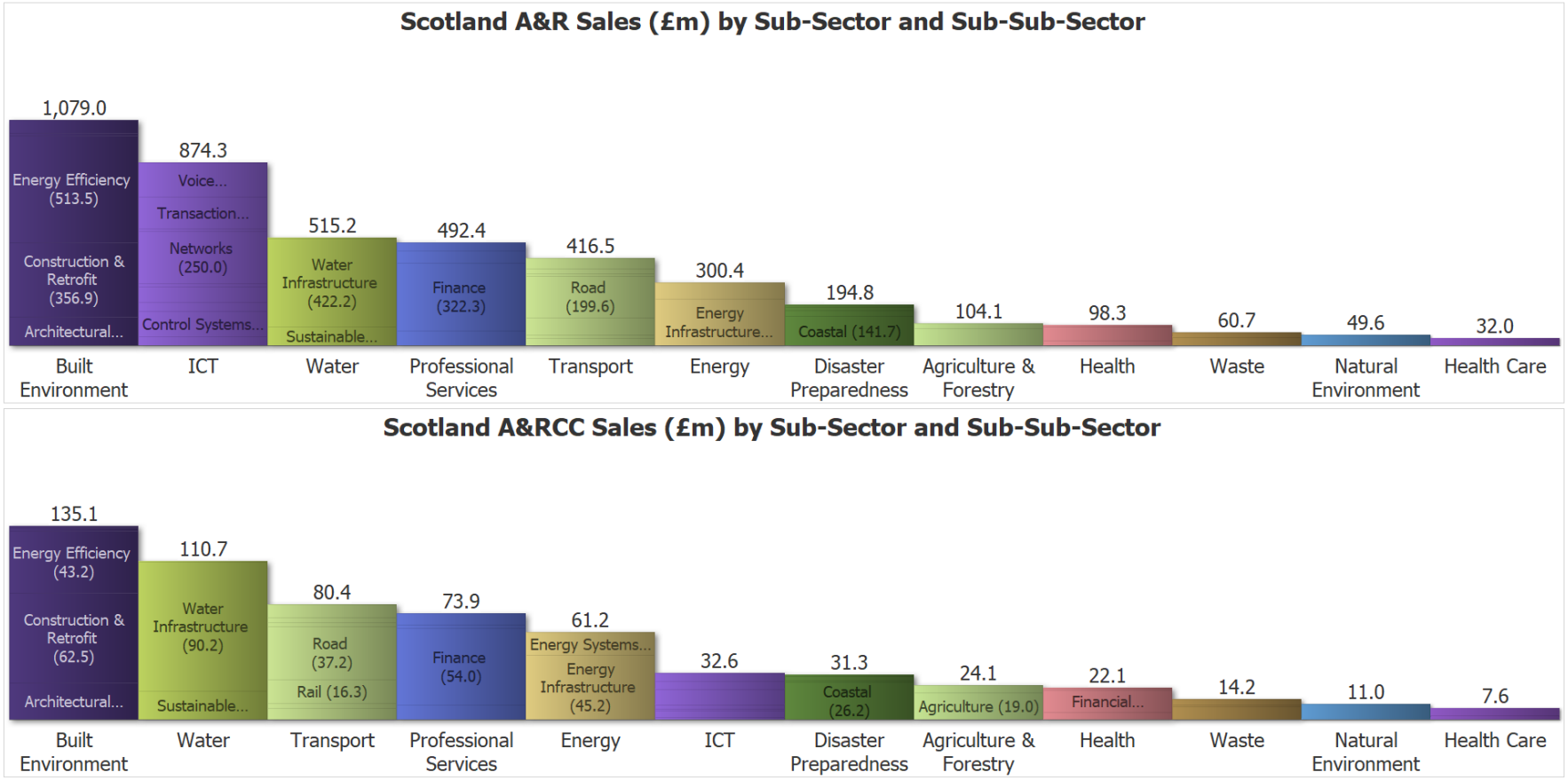


Figure 6 compares the A&R Sales (£m) with A&RCC Sales (£m) by Sub-Sector and Sub-Sub-Sector in Scotland for 2016/17. The graph demonstrates the differences between the two markets. Although Built Environment shows the highest sales (holding 26% of A&R and 22% of the A&RCC market), the other larger Sub-Sectors hold quite different percentages of Sales. For example, ICT is the most notable difference, holding 21% of the A&R market, but only 5% of the A&RCC Sales, whilt the Water Sub-Sector is more dominant in A&RCC, holding 18% of sales, compared to 12% of A&R Sales. Transport shows slightly less variance, with 10% of A&R and 13% of the A&RCC Sales market. At the Sub-Sub-Sector level, the two markets are also very different. Taking Built Environment as an example, Energy Efficiency holds 47.6% of the A&R market, but only 32% of the A&RCC market, whereas Construction & Retrofit holds 46% of the A&RCC market and only 33% of the A&R market. Architectural is similarly different, with 19% of the A&RCC market and only 12.5% of the A&R market. Water Efficiency holds 5.7% of the A&R market, but only 1.3% of the A&RCC market.

Figure 6: Comparison between A&R and A&RCC Sales (£m), split by Sub-Sector and Sub-Sub-Sector for Scotland for 2016/17


Scotland A&R Sales (£m) by Sub-Sector and Sub-Sub-Sector
1,079.0
Energy Efficiency (513.5)
Construction & Retrofit (356.9)
Architectural...
874.3
Voice...
Transaction...
Networks (250.0)
Control Systems...
515.2
Water Infrastructure (422.2)
Sustainable...
492.4
Finance (322.3)
416.5
Road (199.6)
300.4
Energy Infrastructure...
194.8
Coastal (141.7)
104.1
98.3
60.7
49.6
32.0
Built Environment
ICT
Water
Professional Services
Transport
Energy
Disaster Preparedness
Agriculture & Forestry
Health
Waste
Natural Environment
Health Care

Scotland A&RCC Sales (£m) by Sub-Sector and Sub-Sub-Sector
135.1
Energy Efficiency (43.2)
Construction & Retrofit (62.5)
Architectural...
110.7
Water Infrastructure (90.2)
Sustainable...
80.4
Road (37.2)
Rail (16.3)
73.9
Finance (54.0)
61.2
Energy Systems...
Energy Infrastructure (45.2)
32.6
31.3
Coastal (26.2)
24.1
Agriculture (19.0)
22.1
Financial...
14.2
11.0
7.6
Built Environment
Water
Transport
Professional Services
Energy
ICT
Disaster Preparedness
Agriculture & Forestry
Health
Waste
Natural Environment
Health Care

Figure 7 compares the A&R Sales (£m) with A&RCC Sales (£m) by Sub-Sector and Sub-Sub-Sector in the Glasgow City Region for 2016/17. The graph shows similar pattern to that for Scotland and again demonstrates the differences between the two markets, although Built Environment shows the highest sales (holding 26% of A&R and 22% of the A&RCC market), the other larger Sub-Sectors hold quite different percentages of Sales. For example, ICT is the most notable difference, holding 21% of the A&R market, but only 5% of the A&RCC Sales; the Water Sub-Sector is more dominant in A&RCC, holding 18% of sales, compared to 12% of A&R Sales. Transport shows slightly less variance, with 10% of A&R and 13% of the A&RCC Sales market. At the Sub-Sub-Sector, the two markets are also very different. Taking Built Environment as an example, Energy Efficiency holds 47.5% of the A&R market, but only 32% of the A&RCC market, whereas Construction & Retrofit holds 46% of the A&RCC market and only 33% of the A&R market. Architectural is similarly different, with 19% of the A&RCC market and only 12.5% of the A&R market. Water Efficiency holds 5.7% of the A&R market, but less than 1% of the A&RCC market.

Figure 7: Comparison between A&R and A&RCC Sales (£m), split by Sub-Sector and Sub-Sub-Sector for Glasgow City Region for 2016/17

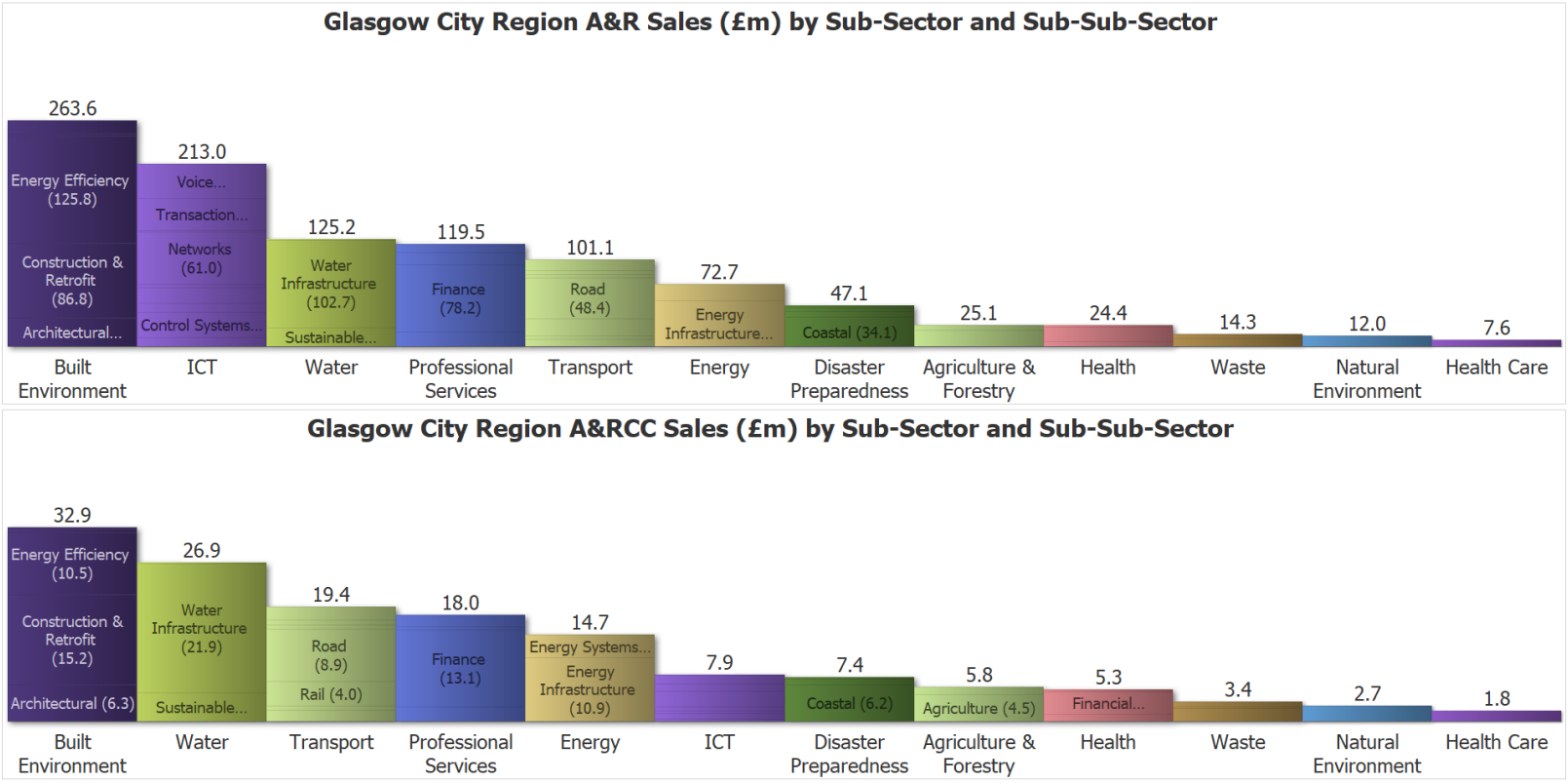


Figure 8 highlights the Sub-Sector information provided in figure 6, comparing A&R and A&RCC distribution of Sales for Scotland, in 2016/17. It gives a good visual representation of the differences in the proportionality of the markets at the Sub-Sector level.

Figure 8: Comparison between 2016/17 A&R and A&RCC Distribution of Sales, split by Sub-Sector for Scotland

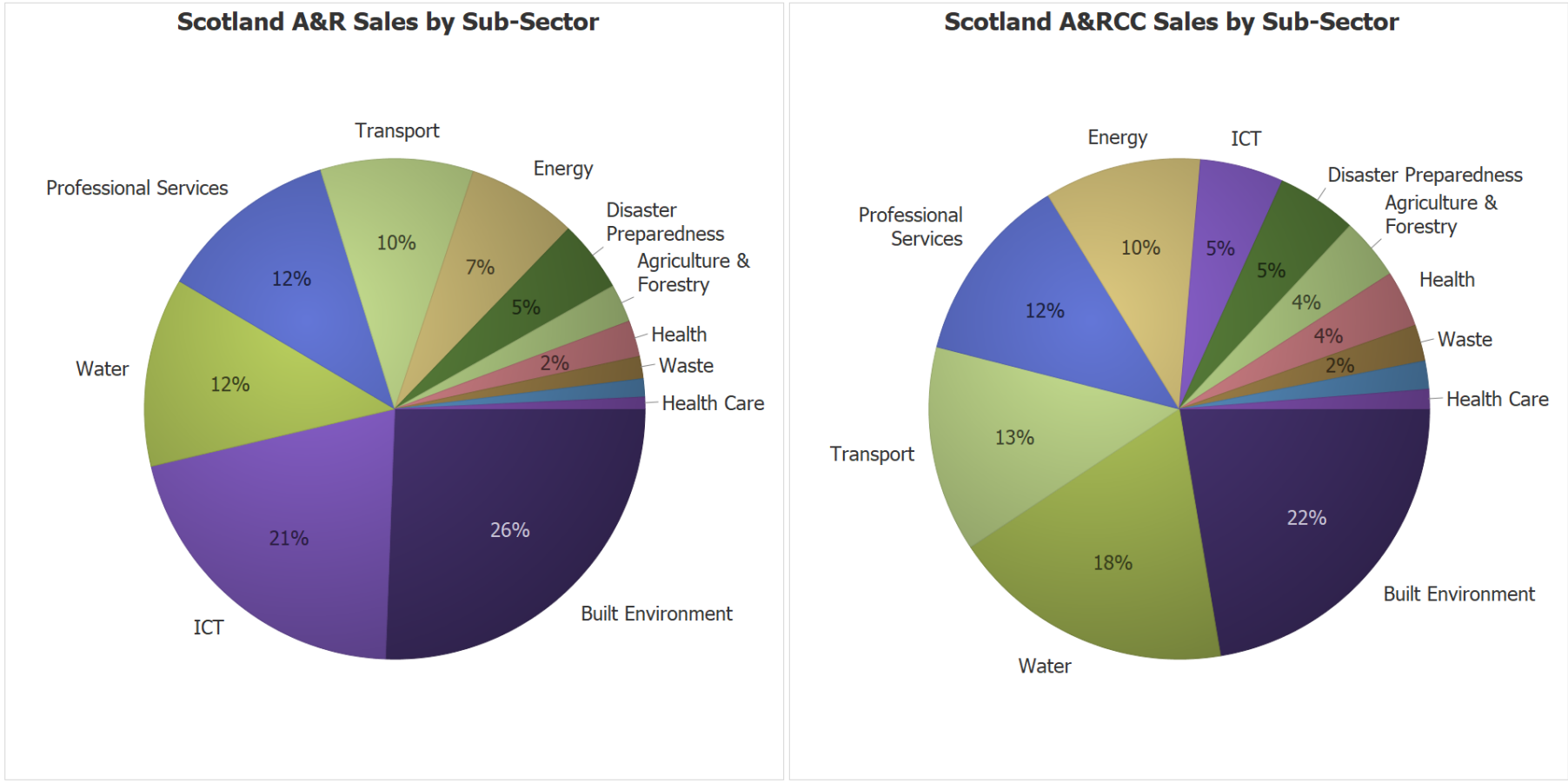
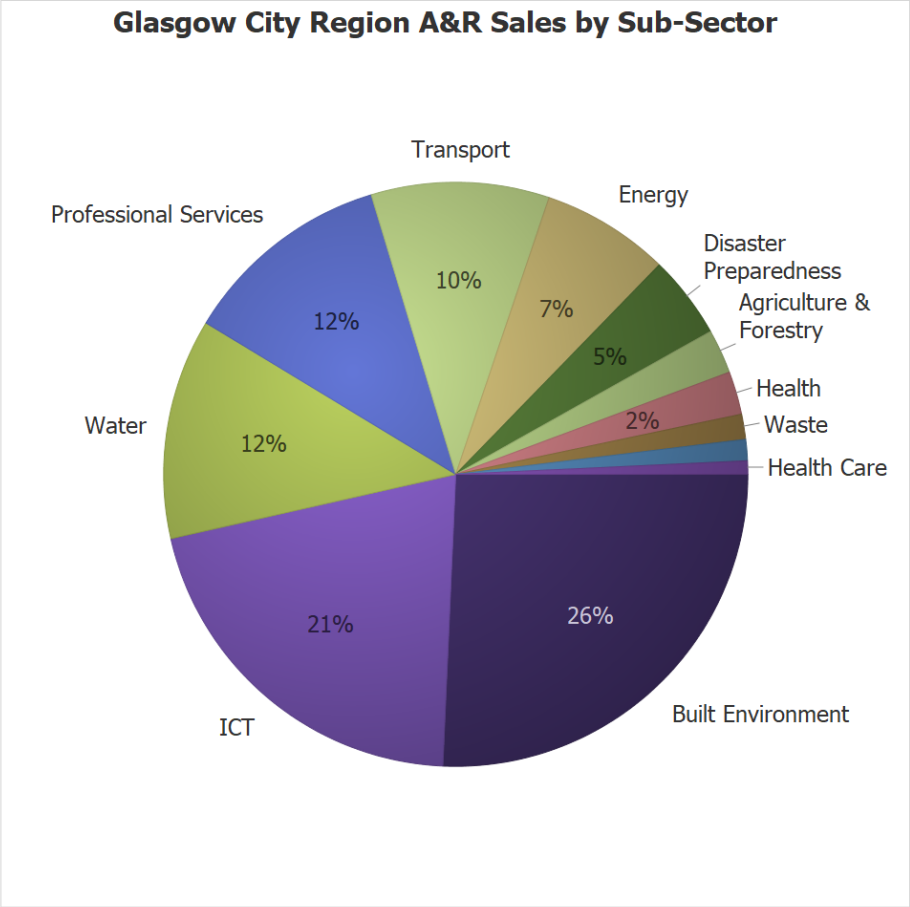


Figure 9 is the Glasgow City Region version of the above figure and again highlights the Sub-Sector information provided in figure 7, comparing A&R and A&RCC distribution of Sales for Glasgow City Region, in 2016/17. It gives a good visual representation of the differences in the proportionality of the markets at the Sub-Sector level.

Figure 9: Comparison between 2016/17 A&R and A&RCC Distribution of Sales, split by Sub-Sector for Glasgow City Region



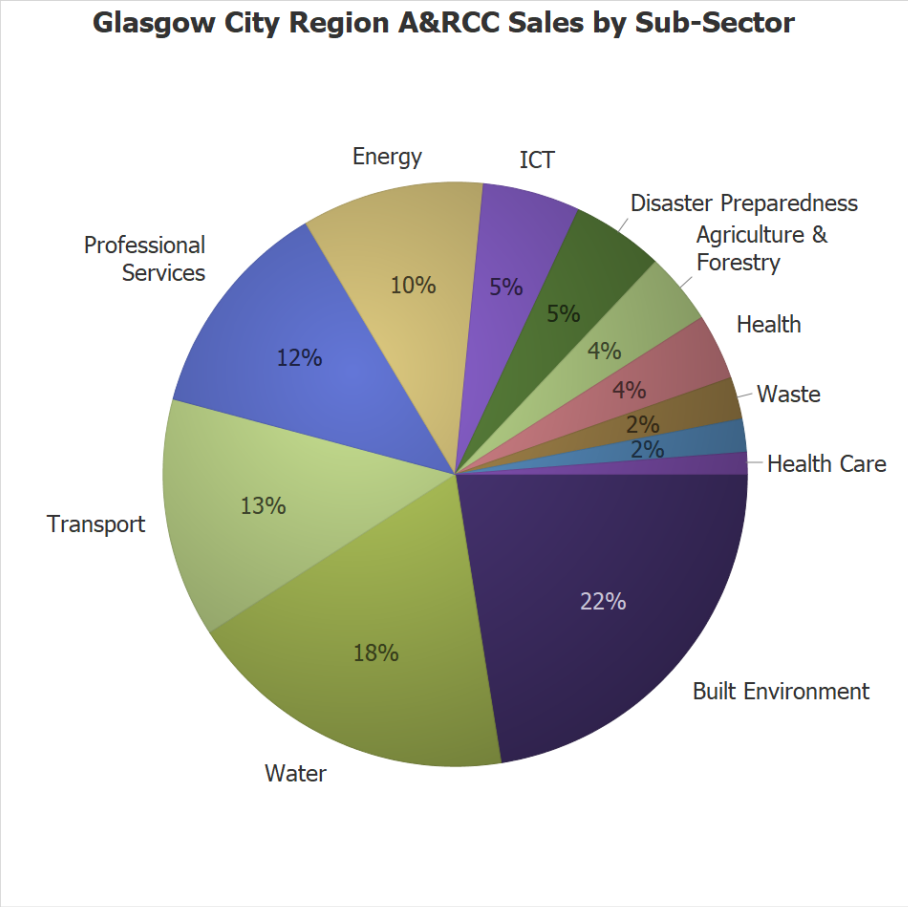


Figure 10 gives the Sales (£m) for A&R and A&RCC by Local Authority for Glasgow City Region

Figure 10: Comparison between A&R and A&RCC Sales (£m) for Local Authorities in Glasgow City Region for 2016/17

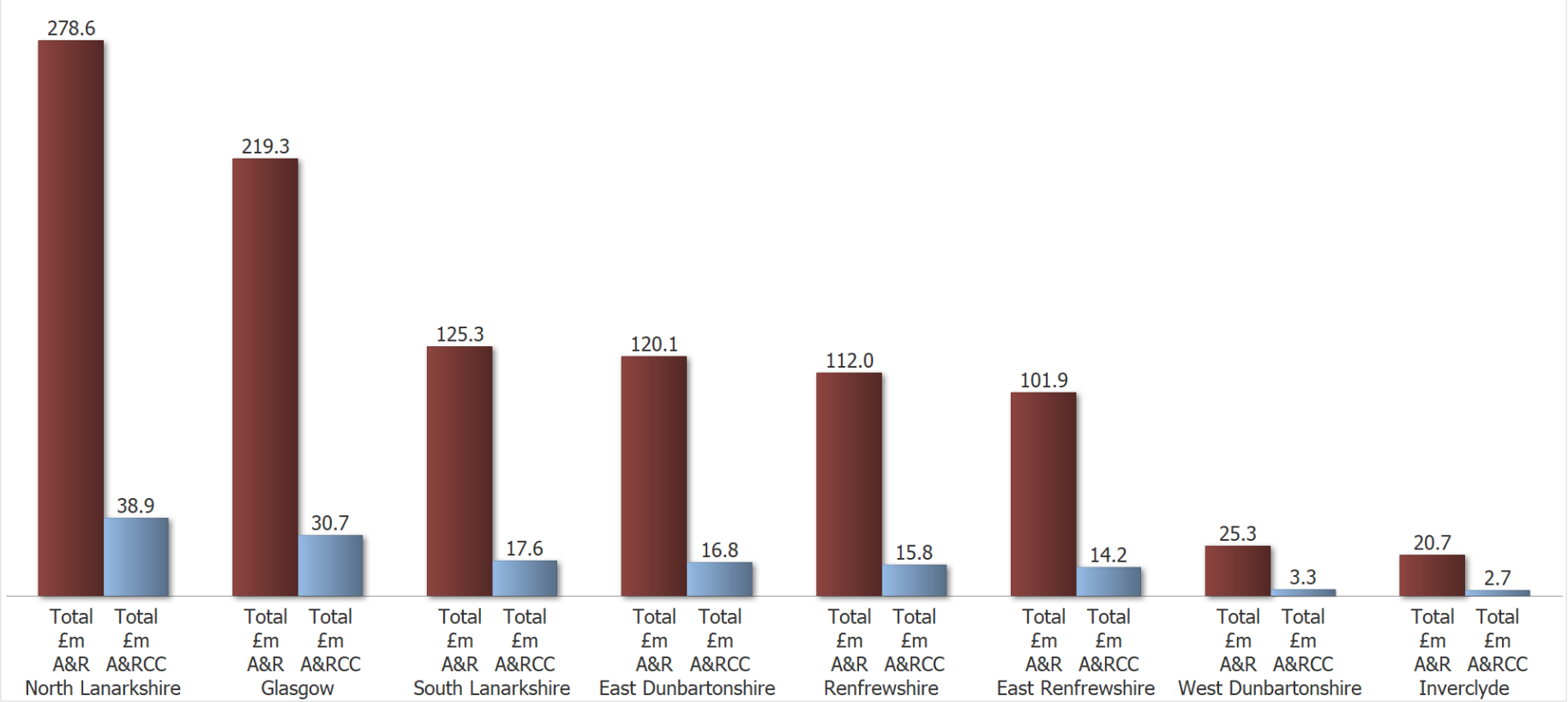


Figure 11 illustrates the Company and Employee numbers for the A&RCC market, by Local Authority in Glasgow City Region for 2016/17. The employee figures have decimal points because they are not an absolute count, they are “heads equivalent”, which is a measure of the number of people who would be working full time in that capacity. North Lanarkshire and Glasgow are the largest Local Authorities for both of these measures, accounting for 51% of employees and 50% of companies. Figure 2 demonstrated that the average number of employees per company in Scotland is 21, whilst the average for Glasgow City Region is approximately 107. Figure 11 illustrates that generally there is not great variety in employee numbers per company between the Local Authorities, ranging between 107 in East Renfrewshire to 117 in Renfrewshire. The outlier in this graph is Inverclyde, with 184 employees in one company. We would suggest that this figure is a result of noise in the data and the inherent inaccuracy of a small company number and in reality, the employee count is likely to be much lower. As a result this one data point should be viewed with caution.

Figure 11: Number of Companies and Employees for A&RCC, by Local Authority in Glasgow City Region for 2016/17

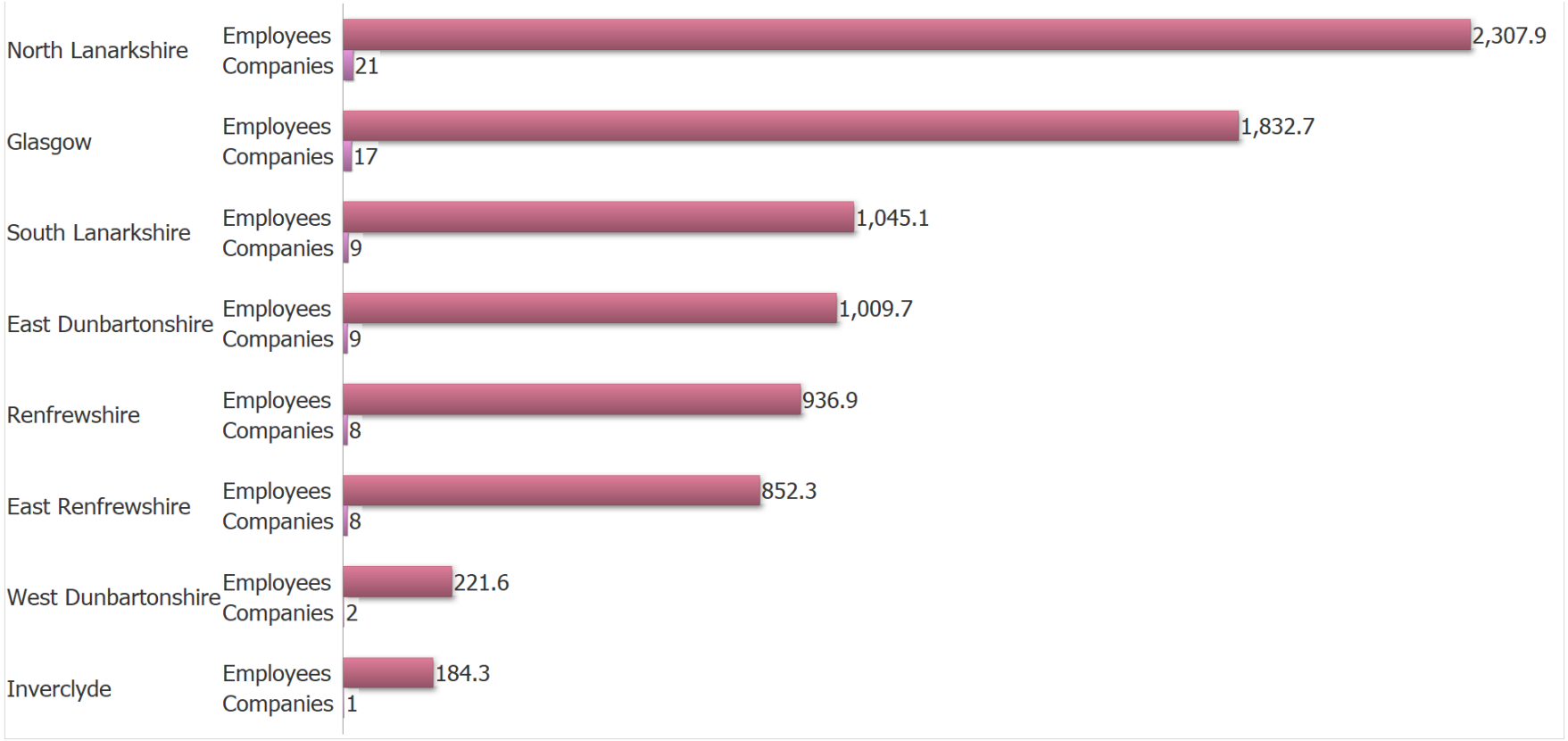


Figure 12 looks at the year-on-year Forecast Sales (£m) for A&RCC by Sub-Sector for Glasgow City Region 2016/17 through to 2020/21. Built Environment dominates the market, with all Sub-Sectors showing strong growth through the forecast period.

Figure 12: Forecast Sales (£m) for A&RCC, by Sub-Sector for Glasgow City Region

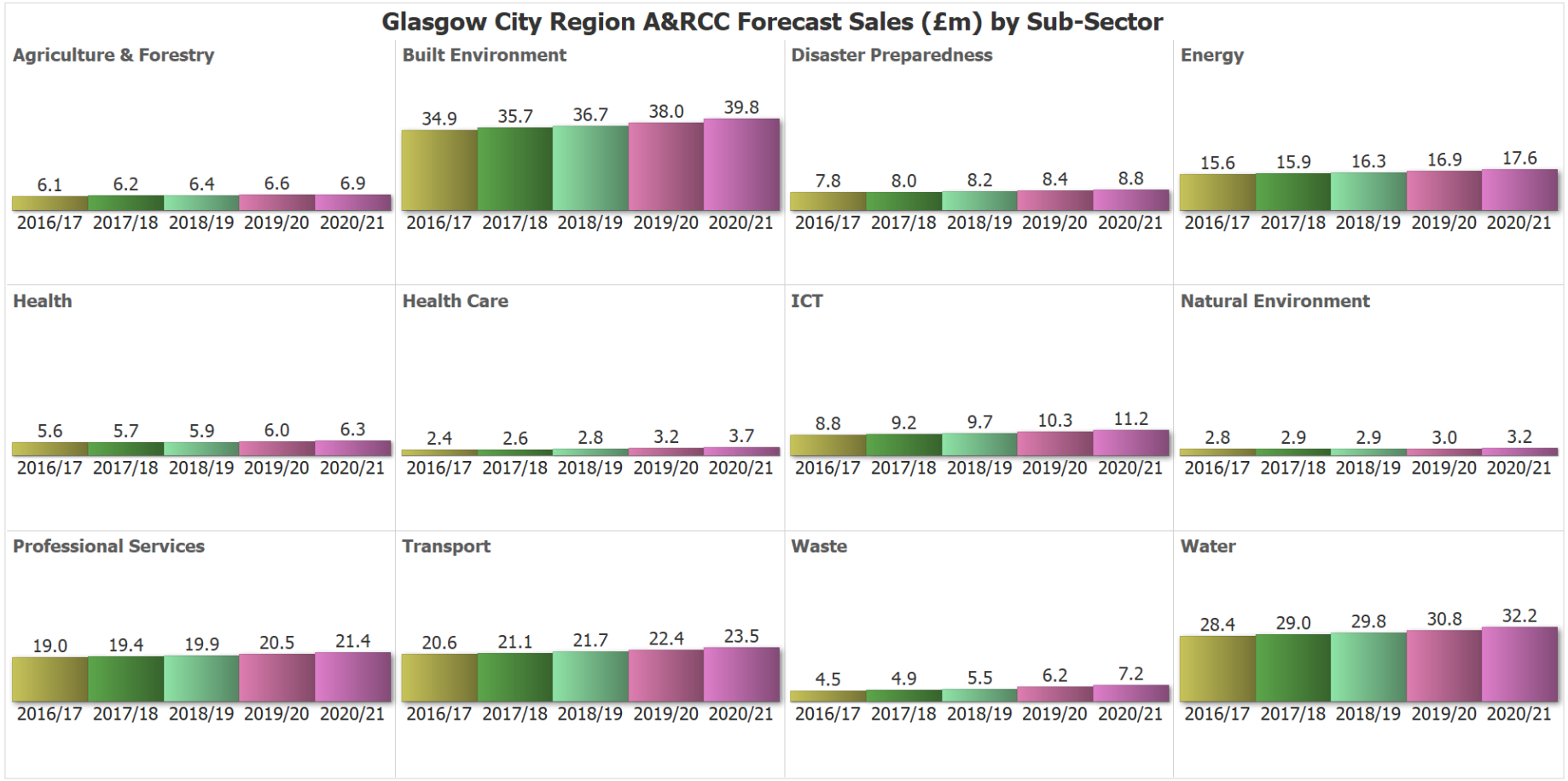


Figure 13 illustrates the A&RCC Sales (£m) and how those sales are distributed as percentages by Activity in Scotland for 2016/17. Services is the largest Activity, followed by Engineering Services and between them, they hold 57% of the market. Design, Consultancy and Maintenance are the smallest Activities in the market.

Figure 13: 2016/17 A&RCC Sales (£m) and Distribution of Sales (%), by Activity for Scotland

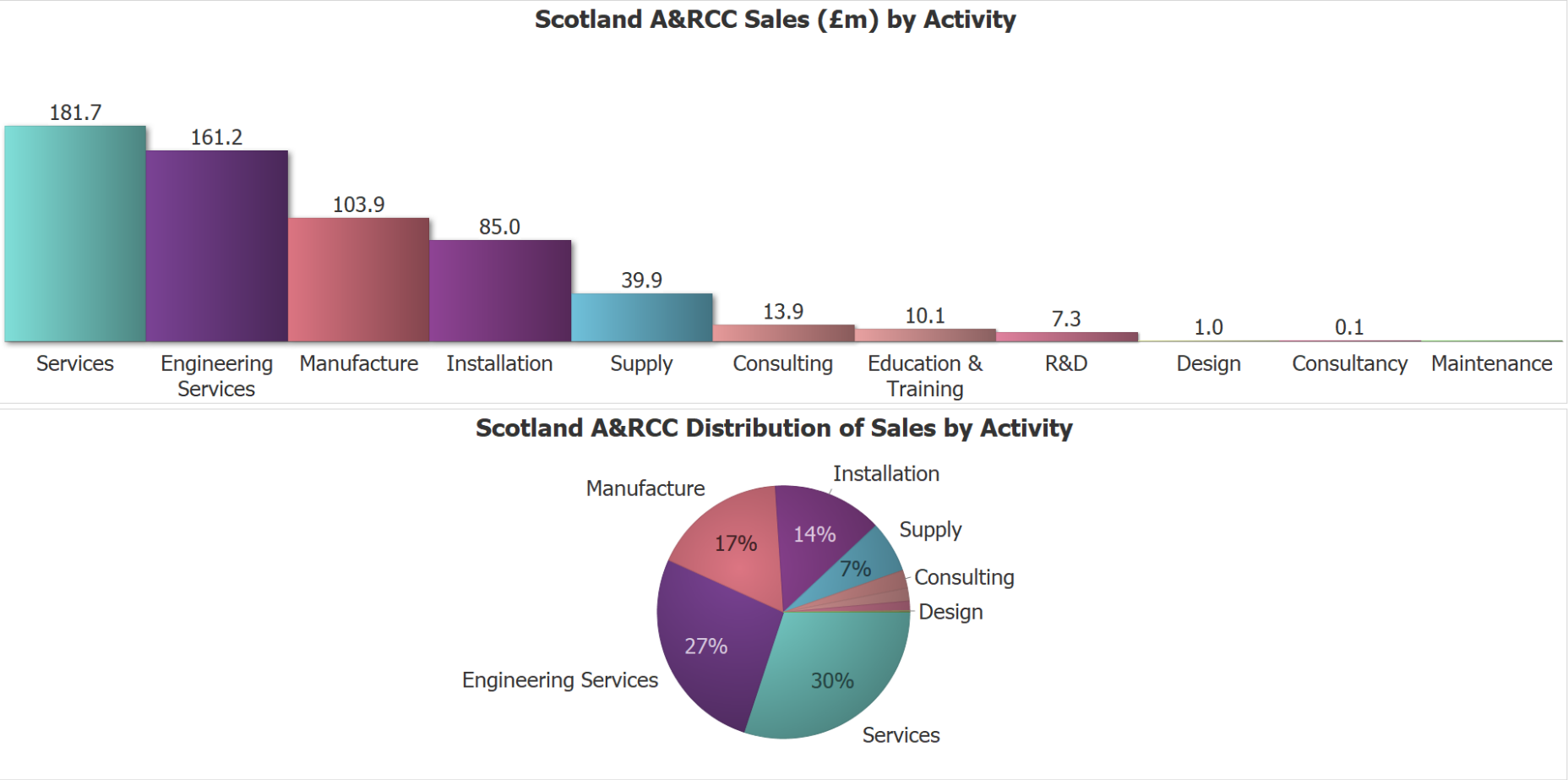


Figure 14 illustrates the A&RCC Sales (£m) and how those sales are distributed as percentages by Activity in Glasgow City Region for 2016/17. The pattern of distribution is similar to that of Scotland, with Services being the largest Activity, followed by Engineering Services and between them, they again hold 57% of the market. Design, Consultancy and Maintenance are the smallest Activities in the market.

Figure 14: 2016/17 A&RCC Sales (£m) and Distribution of Sales (%), by Activity for Glasgow City Region

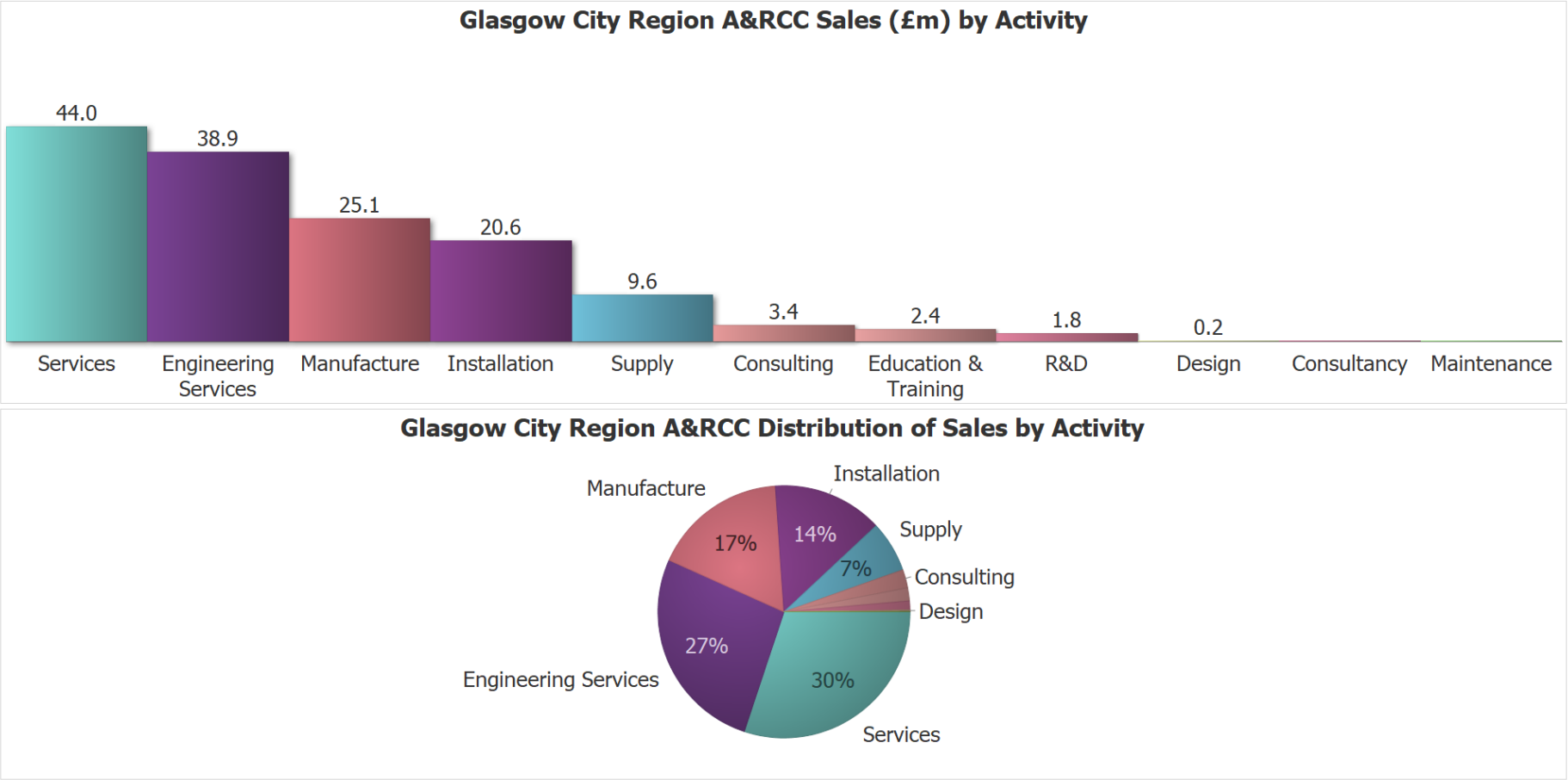


Figure 15 illustrates the A&RCC market for Scotland as a whole, looking at two metrics measuring New Products onto the market, by Sub-Sector and by Activity. The New Product Sales (£m) by Sub-Sector shows that the highest Sales value is in Built Environment, followed by ICT and Water. This shouldn't be a surprise as these are the highest Sub-Sectors by Total Sales (£m) as demonstrated in figure 6. The New Product Sales as a percentage of Total Sales shows that the smaller Sub-Sectors of Natural Environment and Agriculture & Forestry have a slightly higher percentage of New Products as a percentage of Total Sales than larger Sub-Sectors, but all are in the range of 4.3-4.75%. The figures for Activity follow a similar pattern, however figure 13 showed that Engineering Services is the second largest, and Manufacture the third largest Sub-Sectors by Activity, while figure 15 shows that they switch places for the Total New Products Sales (£m) by Activity. When we look at the New Product Sales as a percentage of Total Sales, again the smaller Sub-Sectors see a value than some of the larger Sub-Sectors, with Consultancy being particularly low.

Figure 15: 2016/17 A&RCC New Product Sales (£m) and New Product Sales as a percentage of Total Sales, by Sub-sector and New Product Sales (£m) and New Product Sales as a percentage of Total Sales, by Activity for Scotland

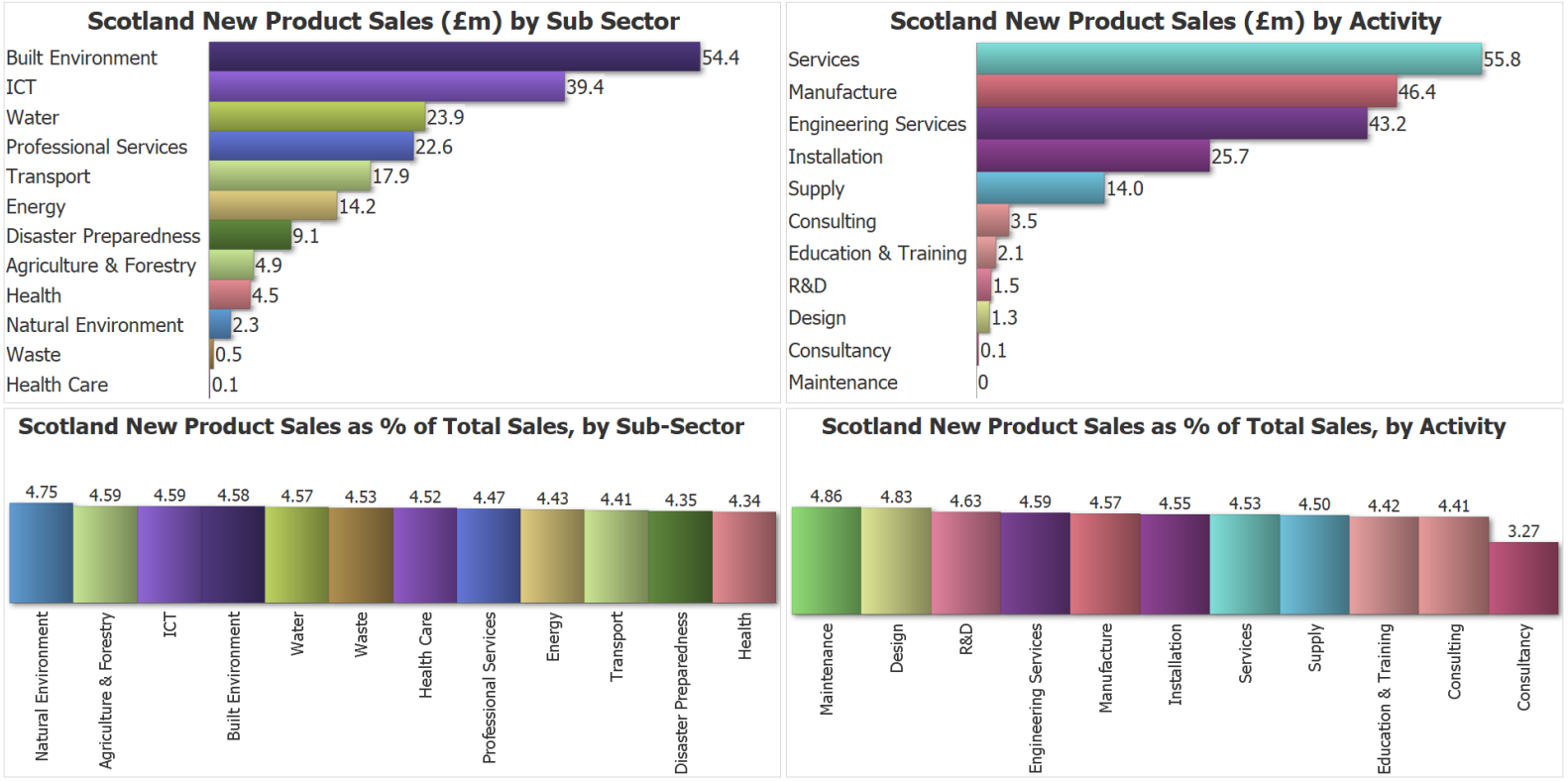
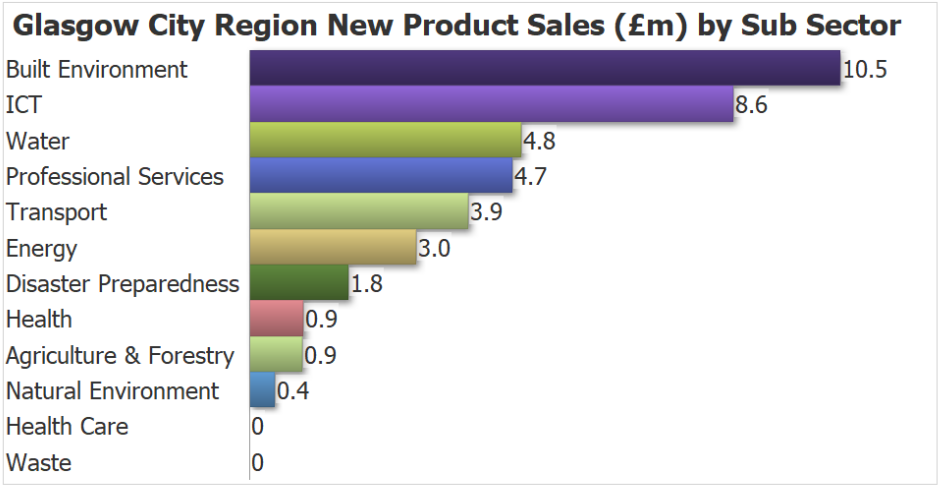
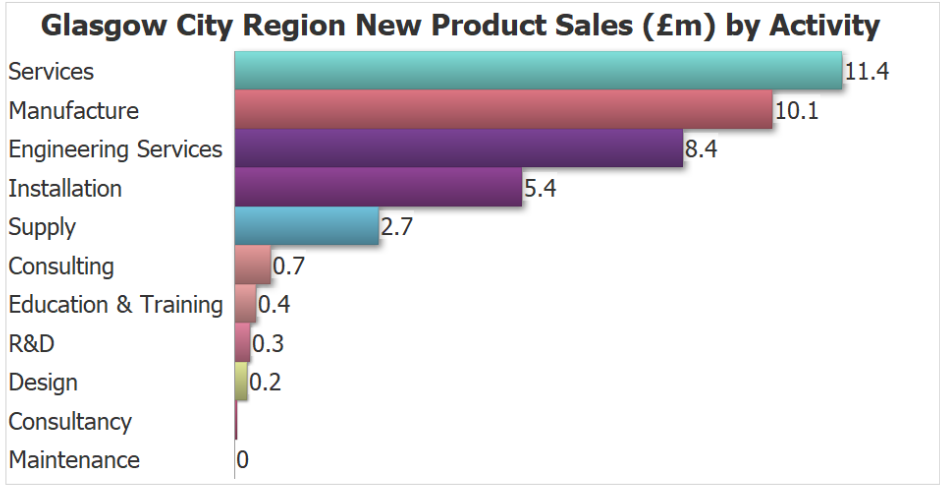
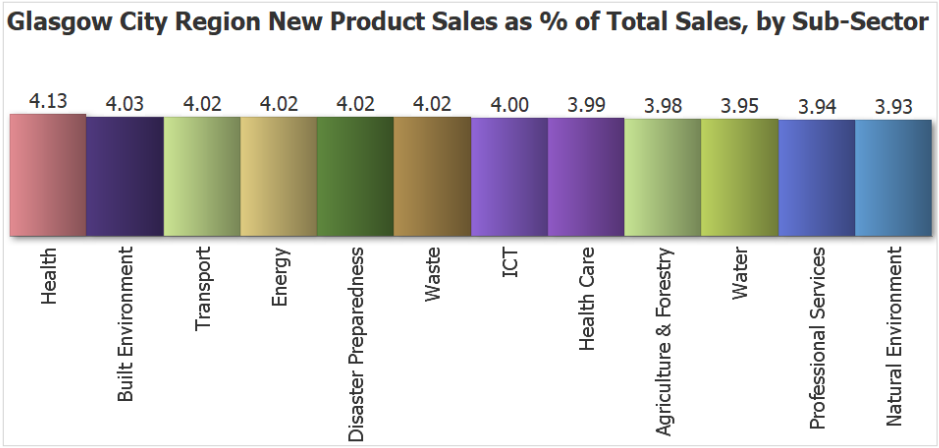


Figure 16 illustrates the A&RCC market for Glasgow City Region, looking at two metrics measuring New Products onto the market, by Sub-Sector and by Activity. The New Product Sales (£m) by Sub-Sector shows that the highest Sales value is in Built Environment, followed by ICT and Water. This shouldn't be a surprise as these are the highest Sub-Sectors by Total Sales (£m) as demonstrated in figure 7. On initial inspection, the New Product Sales as a percentage of Total Sales is different to Scotland as a whole, with Health seeing the highest value in Glasgow City Region compared to the lowest in Scotland and Built Environment and Transport being in the top three. This is not particularly significant in this case because the range in values is so tight, between 0.2%. The figures for Activity follow a similar pattern to figure 15 above, with Manufacture and Engineering Services switching places for the Total New Products Sales (£m) by Activity, compared to figure 14. When we look at the New Product Sales as a percentage of Total Sales, Manufacture is higher in the ranking than for Scotland. Overall the Total New Products as a percentage of Total Sales is lower for Glasgow City Region than for the rest of Scotland.

Figure 16: 2016/17 A&RCC New Product Sales (£m) and New Product Sales as a percentage of Total Sales, by Sub-sector and New Product Sales (£m) and New Product Sales as a percentage of Total Sales, by Activity for Glasgow City Region







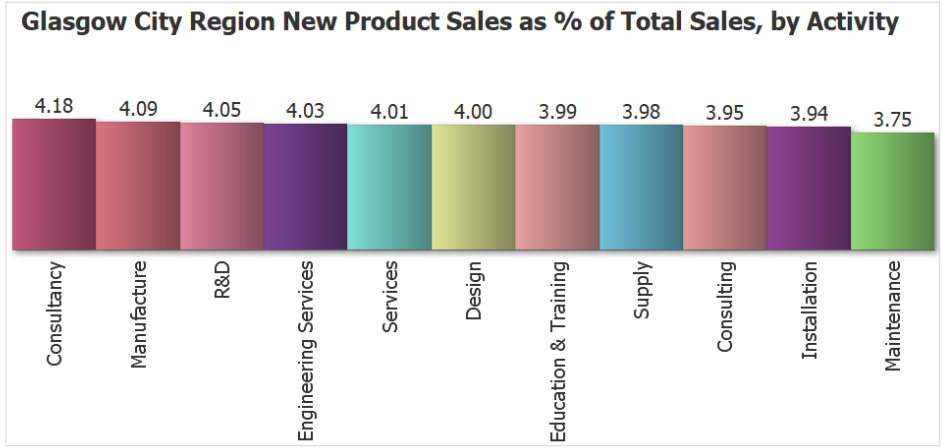


Figure 17 is a bubble depiction of the Number of New Products per Annum against New Products as a percentage of Sales, with the bubbles sized by the figures for New Product Sales and split by Sub-Sector for A&RCC. It is a good visual illustration of the New Products market, simultaneously displaying lots of different information. Health is not a large market in terms of New Products Sales, but it is the strongest in terms of both Number of New Products and New Products as a percentage of sales. By comparison, Professional Services is a much larger marker, but low for the other two metrics. Energy has a fairly low Number of New Products per Annum, but the New Products as a percentage of Sales is higher by comparison.

Figure 17: 2016/17 A&RCC Number of New Products per annum, New Products Sales as a percentage of Total Sales, with bubbles sized by New Product Sales (£m), split by Sub-Sector for Glasgow City Region

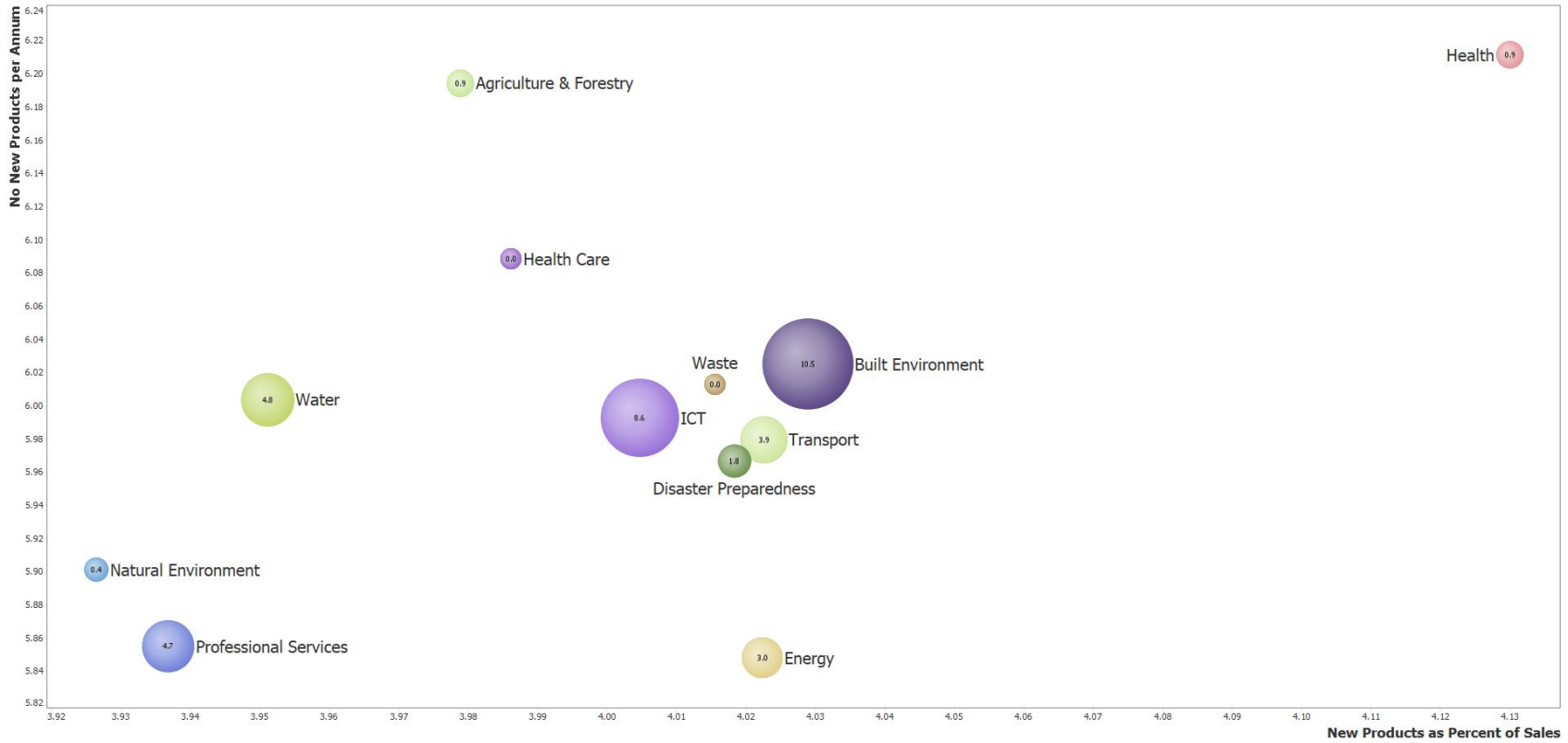


Figure 18 is a bubble depiction of the same information as figure 17, but this time split by Activity. Maintenance is extremely low in all measures, whilst Consultancy is a small New Products market, with a low Number of New Products per Annum but comparatively high New Products as Percentage of Sales, compared with other Activities. Manufacture is performing particularly well, with a large market and high values for both of the other metrics.

Figure 18: 2016/17 A&RCC Number of New Products per annum, New Products Sales as a percentage of Total Sales, with bubbles sized by New Product Sales (£m), split by Activity for Glasgow City Region

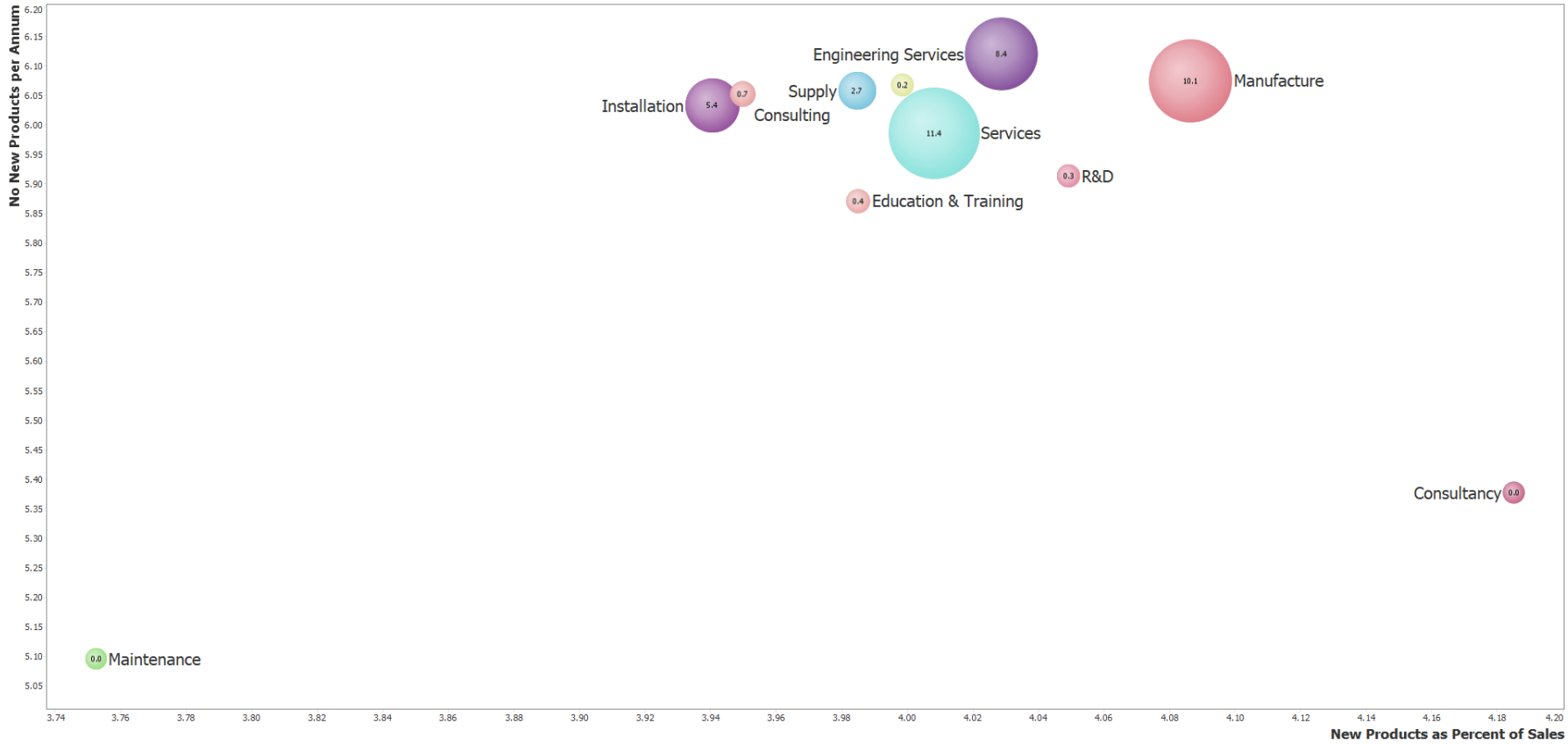


Figure 19 again depicts the same metrics as figure 18, but this time looking at the Local Authorities in Glasgow City Region. Although not the largest market for New Products, South Lanarkshire is particularly strong in terms of New Products as Percent of Sales and has a large Number of New Products per Annum. Renfrewshire is also a mid-range Local Authority in terms of the size of the New Products market, but it is also very strong in the other metrics. This figure illustrated that South Lanarkshire and Renfrewshire are the leading Local Authorities for innovation.

Figure 19: 2016/17 A&RCC Number of New Products per annum, New Products Sales as a percentage of Total Sales, with bubbles sized by New Product Sales (£m), split by Local Authority for Glasgow City Region

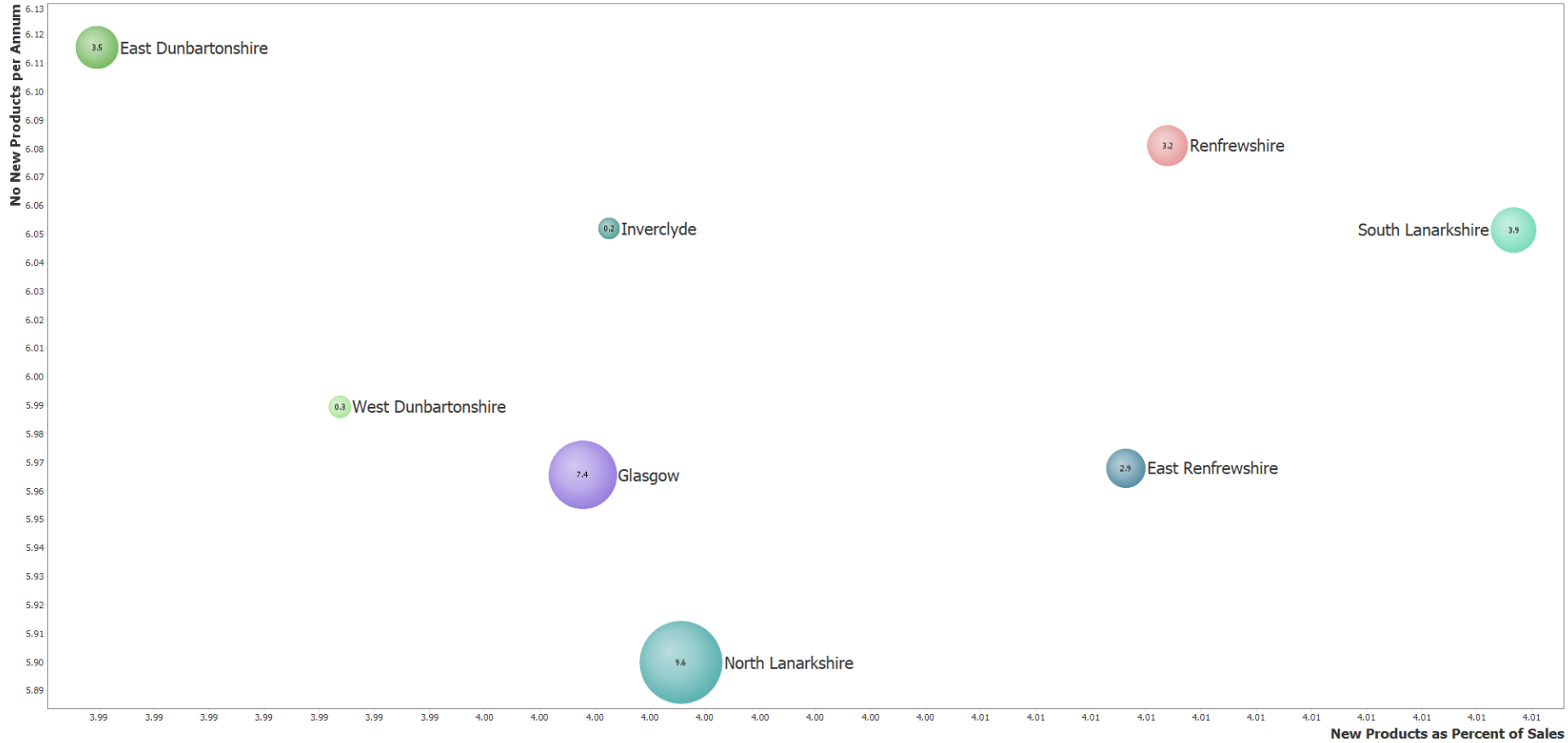


Figure 20 shows radar depictions of market barrier, by sub-sector for Glasgow City Region, for the 2016/17 A&RCC market. Some sub-sectors, such as Agriculture & Forestry, Health Care, Waste and Built Environment have relatively even barriers to entry. Other such as Health, Transport, Disaster Preparedness and Natural Environment have higher barriers to entry in some areas than others. For example, Natural Environment has higher Financial and Operational Barriers to entry, whereas Technological Risk of Substitution and Market Risk of Substitution are quite low. In contrast, Health experiences low financial and operational barriers to entry, but high Technological Risk of Substitution, Customer Power and Market Risk of Substitution.

Figure 20: 2016/17 A&RCC Radar Depictions of Market Barriers, by Sub-Sector for the Glasgow City Region

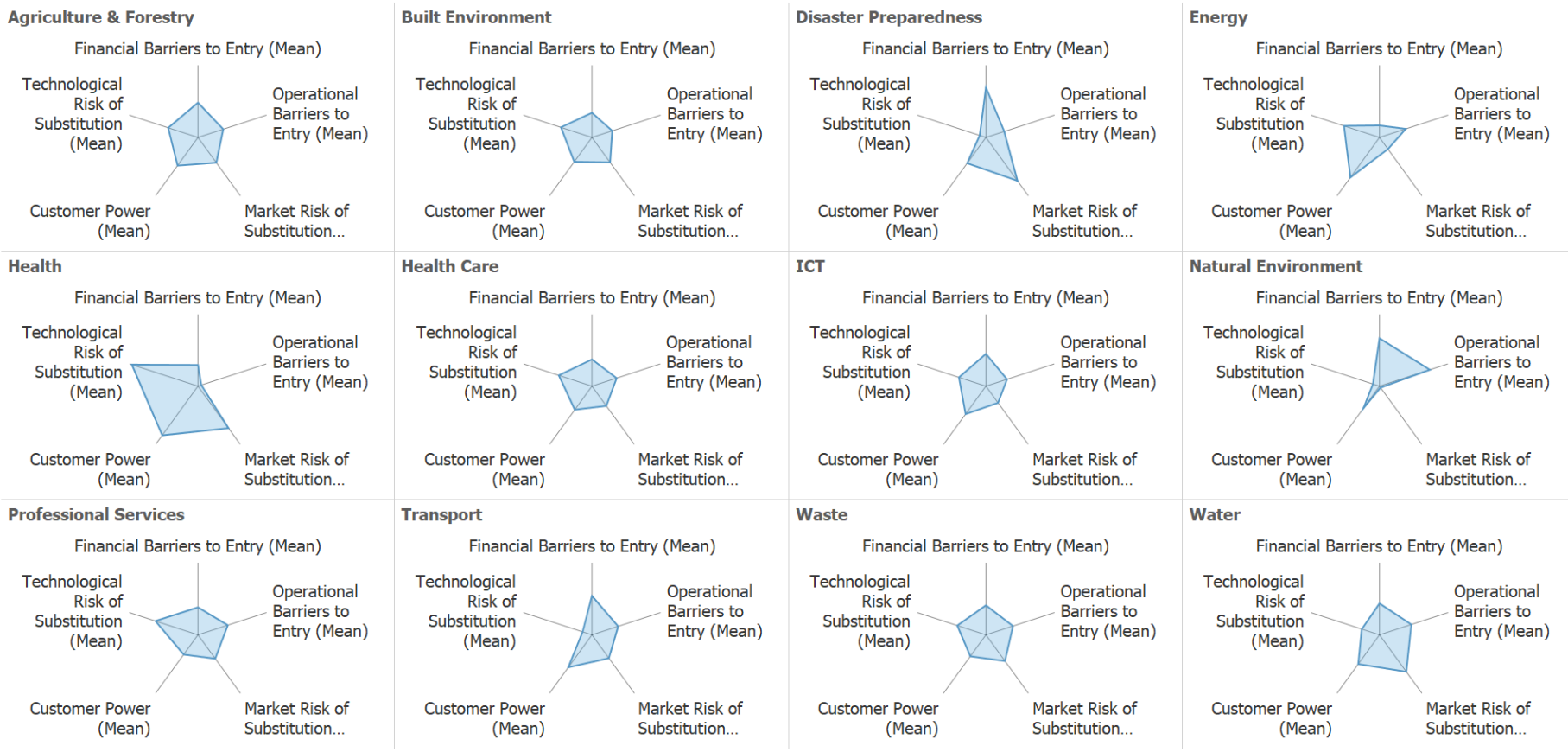


Figure 21 shows the Import and Export and Available Exports (£m) for the A&RCC market for Scotland. Imports and Exports are balanced within Sub-Sectors and follow a similar pattern in size to the Total Sales (£m) illustrated in figure 6. Available Exports measure the proportion of the Export market which is available for penetration at usual cost of sales and ranges between 54-59% of the Export market. ICT is one of the largest Export markets and one of the highest available markets at 59%.

Figure 21: 2016/17 A&RCC Imports and Exports (£m) and Exports and Available Exports (£m), by Sub-Sector for Scotland

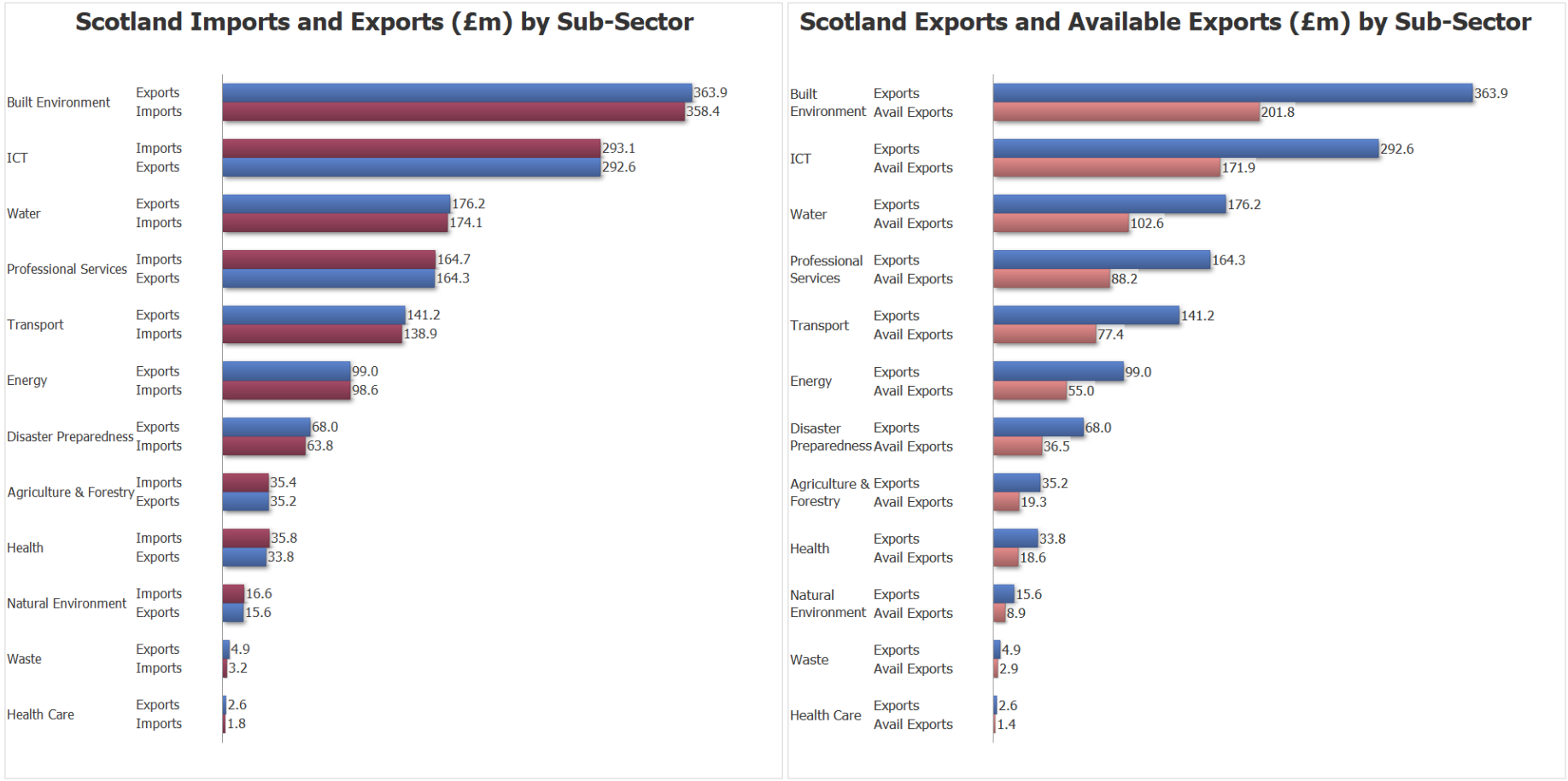


Figure 22 shows the Import and Export and Available Exports (£m) for the A&RCC market for Glasgow City Region. Imports and Exports are balanced within Sub-Sectors and follow a similar pattern in size to the Total Sales (£m) illustrated in figure 7. Available Exports measure the proportion of the Export market which is available for penetration at usual cost of sales and ranges between 54-59% of the Export market. ICT is one of the largest Export markets and one of the highest available markets at 59%. As for Scotland, Water also has one of the strongest Available markets, at 58%.

Figure 22: 2016/17 A&RCC Imports and Exports (£m) and Exports and Available Exports (£m), by Sub-Sector for the Glasgow City Region

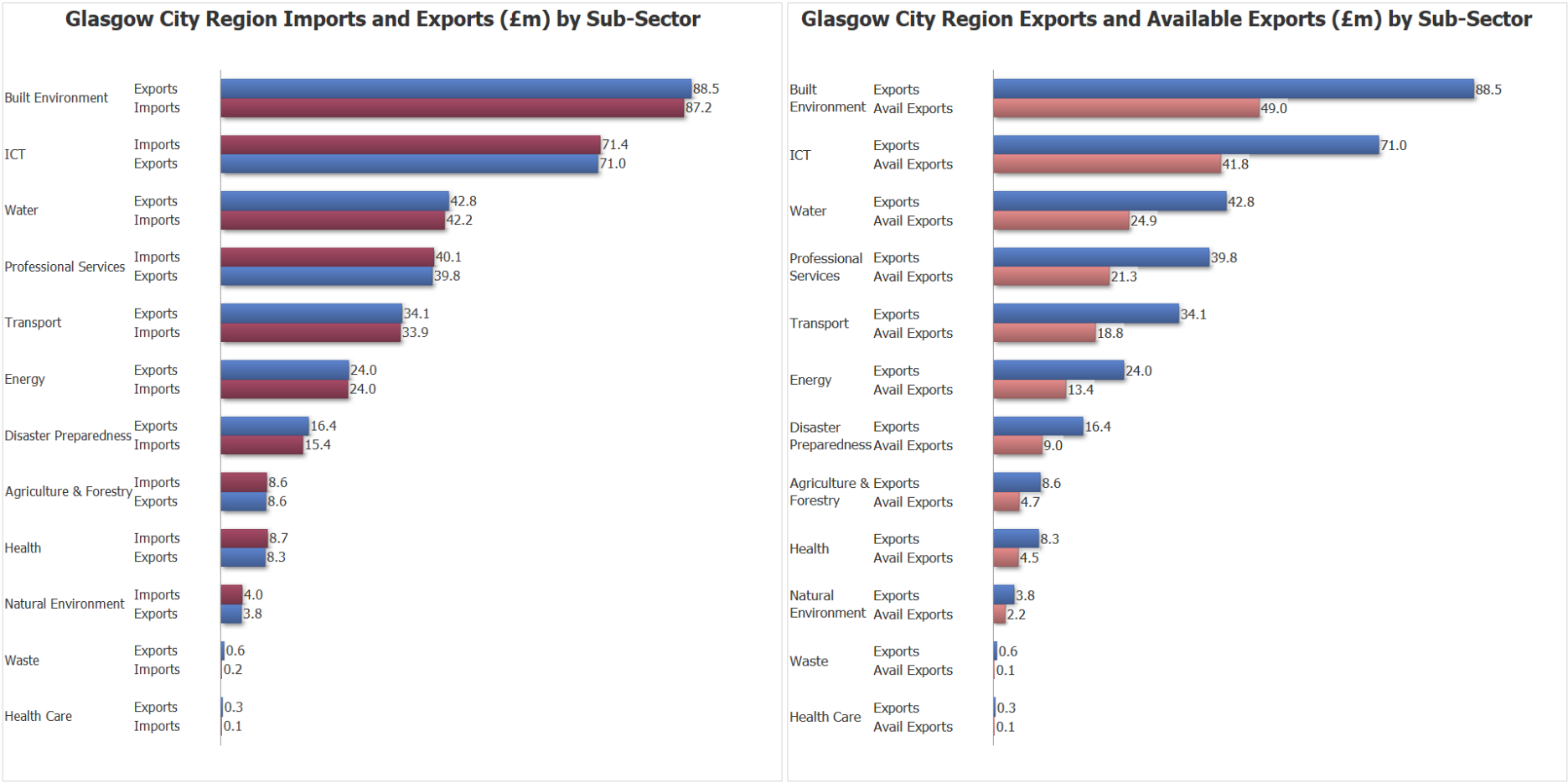


Figure 23 illustrates the Average ROS (%) and Spend on R&D as a percentage of Total Sales, by Sub-Sector for the 2016/17 A&RCC market for Scotland. The largest markets by Sales are not necessarily seeing the highest ROS, with Health being relatively small in terms of Sales, but with the strongest Average ROS in the A&RCC market in Scotland. Agriculture and Forestry sees the lowest, with the rest of the Sub-sectors within 1% of each other. Spend on R&D as a Percentage of Sales is also tightly grouped, with all Sub-Sectors being within 0.6% of each other.

Figure 23: 2016/17 A&RCC Average ROS (%) and Spend on R&D as a Percentage of Total Sales, by Sub-Sector for Scotland

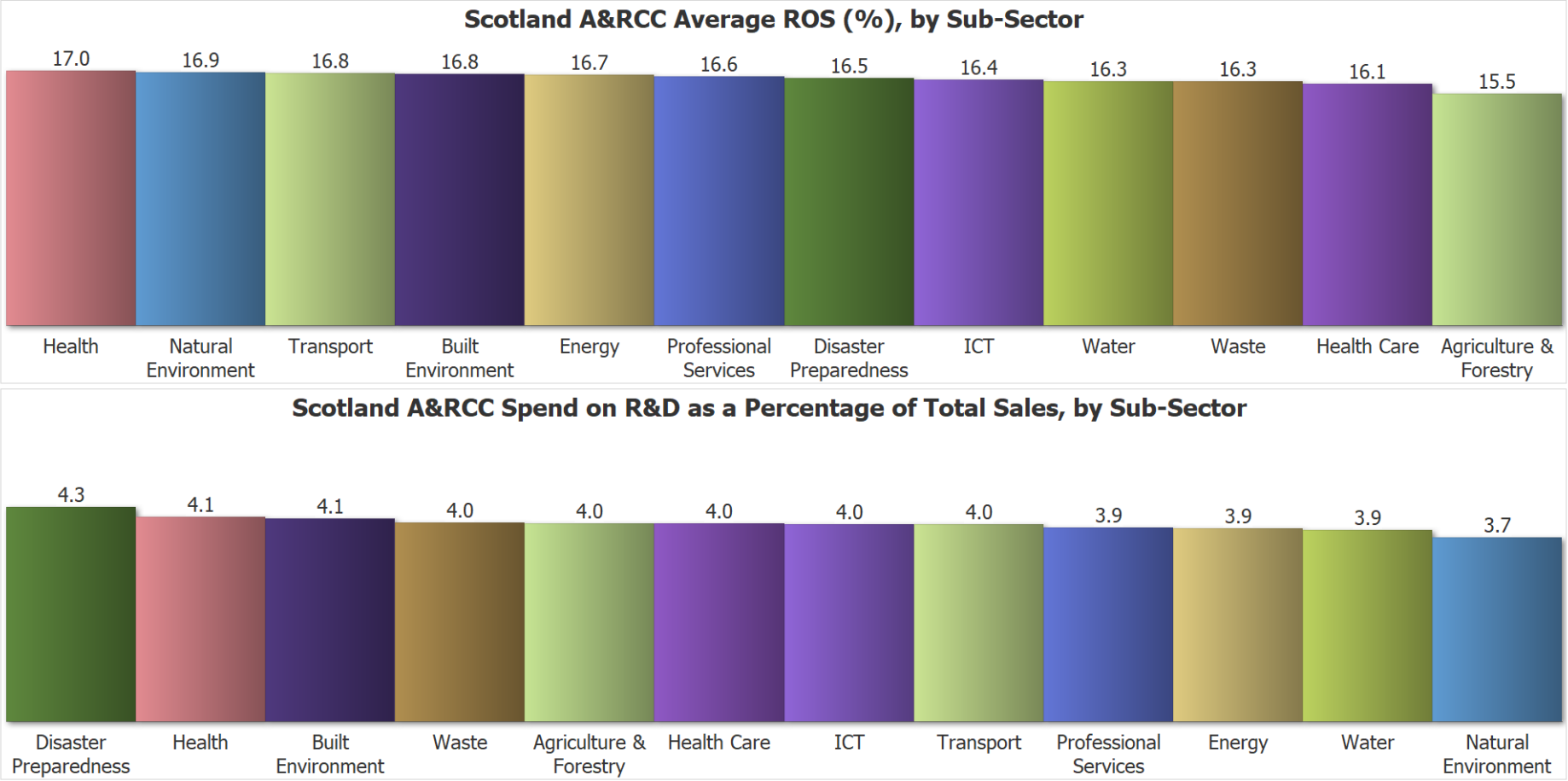
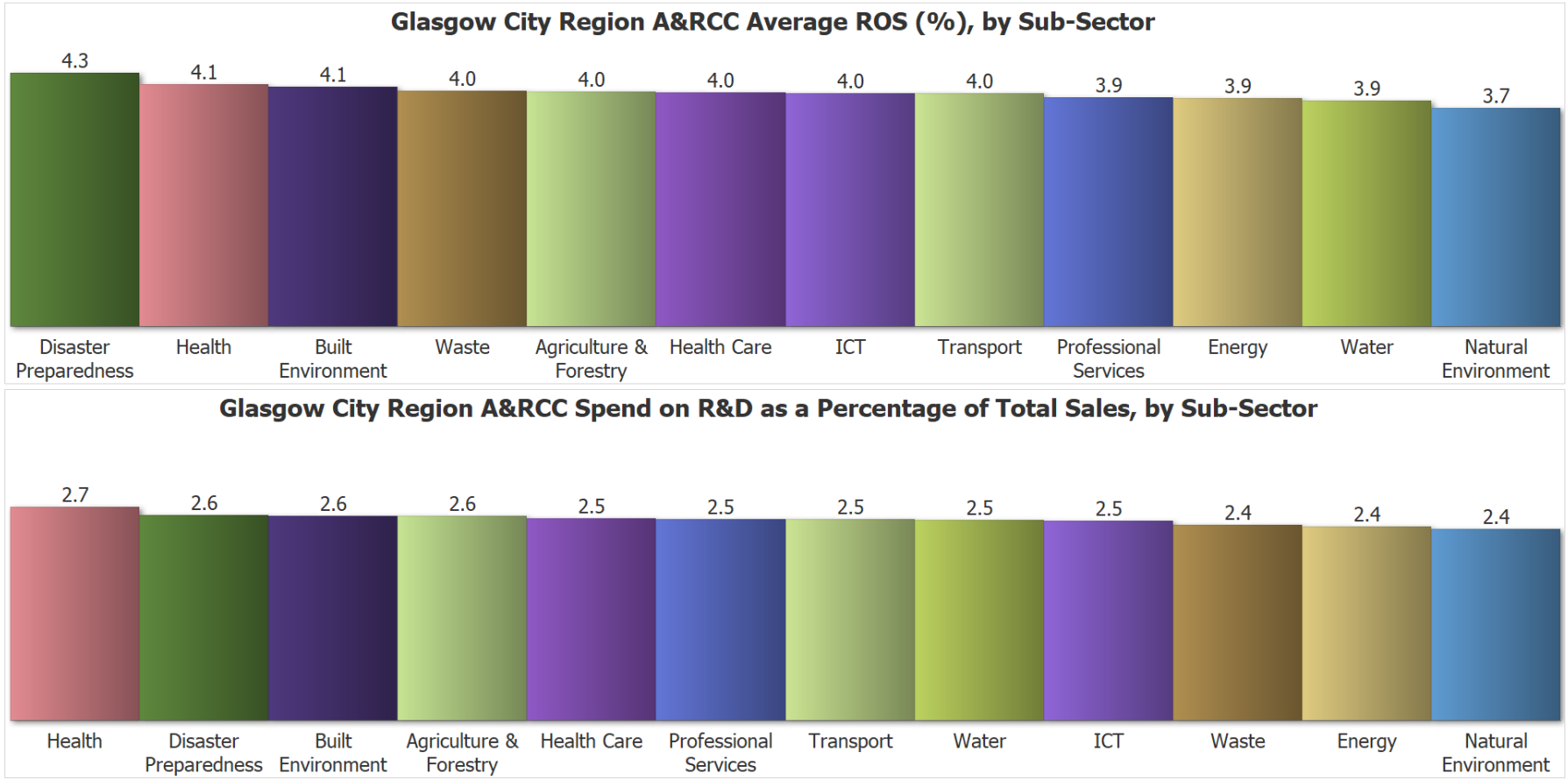


Figure 24 illustrates the Average ROS (%) and Spend on R&D as a percentage of Total Sales, by Sub-Sector for the 2016/17 A&RCC market for Glasgow City Region. As for the Scotland market, the largest markets by Sales are not necessarily seeing the highest ROS, with Disaster Preparedness being relatively small in terms of Sales, but with the strongest Average ROS in the A&RCC market in Scotland. Agriculture and Forestry sees the lowest in Scotland, but Glasgow City Region sees a higher value for that Sub-Sector, with Natural Environment having the lowest value here. All Sub-sectors are within 1% of each other. Spend on R&D as a Percentage of Sales is also tightly grouped, with all Sub-Sectors being within 0.3% of each other. All figures for Glasgow City Region are lower than those for Scotland.

Figure 24: 2016/17 A&RCC Average ROS (%) and Spend on R&D as a Percentage of Total Sales, by Sub-Sector for the Glasgow City Region



Section 5: Conclusions

A number of conclusions have been drawn from the research for wider dissemination and discussion with key stakeholders, with a view to developing actions to inform Glasgow City Region's Climate Change Adaptation Strategy and Action Plan. Given the emerging evidence on the Adaptation Economy, the findings should be treated as tentative and in need of on-going development and refinement to inform economic development policy.

5.1 Size and shape of the adaptation market

Overall, Glasgow City Region comprises 24% of both Scotland's A&R and A&RCC services. The total sales for A&RCC in Scotland were £604m in 2016/17, with Glasgow City Region contributing £146m.

Whilst this is lower as a proportion than Glasgow City Region's contribution to Scottish GVA (currenty around 33%), this is closing marginally, with sector growth rates 0.3% higher per annum than Scotland overall.

Within the City Region itself, the A&RCC market is consistently between 13-14% the size of the broader A&R market. The largest Local Authorities for both markets are North Lanarkshire and Glasgow, which combined, account for 50% of both markets.

In terms of employment, the City Region is home to 78 companies, employing around 8,390 people. The largest number of companies and employees are in North Lanarkshire and Glasgow, with North Lanarkshire containing 21 companies employing 2,308 people and Glasgow with 17 companies employing 1,832.

5.2 Strengths and Growth Potential

The largest numbers of sales by volume for Glasgow City Region's A&RCC sector relate to five key sub-sectors: Built Environment (£263.6m), ICT (£213m), Water (£125.2), Professional Services (£119.5m) and Transport (£101m).

Glasgow City Region has a concentration of skills sets for the A&R and A&RCC sector. This is primarily driven by the localised concentration of large corporates in the sector operating within the sector overall. This makes Glasgow City Region a strong player in the sector due to a wide variety of different activities in the supply chain, all performing fairly similarly in terms of new products per annum and new products as a percentage of sales.

Although the service spread in Glasgow City Region is representative of Scotland overall, the services provided are highly localised. Data indicates the value added chains of supply for the sector are generally localised and not dependant upon national chains of supply.

South Lanarkshire and Renfrewshire lead in innovative services overall, providing both the highest amount of new products as a percentage of sales, and the number of new products per annum. However, East Dunbartonshire has a higher number of new products per annum.

In terms of projected growth, A&R Growth in Glasgow City Region is expected to grow significantly, reaching 18.9% by 2020/2021. This is underpinned with the growth of the available market to £98m, and to new products to £46m for 2020/21. The projected growth in A&R is in line with the broader trend for Scotland, though growth rates for the City Region are projected to be slightly higher than the country overall.

Exports present an opportunity for the city region's key sub sectors with available exports in Built Environment, ICT, Water, Professional Services and Transport sectors totalling over £150m a year. Whilst this is small in comparison to Scotland's total exports, (£75.6Bn in 2016) it remains a positive opportunity for development.

5.3 Key barriers

Some sub-sectors, such as Agriculture & Forestry, Health Care, Waste and Built Environment have relatively even barriers to entry. Other such as Health, Transport, Disaster Preparedness and Natural Environment have higher barriers to entry in some areas than others. However, in general the financial barriers to market for smaller companies in the City Region is relatively high. This suggests there could be possible benefits in providing assistance for smaller companies to access this market. Major competition is not yet a barrier to developing new specialisms in the sector as the sector is still in it's early stages of development.

However market awareness is limited amongst smaller companies and this may be a contributor to the apparently high financial barriers. Instead, the data indicates that sector awareness generally is limited to academia and Government. As such, sector research has so far been limited, with spend on research and development within the city region between 2.4% and 2.7%, though this is typical of a new developing sector. Therefore, for an efficient use of resources, an awareness programme would be a positive step prior to providing financial assistance at company level.

Finally kMatrix's similar work for other UK cities shows that the city region has a similar profiles and similar levels of imports and exports. This suggests that market structures are not well defined and that regional/urban "clusters" of A&/A&RCC activities are not yet formalised or operating in an consistent fashion that can be observed through the data.

Section 6: Further research needs

Measuring and demonstrating the economic activities that benefit from adaptation to climate change will hopefully contribute to the growth of the Adaptation Economy, as organisations seek to protect and enhance their production systems, supply lines and markets and other assets by pursuing adaptation related opportunities.

6.1 Size of the Adaptation Economy

The Adaptation Economy, including both A&R and A&RCC activities is a small part of the global economy, although its political and environmental importance is likely to rise. At a possible 2.5% of GDP, A&R is a diffused market as its activities include a wide range of "make and mend" activities including under pinning, bracing for subsidence, erosion control, coastal defence, road and bridge maintenance and general disaster management for reasons that include, but are not limited to Climate Change. At approximately 14% of the A&R total, A&RCC only accounts for less than half of one percent of GDP at the national level and almost half again for any major city.

As the IPCC's 5th assessment report highlights, the economic impact of climate change will be small relative to the impacts of other drivers like changes in population, age, income, technology, relative prices, lifestyle, regulation, governance and many other aspects of socio-economic development[12].

This means that it will be challenging to unite the business community within major cities around a relatively small niche market in the economy that is still very difficult to define and measure.This research process has demonstrated how hard it has been to find sources of business data, transactional evidence and market analysis, or even a "business language" that suggests A&R/A&RCC activities are routinely recorded and monitored as part of most company's "business as usual." We suspect that most companies would not recognise that they are operating partially or wholly within the Adaptation Economy. This current lack of an obvious economic identity will have to be overcome if efforts to rally joint private and public interest in A&RCC are to be successful.

6.2 Challenges of defining the Adaptation Economy

The Adaptation Economy is difficult to define and measure. It is likely to change its character rapidly as new activities are identified for inclusion. But this very "fuzziness" and lack of defined identity does offer an early opportunity to build a market position and competitive advantage in business areas where specialism and market dominance have yet to develop. In this respect the Adaptation Economy represents a small "economic cluster" that is currently characterised by growth that is primarily policy-driven rather than technology-driven. Another way of describing this would be to say that most A&RCC focus is still at the defining the problem stage rather than at the problem solving stage. This conclusion is supported by the whole of the IPCC report findings and, in particular, in its findings that the combination of local public sector and private sector interest are necessary to drive the Adaptation agenda.

The evidence gathered for this report (as well as through the similar profiles for the Adaptation Economy across different cities and the similar levels of imports and exports), that market structures are not well defined and that regional/urban "clusters" of A&/A&RCC activities are not yet formalised or operating in an consistent fashion that can be observed through the data. Therefore, major competition is not yet a barrier to developing new specialisms and a degree of critical mass in the Adaptation Economy i.e.creating the differentiation that does not yet appear to exist at the national or city level.

[12] IPCC WGII AR5 Chapter 10 p.3

6.3 Evolution of the Adaptation Economy

Much of the existing Adaptation Economy activity appears to have evolved around historical business concentrations and specialisms (e.g. Water in Rotterdam, Finance in London). This is natural, given the multi-sector basis for the Adaptation Economy. Therefore, some specialist activities will (or have) evolved naturally and will continue to do so. In this respect developments in the Adaptation Economy will to some degree be self-generating and self-selecting. This has implications for developing the Adaptation Economy for major cities as it is clear from the evidence and analysis in earlier sections of this report that the natural business concentrations of major cities are not currently representative of the demands for A&R and A&RCC.

However, the increasing focus of attention on major cities as increasing population centres, evidenced by the attention given to "Future Cities", "Networked Cities", "Smart Cities" and "Sustainable Cities" is increasing the awareness of city vulnerabilities to Climate Change and other threats and may contribute momentum to the city-based development of new Adaptation Economy activities. In this respect, activities within the Adaptation Economy need to be considered within the wider context of city-based initiatives, where many urban opportunities for achieving co-benefits have been identified by the IPCC literature (health, IT, emergency services etc) and where many more co-benefits may be waiting to be discovered.

6.4 Evidence Base for the Adaptation Economy

The policy attention given to A&R and A&RCC is comparatively new and it is probably true to say that most of the discussion around A&RCC have not yet translated into traceable economic activity. This conclusion is supported by the findings of the IPCC's 5th assessment, which concludes that while evidence of planning activities is easy to find, practical applications and outcomes of adaptation activities are much rarer. The economic baselines outlined in this report are likely to understate the importance of these activities, given the inevitable lag between intent to act/spend and the outcome.

This rate of growth is in line with, or ahead of, other high profile economic activities like the Low Carbon Economy, Green Economy, Agricultural Technologies or Environmental Technologies (all of which have been measured using this research methodology[13]). This suggests that most governments (UK included) have been successful in maintaining a focus on environmental and climate change policies and supporting a healthy economic environment for these activities even during periods of cut backs and recession.

6.5 Informing the Adaptation Economy

A common theme throughout this report and the IPCC literature as a whole is the lack of research and actionable data/evidence and metrics that relates to the contribution and measurement of the Adaptation Economy. The IPCC points to the increasing demand for metrics to measure adaptation needs and effectiveness as more resources are directed to adaptation activities.

The IPCC identifies the need for increased knowledge and learning on the policy/planning side of the equation to ensure that adaptation needs and activities are better understood, legislated for and funded/incentivised.

[13] Department of Business, Innovation and Skills, Low Carbon and Environmental Goods and Services: 2011 to 2012, July 2013

This research, even within its limited scope has opened up several areas for future research that would affect both the planning and implementation of adaptation activities:

- Will the Adaptation Economy develop in a different way for developing versus mature cities?
- Will the boundary between A&R and A&RCC become more defined over time and will the proportion of activity defined as A&RCC increase in response to national and regional policies?
- Will the "GDP" gap between city and national Adaptation Economy profiles change?
- How will the development of different national risk profiles affect the development of the national Adaptation Economy?

Therefore, to build an effective and thriving Adaptation Economy will require much better research and evidence than currently exists.

Annex A - Adaptation Economy Product and Service Categories

Product and service categories collected from kMatrix market data sources and collated for the Adaptation Economy. Adaptation activities are shown for four of the available six levels of data, with Level 1 referring to the Adaptation Economy as a whole and Level 2 referring to the 12 sub sectors.

Level 2	Level 3	Level 4
Agriculture & Forestry	Agriculture	Adaptation and Management of Farm Equipment
Agriculture & Forestry	Agriculture	Adapting and Management of Farm Equipment
Agriculture & Forestry	Agriculture	Crop and Soil Management
Agriculture & Forestry	Agriculture	Cultivation of New Crops Enabled by Climate Change
Agriculture & Forestry	Agriculture	Development of Drought-Resistant Seeds
Agriculture & Forestry	Agriculture	Education
Agriculture & Forestry	Agriculture	Improvements in Agricultural Management
Agriculture & Forestry	Agriculture	Pest Suppression Systems and Practices
Agriculture & Forestry	Agriculture	Training
Agriculture & Forestry	Forestry	Forestry Services
Agriculture & Forestry	Forestry	Improved New Species
Agriculture & Forestry	Forestry	Improvements in Forest Management
Built Environment	Architectural	Architectural Design Services
Built Environment	Architectural	Architectural Engineering
Built Environment	Architectural	Architectural Project Management Services
Built Environment	Construction & Retrofit	Adaptive Civil Engineering Services
Built Environment	Construction & Retrofit	Agricultural
Built Environment	Construction & Retrofit	Agricultural
Built Environment	Construction & Retrofit	Domestic
Built Environment	Construction & Retrofit	Domestic Urban Enviro Redesign & Re Engineering
Built Environment	Construction & Retrofit	Industrial
Built Environment	Construction & Retrofit	Manufacture of Retrofit Engineering Equipment
Built Environment	Construction & Retrofit	Manufacture of Retrofit Materials
Built Environment	Construction & Retrofit	Manufacturers of Temporary Accommodation For Renovation Projects
Built Environment	Construction & Retrofit	Public
Built Environment	Construction & Retrofit	Public Urban Enviro Redesign & Re Engineering
Built Environment	Construction & Retrofit	Retrofit Buildings Services
Built Environment	Construction & Retrofit	Suppliers of Temporary Accommodation For Renovation Projects
Built Environment	Construction & Retrofit	Supply of Retrofit Engineering Equipment
Built Environment	Construction & Retrofit	Supply of Retrofit Materials
Built Environment	Energy Efficiency	Energy Efficient Adaptation of Buildings
Built Environment	Energy Efficiency	Energy Efficient Cooling of buildings
Built Environment	Energy Efficiency	Green Roofing and Equivalent
Built Environment	Energy Efficiency	Reflective Roofing and Equivalent
Built Environment	Technical Services	Assessing Green Spaces
Built Environment	Technical Services	Upgrading of Qualifications/ Training
Built Environment	Water Efficiency	Water Supply & Use
Disaster Preparedness	Coastal	Coastal Defences
Disaster Preparedness	Coastal	Coastal Protection
Disaster Preparedness	Critical Buildings and Installations	Installation of Evacuation Alarms Noxious Gasses
Disaster Preparedness	Critical Buildings and Installations	Installation of Sustained Heat Increase Early Warning Systems
Disaster Preparedness	Critical Buildings and Installations	Installation of Water Level Early Warning Systems
Disaster Preparedness	Critical Buildings and Installations	Maintenance of Evacuation Alarms Noxious Gasses
Disaster Preparedness	Critical Buildings and Installations	Maintenance of Sustained Heat Increase Early Warning Systems
Disaster Preparedness	Critical Buildings and Installations	Maintenance of Water Level Early Warning Systems
Disaster Preparedness	Critical Buildings and Installations	Manufacture of Evacuation Alarms Noxious Gasses
Disaster Preparedness	Critical Buildings and Installations	Manufacture of Sustained Heat Increase Early Warning Systems
Disaster Preparedness	Critical Buildings and Installations	Manufacture of Water Level Early Warning Systems
Disaster Preparedness	Critical Buildings and Installations	Supply of Evacuation Alarms Noxious Gasses
Disaster Preparedness	Critical Buildings and Installations	Supply of Sustained Heat Increase Early Warning Systems
Disaster Preparedness	Critical Buildings and Installations	Supply of Water Level Early Warning Systems

Level 2	Level 3	Level 4
Disaster Preparedness	Emergency Response	Relocation of Exposed Settlements
Disaster Preparedness	Flood Barrier and Water Ingress Equipment	Manufacture of Sand Bags
Disaster Preparedness	Flood Barrier and Water Ingress Equipment	Supply of Sand Bags
Disaster Preparedness	Services	Advanced Risk Modelling
Energy	Energy Infrastructure	Flood Protection for Power Stations etc
Energy	Energy Infrastructure	Flood Protection for Power Stations etc
Energy	Energy Infrastructure	Hydropower Reservoir Stations: increase in dam height
Energy	Energy Infrastructure	Increase Robustness of Transmission Grids
Energy	Energy Infrastructure	Underground Cable Installation
Energy	Energy Systems	Embedding Climate Change Risk in Energy Infrastructure Planning
Energy	Energy Systems	Energy Efficient Ventilation Systems
Energy	Energy Systems	Investment in Generators with Minimal Cooling Water Requirements
Energy	Energy Systems	Manufacture and Supply of Small Scale Energy Systems
Energy	Energy Systems	New Distribution Systems
Energy	Energy Systems	New Transmission Systems
Energy	Energy Systems	Solar Cooling (PV powered) to cope with Demand Peaks
Health	Disease Monitoring	Research & Planning for Disease Monitoring
Health	Energy Efficient Cooling of Hospitals	Installers of Energy Efficient Cooling of Hospitals
Health	Energy Efficient Cooling of Hospitals	Maintenance of Energy Efficient Cooling of Hospitals
Health	Energy Efficient Cooling of Hospitals	Manufacturers of Energy Efficient Cooling of Hospitals
Health	Energy Efficient Cooling of Hospitals	Suppliers of Energy Efficient Cooling of Hospitals
Health	Financial Instruments	Specialist Financial Instruments for the Health Sector
Health	Green and Blue Spaces	R & D Green & Blue Spaces and their Implementation
Health	Green and Blue Spaces	Specialist Developers of Green & Blue Spaces
Health Care	Alternative Therapies	Alternative medicine manufacturers
Health Care	Alternative Therapies	Products
Health Care	Alternative Therapies	Retreats and vacations
Health Care	Medical Services	Health education services
Health Care	Medical Services	Social workers
Health Care	Medical Services	Counselling services
Health Care	Medical Services	Ambulance Services
Health Care	Medical Services	Nursing Temp Agencies
Health Care	Medical Services	Laboratory Services
Health Care	NHS	Community Health Services
Health Care	NHS	Hospitals
Health Care	NHS	NHS Dentists
Health Care	NHS	NHS Ophthalmic Services
Health Care	NHS	NHS Psychiatric Care
Health Care	NHS	Primary care services (family health services)
Health Care	Private healthcare	Acute hospital care
Health Care	Private healthcare	Care Homes
Health Care	Private healthcare	Dental Services
Health Care	Private healthcare	Long term care
Health Care	Private healthcare	Medical Services
Health Care	Private healthcare	Ophthalmic Services
Health Care	Private healthcare	Psychiatric care
Health Care	Supply of Dental and Ophthalmic Equipment	Contact lens manufacturers
Health Care	Supply of Dental and Ophthalmic Equipment	Dental equipment manufacturers
Health Care	Supply of Dental and Ophthalmic Equipment	Ophthalmic Equipment
Health Care	Supply of Disabled equipment	Access equipment
Health Care	Supply of Disabled equipment	Bathroom equipment
Health Care	Supply of Disabled equipment	Children's equipment
Health Care	Supply of Disabled equipment	Furniture
Health Care	Supply of Disabled equipment	Hoists General purpose
Health Care	Supply of Disabled equipment	Lifts, stair and vertical
Health Care	Supply of Disabled equipment	Miscellaneous
Health Care	Supply of Disabled equipment	Scooters
Health Care	Supply of Disabled equipment	Vehicles
Health Care	Supply of Disabled equipment	Wheelchairs

Level 2	Level 3	Level 4
Health Care	Supply of Dressings, Sterilisation & Garments	Garments
Health Care	Supply of Dressings, Sterilisation & Garments	Laundry Equipment
Health Care	Supply of Dressings, Sterilisation & Garments	Sterilisation equipment
Health Care	Supply of Dressings, Sterilisation & Garments	Sterilised suture manufacturers
Health Care	Supply of General Medical equipment and consumables	Anaesthetic and respiratory equipment manufacturers
Health Care	Supply of General Medical equipment and consumables	Anaesthetic and respiratory equipment manufacturers
Health Care	Supply of General Medical equipment and consumables	Blood transfusion equipment and consumables
Health Care	Supply of General Medical equipment and consumables	Blood transfusion equipment and consumables
Health Care	Supply of General Medical equipment and consumables	Chiropody equipment
Health Care	Supply of General Medical equipment and consumables	Chiropody equipment
Health Care	Supply of General Medical equipment and consumables	Fibulators
Health Care	Supply of General Medical equipment and consumables	Fibulators
Health Care	Supply of General Medical equipment and consumables	Hospital beds
Health Care	Supply of General Medical equipment and consumables	Hospital beds
Health Care	Supply of General Medical equipment and consumables	Laryngectomy & Tracheostomy Equipment
Health Care	Supply of General Medical equipment and consumables	Laryngectomy & Tracheostomy Equipment
Health Care	Supply of General Medical equipment and consumables	Measured dosing equipment
Health Care	Supply of General Medical equipment and consumables	Measured dosing equipment
Health Care	Supply of General Medical equipment and consumables	Mobile equipment
Health Care	Supply of General Medical equipment and consumables	Mobile equipment
Health Care	Supply of General Medical equipment and consumables	Needles/syringes
Health Care	Supply of General Medical equipment and consumables	Needles/syringes
Health Care	Supply of General Medical equipment and consumables	Ostomy equipment
Health Care	Supply of General Medical equipment and consumables	Ostomy equipment
Health Care	Supply of General Medical equipment and consumables	Other Life support equipment
Health Care	Supply of General Medical equipment and consumables	Other Life support equipment
Health Care	Supply of General Medical equipment and consumables	Paediatric equipment
Health Care	Supply of General Medical equipment and consumables	Paediatric equipment
Health Care	Supply of General Medical equipment and consumables	Postnatal equipment
Health Care	Supply of General Medical equipment and consumables	Postnatal equipment
Health Care	Supply of General Medical equipment and consumables	Surgical equipment
Health Care	Supply of General Medical equipment and consumables	Surgical equipment
Health Care	Supply of General Medical equipment and consumables	Urological Equipment
Health Care	Supply of General Medical equipment and consumables	Urological Equipment

Level 2	Level 3	Level 4
Health Care	Supply of Laboratory and Test Equipment	Blood pressure testers
Health Care	Supply of Laboratory and Test Equipment	Diabetic test equipment
Health Care	Supply of Laboratory and Test Equipment	In-vitro diagnostics equipment manufacturers
Health Care	Supply of Laboratory and Test Equipment	Laboratory equipment
Health Care	Supply of Medical ICT Equipment	Informatics
Health Care	Supply of Medical ICT Equipment	Medical computing services and software
Health Care	Supply of Medical ICT Equipment	Monitoring systems
Health Care	Supply of Medical ICT Equipment	Telemedicine
Health Care	Supply of Orthopaedic Surgery & Equipment	Implants
Health Care	Supply of Orthopaedic Surgery & Equipment	Mobility equipment
Health Care	Supply of Orthopaedic Surgery & Equipment	Orthopaedic equipment manufacturers
Health Care	Supply of Orthopaedic Surgery & Equipment	Physiotherapy equipment
Health Care	Supply of Orthopaedic Surgery & Equipment	Prosthetics
Health Care	Supply Of OTC General sales lists medicines	Analgesics (pain relievers)
Health Care	Supply Of OTC General sales lists medicines	Cough/cold/sore throat treatments
Health Care	Supply Of OTC General sales lists medicines	Gastro-intestinal products
Health Care	Supply Of OTC General sales lists medicines	Others Products
Health Care	Supply Of OTC General sales lists medicines	Skincare treatments
Health Care	Supply Of OTC Other Treatments and Items	Family Planning Products
Health Care	Supply Of OTC Other Treatments and Items	Other healthcare products
Health Care	Supply Of OTC Other Treatments and Items	Personal care products
Health Care	Supply Of OTC Pharmacy-only medicines	Analgesics (pain relievers)
Health Care	Supply Of OTC Pharmacy-only medicines	Cough/cold/sore throat treatments
Health Care	Supply Of OTC Pharmacy-only medicines	Gastro-intestinal products
Health Care	Supply Of OTC Pharmacy-only medicines	Others Products
Health Care	Supply Of OTC Pharmacy-only medicines	Skincare treatments
Health Care	Supply Of OTC Prescribed Pharmaceuticals Alimentary tract and metabolism	Anabolics, systemic
Health Care	Supply Of OTC Prescribed Pharmaceuticals Alimentary tract and metabolism	Antacids, antiflatulentsand anti-ulcerants
Health Care	Supply Of OTC Prescribed Pharmaceuticals Alimentary tract and metabolism	Antidiarrhoeals, oral electrolyte replacers and intestinal anti-inflammatory
Health Care	Supply Of OTC Prescribed Pharmaceuticals Alimentary tract and metabolism	Antiemetics and antinauseants
Health Care	Supply Of OTC Prescribed Pharmaceuticals Alimentary tract and metabolism	Antiobesity preparations excluding dietetics
Health Care	Supply Of OTC Prescribed Pharmaceuticals Alimentary tract and metabolism	Appetite stimulants
Health Care	Supply Of OTC Prescribed Pharmaceuticals Alimentary tract and metabolism	Cholagogues and hepatic protectors
Health Care	Supply Of OTC Prescribed Pharmaceuticals Alimentary tract and metabolism	Digestives including digestive enzymes
Health Care	Supply Of OTC Prescribed Pharmaceuticals Alimentary tract and metabolism	Drugs used in diabetes

Level 2	Level 3	Level 4
Health Care	Supply Of OTC Prescribed Pharmaceuticals Alimentary tract and metabolism	Functional gastro-intestinal disorder drugs
Health Care	Supply Of OTC Prescribed Pharmaceuticals Alimentary tract and metabolism	Laxatives
Health Care	Supply Of OTC Prescribed Pharmaceuticals Alimentary tract and metabolism	Mineral supplements
Health Care	Supply Of OTC Prescribed Pharmaceuticals Alimentary tract and metabolism	Other alimentary tract and metabolism products
Health Care	Supply Of OTC Prescribed Pharmaceuticals Alimentary tract and metabolism	Stomatologicals, mouth preparations, medicinal dentifrices etc
Health Care	Supply Of OTC Prescribed Pharmaceuticals Alimentary tract and metabolism	Tonics
Health Care	Supply Of OTC Prescribed Pharmaceuticals Alimentary tract and metabolism	Vitamins
Health Care	Supply Of OTC Prescribed Pharmaceuticals Antineoplastic and immunomodulating agents	Antineoplastics
Health Care	Supply Of OTC Prescribed Pharmaceuticals Antineoplastic and immunomodulating agents	Cystostatic hormone therapy
Health Care	Supply Of OTC Prescribed Pharmaceuticals Antineoplastic and immunomodulating agents	Immunostimulating agents
Health Care	Supply Of OTC Prescribed Pharmaceuticals Blood and Supply Of OTC Prescribed Pharmaceuticals Blood forming organs	Antithrombotic agents
Health Care	Supply Of OTC Prescribed Pharmaceuticals Blood and Supply Of OTC Prescribed Pharmaceuticals Blood forming organs	Antifibrinolytics, antidotes to anti-coagulants, inhibitors, blood coagulation and haemostyptics
Health Care	Supply Of OTC Prescribed Pharmaceuticals Blood and Supply Of OTC Prescribed Pharmaceuticals Blood forming organs	Anti-anaemic preparations
Health Care	Supply Of OTC Prescribed Pharmaceuticals Blood and Supply Of OTC Prescribed Pharmaceuticals Blood forming organs	All other haematology agents
Health Care	Supply Of OTC Prescribed Pharmaceuticals Cardiovascular system	Agents acting on the renin-angiotensin system
Health Care	Supply Of OTC Prescribed Pharmaceuticals Cardiovascular system	Antihypertensives
Health Care	Supply Of OTC Prescribed Pharmaceuticals Cardiovascular system	Antivaricosis/antihaemorrhoidal preparations
Health Care	Supply Of OTC Prescribed Pharmaceuticals Cardiovascular system	Beta-blocking agents
Health Care	Supply Of OTC Prescribed Pharmaceuticals Cardiovascular system	Calcium antagonists
Health Care	Supply Of OTC Prescribed Pharmaceuticals Cardiovascular system	Cardiac therapy
Health Care	Supply Of OTC Prescribed Pharmaceuticals Cardiovascular system	Cerebral and peripheral vasotherapeutics
Health Care	Supply Of OTC Prescribed Pharmaceuticals Cardiovascular system	Diuretics
Health Care	Supply Of OTC Prescribed Pharmaceuticals Cardiovascular system	Hypolipidaemmics/anti-atheroma preparations
Health Care	Supply Of OTC Prescribed Pharmaceuticals Cardiovascular system	Other cardiovascular products
Health Care	Supply Of OTC Prescribed Pharmaceuticals Central nervous system	Anaesthetics

Level 2	Level 3	Level 4
Health Care	Supply Of OTC Prescribed Pharmaceuticals Central nervous system	Analgesics
Health Care	Supply Of OTC Prescribed Pharmaceuticals Central nervous system	Anti-epileptics
Health Care	Supply Of OTC Prescribed Pharmaceuticals Central nervous system	Anti-Parkinson drugs
Health Care	Supply Of OTC Prescribed Pharmaceuticals Central nervous system	Psycholeptics
Health Care	Supply Of OTC Prescribed Pharmaceuticals Central nervous system	Psychoanaleptics excluding anti-obesity preparations
Health Care	Supply Of OTC Prescribed Pharmaceuticals Central nervous system	Other CNS drugs
Health Care	Supply Of OTC Prescribed Pharmaceuticals Dermatological	Anti-acne preparations
Health Care	Supply Of OTC Prescribed Pharmaceuticals Dermatological	Antifungals, dermatological
Health Care	Supply Of OTC Prescribed Pharmaceuticals Dermatological	Anti-pruritics, including topical antihistamines, anaesthetics etc
Health Care	Supply Of OTC Prescribed Pharmaceuticals Dermatological	Antiseptics and disinfectants
Health Care	Supply Of OTC Prescribed Pharmaceuticals Dermatological	Emollients, protectives
Health Care	Supply Of OTC Prescribed Pharmaceuticals Dermatological	Nonsteroidal products for inflammatory skin disorders
Health Care	Supply Of OTC Prescribed Pharmaceuticals Dermatological	Other dermatological preparations
Health Care	Supply Of OTC Prescribed Pharmaceuticals Dermatological	Topical antibiotics, sulphonomides and antivirals
Health Care	Supply Of OTC Prescribed Pharmaceuticals Dermatological	Topical corticosteroids
Health Care	Supply Of OTC Prescribed Pharmaceuticals Dermatological	Wound healing agents
Health Care	Supply Of OTC Prescribed Pharmaceuticals Diagnostic agents	Diagnostic equipment and accessories
Health Care	Supply Of OTC Prescribed Pharmaceuticals Diagnostic agents	Diagnostic imaging
Health Care	Supply Of OTC Prescribed Pharmaceuticals Diagnostic agents	Diagnostic test
Health Care	Supply Of OTC Prescribed Pharmaceuticals General anti-infectives systemic	Antimycobacterials
Health Care	Supply Of OTC Prescribed Pharmaceuticals General anti-infectives systemic	Antivirals for systemic use
Health Care	Supply Of OTC Prescribed Pharmaceuticals General anti-infectives systemic	General anti-infectives systemic
Health Care	Supply Of OTC Prescribed Pharmaceuticals General anti-infectives systemic	Other anti-infectives
Health Care	Supply Of OTC Prescribed Pharmaceuticals General anti-infectives systemic	Sera and gamma-globulin
Health Care	Supply Of OTC Prescribed Pharmaceuticals General anti-infectives systemic	Systemic agents for fungal infections
Health Care	Supply Of OTC Prescribed Pharmaceuticals General anti-infectives systemic	Systemic sulphonamides
Health Care	Supply Of OTC Prescribed Pharmaceuticals General anti-infectives systemic	Vaccines
Health Care	Supply Of OTC Prescribed Pharmaceuticals Genito-urinary system and sex hormones	Gynaecological anti-infectives
Health Care	Supply Of OTC Prescribed Pharmaceuticals Genito-urinary system and sex hormones	Other gynaecologicals

Level 2	Level 3	Level 4
Health Care	Supply Of OTC Prescribed Pharmaceuticals Genito-urinary system and sex hormones	Sex hormones and products with similar desired effects, systemic action only
Health Care	Supply Of OTC Prescribed Pharmaceuticals Genito-urinary system and sex hormones	Urologicals
Health Care	Supply Of OTC Prescribed Pharmaceuticals Hospital solutions	Dialysis solutions
Health Care	Supply Of OTC Prescribed Pharmaceuticals Hospital solutions	Injection solutions /infusion additives (less than 100ml)
Health Care	Supply Of OTC Prescribed Pharmaceuticals Hospital solutions	Intravenous solutions
Health Care	Supply Of OTC Prescribed Pharmaceuticals Hospital solutions	Irrigating solutions
Health Care	Supply Of OTC Prescribed Pharmaceuticals Hospital solutions	Perfusion solutions
Health Care	Supply Of OTC Prescribed Pharmaceuticals Hospital solutions	Plasmaexpanders
Health Care	Supply Of OTC Prescribed Pharmaceuticals Hospital solutions	Whole blood and plasma substitute solutions
Health Care	Supply Of OTC Prescribed Pharmaceuticals Musculo-skeletal system	Anti-inflammatory enzymes
Health Care	Supply Of OTC Prescribed Pharmaceuticals Musculo-skeletal system	Anti-gout preparations
Health Care	Supply Of OTC Prescribed Pharmaceuticals Musculo-skeletal system	Anti-inflammatory and anti-rheumatic products
Health Care	Supply Of OTC Prescribed Pharmaceuticals Musculo-skeletal system	Muscle relaxants
Health Care	Supply Of OTC Prescribed Pharmaceuticals Musculo-skeletal system	Other drugs for disorders of the musculo-skeletal system
Health Care	Supply Of OTC Prescribed Pharmaceuticals Musculo-skeletal system	Topical anti-rheumatics
Health Care	Supply Of OTC Prescribed Pharmaceuticals Other Prescribed Pharmaceuticals	All other non-therapeutic products
Health Care	Supply Of OTC Prescribed Pharmaceuticals Other Prescribed Pharmaceuticals	All other therapeutic products
Health Care	Supply Of OTC Prescribed Pharmaceuticals Other Prescribed Pharmaceuticals	Allergens
Health Care	Supply Of OTC Prescribed Pharmaceuticals Other Prescribed Pharmaceuticals	Antiseptics for non human use
Health Care	Supply Of OTC Prescribed Pharmaceuticals Other Prescribed Pharmaceuticals	Dietetic agents
Health Care	Supply Of OTC Prescribed Pharmaceuticals Parasitology	Antiprotozoals and anthelmintics
Health Care	Supply Of OTC Prescribed Pharmaceuticals Parasitology	Ectoparastiticides including scabicides, insecticides and repellents
Health Care	Supply Of OTC Prescribed Pharmaceuticals Respiratory system	Anti-asthma and COPD products
Health Care	Supply Of OTC Prescribed Pharmaceuticals Respiratory system	Chest rubs and other inhalants
Health Care	Supply Of OTC Prescribed Pharmaceuticals Respiratory system	Cough and cold preparations
Health Care	Supply Of OTC Prescribed Pharmaceuticals Respiratory system	Nasal preparations
Health Care	Supply Of OTC Prescribed Pharmaceuticals Respiratory system	Other respiratory systems products
Health Care	Supply Of OTC Prescribed Pharmaceuticals Respiratory system	Systemic antihistamines
Health Care	Supply Of OTC Prescribed Pharmaceuticals Sensory organs	Ophthalmological/ontological combinations

Level 2	Level 3	Level 4
Health Care	Supply Of OTC Prescribed Pharmaceuticals Sensory organs	Ophthalmological
Health Care	Supply Of OTC Prescribed Pharmaceuticals Sensory organs	Ontological
Health Care	Supply Of OTC Prescribed Pharmaceuticals Systemic hormonal preparations (excluding sex hormones)	Pituitary and hypothalamic hormones
Health Care	Supply Of OTC Prescribed Pharmaceuticals Systemic hormonal preparations (excluding sex hormones)	Systemic corticosteroids
Health Care	Supply Of OTC Prescribed Pharmaceuticals Systemic hormonal preparations (excluding sex hormones)	Thyroid therapy
Health Care	Supply Of OTC Prescribed Pharmaceuticals Systemic hormonal preparations (excluding sex hormones)	Other hormones
Health Care	Supply of Scanners and Xray	CT Scanners
Health Care	Supply of Scanners and Xray	MRI Scanners
Health Care	Supply of Scanners and Xray	Ultra-sound scanners
Health Care	Supply of Scanners and Xray	X-ray equipment manufacturers
Health Care	Supply of Scanners and Xray	Other Scanners
Health Care	Voluntary Organisations	Palliative care
Health Care	Voluntary Organisations	Charitable organisations
ICT	Communications	Mobile Devices
ICT	Communications	SCADA
ICT	Control Systems	Ruggedized Control Systems
ICT	Data Management	Data Centres
ICT	ICT Installations	ICT Static Installations
ICT	Information Systems	Customer/ Passenger Information Systems
ICT	Networks	Cable Systems
ICT	Networks	Data
ICT	Networks	Fibre
ICT	Networks	ICT Networks
ICT	Networks	Mobile Systems
ICT	Networks	Radio Frequency
ICT	RF Comms	Antenna
ICT	RF Comms	Masts
ICT	Transaction Management	ATM Machines
ICT	Transaction Management	Ticketing & Billing
ICT	Voice Communications	Call Centres
Natural Environment	Climate Change Management	Weather Station Services
Natural Environment	Coast	Supply of Retrofit Engineering Equipment
Natural Environment	Land	Landscape Design
Natural Environment	Land	Maintenance of Green Areas
Natural Environment	Land	Planting Trees
Natural Environment	Land	Survey & Mapping for Environment and Conservation
Professional Services	Consulting	Agriculture
Professional Services	Consulting	Built Environment
Professional Services	Consulting	Built Environment
Professional Services	Consulting	Energy
Professional Services	Consulting	Forestry
Professional Services	Consulting	Health
Professional Services	Consulting	ICT
Professional Services	Consulting	Natural Environment
Professional Services	Consulting	Transport
Professional Services	Consulting	Water
Professional Services	Consulting	Water
Professional Services	Finance	Banking Services
Professional Services	Finance	Disaster Preparedness
Professional Services	Finance	Energy
Professional Services	Finance	Environmental Finance
Professional Services	Finance	Environmental Finance Planning
Professional Services	Finance	Equity Investment Services
Professional Services	Finance	Forestry
Professional Services	Finance	Insurance Services
Professional Services	Finance	Transport

Level 2	Level 3	Level 4
Professional Services	Insurance	ICT
Professional Services	Risk Management & Business Continuity	Business Continuity
Professional Services	Risk Management & Business Continuity	Risk Mitigation
Transport	Airport	Airport Infrastructure
Transport	Bridge	Bridge Infrastructure
Transport	Bridge	Bridge Services
Transport	Rail	Rail Infrastructure
Transport	Rail	Rail Services
Transport	Road	Road Infrastructure
Transport	Road	Road Infrastructure
Transport	Road	Road Services
Transport	Transport Services	General Maintenance
Transport	Transport Services	R&D and Consulting Engineering Services
Transport	Transport Services	Travel & Information
Transport	Vegetation Management	Clearance Gangs
Transport	Vegetation Management	Maintenance of Specialist Equipment for Vegetation Management
Transport	Vegetation Management	Manufacturers of Specialist Equipment for Vegetation Management
Transport	Vegetation Management	Suppliers of Specialist Equipment for Vegetation Management
Transport	Waterways	Waterways and Barrier Management
Transport	Waterways	Waterways Infrastructure
Transport	Waterways	Waterways Infrastructure
Transport	Waterways	Waterways Services
Waste	Recovery and Recycling	Automobile Recycling
Waste	Recovery and Recycling	Coal Combustion Products Stock Processing
Waste	Recovery and Recycling	Composting Feed Stock Processing
Waste	Recovery and Recycling	Construction and Demolition Debris Stock Processing
Waste	Recovery and Recycling	Consultancy, Training and Education
Waste	Recovery and Recycling	Electronics & Related Stock Processing
Waste	Recovery and Recycling	Engineering & Equipment
Waste	Recovery and Recycling	Glass Stock Processing
Waste	Recovery and Recycling	Household Electrical Goods Stock Processing
Waste	Recovery and Recycling	Metals Recycling Stock Processing
Waste	Recovery and Recycling	Oil Stock Processing
Waste	Recovery and Recycling	Paper Feed Stock Processing
Waste	Recovery and Recycling	Plastics Stock Processing
Waste	Recovery and Recycling	Rubber Products Stock Processing
Waste	Recovery and Recycling	Textiles Feed Stock Processing
Waste	Recovery and Recycling	Waste Collection
Waste	Recovery and Recycling	Waste Collection
Waste	Recovery and Recycling	Wood Stock Processing
Waste	Waste Management	Construction & Operation of Waste Treatment Facilities
Waste	Waste Management	Equipment For Waste Treatment
Waste	Waste Water Treatment	Consulting, Education & Training
Waste	Waste Water Treatment	Engineering
Waste	Waste Water Treatment	Technology, Research & Development
Waste	Waste Water Treatment	Water Treatment and Distribution
Water	Sustainable Drainage & Water Management	Agricultural
Water	Sustainable Drainage & Water Management	Domestic
Water	Sustainable Drainage & Water Management	Industrial
Water	Sustainable Drainage & Water Management	Public
Water	Sustainable Drainage & Water Management	Sustainable Urban Drainage Systems
Water	Water Infrastructure	River Basins Management
Water	Water Infrastructure	Advanced Water Management Technologies
Water	Water Infrastructure	Leakage Control in Water Distribution System
Water	Water Infrastructure	Storm Water (management, treatment, planning)
Water	Water Irrigation	Agriculture
Water	Water Irrigation	Leisure Areas

Annex B - Selected Sources

AAC Capital Partners
Abacus Financial Services Group Ltd.
Aberdeen Asset Managers Limited
Abingw orth Management Ltd
Abraaj Capital
ABRY Partners LLC
ABS - Atlantic Broadcasting System
Acacia Capital Partners Limited
Accel Partners
Acorn Capital Partners
ACT Venture Capital Ltd
Active Private Equity Advisory LLP
Adobe Systems
ADSIP Research Centre
Advanced Portfolio Technologies
Advanced Technologies Inc
Advantage Capital Limited
Advantage Early Grow th Limited
Advantage Partners Inc.
Advent International Corp.
Advent Venture Partners LLP
Adveq
Aebiom (European Biomass Association)
Aerospace Technology
Aggregatemarket
Agricultural Engineers Association AEA
AIG Highstar Capital
AIG Investments
AIM
Air Conditioning & Refrigeration Industry Board
Airport Operators' Association
Air-Scene UK
Alchemy Partners LLP
Alder & Allan
Alfred Wegener Institute Foundation for Polar & Marine Research
allbizreport
Alliance for Marine Remote Sensing Canada
Alliance Fund Managers Limited
Alliance Trust Equity Partners Ltd
Alpha Private Equity
AlpInvest Partners NV
Alta Berkeley
Alternative Investment Solutions
Altor Equity Partners
Aluminium Federation
Aluminium Stockholders Association
AMA Research
Amadeus Capital Partners Limited
Amadeus IT Group
American Capital Strategies
American Fisheries Society
American Institute of Aeronautics and Astronautics (AIAA)
American Securities Capital Partners LLC
American Society of Naval Engineers
AMPS Association of Manufacturers and Suppliers of Pow er Systems
AMRC
AnaCap Financial Partners LLP
Anakonda
Anchin, Block & Anchin LLP
Annual Report Gallery
Apax Partners Worldw ide LLP
Apex Fund Services
Apollo Advisors LP
Apposite Capital LLP
Arboricultural Association
Arcapita Limited
Architectural & Specialist Door Manufacturers Association
BART International
Battery Ventures
BC Partners Limited
Architectural Association (AA) School of Architecture
Architectural Cladding Association
Architecture and Design Scotland
Aruvian Research
Asbestos Information Centre Ltd
Asbestos Removal Contractors Association
Association for Environment Conscious Building
Association for Project Management
Association for Specialist Fire Protection
Association for the Conservation of Energy
Association of Average Adjusters
Association of Builders' Hardw are Manufacturers
Association of Building Component Manufacturers Ltd
Association of Building Engineers
Association of Consulting Engineers
Association of Facilities Engineers
Association of Interior Specialists
Association of Loading & Elevating Equipment Manufacturers
Association of Manufacturers of Domestic Appliances
Association of Marine Products & Services
Association of Naval Aviation
Association of Play Industries
Association of Rooflight Manufacturers
Association of Tank & Cistern Manufacturers
Atlantic Marine Trades Association
Atlas Venture LLP
Atmospheric Research and Information Centre
ATVEA
Audax Group
Augentius
August Equity LLP
Austin Ventures
Australasian Institute of Marine Surveyors
Australian Graduate School of Management Annual Report Database
Australian International Marine Export Group
Australian Marine Industries Federation
Australian Marine Sciences Association
Australian Research Centre for Aerospace Automation
Australian Shipbuilders Association
Australian Stock Market and Historical Data Page
Autoclaved Aerated Concrete Products Association
Automatic Door Suppliers Association
Avenue Capital Group
Aviation International
Aviation Week
Avitop
Avlar BioVentures Limited
AVMARK
AXA Private Equity
AXM Venture Capital Ltd
Aztec Group
B.P. Marsh & Partners Plc
BAA
BAC Marketing Equities Research Page
BAC Marketing Equities Research Page
BAE Systems
Bain Capital Inc.
Baird Capital Partners Europe
Balderton Capital Management (UK) LLP
Banc of America Capital Investors
Bank of Scotland Grow th Equity
Bank Rate Monitor
Barclays Capital Principal Investments Area
Barclays Private Equity Limited
Barclays Ventures
Barnes Reports
BARRA
British Resilient Flooring Manufacturers Association
British Rigid Urethane Foam Manufacturers Association
British Security Industry Association

Bear Stearns Merchant Banking
Bell flow Systems
Benchmark Capital
Beringea Ltd
Berkshire Partners LLC
Bessemer Venture Partners
Bestport Ventures LLP
BETA investment reporting
BHA
Biological Control & IM Group (The Association of Applied Biology)
Birmingham Technology (Venture Capital) Ltd
BIS
Blackstone CP
Blackstone Group International Ltd
Blomberg
BLT Financial Group
BLUM Capital Partners LP
BNP
Boardroom Insider
Boiler & Radiator Manufacturers Association Ltd
Bond Basics
Bondtrac Financial Information
Botts & Company Ltd
Bow mark Capital LLP
Box Culvert Association
Brain Wave
Braveheart Ventures
BRE Building Research Establishment
Brick Development Association
Bridge Information Systems
Bridgepoint Capital
Bridges Community Ventures Limited
Briefing by Charter Media
Briefing by Charter Media
British Airport Services and Equipment Association
British Architectural Library
British Blind & Shutter Association
British Board of Agrement
British Cattle Veterinary Association
British Cement Association
British Concrete Masonry Association
British Constructional Steelw ork Association
British Contract Furnishing Association
British Decorators Association
British Fire Protection Systems Association
British Floor Covering Manufacturers Association
British Foundry Association
British Furniture Manufacturers Federation
British Glass Manufacturers Association
British Hard Metals Association
British Institute of Architectural Technologists
British Laminate Fabricators Association Ltd.
British Marine Equipment Association (BMEA),
British Marine Finfish Association
British Maritime Law Association
British Metals Castings Association
British Metals Federation
British Non-Ferrous Metals Federation
British Plastics Federation
British Precast Concrete Federation
British Property Federation
British Pump Manufacturers Association
British Pump Manufacturers Association(BPMA)
British Quality foundation
CIA
Cinven Ltd.
CIRIA
CISCO - Futures research and data
CITB-ConstructionSkills
Citi Venture Capital
Citibase
Civil Aviation Authority (CAA)
Civil engineering contractors Association
Clarendon Fund Managers Limited
British Sign Association
British Stainless Steel Association
British Steel Corporation
British Steel Strip Products
British Timber Merchants Association
British Urethane Foam Contractors Association
British Warm Air Hand Dryer Association
British Wood Preserving & Damp Proofing Association
British Woodw orking Federation
Brow n Brothers Harriman & Co.
BSRIA The Building Services Research and Information Association
Builders Merchants Federation
Bureau of International Recycling
Business & Commercial Aviation
Buttonw ood Financial Resources
BVCA
CA Technology
Cabal Capital Management
Cabot Square Capital LLP
CACEIS
Cadvantage
Calculus Capital Ltd
Callatay & Wouters
Canaan Partners
Canadian Marine Manufacturers Association Canada
Candover Partners Ltd.
CANNEX
CapitalTrack
CapMan Group
Carbon Market Data
Caribbean Marine Association
Carlyle Group LP
CaSO4 Plastering Consultancy
Cast Metals Development
Catapult Venture Managers Ltd
Catering Equipment Manufacturers Association
Catterton Partners
Cavity Foam Bureau
CBOT
CCMP Capital Advisors LLC
CCN New sNet
CEMA (European Agricultural Machinery)
Cement Admixtures Association
Census Department (US)
Central Office of Information
Central Statistical Office (UK)
Centre for Alternative Technology (CAT)
Centre for Window & Cladding Technology
CERAM Research
Certifire
Chamonix Private Equity
Charles River Ventures
Chartered Institute of Building
Chartered Institute of Environmental Health
Chartered Institute of Housing
Chartered Institute of Purchasing & Supply
Chartered Institution of Building Services Engineers
Chartered Institution of Water and Environmental Management (CIWEM)
Chartered Society of Designers
Charterhouse Capital Partners LLP
Chicago Board of Trade
Chicago Mercantile Exchange
Chinese Society of Naval Architects & Marine Engineers
Chrysalis VCT plc
CVC Capital Partners Limited
Cypress Group LLC
D&B PE VC data
Daily Markets
Daily Stocks
Daiw a's Information Bank
Danaher Corporation
Darby Overseas Investments Ltd.
Darw in Private Equity LLP
Data and Program Library Services at Wisconsin

Clay Pipe Development Association
Clay Roof Tile Council
Clayton Dubilier & Rice Limited
Cliometric Society
Close Brothers Private Equity LLP
Close Fund Services Limited
Close Growth Capital Ltd
Close Ventures
CNNfn
Coastal Resources Center
Code Hennessy & Simmons LLC
Cognetas LLP
Cold Rolled Sections Association
Columbia Capital LLC
Commodity Resource Corp.
CommodityTrader.Net
Company Guides Venture Partners Limited
Concrete Pipe Association
Concrete Repair Association
Concrete Society Ltd
Concrete Tile Manufacturers Association
Confederation of Aerial Industries
Confederation of British Industries
Confederation of British Metal Forming
Confederation of Construction Specialists
Confederation of European Aerospace Societies (CEAS)
Connecticut Marine Trades Association
Construct UK
Construction Confederation
Construction Employers Federation
Construction Fixings Association
Construction Industry Computing Association
Construction Plant-Hire Association
Construction Products Association
Consumers Association
Contract Flooring Association
Copper Development Association
Core Capital LLP
Cork Industry Federation
Cornhill
Cortland Fund Services
Council for Aluminium in Building
Council for the Protection of Rural England (CPRE)
Council of Forest Industries
Country by Country registered data sources
County Clean Environmental
Court Square Capital Partners
Create Partners Ltd
Creative Environmental Networks (CEN)
Credit Suisse Private Equity
Crop Improvement Research Club (CIRC)
Crosspoint Venture Partners
CRSP (Center for Research in Security Prices)
CSA
CSI
CU Time Series Repository
Currency Management, Inc.
Enterprise Private Equity Limited
Enterprise Ventures Limited
Envestors LLP
Eos Partners LP
EPIC Private Equity
Epi-V LLP
EPP Elektronik Produktion & Prueftechnik (Electronics Production and Test)
EPP Europe
EPRO European Association of Plastics Recycling
EQT Partners AB
Equity Data
Equity Ventures Ltd
ESA (European Seed Association)
ESPIN Stock Charts
ESRC Data Archive
E-Synergy Limited
ETCapital Ltd
Data Monitor
Data Used in Research Papers at the Federal Reserve Bank of St. Louis.
DataMerge Financing Resources for Entrepreneurs
Datamonitor
Datastream International
Dave Financial Services
Dawn Capital LLP
Dawnay Day Principal Investments
DDJ Capital Management
Defense Manufacturers Association
Defense News
Deloitte & Touche Peerscape
Derbyshire First Investments Limited
Design & Industries Association
Deutsche Bank List of the Prices of 60 German Stocks
DFJ Esprit LLP
Dialog
Disclosure
Domain Associates LLC
Door & Shutter Manufacturers Association
Doughty Hanson & Co Ltd
Dow Jones Business Directory
Draper Fisher Jurvetson
Draught Proofing Advisory Association
Dry Stone Walling Association
Ductile Iron Producers Committee (DIPA)
Duke Street Capital
Dun & Bradstreet
Dunedin Capital Partners Limited
EADS
ECI Partners LLP
Ecological Design Association (EDA)
Economist Intelligence Unit
Ed Yardeni's Chart Room
Edgar Online.Com from Cybernet Data Systems
EGMF European Garden Machinery Federation
E-Investor
Elderstreet Investments Limited
Electra Partners LLP
Electrical Contractors Association
Electrical Installation Equipment Manufacturers Asssociation
Electrical Insulation Association
Electronic Data Interchange (Construction) Ltd
Elektronikpraxis (Applied Electronics)
E-Line Financials
EMEC, the European Marine Equipment Council
Emergingpe
EMP Global LLC
Empire State Marine Trades Association
Endless LLP
Energy Industries Council
Engineering Construction Industry Association
Engineering Employers Federation
Engineering Industries Association
Engineering Manufacturers Association
Englefield Capital LLP
Enterprise Equity Fund Management (NI) Limited
FISH
Flat Glass Manufacturers Association
Flat Roofing Alliance
Flight International
Florida Aquatic Plant Management Society
Forecast International
Foresight Venture Partners
Forests Forever
Fortitude
Fortune Magazine Online
Fox Paine & Co.
Francisco Partners
Freedonia Group
Freight Transport Association
Friedman Fleischer & Lowe LLC
Frontiers Capital Limited
Frost & Sullivan

Eurekahedge
Eurisol (UK) Ltd
Euro Monitor
Euromoney Data
Euromoney Institutional Investor PLC
Euromonitor
European Capital Ltd
European Federation for Spec. Prods & Applications in Structures
European Fund Administration
European Investment Monitor
European Liquid Roofing Association
European Organisation for Packaging and the Environment
European Regions Airline Association
European Seed Association
European Small Business Alliance
European Space Agency
Europeanvc
Eurotrader Strategies
EVCA
Expanded Polystyrene Cavity Insulation Association
Exponent Private Equity LLP
External Wall Insulation Association
Faciva
Federal Filings Business News
Federal Reserve Bank of Minneapolis
Federal Reserve Bank of New York
Federal Reserve Bank of Philadelphia
Federation for the Repair & Protection of Structures
Federation of British Hand Tool Manufacturers
Federation of Finnish Technology Industries
Federation of Master Builders
Federation of Piling Specialists
Federation of Plastering & Dry Walling Contractors
Federation Of The Electronics Industry
Fencing Contractors Association
Fenway Partners Inc.
Ferranti Limited
FF&P Private Equity Ltd
Fibre Cement Manufacturers Association
Fidelity Equity Partners
Fidelity Ventures
Finance Cornwall Limited
Finance Wales Investments Limited
Financial Post
Financial Technologies International
Financial Times
Fire Protection Association
Fire Resistant Glass & Glazed Systems Association
First Reserve Corp.
Fiserve
Hot Water Association (HWA)
Hotbed Limited
House Builders Federation
Houseboat Association of America
HSBC Alternative Fund Services
I/B/E/S Analyst Earnings Forecasts
I/B/E/S Analyst Earnings Forecasts
Ibbotson Associates
IBC Data
ICE Clean
Iceni Capital
Icomia : International Council of Marine Industry Associations
Icon Group International, Inc.
IDD
IFA Information
IMCA - International Marine Contractors Association
IMPA International Marine Purchasing Association
Impax Asset Management Ltd
Imperial Innovations Group plc
Independent Defense Media Association
Indian Space Research Organisation
Industri Kapital Ltd
Industry Research group
Infinity Asset Management LLP
Fundadministration
Futures Guide
Futures Price Data
GBQ/Nesser Consulting Group
Geller & Company - Investment Partnership Services
General Atlantic LLC
General Electric Company
Genstar Capital LLC
GI Partners
Glass and Glazing Federation
Glenara Management Services
Glitnir Total Capital
Global Financial Data
Global Industry Analysts
Global Investor Analytics
Global Recycling Network
Glued Laminated Timber Association
GMID
GMT Communications Partners III LLP
Gold Coast Marine Industry Association
Golden Gate Capital
Goldman Sachs Capital Partners
Golub Capital
GP Investments
Graphite Capital Management LLP
Gravity Financial, LLC
Greenhill Capital Partners Europe LLP
Gresham LLP
Greylock Partners
Growth Stock Gazette
GS Capital Partners Inc.
GTCR Golder Rauner LLC
Guild of Architectural Ironmongers
Guild of Master Craftsmen
Gypsum Products Development Association
H&Q Asia Pacific Ltd.
H.I.G. Capital
Harmonic Fund Services
Harvard Data
Health Estate Facilities Management Association
Heating & Ventilating Contractors Association
Helaba Trust
Hellman & Friedman LLC
Henderson Equity Partners Limited
Herald Investment Management Limited
Hermes Private Equity
HgCapital
Holt's Daily Stock Market Report
Honeywell International Inc.
Hoovers Online
International Association of Dredging Companies
International Association of Producers of Insurance and Reinsurance
International Council of Marine Industry Associations (ICOMIA)
International Economics Information
International electronic Engineers consortium
International Federation of Shipmasters' Associations
International Institute of Marine Surveyors
International institutes of technology
International Marine Certification Institute Belgium
International Monetary Fund
International Ship Electric Service Association (Ises) Ltd
International Universities
International Waterproofing Association
Internet Securities, Inc.
Interpave
InterQuote - Continuous Quotes
InterQuote - Continuous Quotes
Intex Solutions - CMO data
Intex Solutions - CMO data
Intuit
Invest Northern Ireland
Investment Data Services Group (IDS)
Investment Education PLC
Investment Project Database

Inflexion Private Equity
INFO-MINE
Information Echo
Information Echo
ING Bank International (insurance actuarial)
Ingenious Ventures Limited
Innvotec Limited
Institute for Defense & Government Advancement (IDGA)
Institute for Naval Automation Italy
Institute for the Study of Naval Architecture Italy
Institute of Arable Crop Research
Institute of Architectural Ironmongers
Institute of Builders Merchants
Institute of Building Control
Institute of Civil Engineers
Institute of Clerks of Works of Great Britain
Institute Of Corrosion
Institute of electrical & Mechanical engineers
Institute of electrical and Electronic Engineers
Institute of Management consultants
Institute of Marine Engineering, Science and Technology (Small Ships Group)
Institute Of Marine Engineers
Institute of Mechanical Engineers
Institute Of Metal Finishing
Institute Of Petroleum
Institute of Plumbing
Institution of Civil Engineers
Institution of Electrical Engineers
Institution of Fire Engineers
Institution of Gas Engineers and Managers (IGEM)
Institution of Highw ays & Transportation
Institution of Incorporated Engineers
Institution of Lighting Engineers
Institution of Mechanical Engineers
Institution of Structural Engineers
Institutor Logic
Instrument Society of America
Intel Capital
Interactive data
Inter-American Development Bank
Interior Decorators & Designers Association
Intermediate Technology Development Group
International Air Transport Association (IATA)
Legis Group
Lehman Brothers
Leonard Green & Partners
LeverPoint Management, LLC
LF Europe Investments
LGV Capital
Libguides Princeton
LIFFE
Lift and Escalator Industry Association
Lighting Association
Lighting Industry Federation
Lind-Waldock & Co.
Lion Capital
Lloyd's Register
Lockheed Martin Corporation
London Seed Capital Ltd
London Ventures (Fund Managers) Limited
Longbow Capital LLP
Loudw ater Investment Partners Ltd
Ludgate Investments Limited
Lyceum Capital Partners LLP
Manifest
Manufacturers of Domestic Unvented Supply Systems Equipment
Marina Operators Association of America
Marine Aggregates Producers Association (BMAPA)
Marine Biological Association of the United Kingdom
Marine Clerks Associations
Marine Conservation Society
Marine Engine & Equipment Manufacturers Association
Marine Industries Association
Marine Industries Association of South Florida
Investor Relations Society
InvestorGuide
Investor's Diary
Investors Free Forum
InvestorSquare
Ipes
IQ Capital Partners LLP
IQPC Defence
IRIN
ISIS EP LLP
Isis Innovation Ltd
ITEA International Test and Evaluation Society
JAL Trading
Jane's Information Group Ltd
Japan Aerospace Exploration Agency
Japan Marine Engineers' Association
Japan Naval Architecture Institute
Javelin Ventures Limited
Journal of Applied Econometric Data Archive
JPMorgan Private Equity Fund Services
JW Childs Associates LP
Kansai Society of Naval Architects
KAS Bank
Kelso Place Asset Management LLP
Kensington Management Company
Key Capital Partners LLP
Key Note Publications Ltd
Key Publishing
kMatrix Profiling Data sets
Kmatrix Propriety Data Sets (non profiling)
Knight Capital
Kohlberg Kravis Roberts & Co Ltd
Koku Shimbun Sha
Korea Aerospace Research Institute (KARI)
L. T. Institute of Finance
L-3 Communications Holdings, Inc.
LA Investments Ltd
Landscape Institute
Langham Hall UK LLP
LCCS
LDC
Lead Sheet Association
Leading Edge Management Consultancy Ltd.
Milking Equipment Association
Mind Branch
Ministry of Economy and Public Works and Services of Argentina
Mintel
Mintel International Group Ltd.
MIT Stock Price Data
Mitsui & Co Europe Plc
MMC Ventures Ltd
Modus Private Equity Ltd
Money Magazine Online
Money Manager Performance Data
Moneyline
Montagu Private Equity LLP
Moorfield Investment Management Ltd
Morgan Stanley
MORST New Zealand
Motorola, Inc.
MTC&D - Marine Technical Consultancy & Design
MTI
Multi Sourced Academic Data
Mutual Fund Magazine Database of Fund Performance
Mutual Funds Central
Mutual Funds Interactive
NASA
NASC (National Access and Scaffolding Confederation)
NASDAQ
National Association of Marine Surveyors (NAMS)
National Association of Shopfitters
National Bureau of Economic Research
National Clayw are Federation
National Defense Industry Association

Marine Industries Association of St. Lucia (MIASL),
Marine Preservation Association (USA)
Marine Queensland
Marine Studies and Environmental Research Centre Plymouth
Marine Trades Association
Marine Trades Association of Maryland
Maritime Law Association of Australia and New Zealand
Market and Business Development
Market Guide
Market Paradigm
MarketEdge
MarketPlayer
MarketTrak
Markt & Technik (Market & Technology)
Massachusetts Marine Trades Association
Master Carvers Association
Master Locksmiths Association
Mastic Asphalt Council
MATIF
Matrix Private Equity Partners LLP
Maventic
MB Fund Services
MBD
McGladrey & Pullen LLP
Mead Data Central Lexis/Nexis
Mechanical and Metal Trades Confederation
Media Logic Economic Indicators
Merlin Biosciences Limited
Merrill Lynch OnLine
Metal Cladding & Roofing Manufacturers Association Ltd
Metal Finishing Association
MICHAEL WEMIMO AGENCY
Micropal
Midas Online
Midven Limited
Milestone Capital Partners Limited
North West Equity Fund
Northern Offshore Federation
NORTHERN TRUST
Northrop Grumman Corporation
NorthStar Equity Investors Ltd
NVM Private Equity Limited
nycetc
OAG
Octopus Private Equity
OECD
Oil Tank Solutions
Ontario Marine Operators Association
Oracle
OSPAR
Oxford Capital Partners
Oxford Technology Management Limited
Paint Research Association
Palamon Capital Partners, LP
Parallel Private Equity Limited
Parker Hannifin Corporation
Partners Group
Pasture-fed Livestock Association
PC Trader
Pe data centre
Penta Capital Partners Ltd
Pentech Ventures
PERE
Perfect Information
Permira Advisers LLP
Phoenix Equity Partners
Phoenix Fund Services
Pi Capital
Piedmont Fund Services, LLC
Pipeline Industries Guild
Piper Jaffray
Piper Private Equity Limited
Plastic Bag Association
Plastic Pipe Manufacturers Society
National Federation of Building Trade Employees
National Federation of Demolition Contractors
National Federation of Painting & Decorating Contractors
National Federation of Roofing Contractors Ltd
National Federation of Terrazzo, Marble & Mosaic Specialists
National GRP Cladding Federation
National Heating Consultancy
National House-Building Council NHBC
National Housing Federation
National Inspection Council for Electrical Installation Contracting
National Institute of Agricultural Botany
National Insulation Association
National Marine Electronics Association
National Marine Manufacturers Association
National Marine Representatives Association
National Master Tile Fixers Association
National Oil Recyclers Association
National Physical Laboratory
National Sprayer Testing Scheme
NATO Undersea Research Centre Italy
Natural Slate Quarries Association
NBGI Private Equity
NCS
NDIA's National Defense
NEL Fund Managers Limited
Neptune Association Netherlands
NESTA Investments
NETworth by Quicken
New York Stock Exchange
Next Wave Ventures
NextVIEW Pte
Nihon Marinenjiniaringu Gakkai
Nikko Securities
Noble Fund Managers Limited
Nomura Private Equity
Norgate Investor Services
QBL
QSRMC (The Quality Scheme for Ready Mixed Concrete)
Quarry Products Association
Queensland Seafood Industry Association
Quester
Quilvest Private Equity
Quote.com
Quoteline
Raging Bull
Reality House
Recruitment & Employment Confederation Ltd
Recyclers world
Reed Business Information
Reed Construction Data
Reed Construction Data
Reed Electronics
Relevant Aerospace and Engineering University Centres Internatonally
Remade Network UK
ResearchandMarkets
Researchmag
Rhode Island Marine Trades Association
RICS
Risk Capital Partners
RJD Partners Limited
RNCOS
Roslin Insititute
Rothamsted Research
ROUSSIN
Royal Aeronautical Society
Royal Air Force
Royal Bank of Canada
Royal Bank of Scotland Equity Finance
Royal Incorporation of Architects
Royal Institute of British Architects
Rutland Partners LLP
Rye, Man & Gor Securities
Salomon Brothers
San Diego Daily Transcript.

Plastics & Rubber Advisory Service
Plastics Window Federation
Platina Finance Limited
Plimsoll Publishing Ltd.
PMpublishing's Daily Option Summary
Polyethylene Foam Insulation Association
Pond Venture Partners Ltd
Ports & Terminals Group
Pow der Actuated Systems Association
PPM Capital Limited
PR Inside
Precast Flooring Federation
Preqin
Prestressed Concrete Association
Price Waterhouse
Primark
Primary Capital Ltd
Prime data
Pristine Day Trader
Private Equity Connect
Private Equity Insight
Private Equity Intelligence
Pro clean
Productronic (Electronics Production)
Professional Naval Engineering Council Argentina
Providence Equity LLP
PSEPS
Public Register's Annual Report Service (PRARS)
PUK Ventures
SL Capital Partners LLP
Smedvig Capital Limited
Snapdata International Group
Société Générale Securities Services
Society For Underw ater Technology
Society of Accredited Marine Surveyors (SAMS)
Society of British Aerospace Companies
Society of British Gas Industries
Society of Chief Electrical & Mechanical Engineers
Society of Consulting Marine Engineers and Ship Surveyors
Society Of Maritime Industries
Society of Naval Architects & Marine Engineers
Soil Association
Solar Energy Society (Uk Section)
Solar Trade Association Ltd
Sovereign Capital Partners LLP
SPARK Ventures plc
Sprayed Concrete Association
SRPE LLP
SS&C Fund Services
Ssga
Stainless Steel Advisory Service (SSAS)
Standard & Poors Compustat
Standard & Poors Equity Investor Services
Standard Chartered Bank
Standard Life Investments
STAR Capital Partners
Stargate Capital Management Ltd
Statistics Canada
Steel Lintel Manufacturers Association
Stock Commando
Stock Data Corporation
Stock Investors' Fraud Resource
Stock Research (From Spain)
Stock Smart
StockMaster
Stockpicks.com
StockSense
StockSite
Stock-Talk.com
Stockw arrants.com
Stone Coast Fund Services
Stone Federation
Strand Partners Limited
Strategis
Sanne Trust Company Limited
SAP
SCOPA (Seed Crushers and Oil Processors Association)
Scottish Building Employers Federation
Scottish Ecological Design Association (SEDA)
Scottish Equity Partners
Scottish Homes
Scripps Institution of Oceanography
Scuba Industries Trade Association
SEC Database
Securities Data Corporation
SecurityAPL Current Quote Server
SEDB Investment data
SELECT - Electrical Contractors Association of Scotland
Semiconductor Test Consortium
Seraphim Capital (General Partner) LLP
SGGG Fexco Fund Services (Malta) Limited
Shackleton Ventures Limited
Shephard Group
Ship Research Institute
Shoreline Trading Group, LLC
Sigma Technology Management Ltd
Silicon Investor
Silver Lake
SilverPlatter
SilverPlatter
Single Ply Roofing Association
SIX Telekurs
Skye Fund Services Ltd
The Bank of New York
The Boeing Company
The British Marine Federation
The Carbon Trust
The Carlyle Group
The Carpet Foundation
The Corner House
The European Recovered Paper Council (ERPC)
TFC Financial Charts
Thales
The Aerospace Research Institute
The Bank of England
The Housing Corporation
The Institute of Agricultural Management
The Institute Of Diesel & Gas Turbine Engineers
The Institute Of Logistics & Transport
The Institution of Environmental Sciences
The International Union of Marine Insurance (IUMI)
The James Hutton Institute
The Manchester Technology Fund Ltd
The Mining Company
The Motley Fool
The National Building Specification (NBS)
The National Marine Educators Association
The Nautical Institute
The Oil Companies International Marine Forum (OCIMF)
The Organic Research Centre (Europe)
The Royal Agricultural Society
The Royal Institution Of Naval Architects
The Scottish Association for Marine Science (SAMS)
The Scottish Environment Protection Agency (SEPA)
The Shephard Press
The Steel Construction Institute
The Summit Group Ltd
Thermal Insulation Contractors Association
Thermal Insulation Manufacturers and Suppliers Association
TheStreet.com
Thomson Reuters
Tile Association
Timber & Brick Information Council
Timber Trade Federation
Top Technology Ventures Limited
Tow erBrook Capital Partners (UK) LLP
Tow n & Country Planning Association
TPG Capital LLP

Structural Precast Association
Sulis Innovation Ltd
Surfrat Quotes
Suspended Access Equipment Manufacturers Association
Sussex Place Ventures
SV Life Sciences Advisers LLP
Swarraton Partners
Swedish Network of Design for Test Research
Symantec
Synova Capital LLP
Tank Inspections
TDR Capital LLP
Telescan
Temple Group
Teradyne
Terra Firma Capital Partners Limited
Test & Measurement
Test and Diagnostics consortium
University of Waterloo
Value Investing
Vangaurd
VC Returns New York
VDC Corp
Venture Capital Resource Library
Venture Capital World Online
Veronis Suhler Stevenson International Limited
Viking Fund
Vision Capital Ltd
Vitruvian Partners LLP
Vmware
Vortex Volatility Chart Library
Wales Fund Managers Limited
Wall Street Directory
Wall Street Net
WallStreeter.Com
Warburg Pincus International LLC
Waste Watch
Wertpapier Mitteillungen
TRADA Technology Ltd
Trance Consulting Pvt Ltd
Transport Research Laboratory
Trident Fund Services
TRINET America
Triodos Bank NV
Trustees Executors Limited
TTP Venture Managers Ltd
Tunnel Lining Manufacturers Association
TurboMachinery International
UK Marine & Coastguard Agency
UK Steel Association
UK Steel Enterprise Ltd
UNCTAD
Unilever Ventures Ltd
Union of Construction, Allied Trades & Technicians
United States Naval Institute
United Technologies Corporation
What If Ventures
WHEB Ventures Ltd
Wilcoxon Research
WM Enterprise
Woodfield Fund Administration, LLC
WOQATS
World Bank
World Investment Report Data
World Ship Trust
World Wide Quote
WRAP
Write Partnership
Wyatt Investment Research
Xasax Corp
XCOR Aerospace Inc
YFM Private Equity Limited
YFM Venture Finance Ltd
Zacks Investment Research
Zeus Private Equity LLP
Zinc Information Centre

Annex C - Source Selection and Management

kMatrix multi- sources its quantitative data, to offset the limitations of SIC codes. There are comprehensive internal and external quality assured processes for monitoring and rating data sources before they are included in the source management system. This includes a number of checks and balances that enable the capture of meaningful and multiple sources of transactional (and other) data that can be used to a) construct and b) populate a detailed and segmented model of the market/ sector and that transforms the available unstructured or semi- structured evidence from singular and fragmented insights into structured observations.

This data is collected from a very wide range of sources. Some are core to our system whilst others relate to individual markets and sectors. They include:

- Company data - FAME, Dun & Bradstreet, Companies House, Hoover, ICC, Thomson, Companies Online, OneSource
- Journals - Bloomberg, Forbes, Business 2.0, Economist, Wall St Journal, FT, Business Week
- Industry Associations - EEF, NTOs, Industry portals. CISP etc.
- Professional Bodies - Institutes, Chartered Bodies, Associations, Societies, Federations
- Market Research - Keynote, Datamonitor, Euromonitor, FT, Reuters, Economist Intelligence Unit, Forresters, Mintel, Eurobusiness, OECD, IEA
- Industrial Benchmark Information - Data Monitor, Windhaus, Integra, UCSD, DTM Corporation, kMatrix's own benches, Harvard Business School, MIT Bench Series, Cranfield University etc.

Sector- specific sources vary and include additional academic, financial and professional sources. The balance between general and sector- specific sources varies for each sector but is generally weighted strongly in favour of sector sources. These are the sources listed at Annex B.

New sources emerge on a daily basis, but are subject to an incubation period within the source management system before they become active. This establishes the frequency and credibility of the source before it is used as part of any analysis.

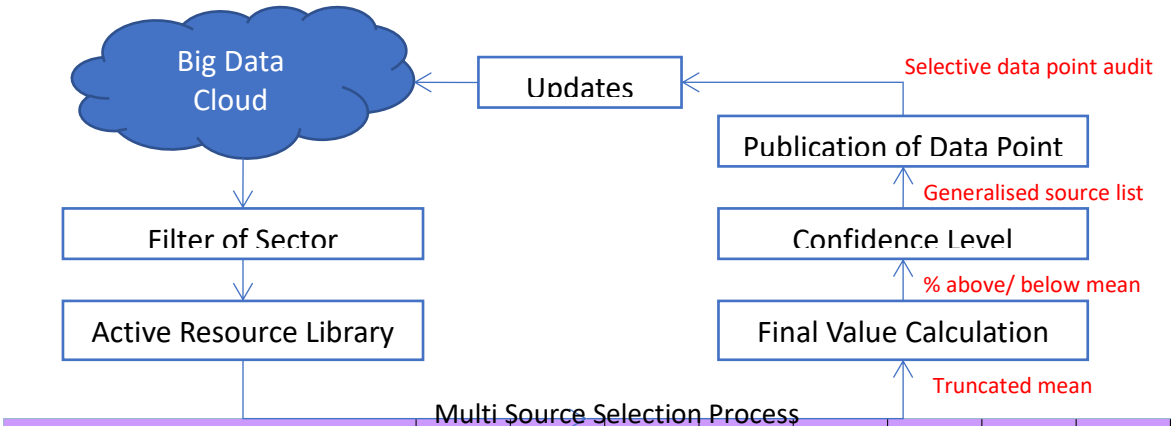
Typically, each annual data update may exclude some old sources and include some new sources (the number is monitored each year) but the volume of sources used ensures that source changes generally improve the quality of the data rather than introduce erratic effects in the year-on-year trend analysis. This is reflected in measureable annual improvements in data confidence levels.

The source management system is shown at Figure C1. It tracks data sources over time. For each source, there is a history based upon source name, source value, year it relates to, the number of times used, "hit rate" (reliability) and whether it is to be accepted for a specific research purpose. The source data banks are fully transparent and auditable and relate to each calculated cell within any sector data set (each country data set for Security includes 80,000 data points). These data banks are monitored closely internally and are routinely spot- checked each year by clients as part of the peer- review audit.

For each product/service activity multiple sources of historical and forecasting data are tracked. From these sources at least seven are selected that are current, have been routinely tracked and verified over a number of years. Sources can be from company, industry, academic, public or market research sources and national statistics. The sources that are rejected may be out of date, unreliable, drastically under or overstated or too similar to other data sources.

When a minimum of seven acceptable sources have been identified the “mean” of the seven figures is calculated. The range of individual responses in relation to the selected figure is then reviewed and if the range of results is within +/- 20% of the selected figure that is generally satisfactory. In some cases (where more than seven reliable sources are available) the range of results may be narrowed by excluding the more extreme results. Where the range of results is greater than +/- 20% then further sources may be used, until an acceptable range is achieved.

Figure C1: High level diagram of the source management system.



Source	Value £m	Year of data relevance	Hit Rate History	Number of times accessed	Accept	Reject	Track	Output
Petrol Retailers Association	869.27	2006	85%	35	1		Yes	869.27
DTI	850	2004	60%	62		1	Yes	
Carbon_Info	1107.32	2005	25%	12		1	Yes	
Planetark	500	2006	48%	6		1	Yes	
Financial Times	604.37	2006	60%	24		1	Yes	
UK Peproliun Industry Association	799.24	2006	80%	47	1		Yes	799.24
BP	904.51	2006	82%	29	1		Yes	904.51
ACEA European Automibile Manufacturers Association	850.5	2006	85%	22	1		Yes	850.5
British Association for Bio Fuels and Oils	915.18	2006	92%	19	1		Yes	915.18
Bloomberg	850	2006	82%	31	1		Yes	850
Flemming Bermann	904.51	2004	72%	1		1	Yes	
Market Watch London	850.27	2006	65%	26		1	Yes	
British Biogen	890.5	2006	85%	22	1		Yes	890.5
Lloyds Environmental UK	962.71	2005	56%	12		1	Yes	
EXXON Research	900.26	2006	83%	17	1		Yes	900.26

The research methodology attempts to limit the risk and error behind the published numbers (whether historical or forecast) by multi- sourcing and monitoring a wide range of reliable and robust sources and then making the remaining range of uncertainty explicit. A full list of sources is provided at Annex B but each data template used for the Adaptation Economy sector research calculates and publishes the number of sources used to compile each of the 4,000 lines of market data. On average 100 sources (differing depending upon the market activity) are combined for each line of data in this study. This combination of multiple sources means that the "formula" behind each data point is unique and that no single- source attributions are made within the Security report.

Annex D - Specific Methodology for quantifying the Adaptation Economy

Section 3 refers to the specific methodology employed for estimating value of the Adaptation Economy. Given the "fuzzy" boundaries between "make & mend", A&R and A&RCC activities it is important to ensure that only the relevant parts of activities like road building, bridge building or house building (big economic sectors) are included.

Model D1 is a simplified representation of a general "triage" model. This shows how:

1. A wide range of appropriate data sources at the "make & mend" level for the twelve sectors are identified and analysed. These sources are then compared with,

2. Procurement data and procurement history (to establish standard levels of "make & mend" procurement), which is then related to,

3. Specific A&R activities like Remedial Works, Major Incidents, Reinforcement Works, Routine Maintenance etc., resulting in

4. A baseline for A&R activities that draws upon the previous three stages, from which

5. Further filtering is applied to identify and separate A&RCC activities (generally through data sources relating to the procurement across the twelve sectors), resulting in

6. A statement of A&RCC values.

The final stage of the model shows an initial attempt to separate the values for Adaptation and Resilience activities. This was subsequently abandoned as the confidence levels in splitting these activities were deemed to be too low to be useful.

Model D2 is a more complex representation for "Roads" as part of the Transport sub sector of the Adaptation Economy. This model stops at the point of estimating A&R values, although further filtering for A&RCC value is part of the research (as outlined by Model D1). "Roads" is a good example of the challenges of analysing large scale projects for their relatively small scale A&RCC content.

Model D2 is more specific in the activities that it includes for analysis i.e. the sales of Supplies (aggregates, asphalt etc.) into Highways Operations and the Private Sector for activities like New Installation, Road Redirection, Road Maintenance and Road Drainage. This model has to calculate the whole "make and mend" value for Road Transport, so that A&R activity can be identified and calculated

The model includes a large number of data triangulation points (stages of the value calculation process where multiple sources are collated and compared) where sources from Transport, Civil Engineering and Raw Materials etc. are drawn upon.

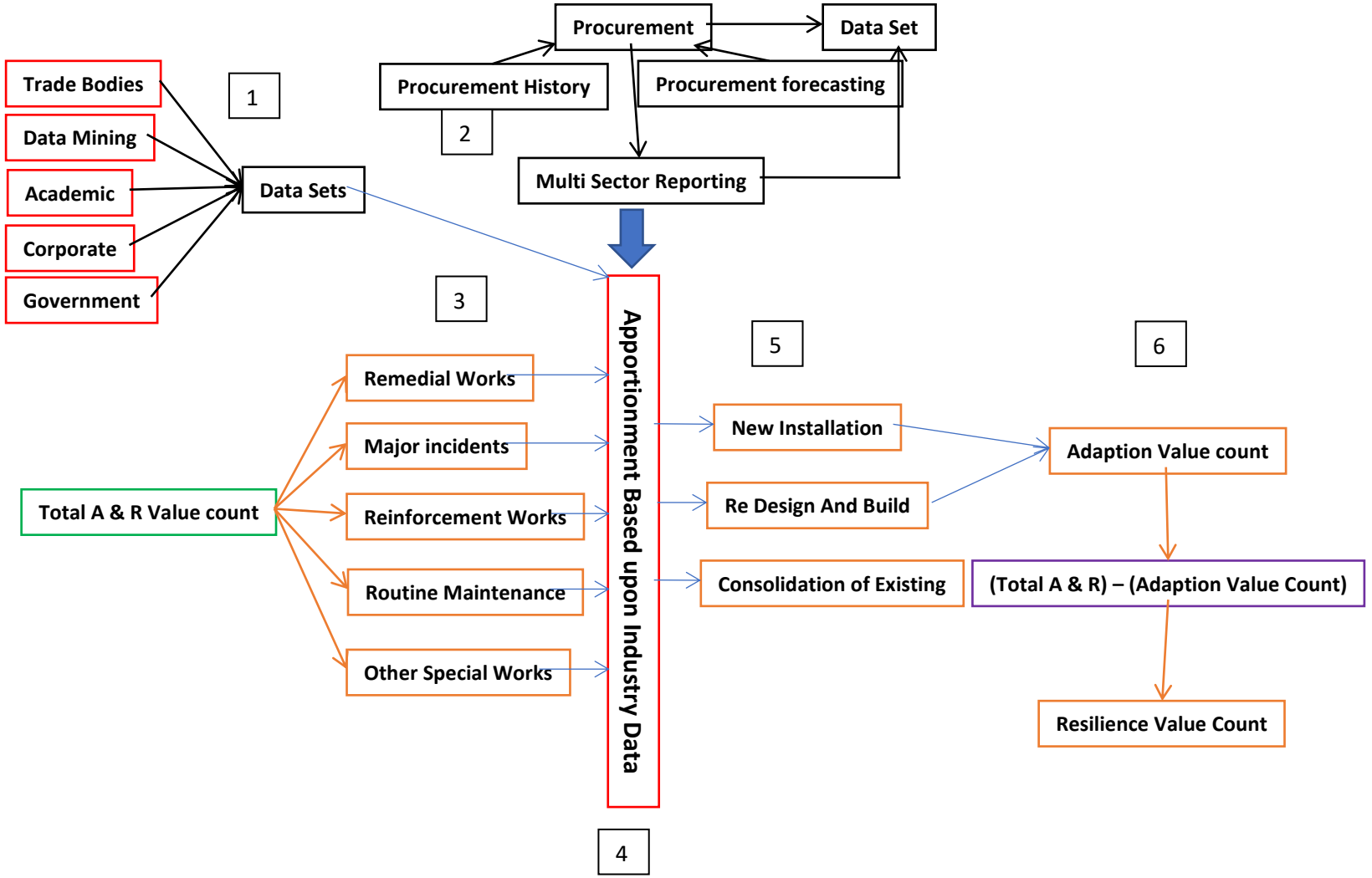
The model includes two specific processes for determining A&R content from the wider economic activity for Roads. The first is the procurement history/ forecasting, road usage data that can be used to estimate the predictable "business-as-usual" baseline for road making and mending i.e. what would have happened anyway. This process assumes that currently, little of the baseline is directly attributable to Adaptation to Climate Change (although this is forecast to change over time). The second process is an analysis of why activities have been undertaken i.e. routine, demand- led or event- driven. This analysis at the "roads system" level, compared with other A&R/ A&RCC reporting

sources at the industry level enable a realistic assessment and then calculation of A&R Road activities.

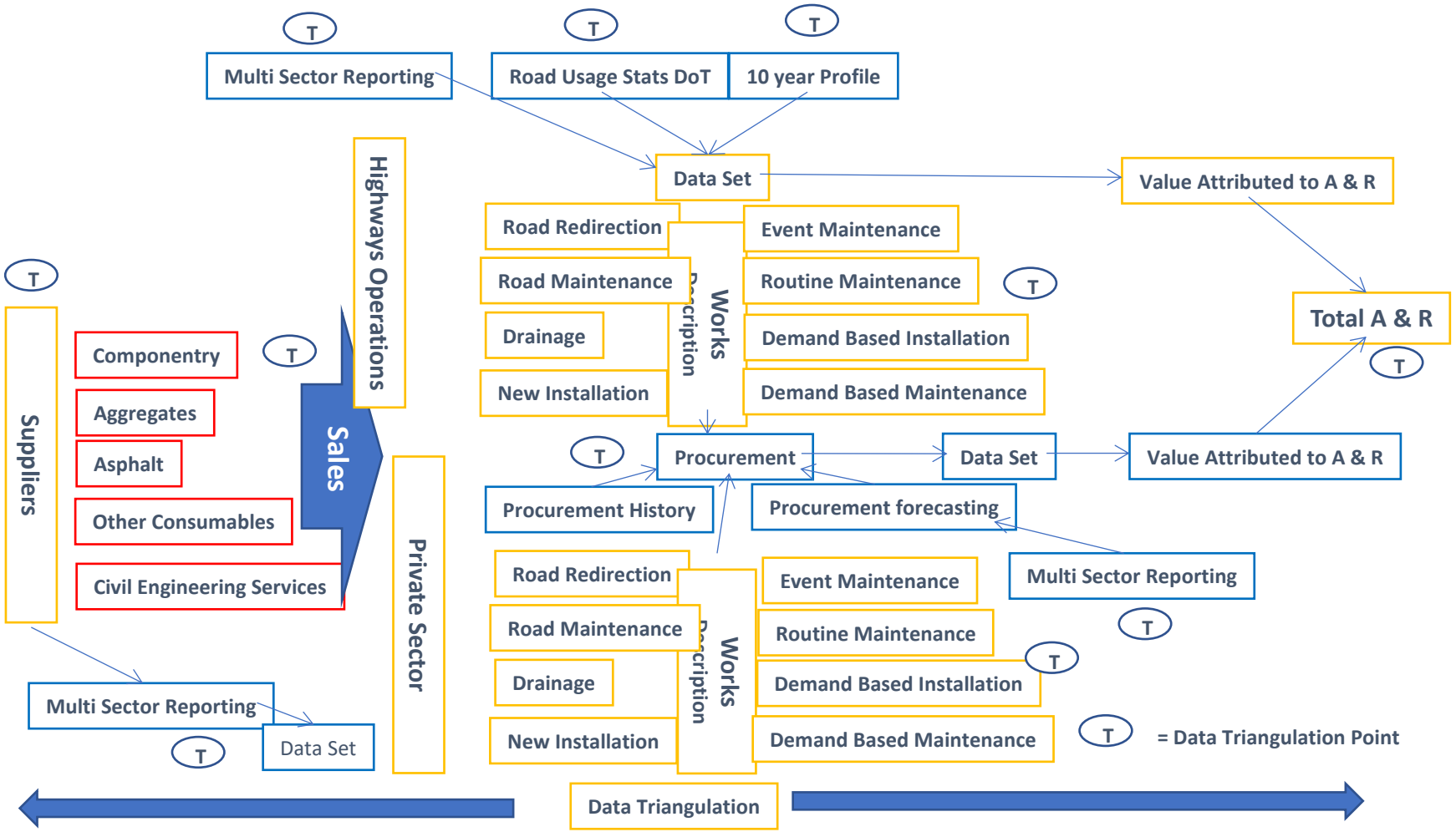
Model D3 extends the analysis to the example of Flood Barriers. This example is highly relevant to Glasgow City Region and is an example of a safety system originally designed for primarily weather-based events that is having to adapt to climate change. Once again the model follows a similar process to "Roads" by looking at sales, activities, "purpose" (routine maintenance, planned installation and event- driven installation and maintenance) before estimating the A&R content for Flood Barriers.

The purpose of these three models is to demonstrate how data analysis process, assumption testing and filters can be applied to existing industrial sources to arrive at estimates for A&R and A&RCC economic activities that are not calculated or reported anywhere else.

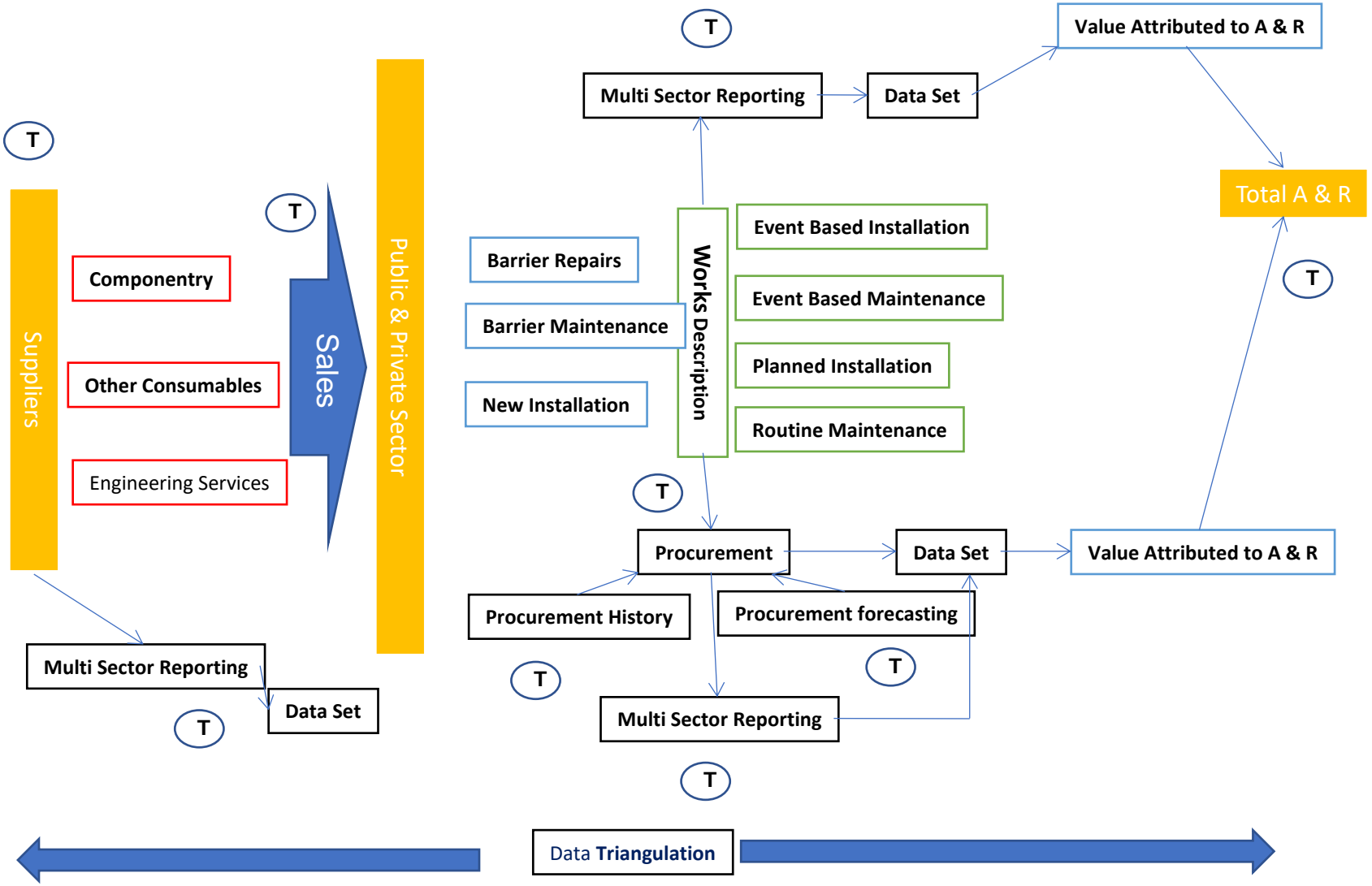
Model D1: General Model



Model D2: Roads



Model D3: Flood Barrier



Annex E - Acknowledgement of Funding

We would like to acknowledge that this report was funded by the Scottish Government.

Annex F - Standard Methodology

Included Activities

The activities included under each of the Adaptation headings vary according to the structure of the industry/sub sector. The approach is inclusive (rather than specialist) and captures as much of the Adaptation sector Value Chain and Supply Chain activity as possible. The activities that we have included are: design/ development, manufacture, supply, distribution, installation, maintenance, operations, R&D, Consultancy, support services and retail.

As well as capturing as broad a cross-section as possible of the Adaptation Value Chain, activities are captured for companies that are specialist to the Adaptation Sector (few) and also companies that are non- specialist but operate within the Adaptation supply chain (many). The analysis, therefore, includes:

- Companies that solely provide Adaptation products and services (anywhere in the Value Chain)
- Companies who are 100% providers of components or inputs into sub-assemblies or final Adaptation products and services delivered by others
- Companies who (amongst other activities) provide components or inputs into sub-assemblies or final assemblies of Adaptation products and services.

The threshold for including a company in the analysis is if at least 20% of estimated sales activity can be attributed to the Adaptation Economy (as defined within this report). In the case of larger companies this can often be extracted from financial reports, cross-referenced to industry sources. For much smaller companies we may have to extrapolate the percentage of sales based on product range and turnover, tempered by more detailed case materials that we hold about the market performance of similar businesses. The exception to this 20% rule is for large companies (greater than £50m turnover) where a small proportion of overall sales is a significant contribution to the Adaptation sector.

While this is not an exact science, it is considered a robust methodology for calculating the size and distribution of supply chain activity across a sector. However, because the methodology is not based solely on historical SIC listings etc. it does mean that estimates of Sales Value, Company numbers and Employment may be higher than more traditional estimates because more supply chain and value chain activities are included in the sector definition.

The threshold for inclusion (>20% of company sales) in this report means that the company numbers and employment figures published in this report focus upon the significant value- creating “core” of the Adaptation Economy. This core is where true economic value is measured and this focus avoids (as far as is possible) any double counting of sales value within the supply chain. This threshold helps to maintain an overall relationship between sales, companies and employment that can be compared year-on-year both internally and with other countries. It also provides a standard and consistent measure that can be compared with other sectors.

Levels of Analysis

The data model for the Adaptation Economy is built bottom-up. This means that economic activities are identified at the lowest possible level of analysis (at the equivalent of a six or seven digit SIC code) and then aggregated together so that they can be reported upon more conveniently. In this report we record Adaptation Economy activities at five hierarchical levels but analyse the data mostly at Levels 1 (Sector), 2 (Sub Sector) and 3 (Sub Sub Sector) only.

Each Level of detail has its own analytical benefits and in this report Level 1 is used to select the Top 53 local countries and for sub national analysis, Level 2 for identifying market growth trends and Level 3 for analysing national, regional and city- based performance.

Levels 1 to 3 are really aggregated "labels" under which activities can be conveniently grouped and assessed, while Levels 4- 5 contain "product group" market intelligence and are the levels closest to Adaptation products and services as companies would understand them.

Key Measures

In our analysis we concentrate on six key measures. These are:

- Sales £m
- Companies
- Employment
- Growth
- Imports
- Exports

Sales is our estimate (in £m) of economic activity by identified companies in a defined region or country. Our estimate of sales is based upon where economic activity takes place i.e. the location of the business rather than the location of the income earner. In calculating Sales value we consider:

- Turnover by sub sector within postcode sets
- Capital asset adjustment by sub sector within postcode sets
- Office for National Statistics (ONS) GDP calculations
- Supply chain procurement value sub sector by sub sector by postcode sets
- Sub sector specific sales reporting where available

Further adjustment is made on a sub sector basis for both head office activities and virtual working organisations so that, *as far as is practical, we report upon where Sales is conducted rather than where it is reported*[14]. This applies to both domestic and international sales.

Companies is a measure of the total number of companies in the region that match (or fit within) the activity headings for the Adaptation Economy. Because of the limitations in using traditional SIC codes to identify high technology and "new economy" businesses we have used our own unique analytical process to allocate companies to the Adaptation Economy activity headings. The total number of companies in this report has been arrived at by a bottom-up analysis of company stock within the country/ region using such sources as: Companies House, European credit agencies, British Telecom, Institutional listings and UK credit agencies.

Having identified the total company stock in the UK, product and service outputs have been identified and verified by accessing further databases that include: Institutional data sets, Yell, kMatrix proprietary databases, Euromonitor, Dun and Bradstreet and Thompson.

[14] Focusing on where sales are conducted rather than where they are reported counteracts the distortion created by the financial reporting of large corporation whose headquarters may be located in a single location although sales are conducted in multiple locations/ countries.

Employment is a measure of the estimated employment numbers across all aspects of the supply chain. National, regional and other economic data sources have been used to estimate current employment levels for each Adaptation Economy activity. Where employment information is scarce, or where we are estimating employment for a proportion of a company's sales, we rely on our comprehensive case study materials[15] to provide sensible industry- specific ratios and benchmarks. These additional methods and sources for calculating employment are important because, just as SIC codes do not currently cover any Adaptation activities, so ONS Standard Occupational Codes (SOC) do not provide any insight into Adaptation Economy employment.

Following national statistics, our employment figures are disaggregated into four streams- management, supervisory, Administrative and Other. Where we are commissioned for Skills analysis, these four streams are disaggregated into much more detailed occupational groupings.

Our employment figures for Adaptation define the labour intensity of some market activities over others and help to identify the economic activities that are generating the highest levels of employment (but not necessarily value or growth).

Market Growth is our forward looking indicator and has been measured for the short to medium term (five years) where we have a high level of confidence in the growth trend. This indicator enables us to identify the ongoing strength and potential of each economic activity relative to other sector activities within the region/ sub region and relative to growth rates across the UK and in other key country markets (See Calculating Market Values for more information on market forecasting). The market growth rates included in this report are, effectively, a snapshot taken in April 2014. In reality market growth forecasts are a constantly changing reflection of market expectations and institutional confidence in economic performance that fluctuate on a monthly basis.

Imports and Exports are calculated using both in- country and out- of- country data. The data sources accessed include those listed (separately) but also include additional data from the logistics and freight forwarding industry (amongst others). National import export data is accessed from either government agencies or other institutions where available. In addition, we track supply chains and networks where we are able to get data, again through many of the data sources already identified for the sales values figures etc., but also through logistics, consumer data, and supply chain management industries. Multi- sourcing import and export data is essential because companies rarely provide accurate or adequate numbers (to protect their competitive position).

Data Sources

We attempt to limit the risk and error behind the numbers that we publish (whether historical or forecast) by multi- sourcing and monitoring a wide range of reliable sources and then making the remaining range of uncertainty explicit. A full list of sources is provided for this (Annex B) report but within each data template we have calculated and published the number of sources used to compile each of the 1679 lines of market data. On average 100 sources (differing depending upon the market activity) are used for each line of data in the Adaptation Economy study.

[15] kMatrix data sources include a wide range of industry- specific case studies and benchmarks that are used to analyse important business ratios like employment/ turnover, standard financial/ profit rations and operational measures of scrap, quality and supply efficiency. These are primarily used for private sector research but have a part to play in "sense-checking" evidence for market activities where performance data has yet to be collected- like the Adaptation Economy.

For each market we track multiple sources of historical and forecasting data. From these sources we look to select at least seven that are current and that we have routinely tracked and verified (and, therefore, have built confidence in) over a number of years. Sources can be from company, industry, academic, public or market research sources and national statistics. The sources we reject may be out of date, unreliable, drastically under or overstated or too similar to other data sources. The sources we reject may be out of date, unreliable, drastically under or overstated or directly derived from another source that has already been included.

When we have identified a minimum of seven acceptable sources we then take the “average” of the seven figures as our selected figure. We then look at the range of individual responses in relation to the selected figure and if the range of results is within +/- 20% of our selected figure we are generally satisfied. In some cases (where more than seven reliable sources are available) we may look to narrow the range of results by excluding the more extreme results. Where the range of results is greater than +/- 20% we then look for further sources that may be used, until we arrive within the accepted range.

Use of Adaptation Economy Data

Adaptation Economy data is derived in a different way to standard SIC- driven sector data or statistical survey data. Adaptation Economy data is based upon an approach that utilises market intelligence and involves the creation, qualification and examination of new data values using techniques that include data mining, data triangulation, deduction, induction, pattern recognition and trend analysis to produce high level, processed and exploitable economic information drawn from a very wide variety of sources.

Quality Assurance

Quality Assurance (QA) of the research methodology involves strict data management protocols and procedures, most of which are part of our intellectual property. These procedures include rules (developed over a number of years) for:

- “input” i.e. how we collect, store, assess and evaluate multiple sources of data
- “throughput” i.e. how we use multiple sources to calculate new values and apply confidence levels to the results
- “output” i.e. how to present the data in standardised tabular and graphical formats suited to the research requirement.

All data is checked by at least three different trained people and by software routines that measure data gaps and variances. Rules are also built into the data visualisation/ presentation software and templates that we use to ensure consistency and quality of research output. We use external data checks to ensure that our measurement of economic values and impacts are "within scope." We apply confidence levels to any quoted economic value, to ensure that any levels of uncertainty or risk are properly measured.

Data testing and QA occurs at every stage of the research model. Three examples can be used to demonstrate the robustness and thoroughness of QA processes relating to data sources and data reporting.

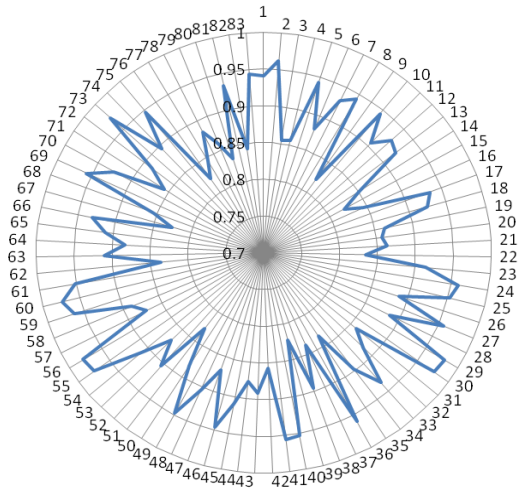
Example 1- Data Source History

Source	Value £m	Year of data relevance	Hit Rate History	Number of times accessed	Accept	Reject	Track	Output	Comments
Petrol Retailers Association	869.27	2006	85%	35	1		Yes	869.27	
DTI	850	2004	60%	62		1	Yes		Old Data
Carbon_Info	1107.32	2005	25%	12		1	Yes		
Planetark	500	2006	48%	6		1	Yes		
Financial Times	604.37	2006	60%	24		1	Yes		
UK Peroliun Industry Association	799.24	2006	80%	47	1		Yes	799.24	
BP	904.51	2006	82%	29	1		Yes	904.51	
ACEA European Automibile Manufacturers Association	850.5	2006	85%	22	1		Yes	850.5	
British Association for Bio Fuels and Oils	915.18	2006	92%	19	1		Yes	915.18	
Bloomberg	850	2006	82%	31	1		Yes	850	
Flemming Bermann	904.51	2004	72%	1		1	Yes		Same ultimate source as BP
Market Watch London	850.27	2006	65%	26		1	Yes		
British Biogen	890.5	2006	85%	22	1		Yes	890.5	
Lloyds Environmental UK	962.71	2005	56%	12		1	Yes		
EXXON Research	900.26	2006	83%	17	1		Yes	900.26	
Range is within tolerance having removed lines 7 and 8	Data range is 962.71 to 850 and is 13% variance						Final Output	872.43	
There are no data warnings for this set									

Example 1 relates to our in-house data banks for tracking data sources over time. For each source, there is a history based upon source name, source value, year it relates to, number of times used by us, "hit rate" (reliability) and whether it is to be accepted for a specific research purpose. These data banks are fully transparent and auditable and relate to each calculated cell within any sector data-set. These data banks are monitored closely internally and are routinely spot- checked each year by clients as part of peer- review audit.

Example 2 shows what happens after sources are accepted as part of the research process. The example shows a sector activity for which there are 80+ data sources. Radar charts are automatically generated within our system and display the variation in the range of source values, with a view to achieving an 85% or higher confidence level. Sources that fall outside of the required range are investigated and then may be filtered out from the final source selection. As with the track record for data sources (above), radar charts (and the further examples listed below) can all be used as part of internal and external audit programmes.

Example 2- Data Source Selection



These radar charts serve multiple purposes:

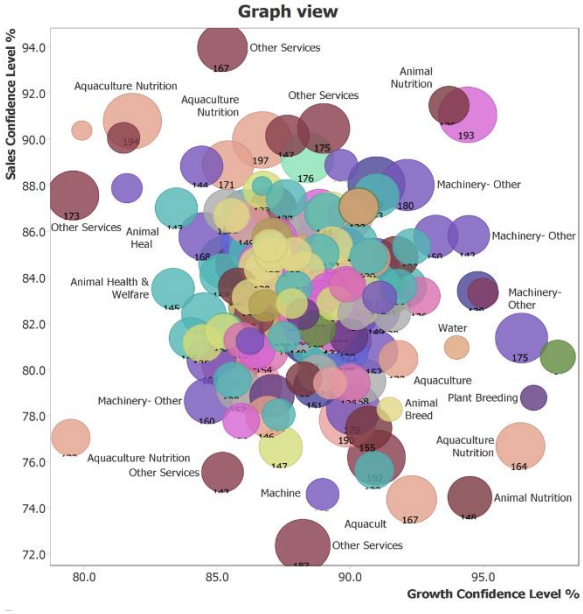
- They make a statement about the overall status of sector reporting (either in terms of volume of sources or variance in sources)

- They illustrate the difference status of data sources between different sub sectors within the same sector (i.e. we can track the improvements in reporting over time for "new" activities)

- They can be run every time a dataset is updated and used to position and evaluate any single source in relation to other data sources (confirming our confidence in its continued inclusion).

Example 3 shows the automatic tracking of confidence levels assigned to each sector activity and to individual measures- in this case Sales and Growth.

Example 3 - Mapping Data Confidence Levels



By mapping multiple measures for activities (or countries) it is possible to quickly identify where additional sources and research may be required to ensure that all values fall within the target confidence levels.

Bubble or scatter charts quickly illustrate the differences in results achieved by the data source selection process and demonstrate:

- Existing variances in data source quality
- Areas for current or future monitoring for new/ additional sources
- Sector activities that need to be "red-flagged" because of low confidence levels, despite best efforts to improve the outcome

Annex G - Further Explanation of Defining and Measuring the Adaptation Economy Referred to in Section 3

Background

The first attempt to define and measure Adaptation and Resilience was made in 2009/10 in research commissioned by the UK Department for Environment, Food and Rural Affairs (Defra)[16]. This research included an initial definition for Adaptation and Resilience of:

- Construction & Retrofit
- Finance, Investment & Insurance
- Risk Management & Business Continuity
- Urban Environment Redesign & Re-Engineering
- Sustainable Drainage & Water Management
- Energy Storage Infrastructure Resilience
- Transport Infrastructure & Logistics Resilience
- Water Irrigation & Foot printing.

During 2013 the definition for Adaptation was extended to include a much wider range of economic activities. The new definition includes the above activities under new sector headings, adds new activities to those sector headings and adds brand new sectors to the definition.

The definition now draws its activity descriptions from twelve sectors of the broader local economy:

- Agriculture & Forestry
- Built Environment
- Disaster Preparedness
- Energy
- Health
- Healthcare
- ICT
- Natural Environment
- Professional Services
- Transport
- Waste
- Water

This definition - referred to briefly in the Glossary and in more detail at Annex A - forms the basis for this report. The definition as it now stands includes the key Adaptation measures identified by the IPCC: systems that warn people of impending disasters; changes in land use planning; sustainable land management; ecosystem management; improvements in health surveillance, water supplies, and drainage systems; development and enforcement of building codes and better education/ awareness. For the avoidance of doubt the definition is not just a subset of the activities analysed in previous Low Carbon and Environmental Goods and Services research[17] but incorporates new analyses from different sectors. It also does not attempt to examine potential economic losses as a result of adaptation activities.

These key Adaptation measures now reflect the full range of "risks"[18] exacerbated by climate change, which include:

- Sea level rise and coastal flooding and storm surges

[16] Published by Department for Business, Innovation and Skills, A&RCC Report 2009/10, dated July 2011

[17] Available here: http://www.london.gov.uk/priorities/environment/publications/london-low-carbon-market-snapshot-2013

[18] IPCC WGII AR5 Chapter 19 pp.33-35 and Committee on Climate Change, 2017 Risk Assessment Report

- Food insecurity and the breakdown of food systems linked to warming, drought and precipitation variability
- Inland flooding and the threat to large urban populations
- Insufficient access to drinking and irrigation water in rural areas and reduced agricultural productivity
- Systemic risks affecting infrastructure electricity, water supply, health and emergency services
- Health risks due to extreme heat, air pollution and disease
- Risks to culturally valued structures and the wider historic environment
- Risks to export markets due to perceived risk of supply

The definition is less representative of risks like loss of marine and terrestrial ecosystems, which are generally more geographically defined and more difficult to measure.

The New Definition

As mentioned previously, there are no available taxonomies or dedicated sources of economic data for the Adaptation Economy. Therefore, the research approach has included several stages:

- Scoping the broader "make and mend[19]" economy (which encompasses the eleven sectors identified previously), within which Adaptation and Resilience activities reside,
- Examining the data and sources within the "make and mend" economy to construct an evidence base of sources that can be used to measure Adaptation and Resilience
- Where possible differentiating the climate change element of the Adaptation Economy from those Adaptation and Resilience activities that occur due to other reasons, see 3.6
- The creation of decision trees/rules sets and economic models that enable the differentiation and quantification of data to produce climate change-specific values

The only possible way to arrive at climate change content has been to create the higher levels of evidence and analysis. The resulting taxonomy is shown at Annex A.

This has been an iterative "bottom-up" and "top-down" process including the search for evidence that fits the "ideal" definition and also the inclusion or omission of aspects of the "ideal" definition according to the available evidence. The result is a pragmatic definition that only includes economic activities for which multiple sources can be identified. These sources, eclectically drawn from all 12 sectors and a wide range of institutions, are listed at Annex B.

Organising the Activities

The second challenge, after identifying the myriad and unconnected strands of evidence (drawn from multiple sectors) that can be used to identify specific Adaptation and Resilience activities is to organise them into a usable taxonomy. This involves two tasks:

[19] Essentially business as usual, with changes to practice as a reaction to events

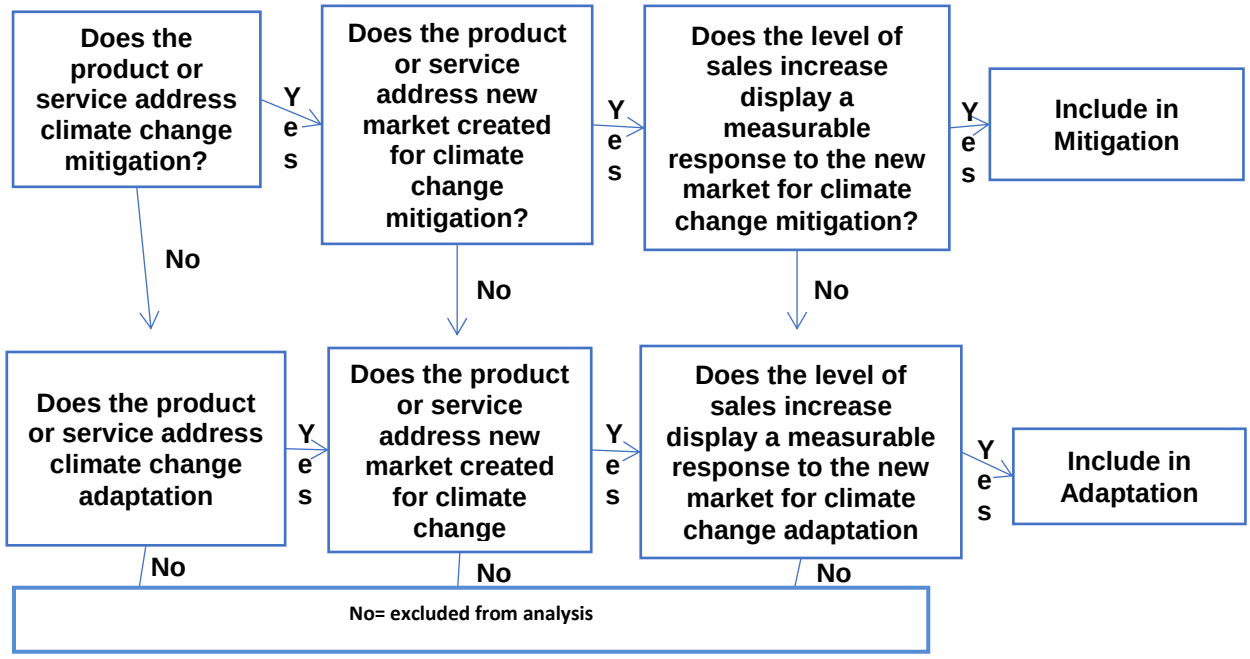
- The first is to try and adapt the "language" of products and services created from different industrial sectors so that they describe and fit with the defined Adaptation activities.
- The second is to then attempt to group those activities together in a meaningful hierarchical relationship for analytical and reporting purposes.

There are many ways to group economic activities together. Obvious examples are: does agricultural finance sit with "Agriculture" or "Finance"? Should Consulting Services be grouped together as part of Professional Services or sit with the industry where they are conducted? Although the report is based on a single taxonomy or grouping of activities (Annex A), the underlying data is coded so that different filters or groupings can be applied. The evidence base could, therefore, be organised and analysed in different ways and produce different results but within the confines of the existing definition. The climate change literature offers no obvious guides to defining the Adaptation Economy, therefore, from analysis of the historical and current highly fragmented sources of evidence, we believe that further definitional changes are inevitable and that new/multiple taxonomies will evolve.

Developing the Rule Sets

Once the Adaptation activities had been identified and then organised, the next stage was to generate the rules and decision trees that would act as filters, firstly for Adaptation and Resilience and then for the Climate Change element.

The first stage of filtration was to ensure that only Adaptation and Resilience activities were included. This involved screening out any Climate Change activities that might relate to Mitigation. A simplified version of the decision tree used is shown below.



The next stage of filtration was to ensure that the sector related data sources only included activities and values that related to Adaptation and Resilience rather than other more general "make and mend" activities i.e. how to ensure that only the relevant parts of road building, bridge building or house building (big economic sectors) are included. This process is described and illustrated in more detail at Annex D, using a general model and examples for roads and flood barriers.

The final stage of filtration was to find sufficient evidence of "purpose or intent" (generally through data sources relating to procurement across the twelve sectors) to be able to determine whether a product or service has been used as an adaptation response to climate change. This process is shown in more detail in the examples shown at Annex D where multiple data "triangulation points" are shown i.e. points at which multiple data sources are compared (industrial reporting, procurement data, contracting, logistics, insurance data etc.) so that direct and indirect adaptation activities (see Section 2.4) can be quantified.

Applying the Rule Sets

Designing the rule sets for Adaptation and Resilience was easier than the process of applying them. Deciding what is/is not Adaptation and Resilience is the more straightforward stage as the industry-based sources of evidence have started to record, if not report, climate and weather related activities. Determining, at the next stage, what is related to climate change is more complex and judgemental as the evidence is often unclear.

Within the research, Adaptation and Resilience activities have been divided into a number of categories, only one of which relates specifically to climate change. These are:

- Response to climate change
- Responses to General Environmental/Ecological Disasters
- Responses to General Environmental Policies and Targets
- General Maintenance
- Traditional (non-Climate Change) Applications
- Other non-Climate Change Services

References to Adaptation and Resilience (A&R) values throughout this report are an aggregate of all of the above categories - including climate change, while references to Adaptation and Resilience due to Climate Change (A&RCC) relate to only the climate change option. A typical example would be road planning and road building to take account of growing population centres and traffic volumes (A&R) as opposed to the same activities, but this time taking account of increased rates of coastal erosion attributable to climate change (see Annex D). Both sets of values are included as part of the Adaptation Economy and used throughout this report because it is important, at least initially, to examine the division, current relationship and future trends between A&R and A&RCC.

As a convention throughout the report, and to reduce the level of analysis to reasonable proportions, A&R and A&RCC sales are measured and compared throughout, but other measures (and comparisons between regions) usually only relate to A&RCC.

Allocating values to these categories was based upon two factors, does the evidence clearly suggest which category is appropriate and, if not, can the activity value be sensibly apportioned across one or more of the categories.

The quality and appropriateness of data sources (once they could be identified) varied widely in terms of not only what they included in their definition for adaptation and resilience but also their granularity of detail. In some cases, reported data was clear and sales (for example) were accounted separately, however in others the sales figures reported included several other aspects not classified as Adaptation and Resilience. In cases such as this there is a need to triangulate[20] with data sources outside of the industry. Recording and reporting practices varied on an industry-by-industry basis, (which in itself is an interesting observation in itself) and this is briefly illustrated in Box 3 and summarised below.

Box 3: Example drawn from Insurance Industry

This example illustrates the apportionment of ARCC for the Insurance Industry i.e. the approach that is used to capture variations from business as usual).

The climate change data is very much driven by the actuarial sector that provide data on historic occurrences that are related to the effects of climate change over a period of time. Examples include not only such elements as extreme flooding and exceptional weather conditions but also more gradual and consistent events like the relative increase and decline of claims over time for climate related issues such as road repair etc. The problem is that there are varying views in the industry as to what constitutes a representative period of time in terms of climate change. It is from these sources however that we are able to differentiate pay out proportions that are relevant to adaption and resilience.

There is an on-going issue around actuaries and statisticians versus data miners as many calculative processes differ between disciplines when dealing with large amounts of historic data. As more data becomes available in large quantities the industry is likely to adopt new ways of assessing historic evidence in order to develop new risk indexes for climate change insurance purposes. There are a number of initiatives currently being conducted towards the development of internationally recognised actuarial climate risk index sets and within these initiatives varying definitions are used. For example, the Casualty Actuarial Society, the Canadian Institute of Actuaries, the Society of Actuaries, and the American Academy of Actuaries' Property/Casualty Extreme Events Committee are collaboratively commissioning committees to recommend, support and perform research on climate change and assess the potential risk management implications for the insurance industry overall

Decision gates are used by kMatrix to record adaption and resilience where the nature of incident is outside the norm as reported by the insurance industry. There are many differing terminologies within the industry, so we have been guided by data from organisations that are focused in this area including the following;

- Institute and faculty of actuaries
- Society of actuaries
- SIAS (Staple Inn Actuarial Society)
- PWC
- Climate Wise
- Munich Climate Insurance Initiative (MCII)
- CEA (Insurers of Europe)
- Lloyds of London
- CIMA (chartered institute of management accountants)
- ACCA

[20] The process of data triangulation is represented in the general, road and flood barrier examples in Annex C

- KPMG
- Chartered insurance institute
- CPCU Society

kMatrix also draws on the insurance industry overall for pay out records.

Observations on the Evidence Base

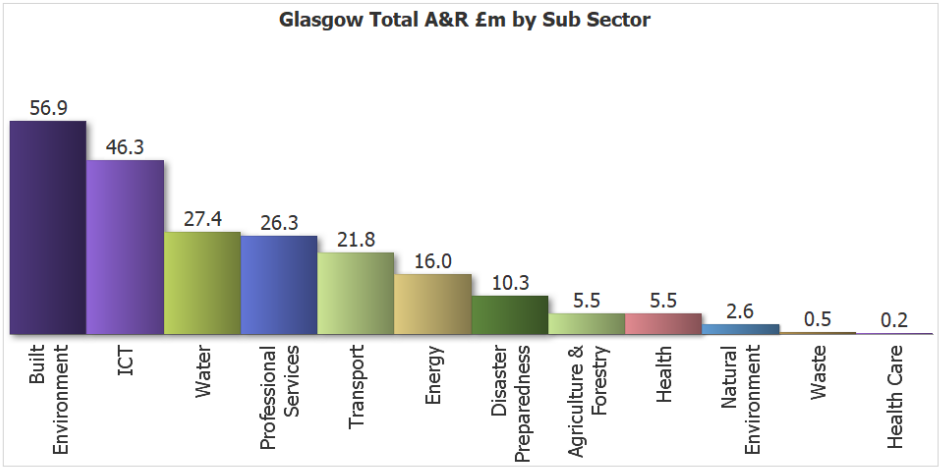
It was stated previously that the Adaptation Economy had no dedicated sources of information that could be accessed or mined for data. However, some industry recording and reporting on Adaptation and Resilience does exist (Annex B), although it may be patchy and often contradictory due to the use of inconsistent definitions. These sources have been data mined thoroughly as part of this research and a selected summary of the quality or "readiness for use" of these sources, by industry, is included below:

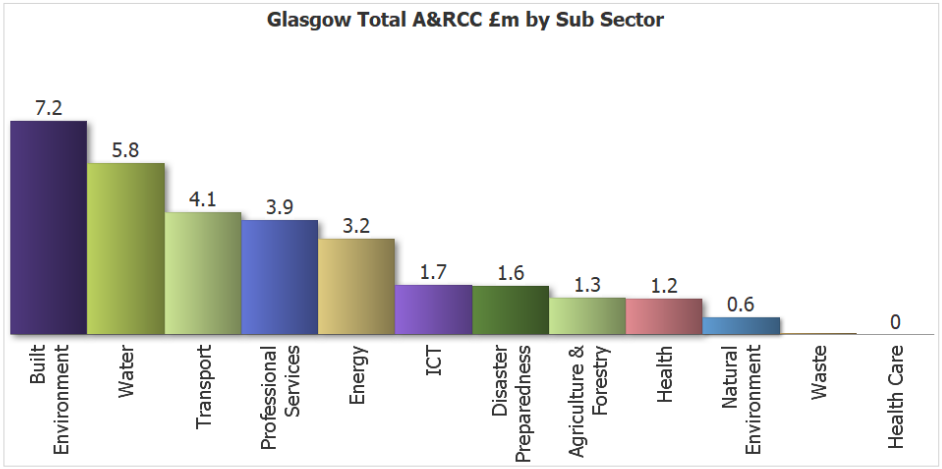
- Environment finance is relatively well informed via the actuarial and financial analytical sectors
- Waterways and barrier management was highly variable in its reporting, but procurement data gave higher definition and granularity
- Weather station services recorded demand for services from both existing (agriculture, shipping, aviation) and new industry clients
- Architectural services data, definition of adaptation and resilience, was probably the most accurate source of all
- Insurance services define new quotations for business as a result of changing risk due to climate adjustment over previous years (see above)
- Banking services, whilst enjoying rich data sets do not consistently record data in this field, therefore it has been necessary to triangulate data outside of the industry
- Urban environment redesign & re-engineering records data consistently for industrial and public projects and sales but not for public sales
- Agriculture is not well documented in this area, so results have been triangulated from a range of sources that include procurement, the water industry and waterways and barrier
- The construction industry trade bodies along with civil engineering and engineering institutions actively report the change in market demand due to climate change. However, due to differences in definition data sources vary quite widely
- Data is available for manufacture and supply of retro fit engineering equipment but not specific to climate change, therefore a degree of apportionment is required
- The water industry records Adaptation and Resilience data on sustainable drainage & water management (domestic, industrial, public and agricultural)
- Transport infrastructure rail and road sector data is relatively detailed, with some triangulation from the procurement chain.

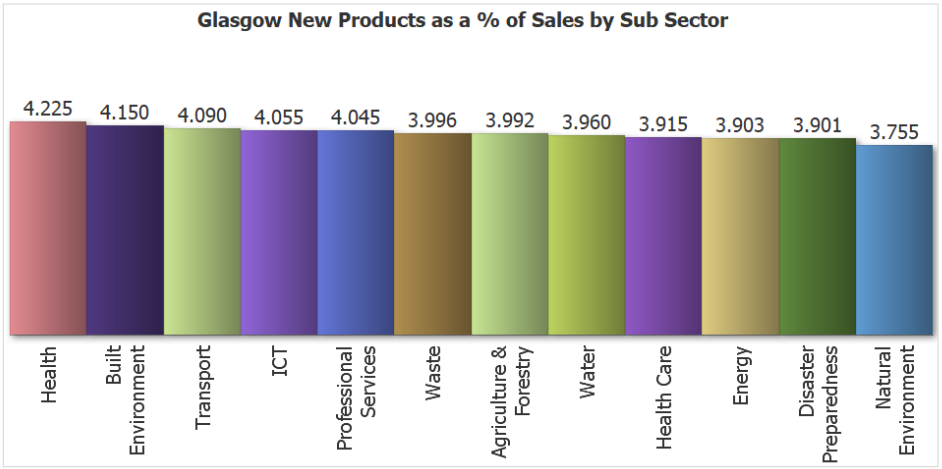
This summary of observations on the evidence base helps to quickly assess the high-level accuracy of data, and also gives an indication of those industries that have already started to respond to the challenges and opportunities of climate change.

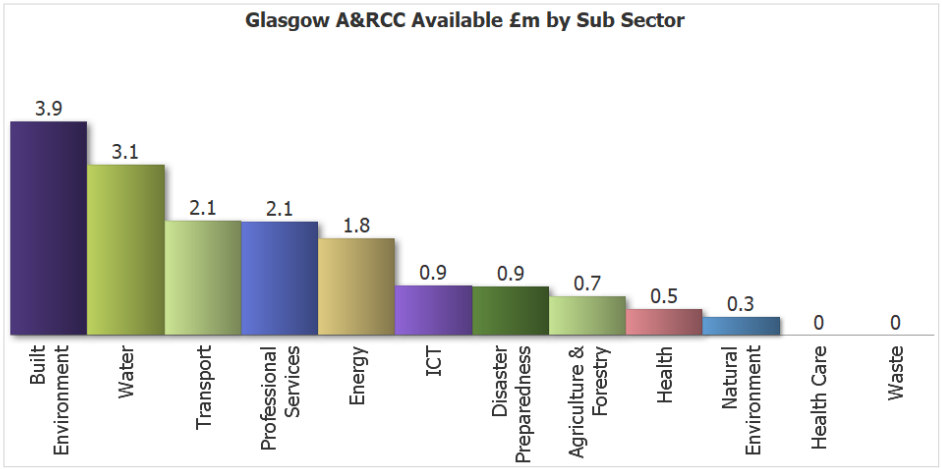
Annex H - Local Authority Dashboards

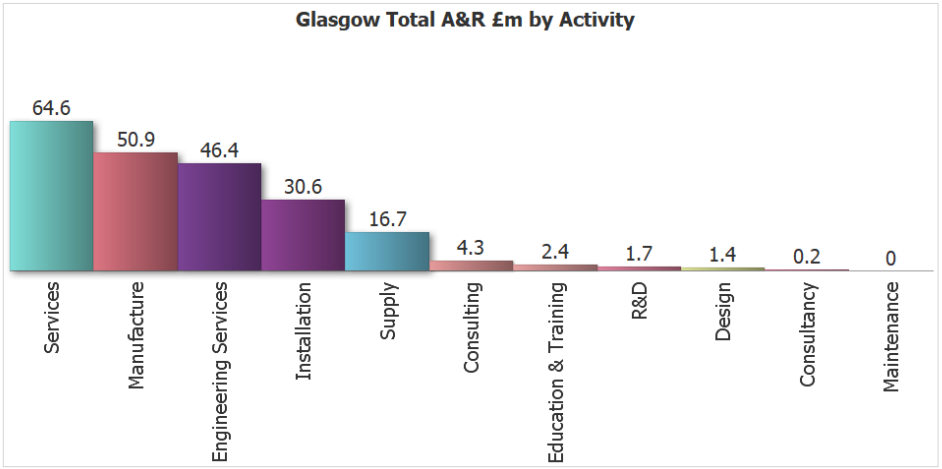
F1: Glasgow

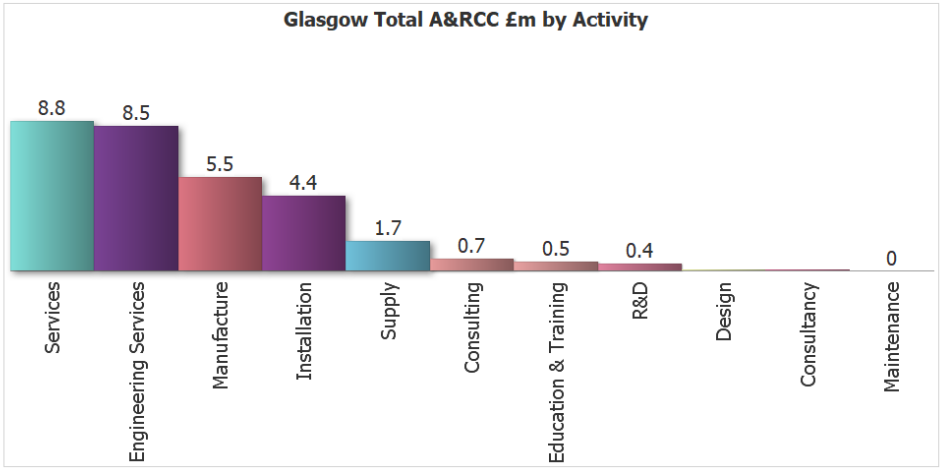


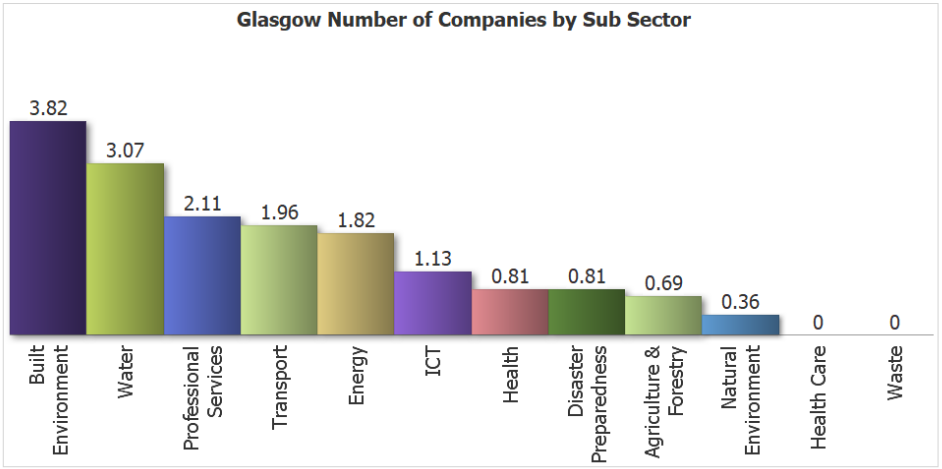


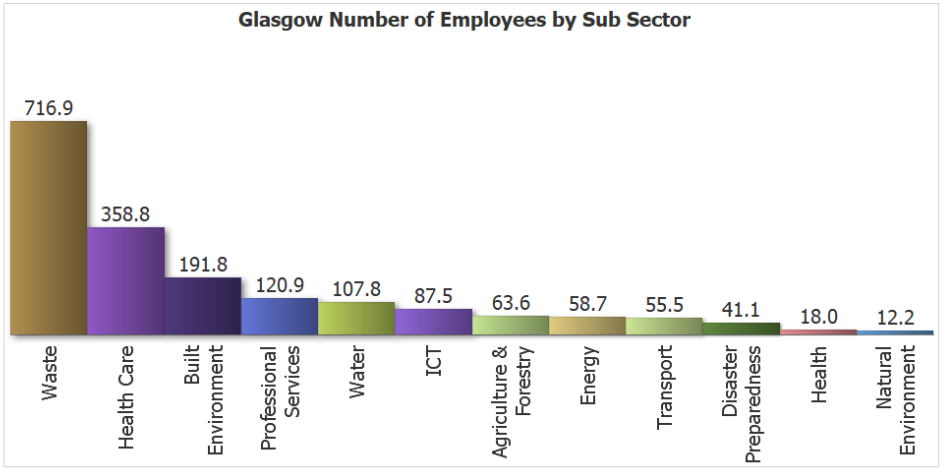


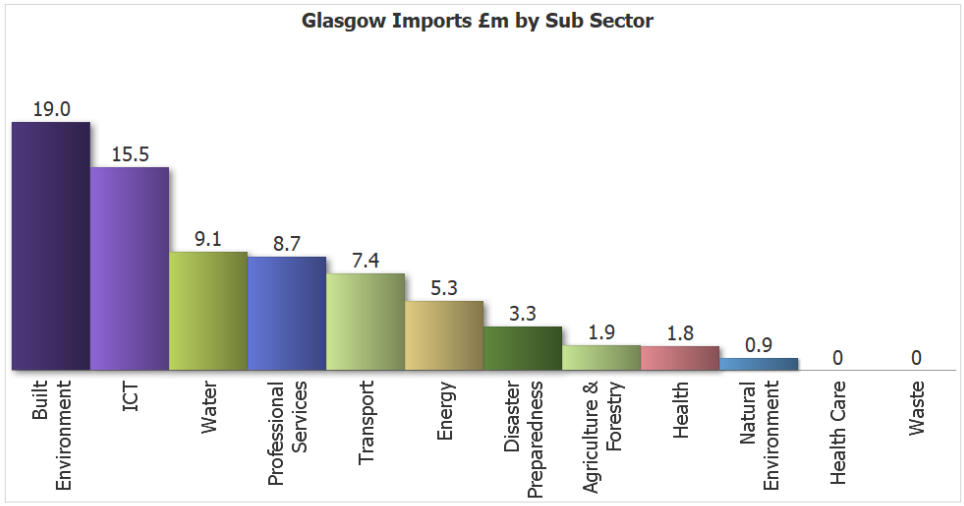


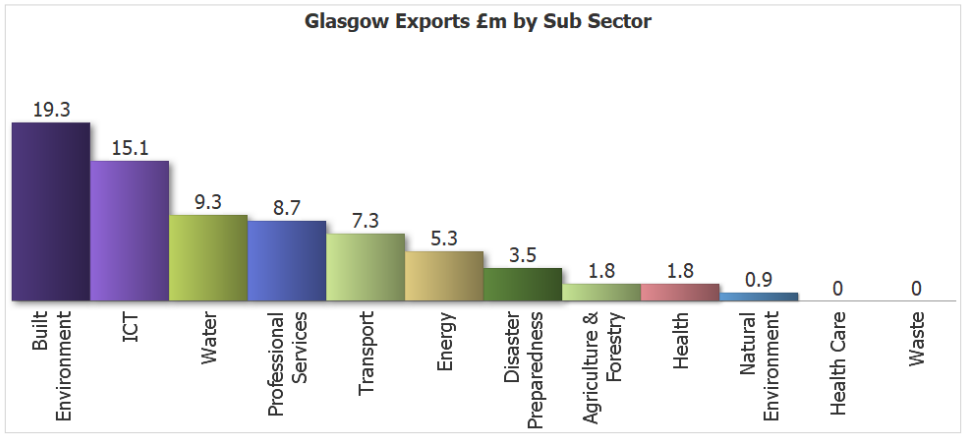

Glasgow Total A&R £m by Activity
64.6
50.9
46.4
30.6
16.7
4.3
2.4
1.7
1.4
0.2
0
Services
Manufacture
Engineering Services
Installation
Supply
Consulting
Education & Training
R&D
Design
Consultancy
Maintenance

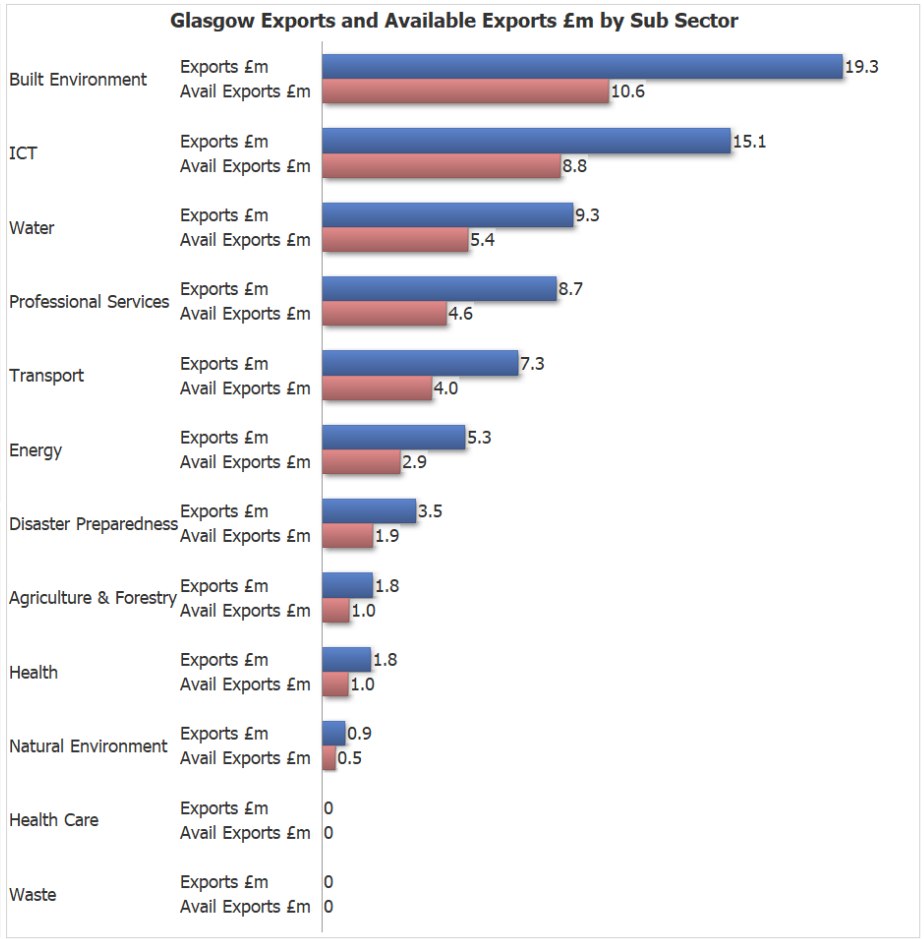

Glasgow Total A&RCC £m by Activity
8.8
8.5
5.5
4.4
1.7
0.7
0.5
0.4
0
Services
Engineering Services
Manufacture
Installation
Supply
Consulting
Education & Training
R&D
Design
Consultancy
Maintenance

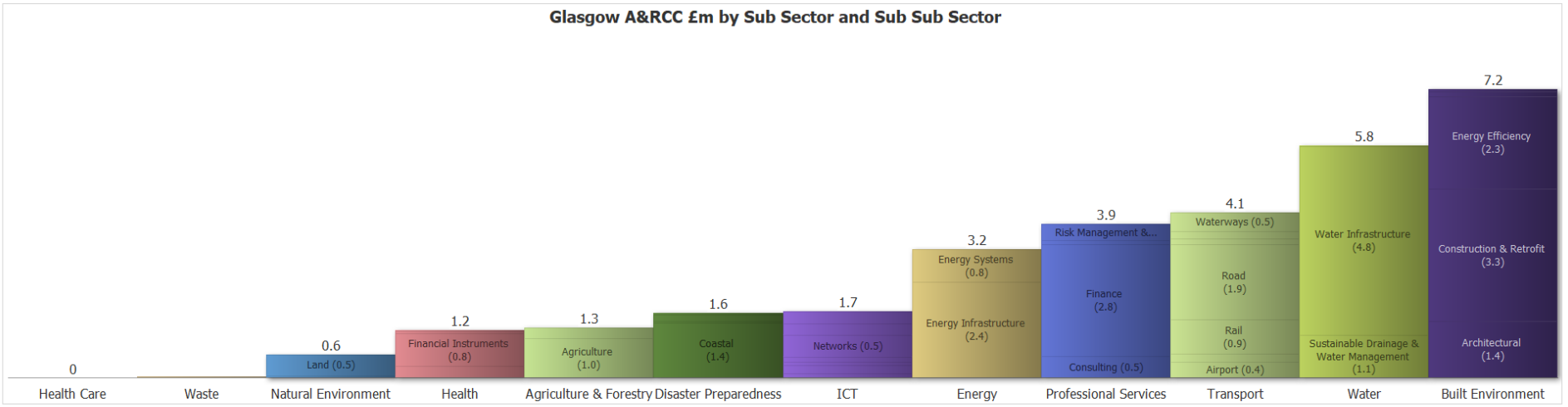

Glasgow Number of Companies by Sub Sector
3.82
3.07
2.11
1.96
1.82
1.13
0.81
0.81
0.69
0.36
0
0
Built Environment
Water
Professional Services
Transport
Energy
ICT
Health
Disaster Preparedness
Agriculture & Forestry
Natural Environment
Health Care
Waste

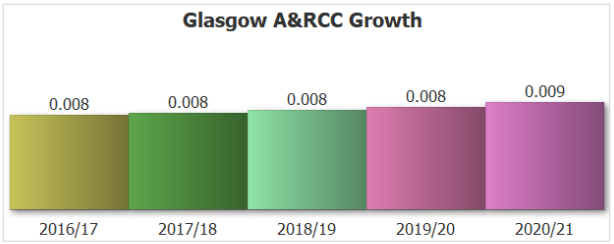

Glasgow Number of Employees by Sub Sector
716.9
358.8
191.8
120.9
107.8
87.5
63.6
58.7
55.5
41.1
18.0
12.2
Waste
Health Care
Built Environment
Professional Services
Water
ICT
Agriculture & Forestry
Energy
Transport
Disaster Preparedness
Health
Natural Environment

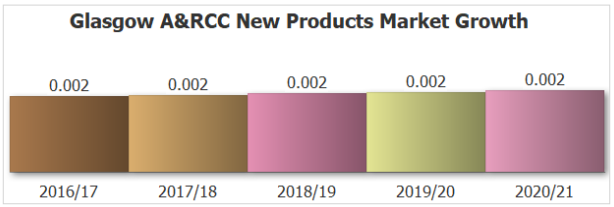

Glasgow Imports £m by Sub Sector
19.0
15.5
9.1
8.7
7.4
5.3
3.3
1.9
1.8
0.9
0
0
Built Environment
ICT
Water
Professional Services
Transport
Energy
Disaster Preparedness
Agriculture & Forestry
Health
Natural Environment
Health Care
Waste

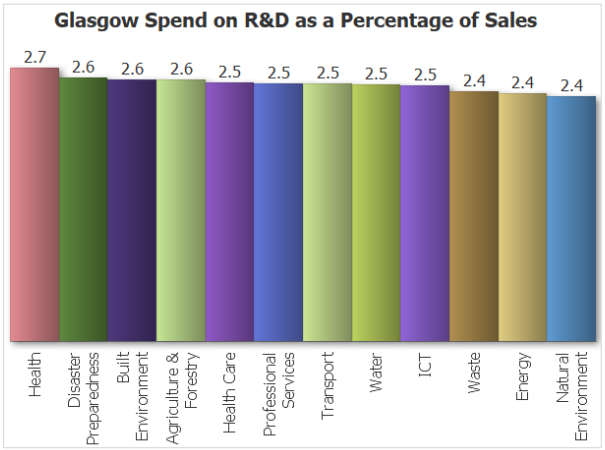

Glasgow Exports £m by Sub Sector
19.3
15.1
9.3
8.7
7.3
5.3
3.5
1.8
1.8
0.9
0
0
Built Environment
ICT
Water
Professional Services
Transport
Energy
Disaster Preparedness
Agriculture & Forestry
Health
Natural Environment
Health Care
Waste

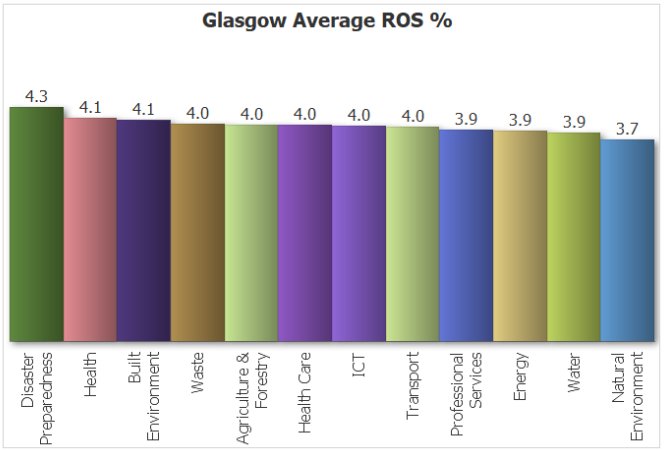

Glasgow Exports and Available Exports £m by Sub Sector
Built Environment
Exports £m 19.3
Avail Exports £m 10.6
ICT
Exports £m 15.1
Avail Exports £m 8.8
Water
Exports £m 9.3
Avail Exports £m 5.4
Professional Services
Exports £m 8.7
Avail Exports £m 4.6
Transport
Exports £m 7.3
Avail Exports £m 4.0
Energy
Exports £m 5.3
Avail Exports £m 2.9
Disaster Preparedness
Exports £m 3.5
Avail Exports £m 1.9
Agriculture & Forestry
Exports £m 1.8
Avail Exports £m 1.0
Health
Exports £m 1.8
Avail Exports £m 1.0
Natural Environment
Exports £m 0.9
Avail Exports £m 0.5
Health Care
Exports £m 0
Avail Exports £m 0
Waste
Exports £m 0
Avail Exports £m 0


Glasgow A&RCC £m by Sub Sector and Sub Sub Sector
0
0.6
Land (0.5)
1.2
Financial Instruments (0.8)
1.3
Agriculture (1.0)
1.6
Coastal (1.4)
1.7
Networks (0.5)
3.2
Energy Systems (0.8)
Energy Infrastructure (2.4)
3.9
Risk Management &...
Finance (2.8)
Consulting (0.5)
4.1
Waterways (0.5)
Road (1.9)
Rail (0.9)
Airport (0.4)
5.8
Water Infrastructure (4.8)
Sustainable Drainage & Water Management (1.1)
7.2
Energy Efficiency (2.3)
Construction & Retrofit (3.3)
Architectural (1.4)
Health Care
Waste
Natural Environment
Health
Agriculture & Forestry
Disaster Preparedness
ICT
Energy
Professional Services
Transport
Water
Built Environment

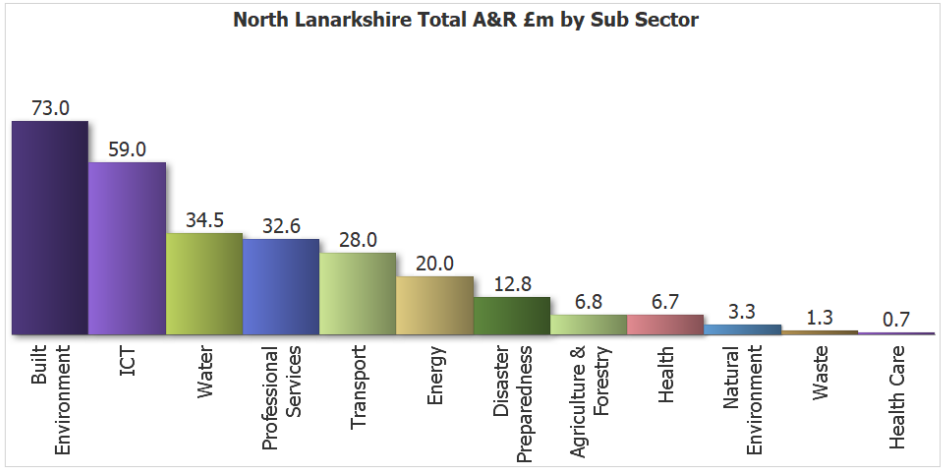

Glasgow A&RCC Growth
0.008
0.008
0.008
0.008
0.009
2016/17
2017/18
2018/19
2019/20
2020/21

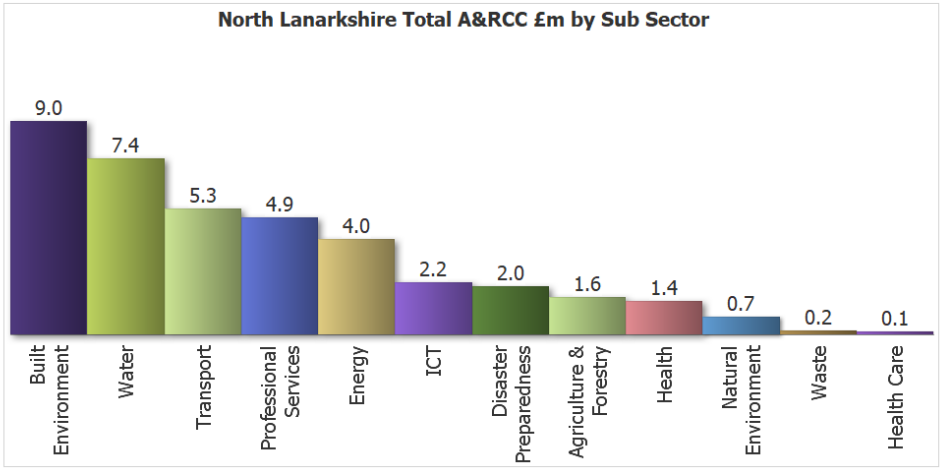

Glasgow A&RCC New Products Market Growth
0.002
0.002
0.002
0.002
0.002
2016/17
2017/18
2018/19
2019/20
2020/21

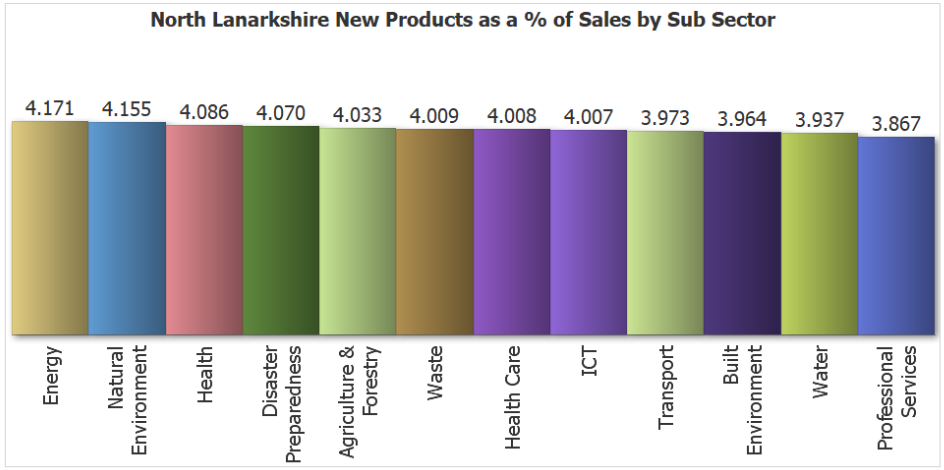

Glasgow Spend on R&D as a Percentage of Sales
2.7
2.6
2.6
2.6
2.5
2.5
2.5
2.5
2.5
2.4
2.4
2.4
Health
Disaster Preparedness
Built Environment
Agriculture & Forestry
Health Care
Professional Services
Transport
Water
ICT
Waste
Energy
Natural Environment

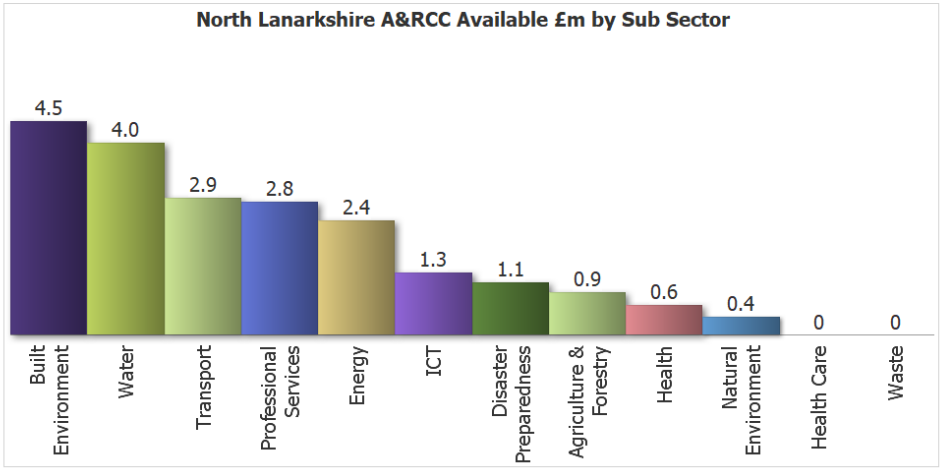

Glasgow Average ROS %
4.3
4.1
4.1
4.0
4.0
4.0
4.0
4.0
3.9
3.9
3.9
3.7
Disaster Preparedness
Health
Built Environment
Waste
Agriculture & Forestry
Health Care
ICT
Transport
Professional Services
Energy
Water
Natural Environment

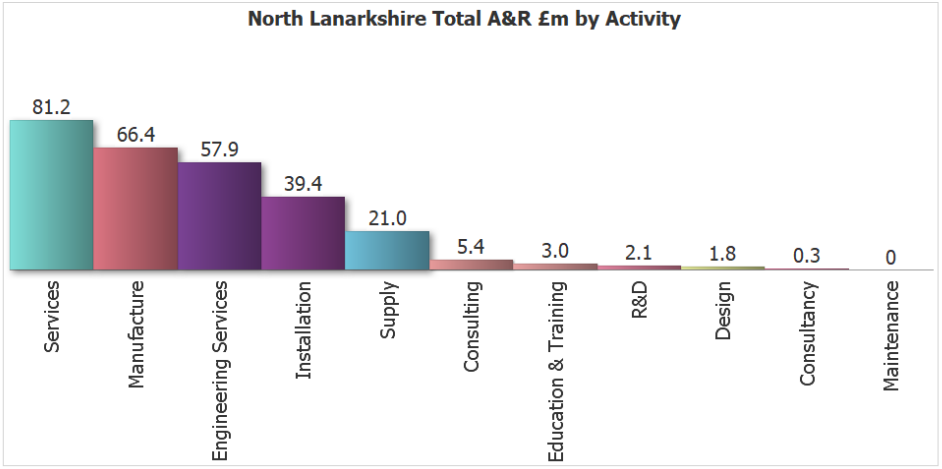
F2: North Lanarkshire

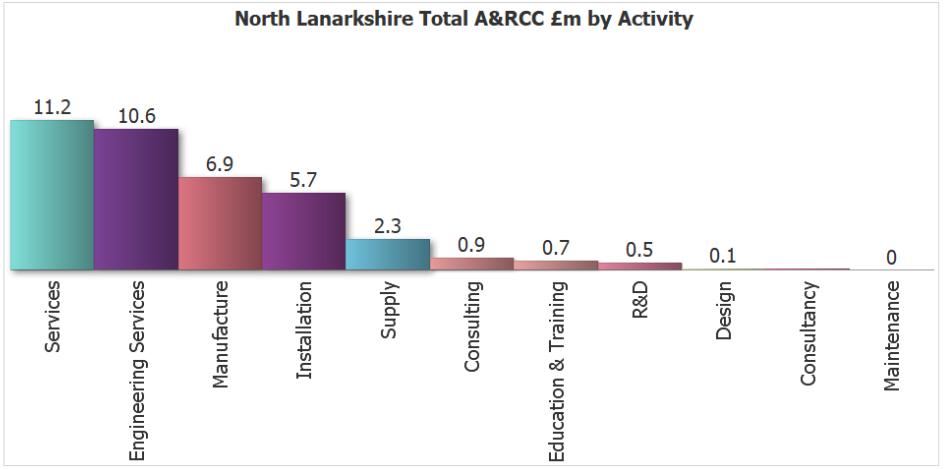


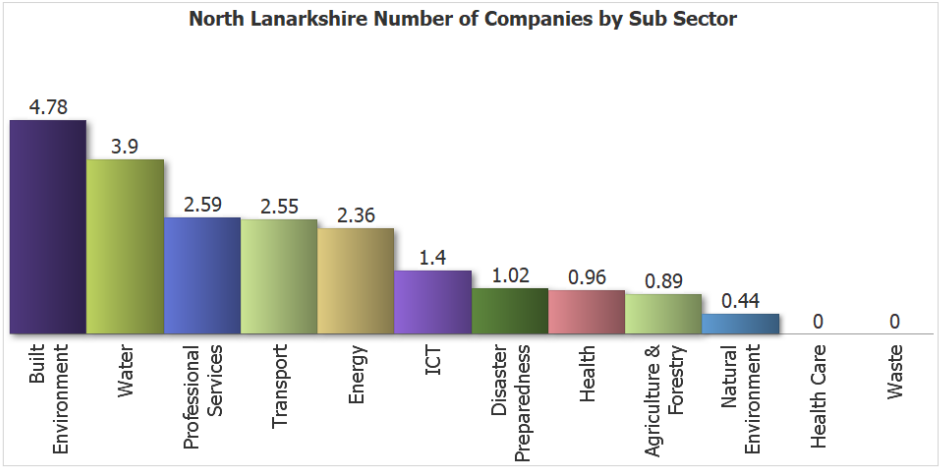


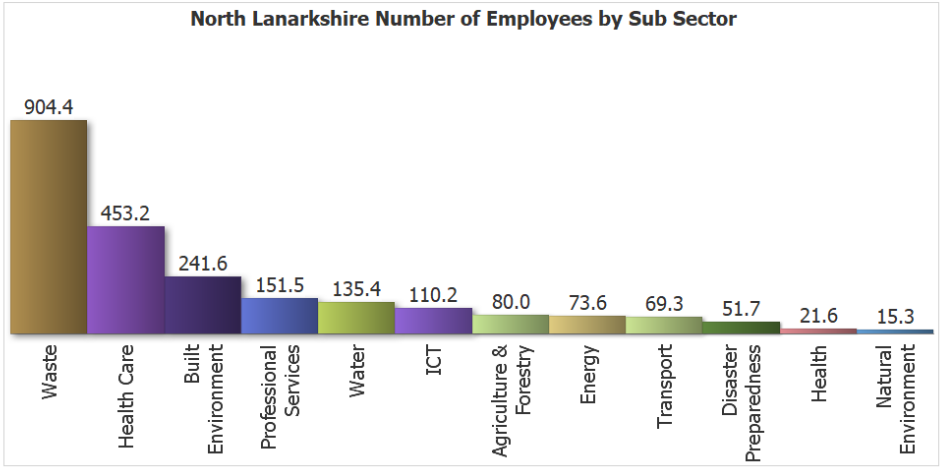


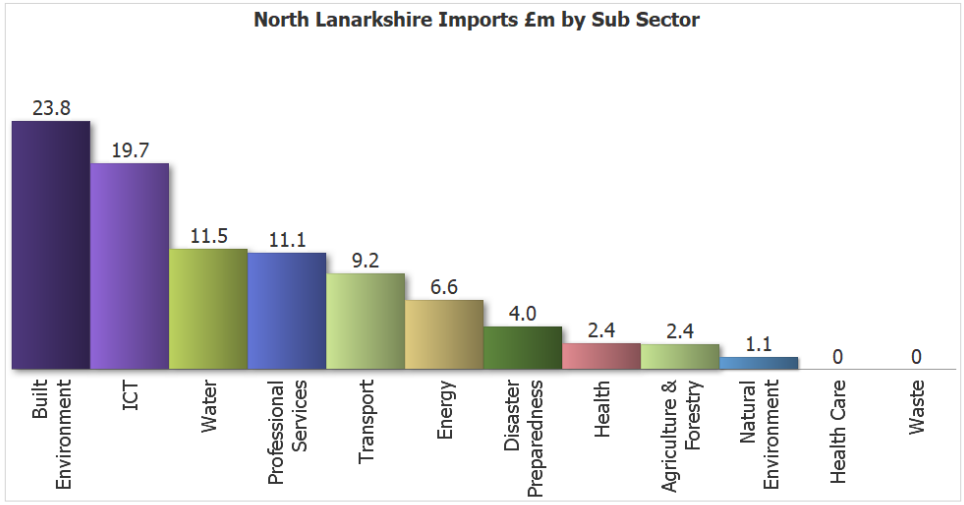


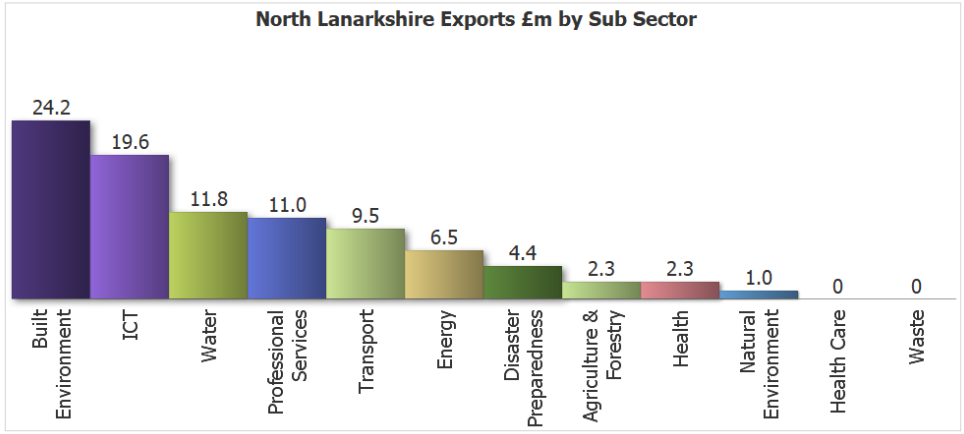

North Lanarkshire Total A&R £m by Activity
81.2
66.4
57.9
39.4
21.0
5.4
3.0
2.1
1.8
0.3
0
Services
Manufacture
Engineering Services
Installation
Supply
Consulting
Education & Training
R&D
Design
Consultancy
Maintenance

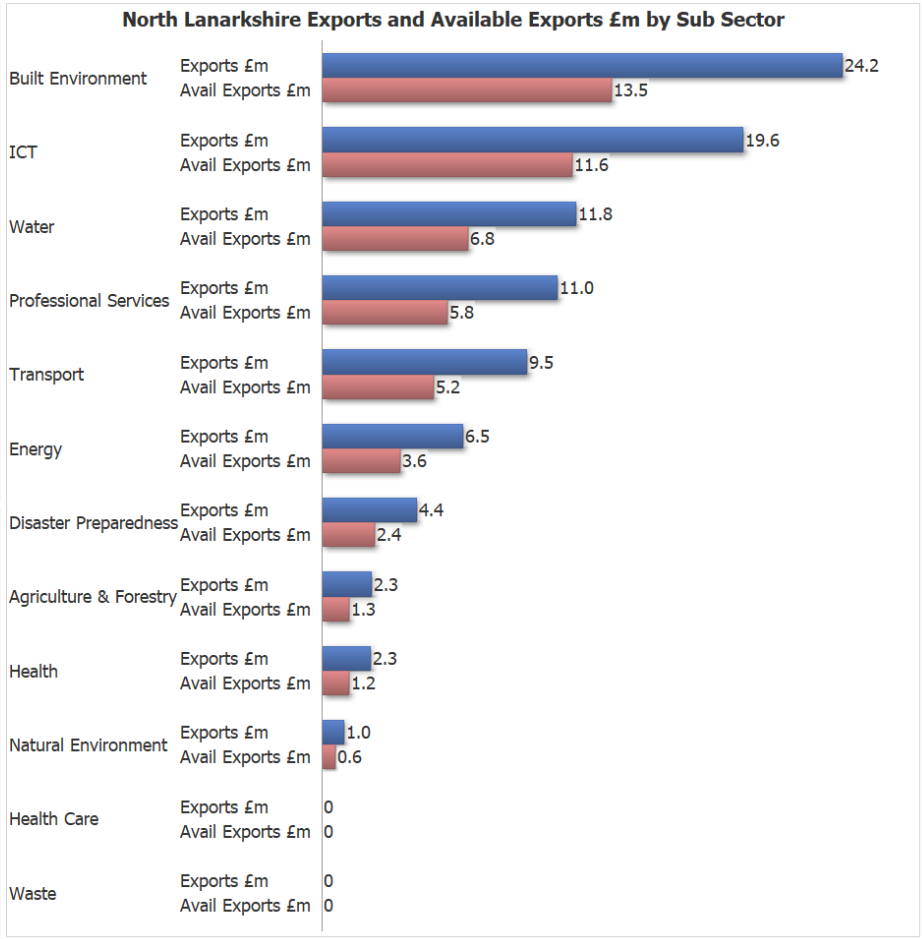

North Lanarkshire Total A&RCC £m by Activity
11.2
10.6
6.9
5.7
2.3
0.9
0.7
0.5
0.1
0
Services
Engineering Services
Manufacture
Installation
Supply
Consulting
Education & Training
R&D
Design
Consultancy
Maintenance

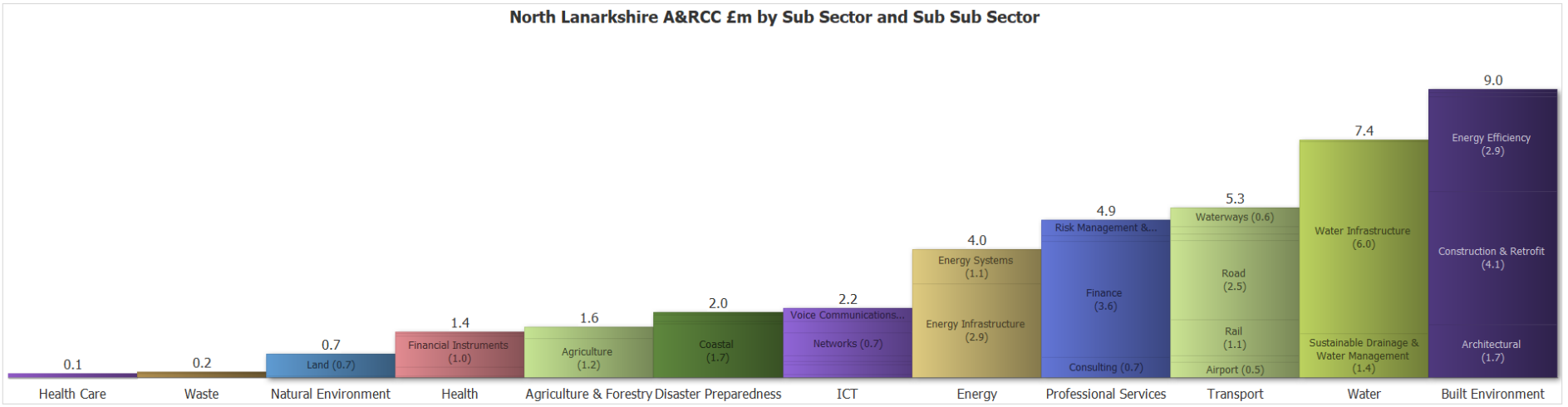

North Lanarkshire Number of Companies by Sub Sector
4.78
3.9
2.59
2.55
2.36
1.4
1.02
0.96
0.89
0.44
0
0
Built Environment
Water
Professional Services
Transport
Energy
ICT
Disaster Preparedness
Health
Agriculture & Forestry
Natural Environment
Health Care
Waste

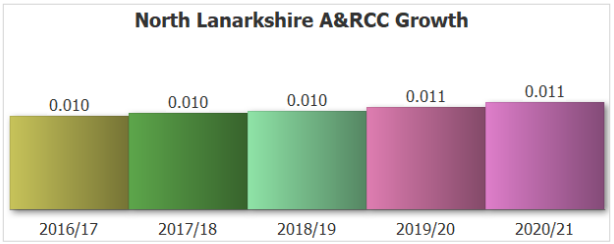

North Lanarkshire Number of Employees by Sub Sector
904.4
453.2
241.6
151.5
135.4
110.2
80.0
73.6
69.3
51.7
21.6
15.3
Waste
Health Care
Built Environment
Professional Services
Water
ICT
Agriculture & Forestry
Energy
Transport
Disaster Preparedness
Health
Natural Environment

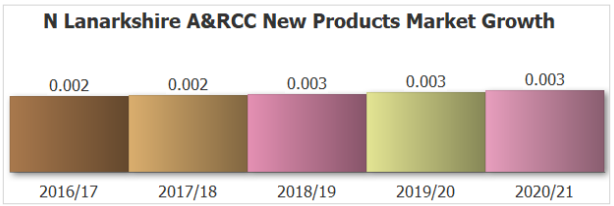

North Lanarkshire Imports £m by Sub Sector
23.8
19.7
11.5
11.1
9.2
6.6
4.0
2.4
2.4
1.1
0
0
Built Environment
ICT
Water
Professional Services
Transport
Energy
Disaster Preparedness
Health
Agriculture & Forestry
Natural Environment
Health Care
Waste

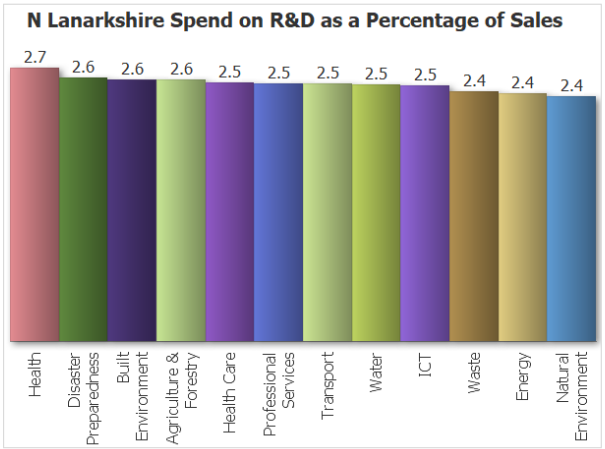

North Lanarkshire Exports £m by Sub Sector
24.2
19.6
11.8
11.0
9.5
6.5
4.4
2.3
2.3
1.0
0
0
Built Environment
ICT
Water
Professional Services
Transport
Energy
Disaster Preparedness
Agriculture & Forestry
Health
Natural Environment
Health Care
Waste

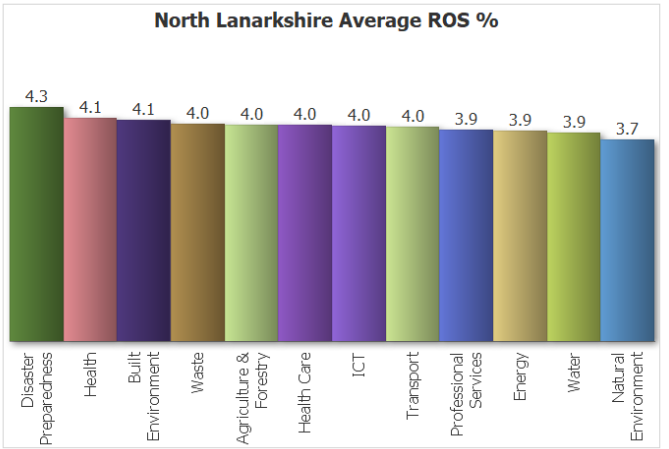

North Lanarkshire Exports and Available Exports £m by Sub Sector
Built Environment
Exports £m 24.2
Avail Exports £m 13.5
ICT
Exports £m 19.6
Avail Exports £m 11.6
Water
Exports £m 11.8
Avail Exports £m 6.8
Professional Services
Exports £m 11.0
Avail Exports £m 5.8
Transport
Exports £m 9.5
Avail Exports £m 5.2
Energy
Exports £m 6.5
Avail Exports £m 3.6
Disaster Preparedness
Exports £m 4.4
Avail Exports £m 2.4
Agriculture & Forestry
Exports £m 2.3
Avail Exports £m 1.3
Health
Exports £m 2.3
Avail Exports £m 1.2
Natural Environment
Exports £m 1.0
Avail Exports £m 0.6
Health Care
Exports £m 0
Avail Exports £m 0
Waste
Exports £m 0
Avail Exports £m 0


North Lanarkshire A&RCC £m by Sub Sector and Sub Sub Sector
0.1
0.2
0.7
Land (0.7)
1.4
Financial Instruments (1.0)
1.6
Agriculture (1.2)
2.0
Coastal (1.7)
2.2
Voice Communications...
Networks (0.7)
4.0
Energy Systems (1.1)
Energy Infrastructure (2.9)
4.9
Risk Management &...
Finance (3.6)
Consulting (0.7)
5.3
Waterways (0.6)
Road (2.5)
Rail (1.1)
Airport (0.5)
7.4
Water Infrastructure (6.0)
Sustainable Drainage & Water Management (1.4)
9.0
Energy Efficiency (2.9)
Construction & Retrofit (4.1)
Architectural (1.7)
Health Care
Waste
Natural Environment
Health
Agriculture & Forestry
Disaster Preparedness
ICT
Energy
Professional Services
Transport
Water
Built Environment

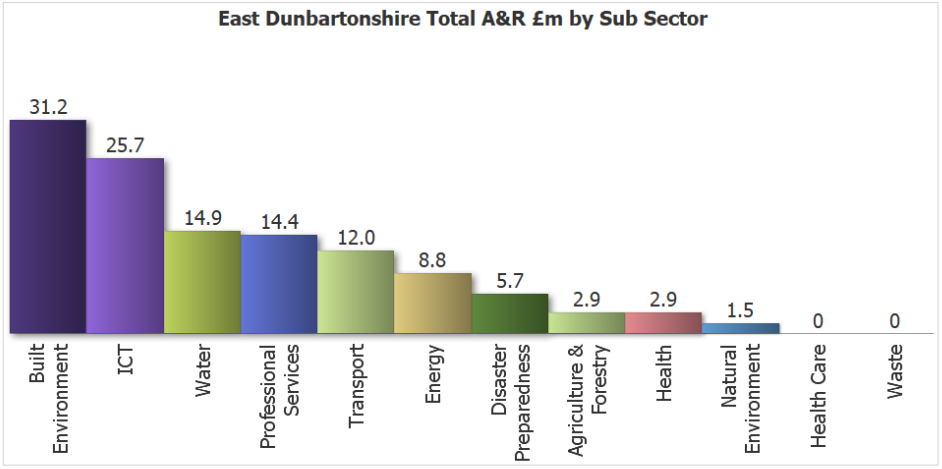

North Lanarkshire A&RCC Growth
0.010
0.010
0.010
0.011
0.011
2016/17
2017/18
2018/19
2019/20
2020/21

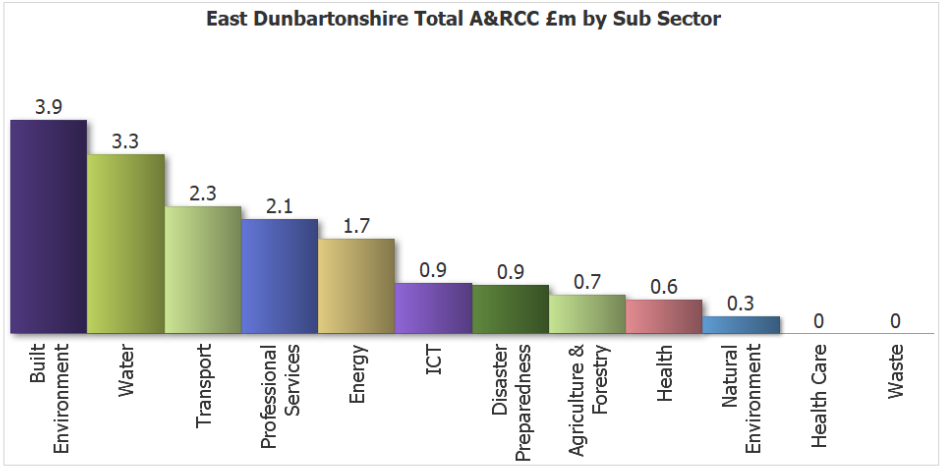

N Lanarkshire A&RCC New Products Market Growth
0.002
0.002
0.003
0.003
0.003
2016/17
2017/18
2018/19
2019/20
2020/21

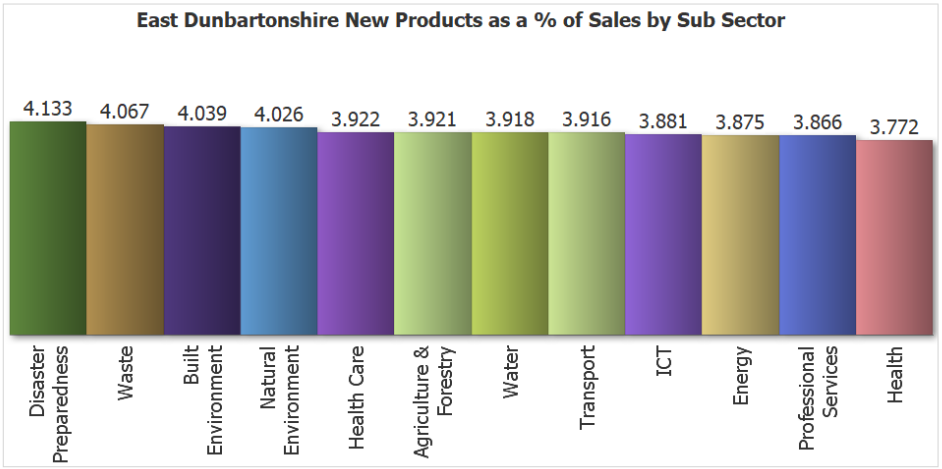

N Lanarkshire Spend on R&D as a Percentage of Sales
2.7
2.6
2.6
2.6
2.5
2.5
2.5
2.5
2.5
2.4
2.4
2.4
Health
Disaster Preparedness
Built Environment
Agriculture & Forestry
Health Care
Professional Services
Transport
Water
ICT
Waste
Energy
Natural Environment

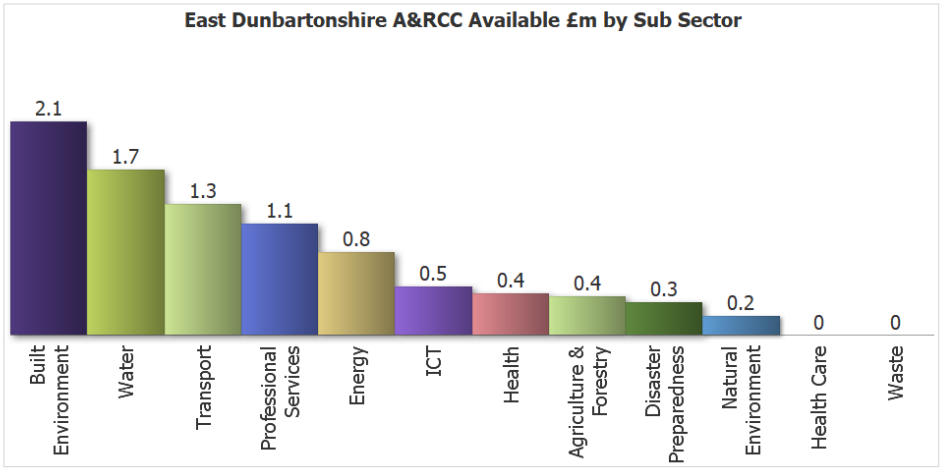

North Lanarkshire Average ROS %
4.3
4.1
4.1
4.0
4.0
4.0
4.0
4.0
3.9
3.9
3.9
3.7
Disaster Preparedness
Health
Built Environment
Waste
Agriculture & Forestry
Health Care
ICT
Transport
Professional Services
Energy
Water
Natural Environment

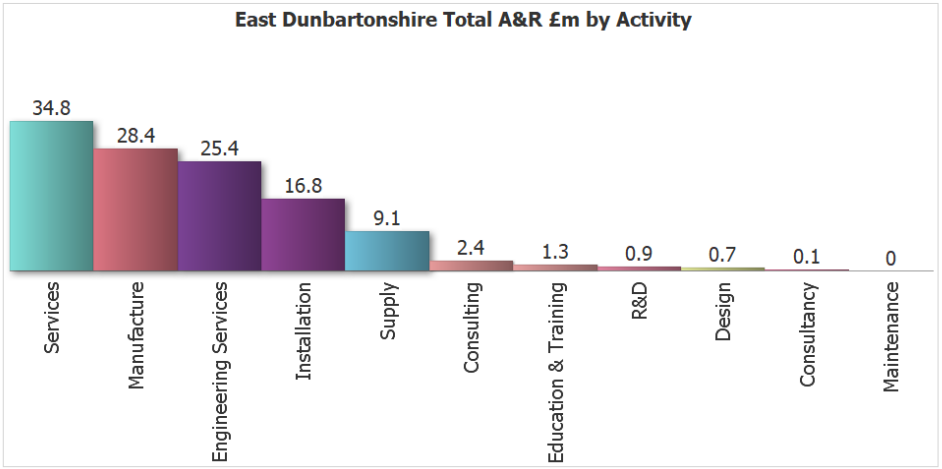
F3: East Dunbartonshire

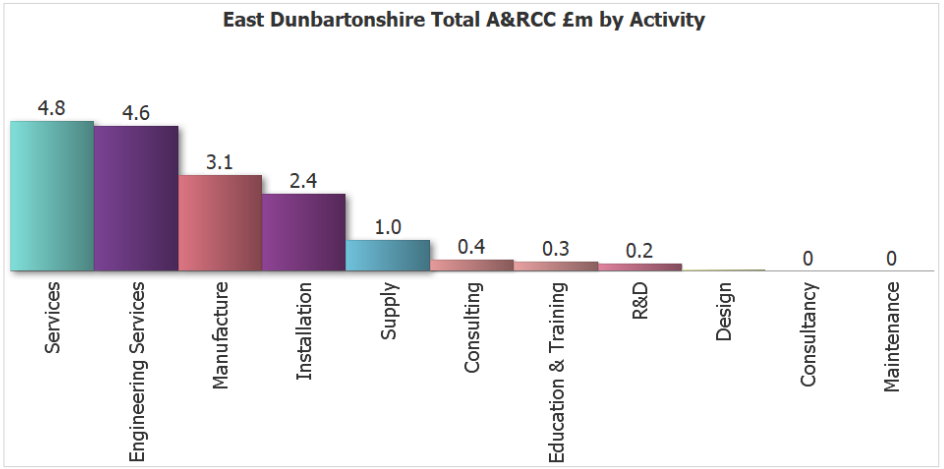


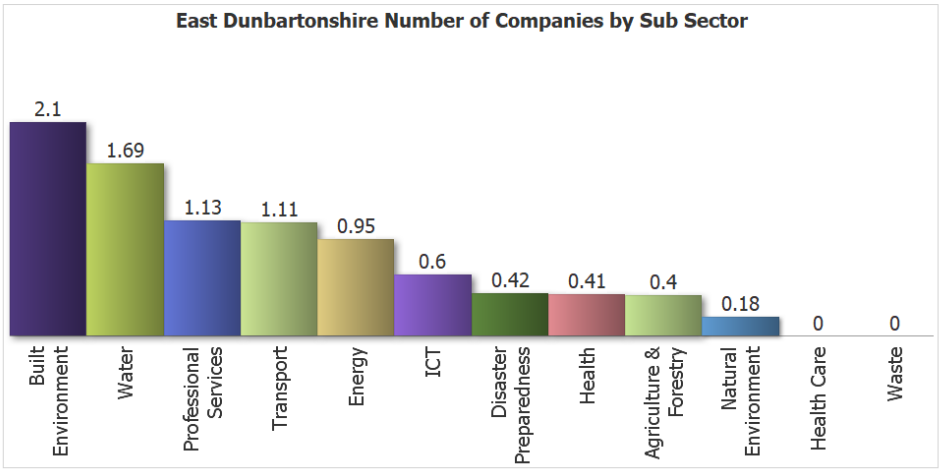


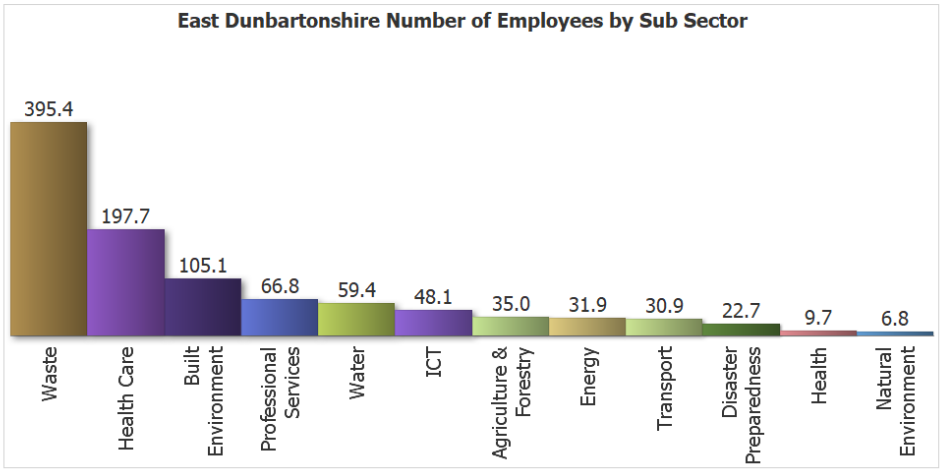


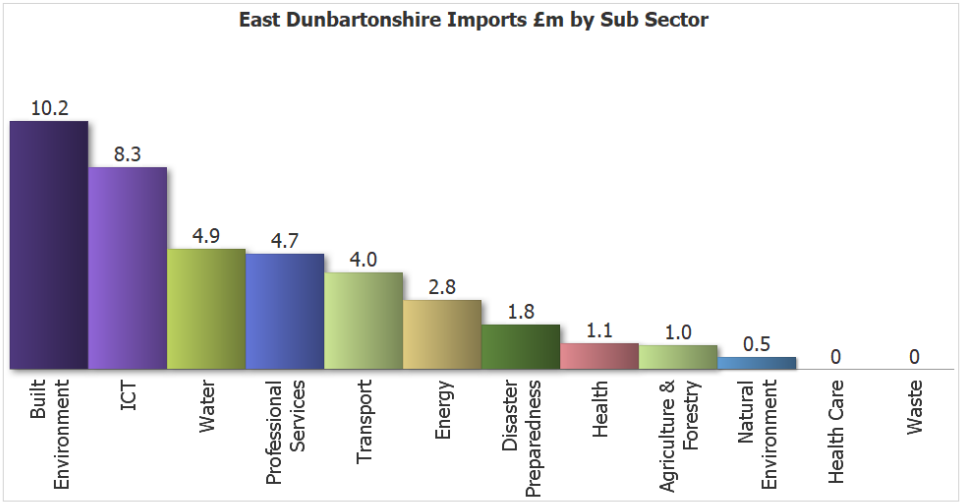


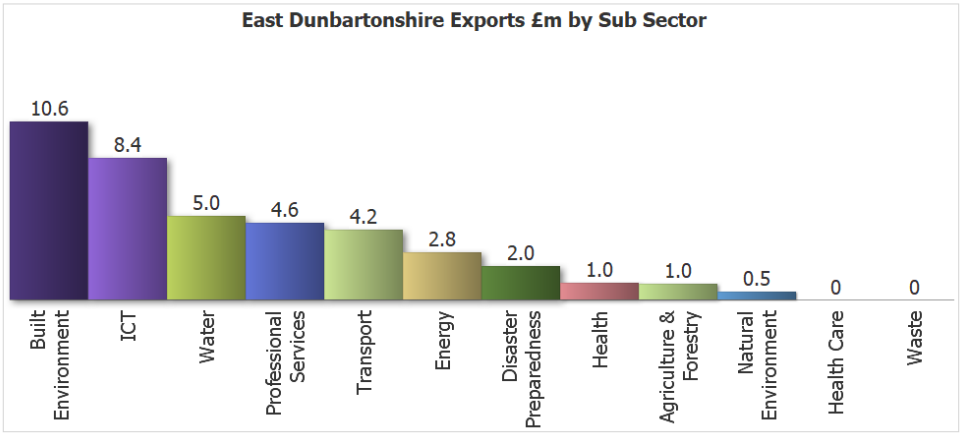

East Dunbartonshire Total A&R £m by Activity
34.8
28.4
25.4
16.8
9.1
2.4
1.3
0.9
0.7
0.1
0
Services
Manufacture
Engineering Services
Installation
Supply
Consulting
Education & Training
R&D
Design
Consultancy
Maintenance

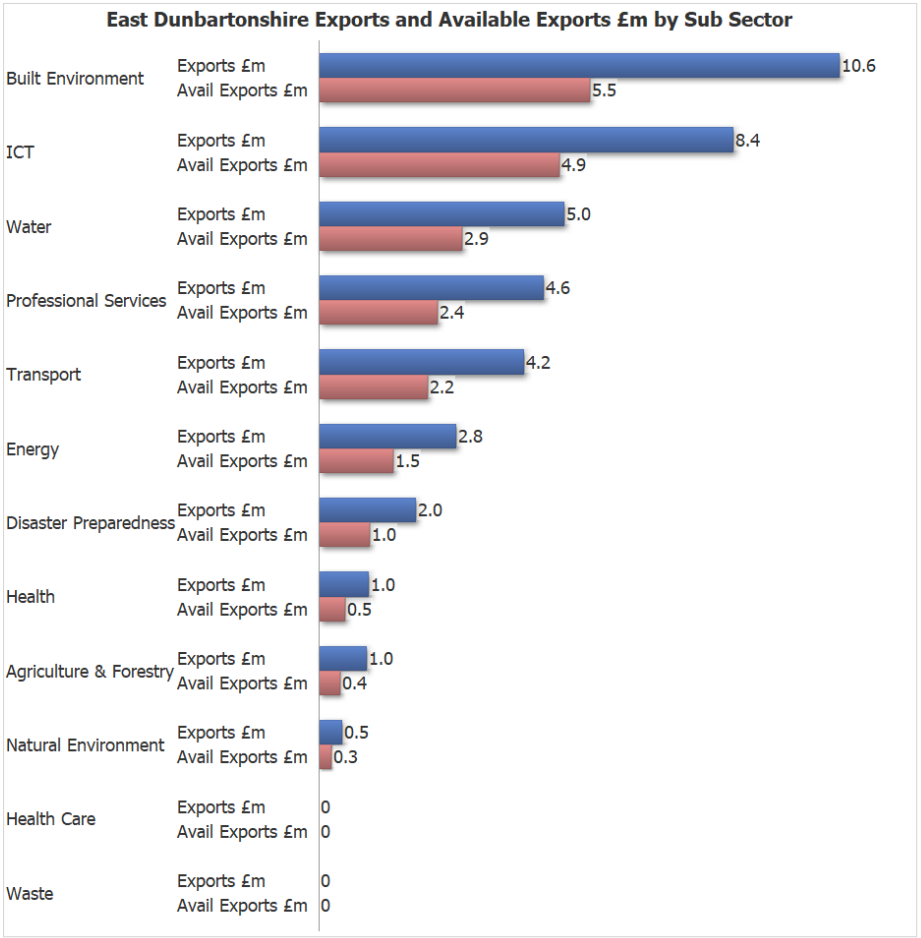

East Dunbartonshire Total A&RCC £m by Activity
4.8
4.6
3.1
2.4
1.0
0.4
0.3
0.2
0
0
Services
Engineering Services
Manufacture
Installation
Supply
Consulting
Education & Training
R&D
Design
Consultancy
Maintenance

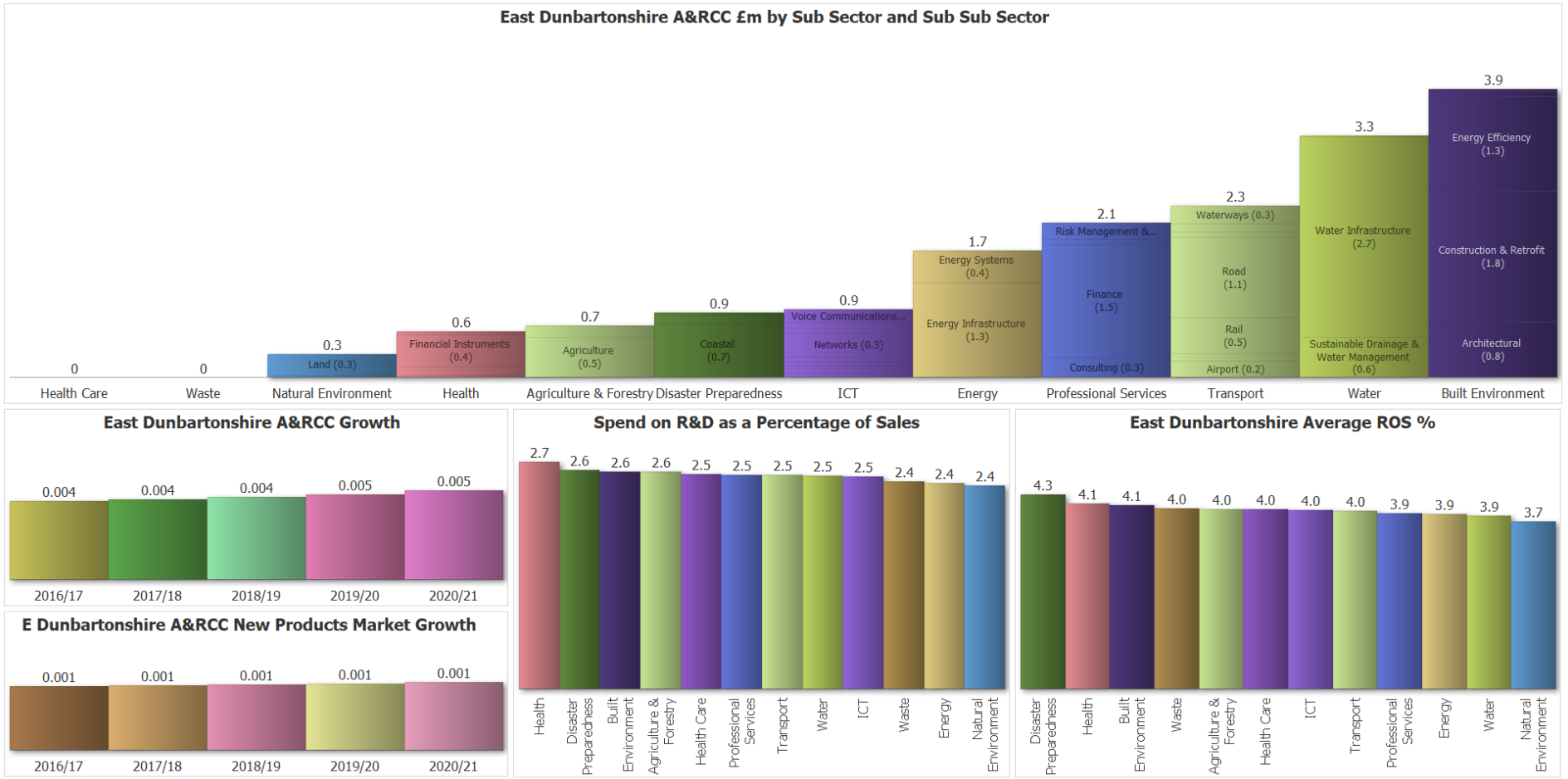

East Dunbartonshire Number of Companies by Sub Sector
2.1
1.69
1.13
1.11
0.95
0.6
0.42
0.41
0.4
0.18
0
0
Built Environment
Water
Professional Services
Transport
Energy
ICT
Disaster Preparedness
Health
Agriculture & Forestry
Natural Environment
Health Care
Waste


East Dunbartonshire Number of Employees by Sub Sector
395.4
197.7
105.1
66.8
59.4
48.1
35.0
31.9
30.9
22.7
9.7
6.8
Waste
Health Care
Built Environment
Professional Services
Water
ICT
Agriculture & Forestry
Energy
Transport
Disaster Preparedness
Health
Natural Environment


East Dunbartonshire Imports £m by Sub Sector
10.2
8.3
4.9
4.7
4.0
2.8
1.8
1.1
1.0
0.5
0
0
Built Environment
ICT
Water
Professional Services
Transport
Energy
Disaster Preparedness
Health
Agriculture & Forestry
Natural Environment
Health Care
Waste


East Dunbartonshire Exports £m by Sub Sector
10.6
8.4
5.0
4.6
4.2
2.8
2.0
1.0
1.0
0.5
0
0
Built Environment
ICT
Water
Professional Services
Transport
Energy
Disaster Preparedness
Health
Agriculture & Forestry
Natural Environment
Health Care
Waste


East Dunbartonshire Exports and Available Exports £m by Sub Sector
Built Environment
Exports £m 10.6
Avail Exports £m 5.5
ICT
Exports £m 8.4
Avail Exports £m 4.9
Water
Exports £m 5.0
Avail Exports £m 2.9
Professional Services
Exports £m 4.6
Avail Exports £m 2.4
Transport
Exports £m 4.2
Avail Exports £m 2.2
Energy
Exports £m 2.8
Avail Exports £m 1.5
Disaster Preparedness
Exports £m 2.0
Avail Exports £m 1.0
Health
Exports £m 1.0
Avail Exports £m 0.5
Agriculture & Forestry
Exports £m 1.0
Avail Exports £m 0.4
Natural Environment
Exports £m 0.5
Avail Exports £m 0.3
Health Care
Exports £m 0
Avail Exports £m 0
Waste
Exports £m 0
Avail Exports £m 0


East Dunbartonshire A&RCC £m by Sub Sector and Sub Sub Sector
0
0
0.3
Land (0.3)
0.6
Financial Instruments (0.4)
0.7
Agriculture (0.5)
0.9
Coastal (0.7)
0.9
Voice Communications...
Networks (0.3)
1.7
Energy Systems (0.4)
Energy Infrastructure (1.3)
2.1
Risk Management &...
Finance (1.5)
Consulting (0.3)
2.3
Waterways (0.3)
Road (1.1)
Rail (0.5)
Airport (0.2)
3.3
Water Infrastructure (2.7)
Sustainable Drainage & Water Management (0.6)
3.9
Energy Efficiency (1.3)
Construction & Retrofit (1.8)
Architectural (0.8)
Health Care
Waste
Natural Environment
Health
Agriculture & Forestry
Disaster Preparedness
ICT
Energy
Professional Services
Transport
Water
Built Environment

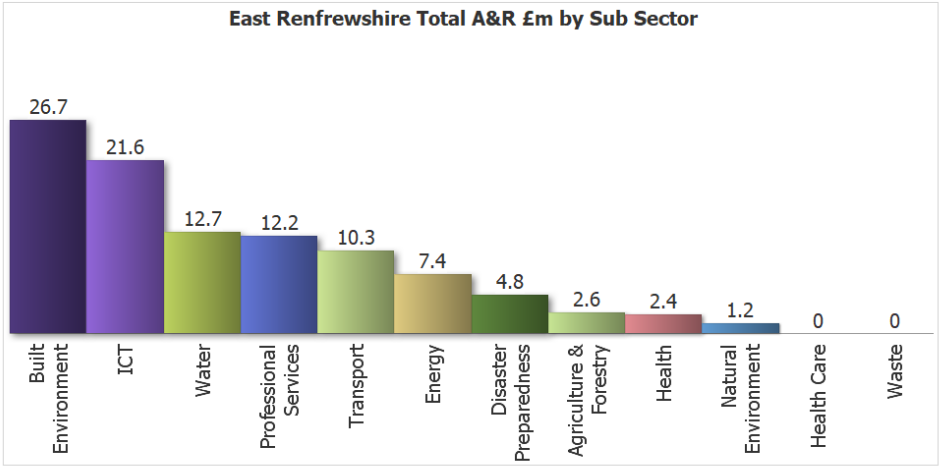
East Dunbartonshire A&RCC Growth
0.004
0.004
0.004
0.005
0.005
2016/17
2017/18
2018/19
2019/20
2020/21

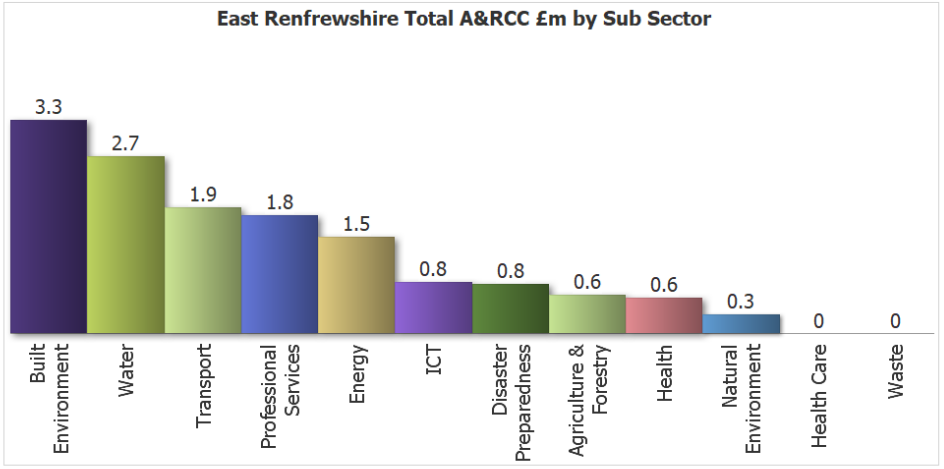
E Dunbartonshire A&RCC New Products Market Growth
0.001
0.001
0.001
0.001
0.001
2016/17
2017/18
2018/19
2019/20
2020/21

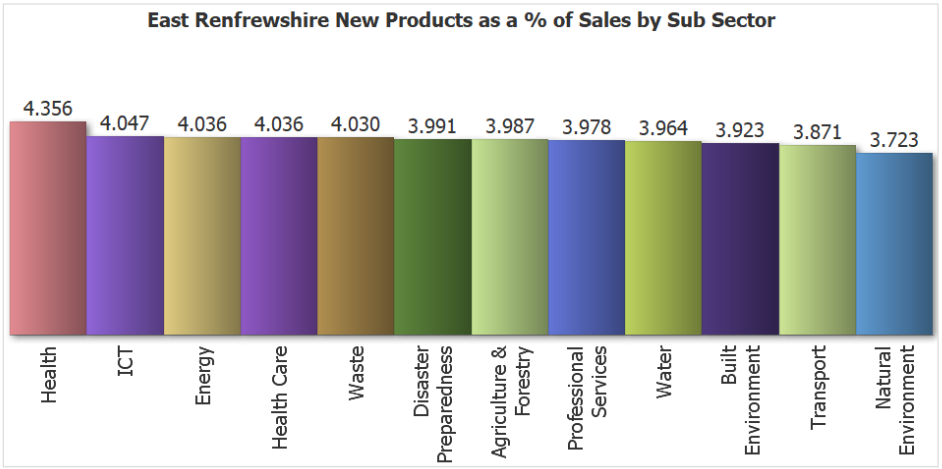
Spend on R&D as a Percentage of Sales
2.7
2.6
2.6
2.6
2.5
2.5
2.5
2.5
2.5
2.4
2.4
2.4
Health
Disaster Preparedness
Built Environment
Agriculture & Forestry
Health Care
Professional Services
Transport
Water
ICT
Waste
Energy
Natural Environment

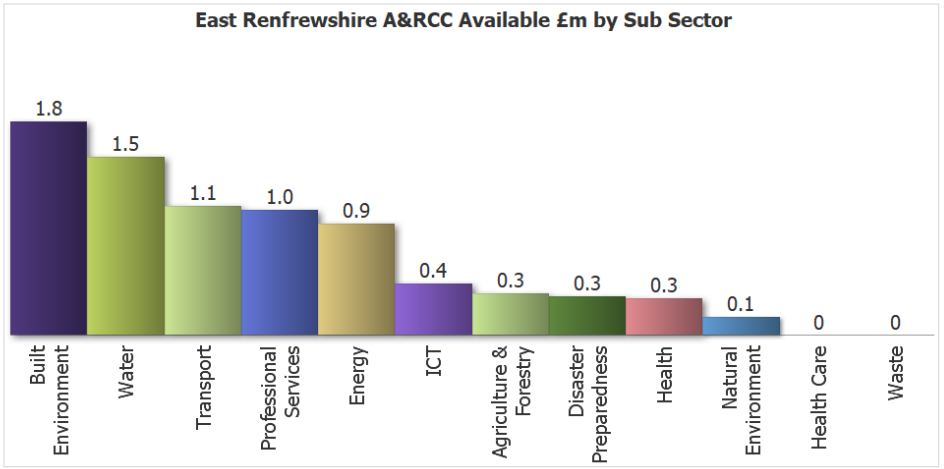
East Dunbartonshire Average ROS %
4.3
4.1
4.1
4.0
4.0
4.0
4.0
4.0
3.9
3.9
3.9
3.7
Disaster Preparedness
Health
Built Environment
Waste
Agriculture & Forestry
Health Care
ICT
Transport
Professional Services
Energy
Water
Natural Environment

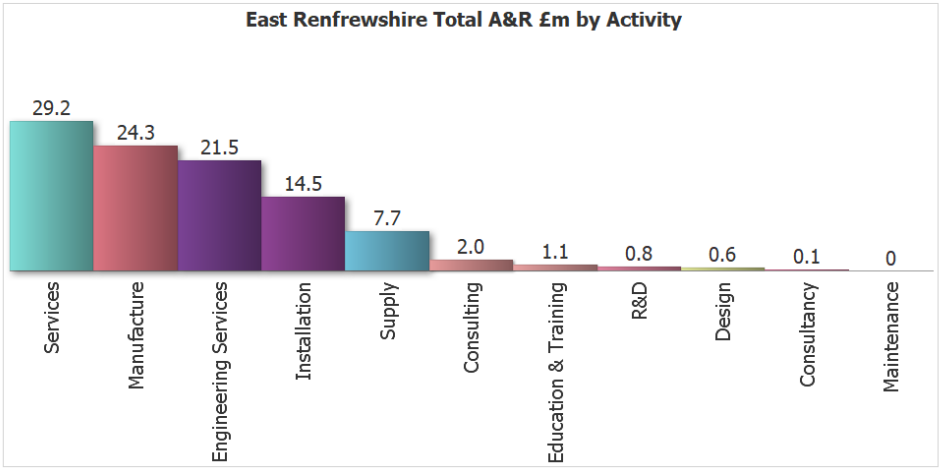
F4: East Renfrewshire

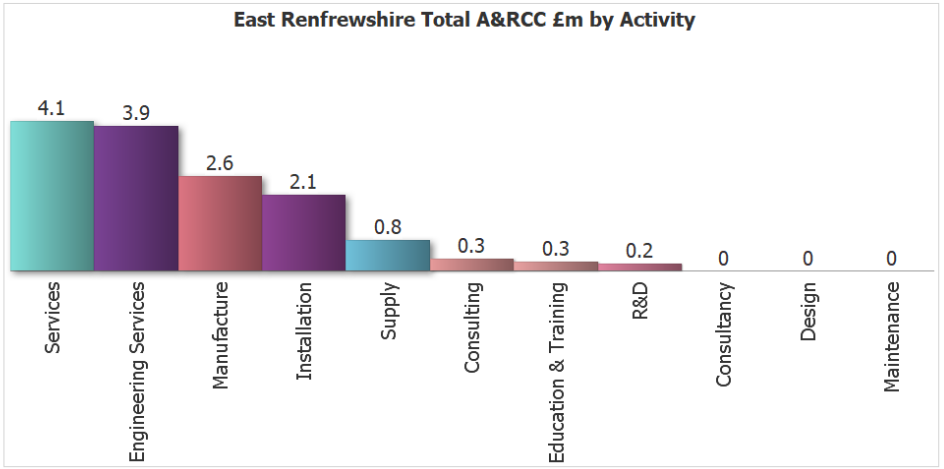


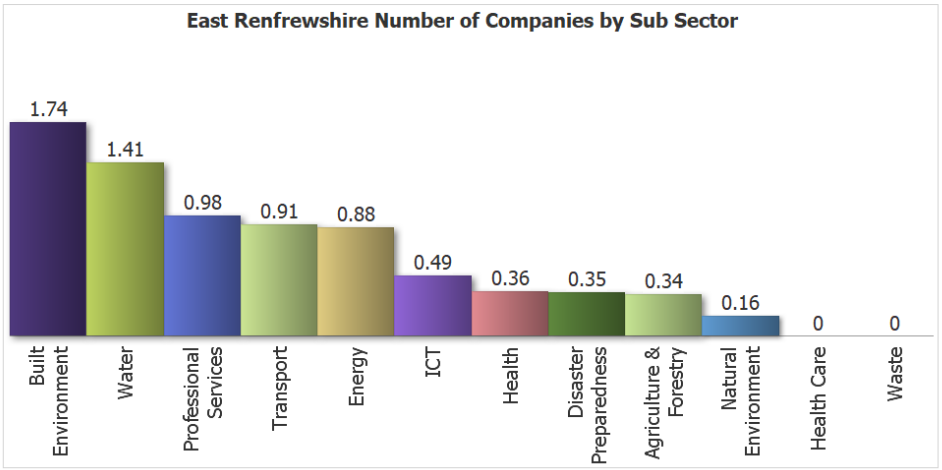


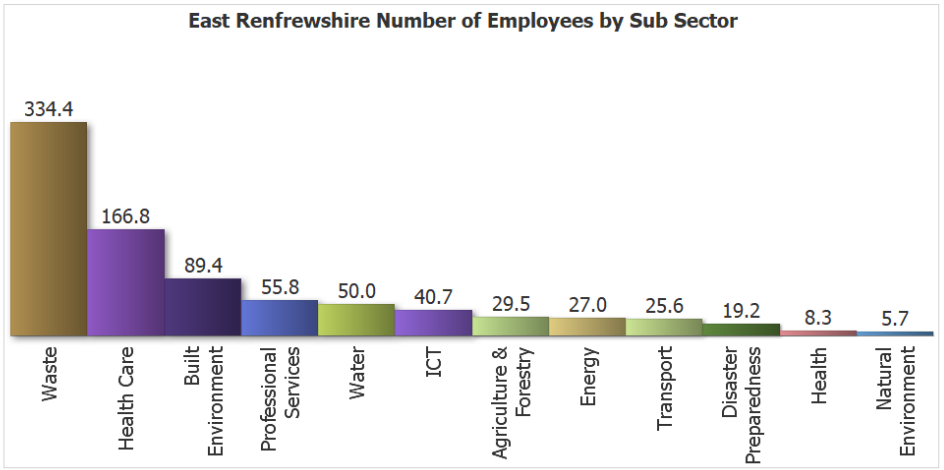


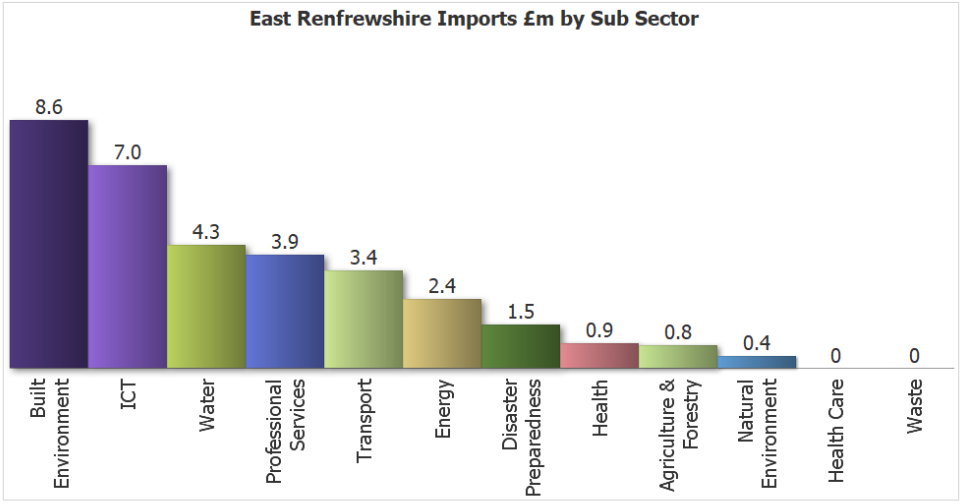


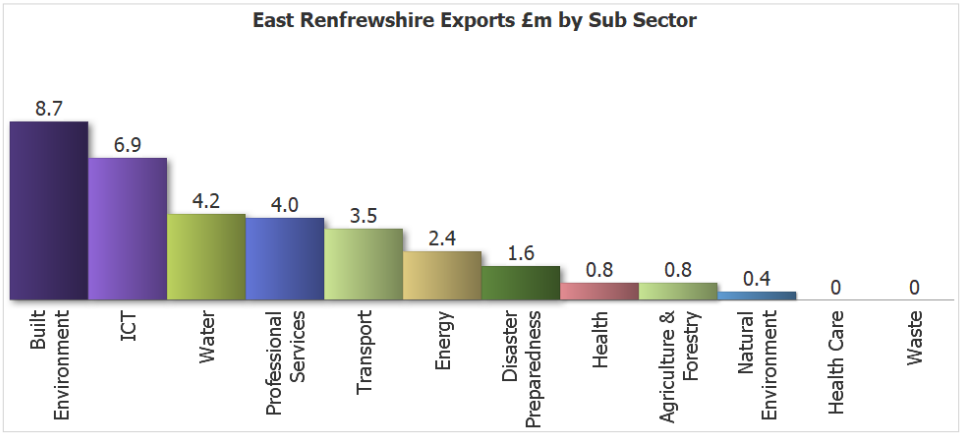

East Renfrewshire Total A&R £m by Activity
29.2
24.3
21.5
14.5
7.7
2.0
1.1
0.8
0.6
0.1
0
Services
Manufacture
Engineering Services
Installation
Supply
Consulting
Education & Training
R&D
Design
Consultancy
Maintenance

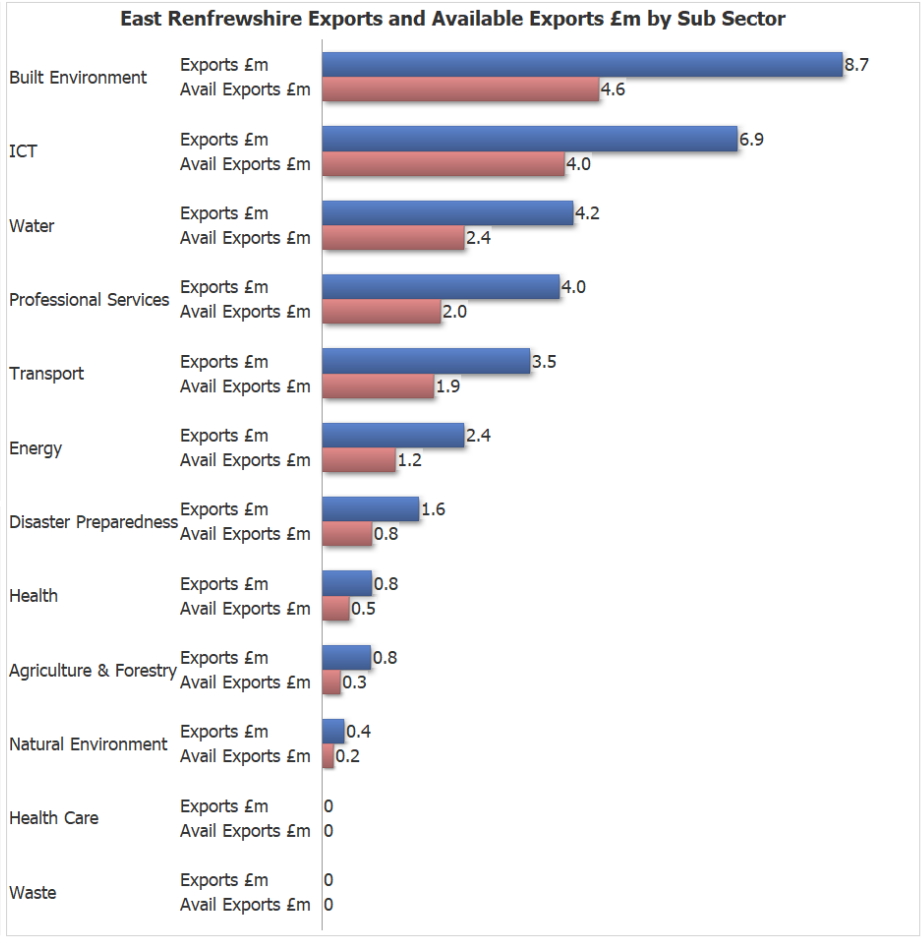

East Renfrewshire Total A&RCC £m by Activity
4.1
3.9
2.6
2.1
0.8
0.3
0.3
0.2
0
0
0
Services
Engineering Services
Manufacture
Installation
Supply
Consulting
Education & Training
R&D
Consultancy
Design
Maintenance

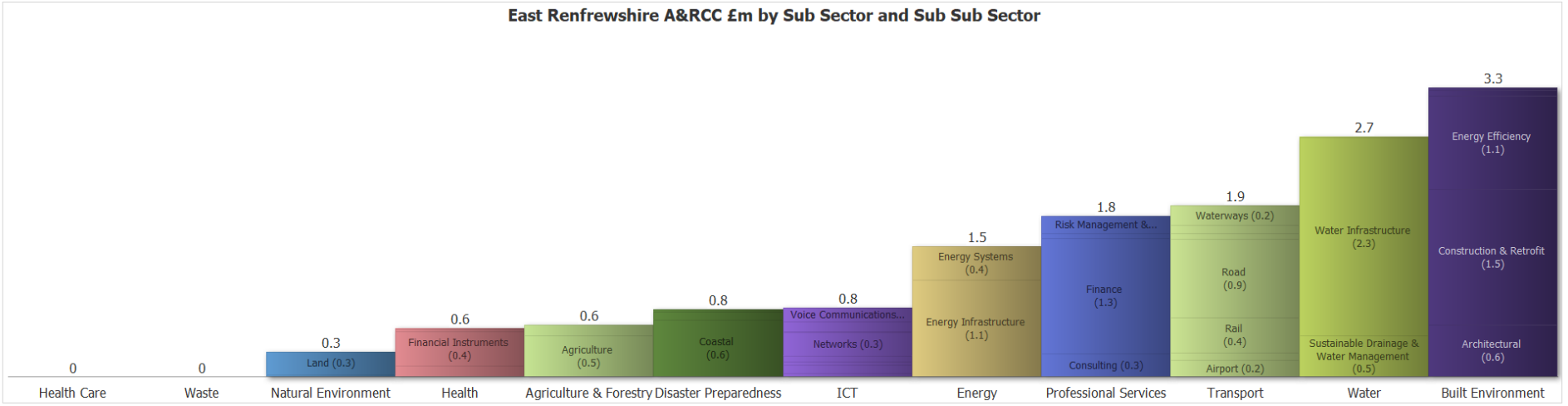

East Renfrewshire Number of Companies by Sub Sector
1.74
1.41
0.98
0.91
0.88
0.49
0.36
0.35
0.34
0.16
0
0
Built Environment
Water
Professional Services
Transport
Energy
ICT
Health
Disaster Preparedness
Agriculture & Forestry
Natural Environment
Health Care
Waste

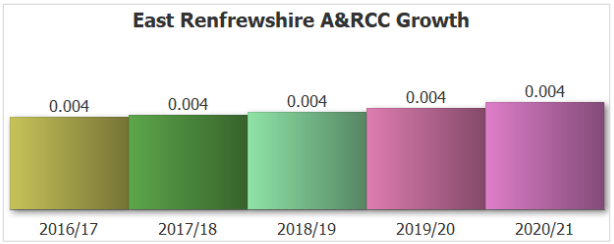

East Renfrewshire Number of Employees by Sub Sector
334.4
166.8
89.4
55.8
50.0
40.7
29.5
27.0
25.6
19.2
8.3
5.7
Waste
Health Care
Built Environment
Professional Services
Water
ICT
Agriculture & Forestry
Energy
Transport
Disaster Preparedness
Health
Natural Environment

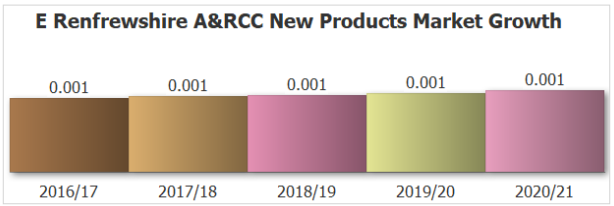

East Renfrewshire Imports £m by Sub Sector
8.6
7.0
4.3
3.9
3.4
2.4
1.5
0.9
0.8
0.4
0
0
Built Environment
ICT
Water
Professional Services
Transport
Energy
Disaster Preparedness
Health
Agriculture & Forestry
Natural Environment
Health Care
Waste

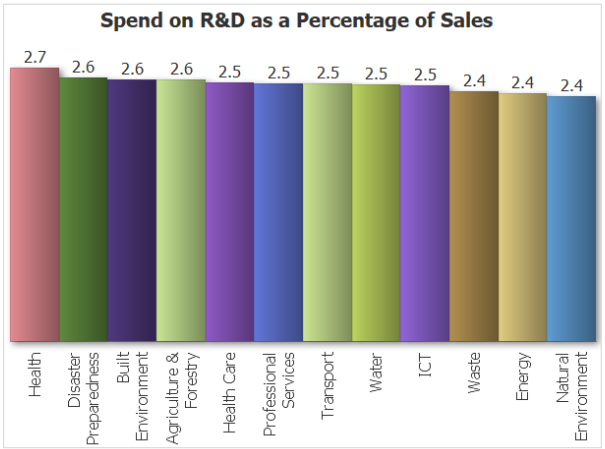

East Renfrewshire Exports £m by Sub Sector
8.7
6.9
4.2
4.0
3.5
2.4
1.6
0.8
0.8
0.4
0
0
Built Environment
ICT
Water
Professional Services
Transport
Energy
Disaster Preparedness
Health
Agriculture & Forestry
Natural Environment
Health Care
Waste

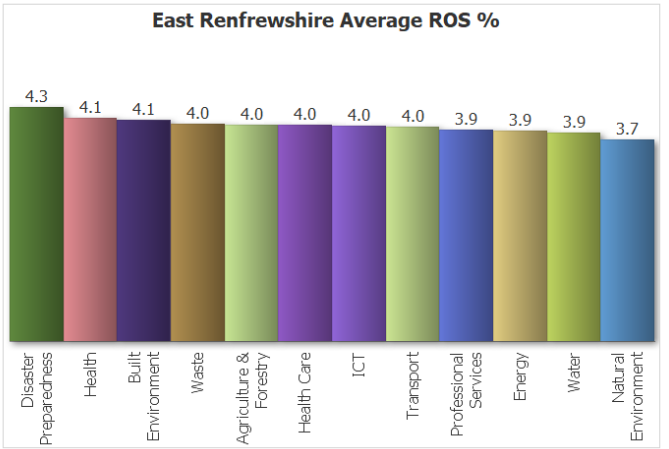

East Renfrewshire Exports and Available Exports £m by Sub Sector
Built Environment
Exports £m 8.7
Avail Exports £m 4.6
ICT
Exports £m 6.9
Avail Exports £m 4.0
Water
Exports £m 4.2
Avail Exports £m 2.4
Professional Services
Exports £m 4.0
Avail Exports £m 2.0
Transport
Exports £m 3.5
Avail Exports £m 1.9
Energy
Exports £m 2.4
Avail Exports £m 1.2
Disaster Preparedness
Exports £m 1.6
Avail Exports £m 0.8
Health
Exports £m 0.8
Avail Exports £m 0.5
Agriculture & Forestry
Exports £m 0.8
Avail Exports £m 0.3
Natural Environment
Exports £m 0.4
Avail Exports £m 0.2
Health Care
Exports £m 0
Avail Exports £m 0
Waste
Exports £m 0
Avail Exports £m 0


East Renfrewshire A&RCC £m by Sub Sector and Sub Sub Sector
0
0
0.3
Land (0.3)
0.6
Financial Instruments (0.4)
0.6
Agriculture (0.5)
0.8
Coastal (0.6)
0.8
Voice Communications...
Networks (0.3)
1.5
Energy Systems (0.4)
Energy Infrastructure (1.1)
1.8
Risk Management &...
Finance (1.3)
Consulting (0.3)
1.9
Waterways (0.2)
Road (0.9)
Rail (0.4)
Airport (0.2)
2.7
Water Infrastructure (2.3)
Sustainable Drainage & Water Management (0.5)
3.3
Energy Efficiency (1.1)
Construction & Retrofit (1.5)
Architectural (0.6)
Health Care
Waste
Natural Environment
Health
Agriculture & Forestry
Disaster Preparedness
ICT
Energy
Professional Services
Transport
Water
Built Environment

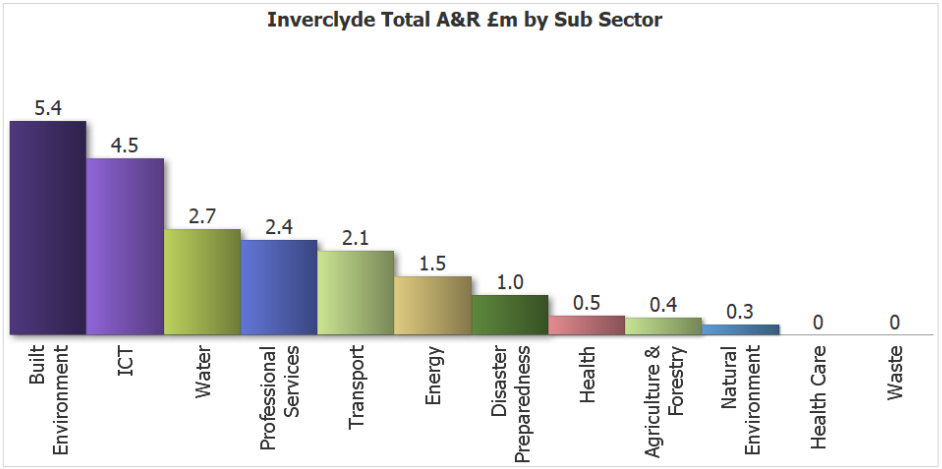

East Renfrewshire A&RCC Growth
0.004
0.004
0.004
0.004
0.004
2016/17
2017/18
2018/19
2019/20
2020/21

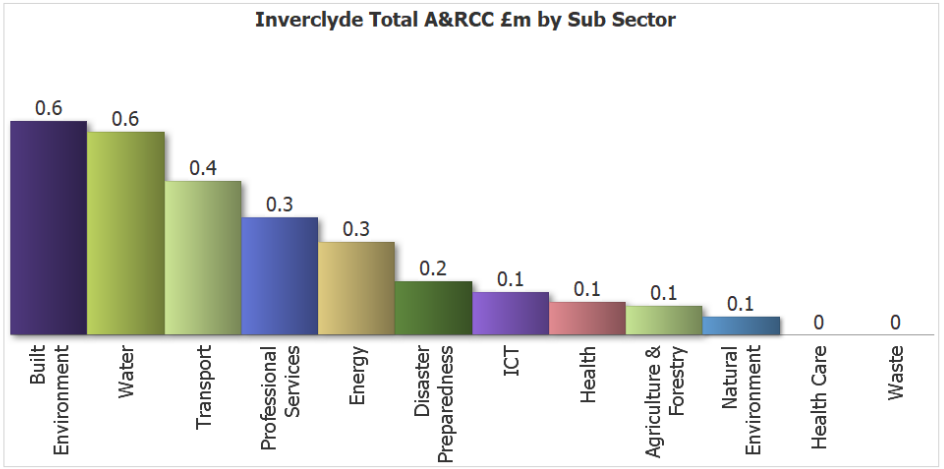

E Renfrewshire A&RCC New Products Market Growth
0.001
0.001
0.001
0.001
0.001
2016/17
2017/18
2018/19
2019/20
2020/21

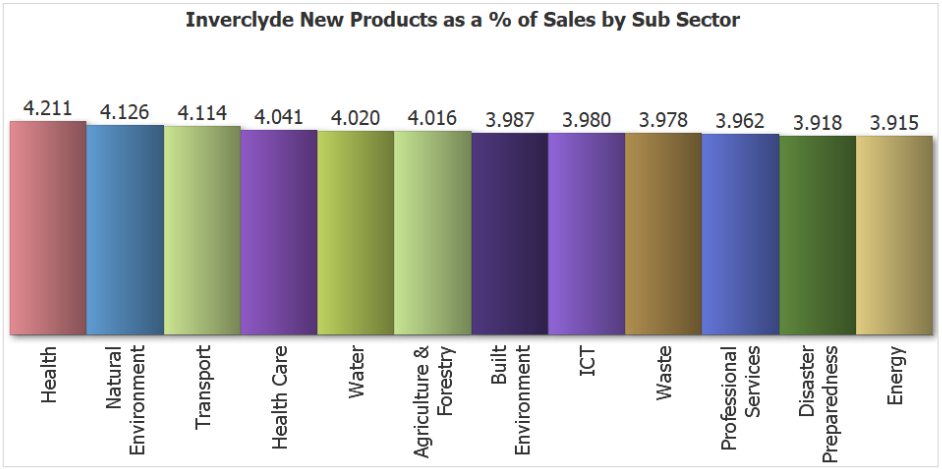

Spend on R&D as a Percentage of Sales
2.7
2.6
2.6
2.6
2.5
2.5
2.5
2.5
2.5
2.4
2.4
2.4
Health
Disaster Preparedness
Built Environment
Agriculture & Forestry
Health Care
Professional Services
Transport
Water
ICT
Waste
Energy
Natural Environment

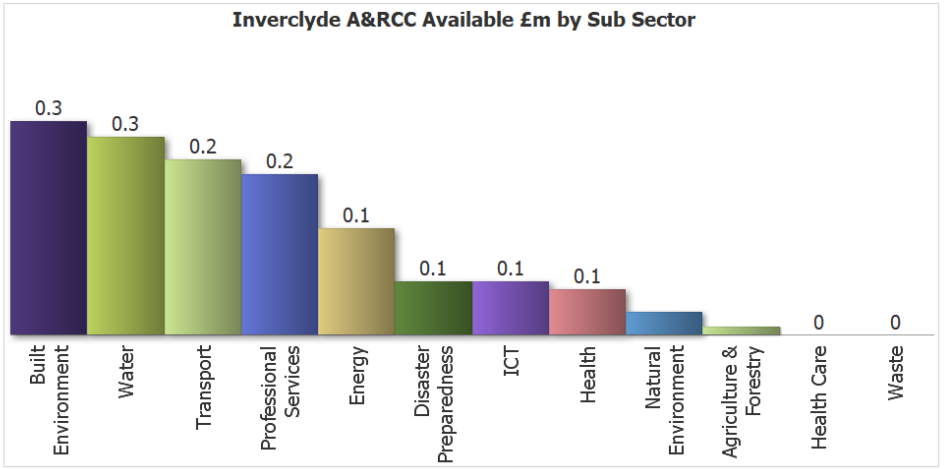

East Renfrewshire Average ROS %
4.3
4.1
4.1
4.0
4.0
4.0
4.0
4.0
3.9
3.9
3.9
3.7
Disaster Preparedness
Health
Built Environment
Waste
Agriculture & Forestry
Health Care
ICT
Transport
Professional Services
Energy
Water
Natural Environment

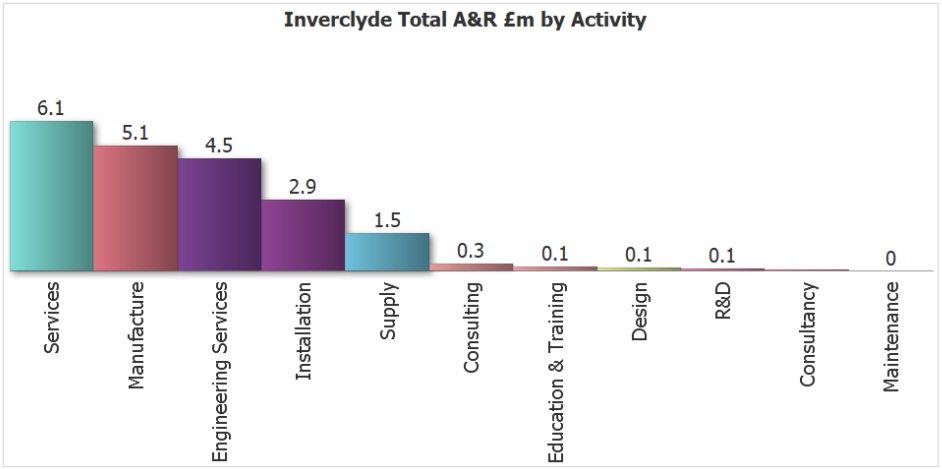
F5: Inverclyde

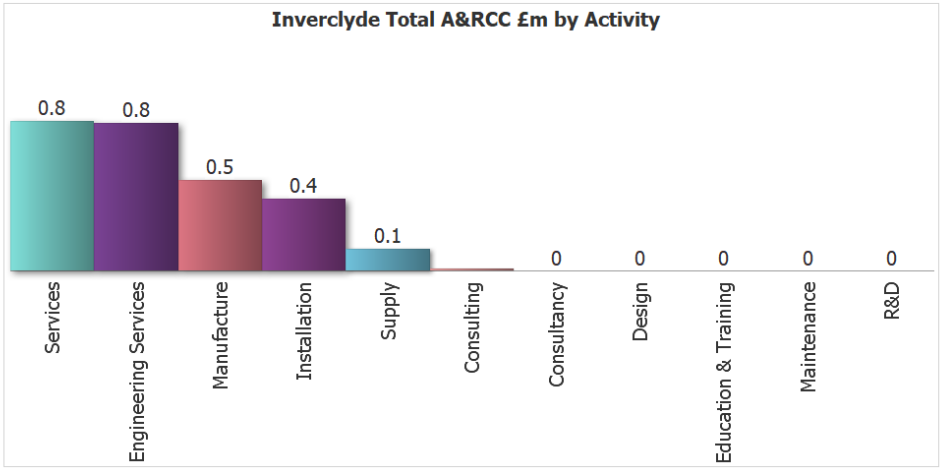


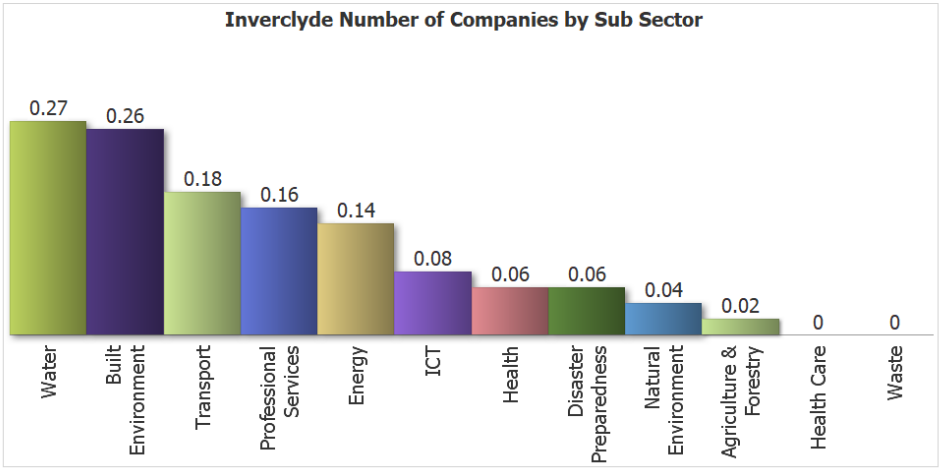


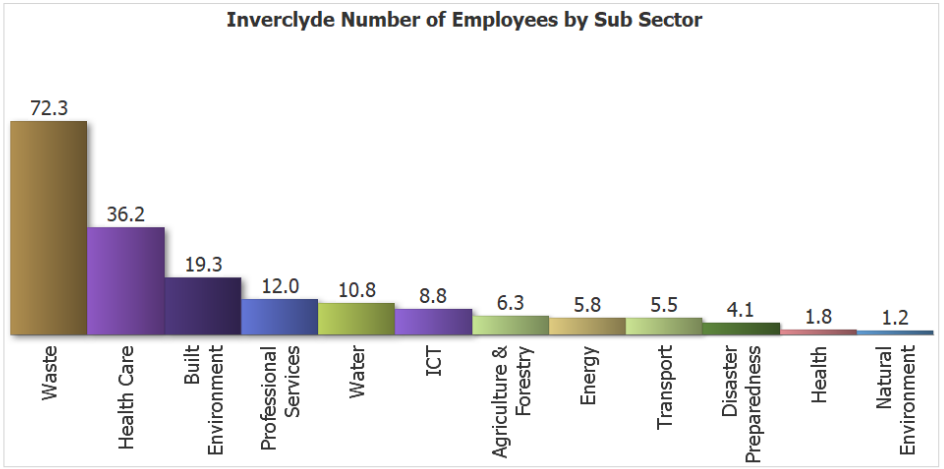


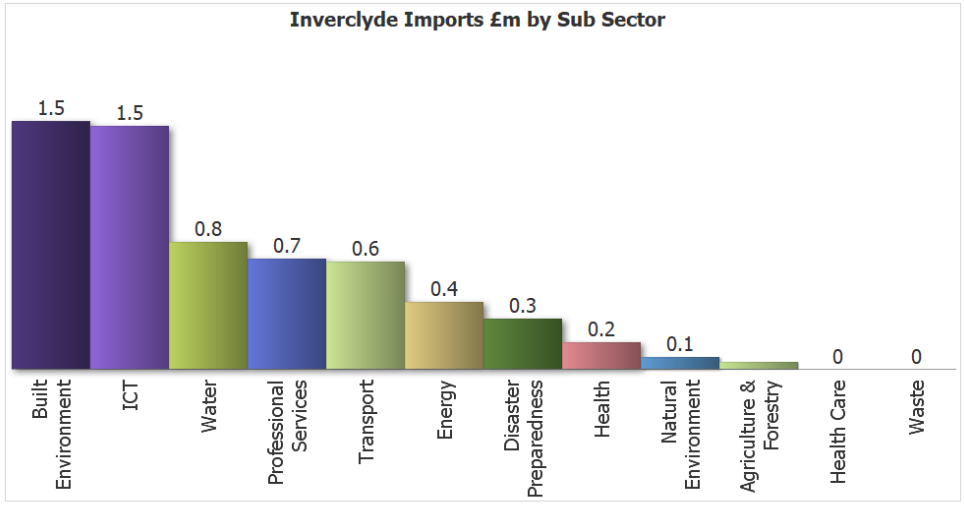


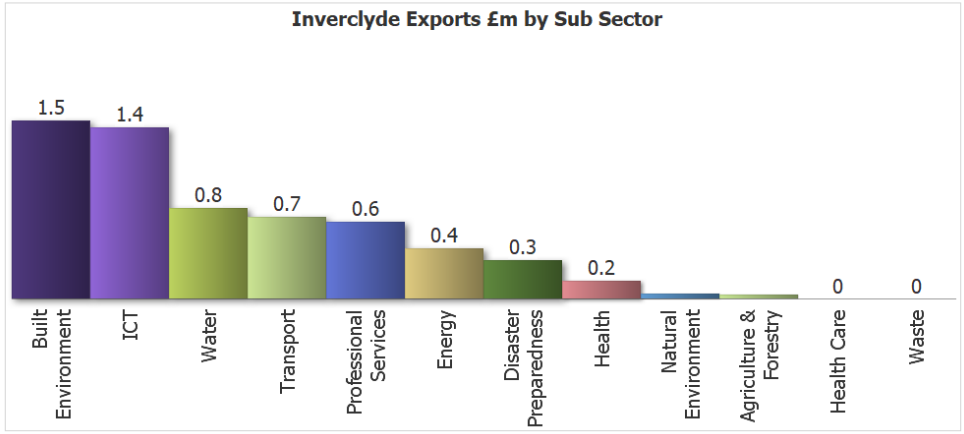

Inverclyde Total A&R £m by Activity
6.1
5.1
4.5
2.9
1.5
0.3
0.1
0.1
0.1
0
Services
Manufacture
Engineering Services
Installation
Supply
Consulting
Education & Training
Design
R&D
Consultancy
Maintenance

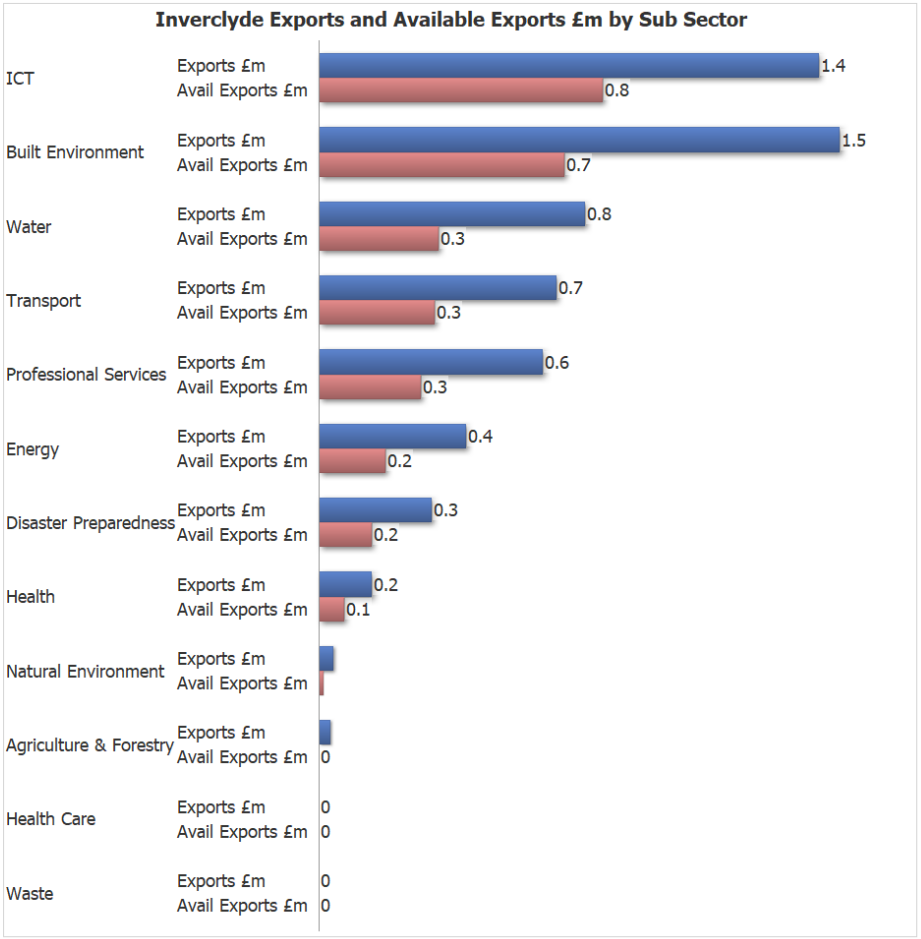

Inverclyde Total A&RCC £m by Activity
0.8
0.8
0.5
0.4
0.1
0
0
0
0
0
Services
Engineering Services
Manufacture
Installation
Supply
Consulting
Consultancy
Design
Education & Training
Maintenance
R&D

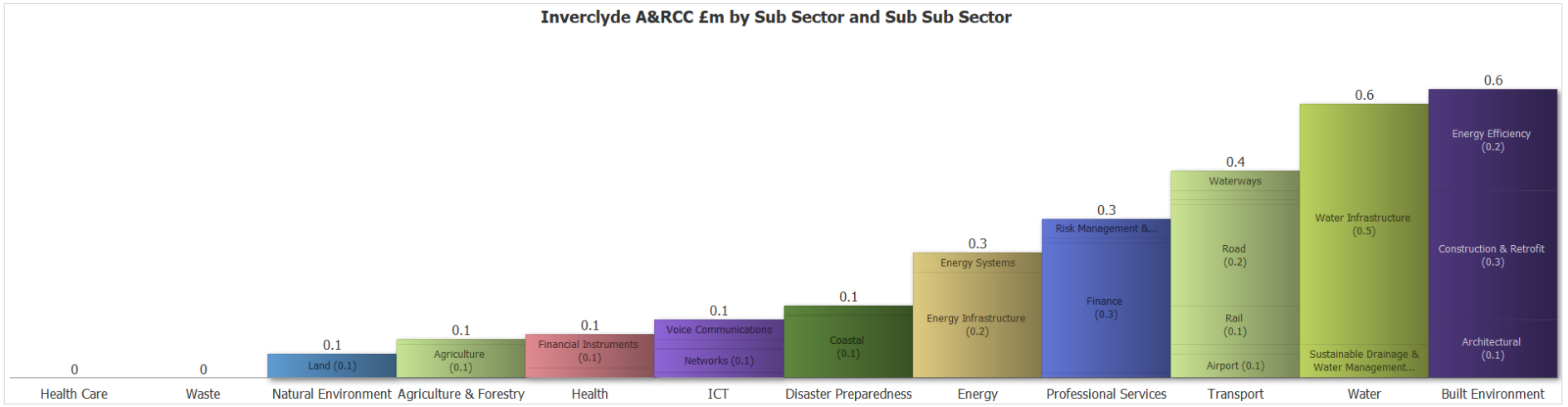

Inverclyde Number of Companies by Sub Sector
0.27
0.26
0.18
0.16
0.14
0.08
0.06
0.06
0.04
0.02
0
0
Water
Built Environment
Transport
Professional Services
Energy
ICT
Health
Disaster Preparedness
Natural Environment
Agriculture & Forestry
Health Care
Waste

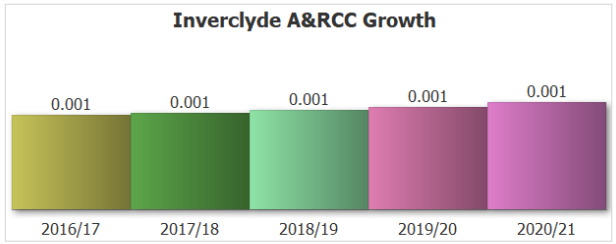

Inverclyde Number of Employees by Sub Sector
72.3
36.2
19.3
12.0
10.8
8.8
6.3
5.8
5.5
4.1
1.8
1.2
Waste
Health Care
Built Environment
Professional Services
Water
ICT
Agriculture & Forestry
Energy
Transport
Disaster Preparedness
Health
Natural Environment

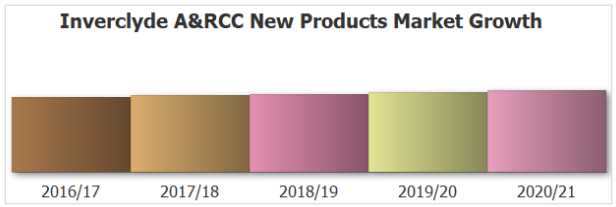

Inverclyde Imports £m by Sub Sector
1.5
1.5
0.8
0.7
0.6
0.4
0.3
0.2
0.1
0
0
Built Environment
ICT
Water
Professional Services
Transport
Energy
Disaster Preparedness
Health
Natural Environment
Agriculture & Forestry
Health Care
Waste

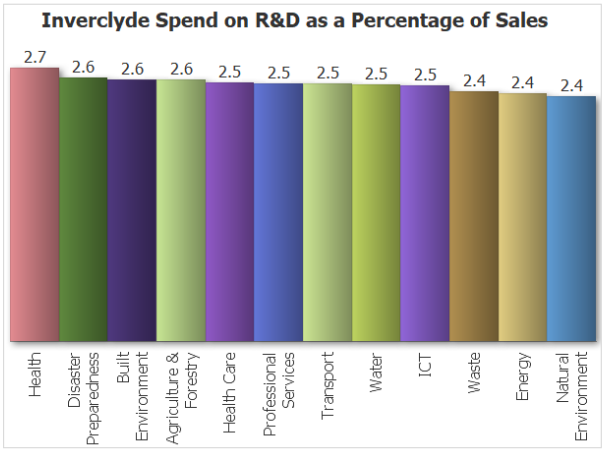

Inverclyde Exports £m by Sub Sector
1.5
1.4
0.8
0.7
0.6
0.4
0.3
0.2
0
0
Built Environment
ICT
Water
Transport
Professional Services
Energy
Disaster Preparedness
Health
Natural Environment
Agriculture & Forestry
Health Care
Waste

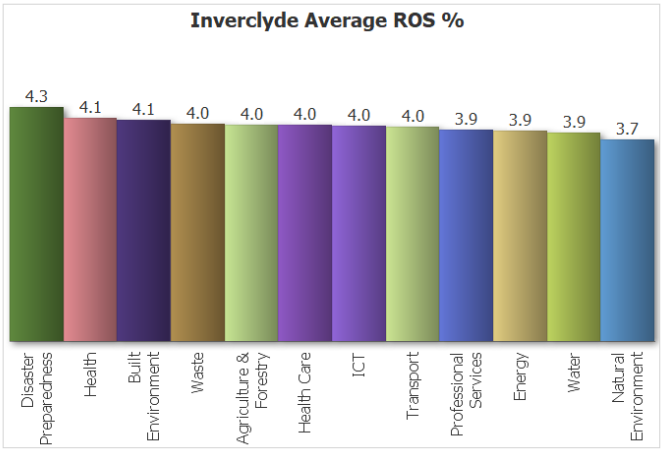

Inverclyde Exports and Available Exports £m by Sub Sector
ICT
Exports £m 1.4
Avail Exports £m 0.8
Built Environment
Exports £m 1.5
Avail Exports £m 0.7
Water
Exports £m 0.8
Avail Exports £m 0.3
Transport
Exports £m 0.7
Avail Exports £m 0.3
Professional Services
Exports £m 0.6
Avail Exports £m 0.3
Energy
Exports £m 0.4
Avail Exports £m 0.2
Disaster Preparedness
Exports £m 0.3
Avail Exports £m 0.2
Health
Exports £m 0.2
Avail Exports £m 0.1
Natural Environment
Exports £m
Avail Exports £m
Agriculture & Forestry
Exports £m
Avail Exports £m 0
Health Care
Exports £m 0
Avail Exports £m 0
Waste
Exports £m 0
Avail Exports £m 0


Inverclyde A&RCC £m by Sub Sector and Sub Sub Sector
0
0
0.1
Land (0.1)
0.1
Agriculture (0.1)
0.1
Financial Instruments (0.1)
0.1
Voice Communications
Networks (0.1)
0.1
Coastal (0.1)
0.3
Energy Systems
Energy Infrastructure (0.2)
0.3
Risk Management &...
Finance (0.3)
0.4
Waterways
Road (0.2)
Rail (0.1)
Airport (0.1)
0.6
Water Infrastructure (0.5)
Sustainable Drainage & Water Management...
0.6
Energy Efficiency (0.2)
Construction & Retrofit (0.3)
Architectural (0.1)
Health Care
Waste
Natural Environment
Agriculture & Forestry
Health
ICT
Disaster Preparedness
Energy
Professional Services
Transport
Water
Built Environment

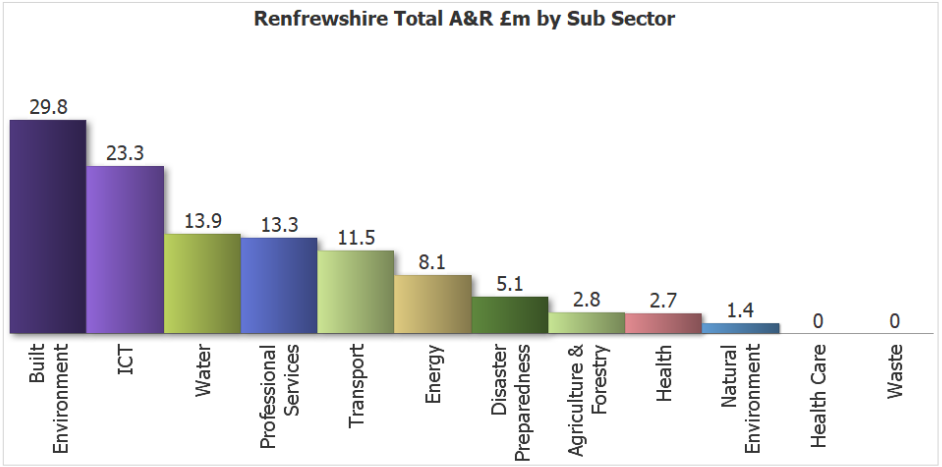

Inverclyde A&RCC Growth
0.001
0.001
0.001
0.001
0.001
2016/17
2017/18
2018/19
2019/20
2020/21

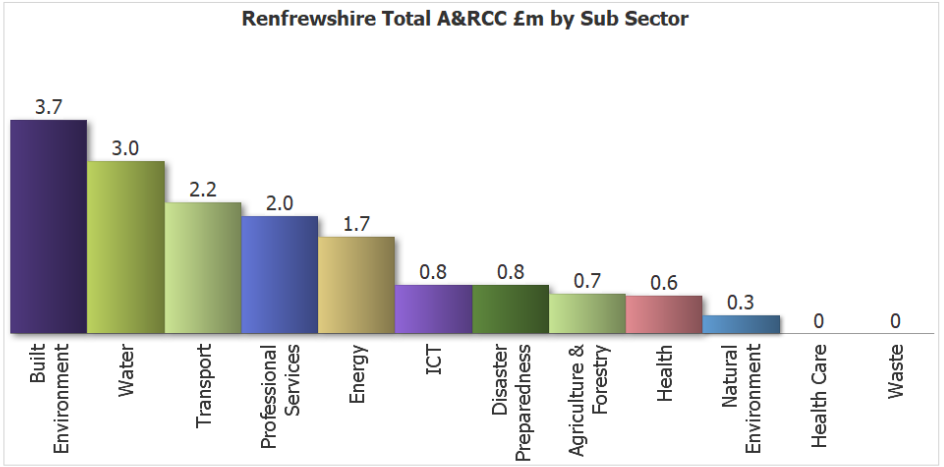

Inverclyde A&RCC New Products Market Growth
2016/17
2017/18
2018/19
2019/20
2020/21

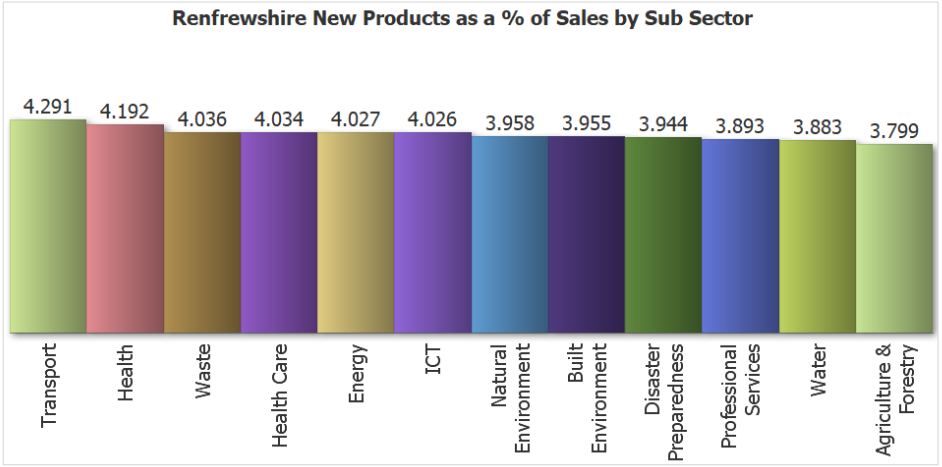

Inverclyde Spend on R&D as a Percentage of Sales
2.7
2.6
2.6
2.6
2.5
2.5
2.5
2.5
2.5
2.4
2.4
2.4
Health
Disaster Preparedness
Built Environment
Agriculture & Forestry
Health Care
Professional Services
Transport
Water
ICT
Waste
Energy
Natural Environment

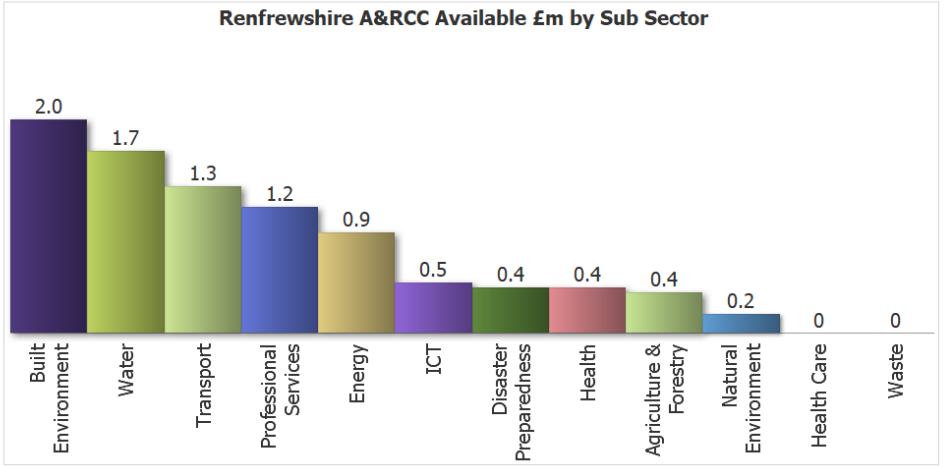

Inverclyde Average ROS %
4.3
4.1
4.1
4.0
4.0
4.0
4.0
4.0
3.9
3.9
3.9
3.7
Disaster Preparedness
Health
Built Environment
Waste
Agriculture & Forestry
Health Care
ICT
Transport
Professional Services
Energy
Water
Natural Environment

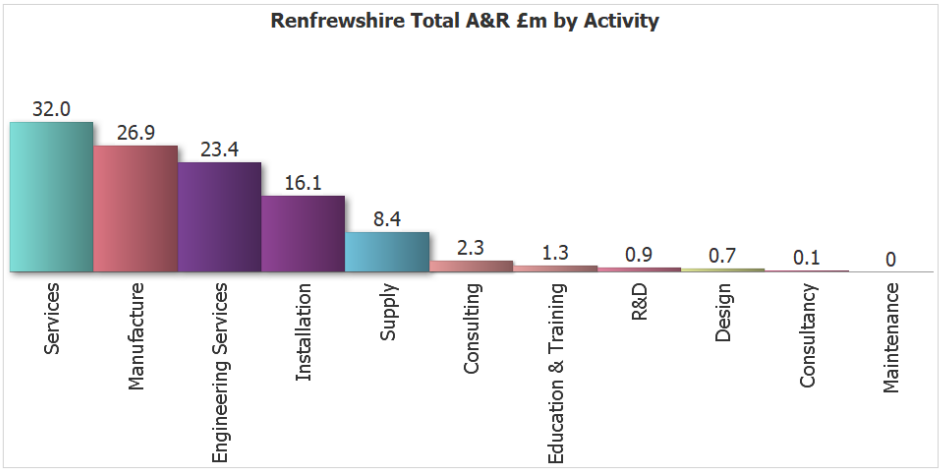
F6: Renfrewshire

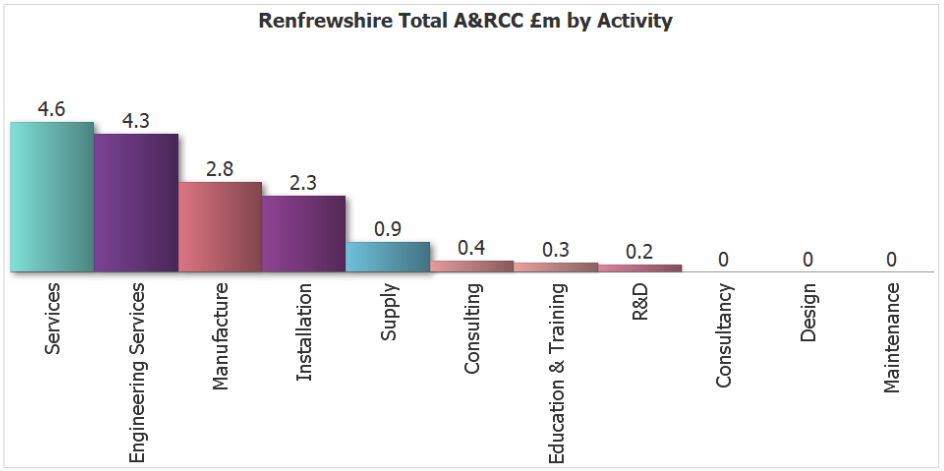


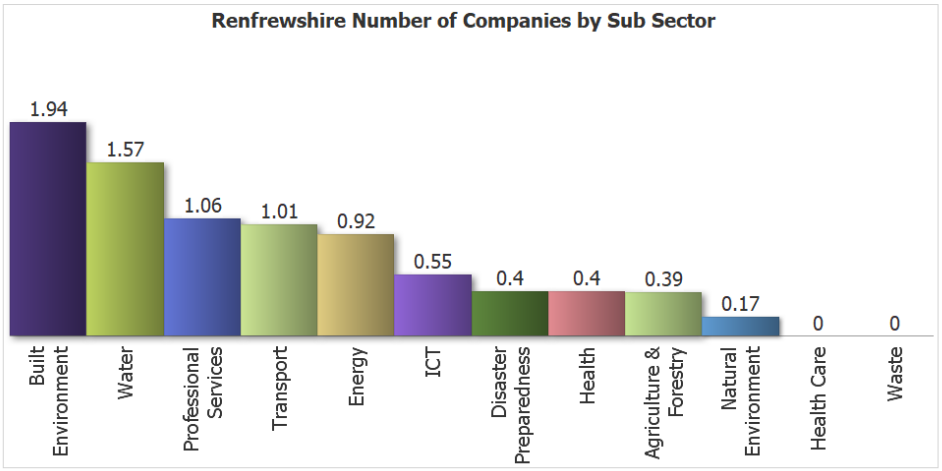


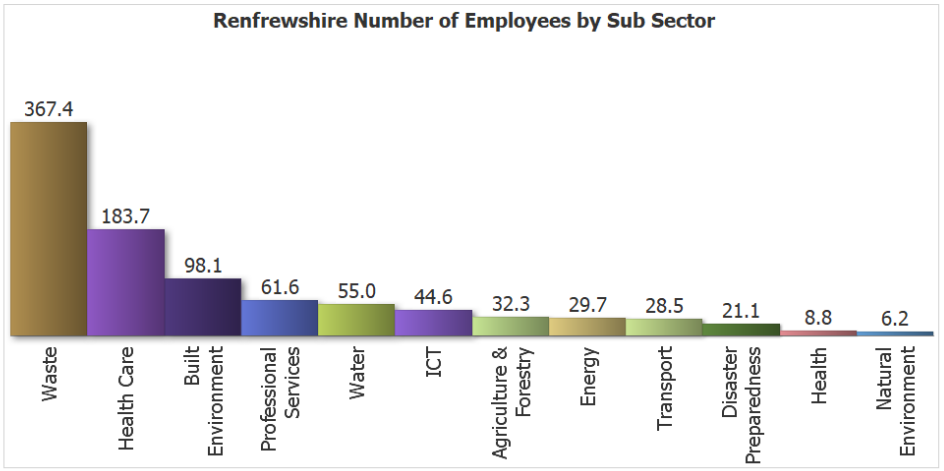


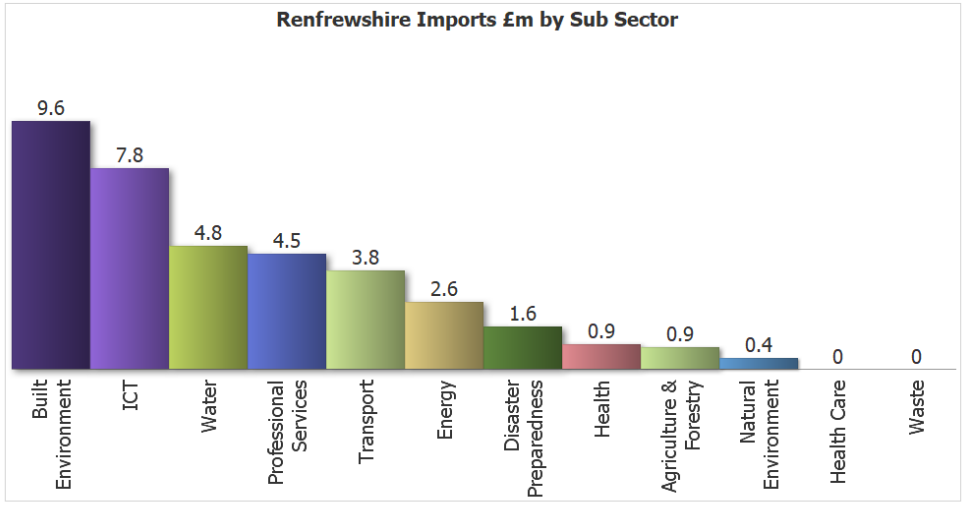


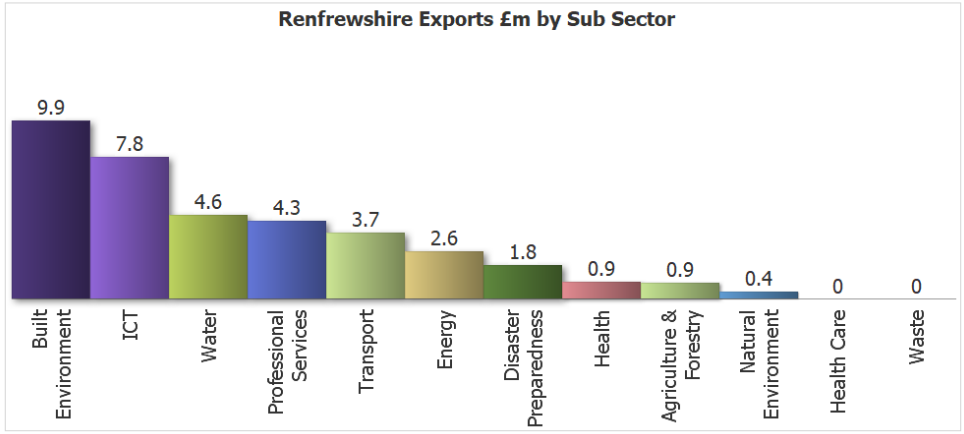

Renfrewshire Total A&R £m by Activity
32.0
26.9
23.4
16.1
8.4
2.3
1.3
0.9
0.7
0.1
0
Services
Manufacture
Engineering Services
Installation
Supply
Consulting
Education & Training
R&D
Design
Consultancy
Maintenance

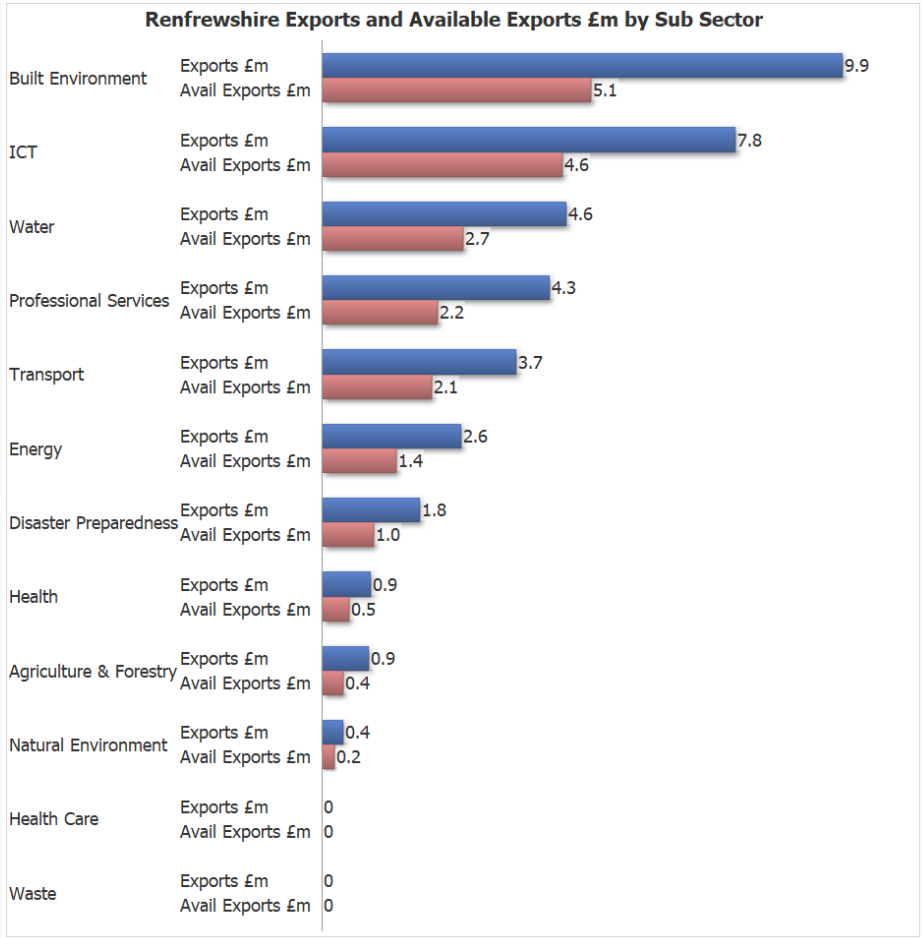

Renfrewshire Total A&RCC £m by Activity
4.6
4.3
2.8
2.3
0.9
0.4
0.3
0.2
0
0
0
Services
Engineering Services
Manufacture
Installation
Supply
Consulting
Education & Training
R&D
Consultancy
Design
Maintenance

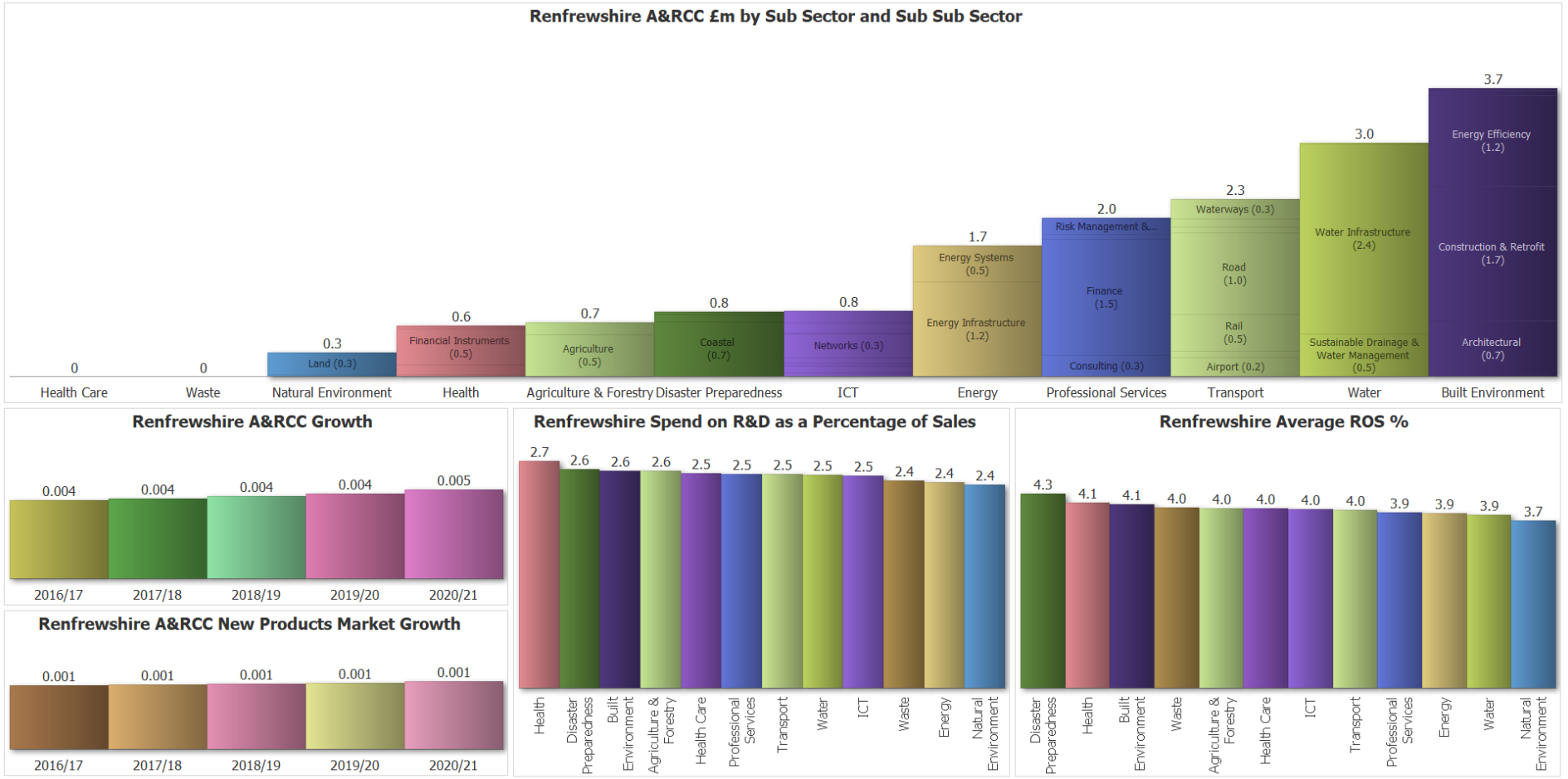

Renfrewshire Number of Companies by Sub Sector
1.94
1.57
1.06
1.01
0.92
0.55
0.4
0.4
0.39
0.17
0
0
Built Environment
Water
Professional Services
Transport
Energy
ICT
Disaster Preparedness
Health
Agriculture & Forestry
Natural Environment
Health Care
Waste


Renfrewshire Number of Employees by Sub Sector
367.4
183.7
98.1
61.6
55.0
44.6
32.3
29.7
28.5
21.1
8.8
6.2
Waste
Health Care
Built Environment
Professional Services
Water
ICT
Agriculture & Forestry
Energy
Transport
Disaster Preparedness
Health
Natural Environment


Renfrewshire Imports £m by Sub Sector
9.6
7.8
4.8
4.5
3.8
2.6
1.6
0.9
0.9
0.4
0
0
Built Environment
ICT
Water
Professional Services
Transport
Energy
Disaster Preparedness
Health
Agriculture & Forestry
Natural Environment
Health Care
Waste


Renfrewshire Exports £m by Sub Sector
9.9
7.8
4.6
4.3
3.7
2.6
1.8
0.9
0.9
0.4
0
0
Built Environment
ICT
Water
Professional Services
Transport
Energy
Disaster Preparedness
Health
Agriculture & Forestry
Natural Environment
Health Care
Waste


Renfrewshire Exports and Available Exports £m by Sub Sector
Built Environment
Exports £m 9.9
Avail Exports £m 5.1
ICT
Exports £m 7.8
Avail Exports £m 4.6
Water
Exports £m 4.6
Avail Exports £m 2.7
Professional Services
Exports £m 4.3
Avail Exports £m 2.2
Transport
Exports £m 3.7
Avail Exports £m 2.1
Energy
Exports £m 2.6
Avail Exports £m 1.4
Disaster Preparedness
Exports £m 1.8
Avail Exports £m 1.0
Health
Exports £m 0.9
Avail Exports £m 0.5
Agriculture & Forestry
Exports £m 0.9
Avail Exports £m 0.4
Natural Environment
Exports £m 0.4
Avail Exports £m 0.2
Health Care
Exports £m 0
Avail Exports £m 0
Waste
Exports £m 0
Avail Exports £m 0


Renfrewshire A&RCC £m by Sub Sector and Sub Sub Sector
0
0
0.3
Land (0.3)
0.6
Financial Instruments (0.5)
0.7
Agriculture (0.5)
0.8
Coastal (0.7)
0.8
Networks (0.3)
1.7
Energy Systems (0.5)
Energy Infrastructure (1.2)
2.0
Risk Management &...
Finance (1.5)
Consulting (0.3)
2.3
Waterways (0.3)
Road (1.0)
Rail (0.5)
Airport (0.2)
3.0
Water Infrastructure (2.4)
Sustainable Drainage & Water Management (0.5)
3.7
Energy Efficiency (1.2)
Construction & Retrofit (1.7)
Architectural (0.7)
Health Care
Waste
Natural Environment
Health
Agriculture & Forestry
Disaster Preparedness
ICT
Energy
Professional Services
Transport
Water
Built Environment

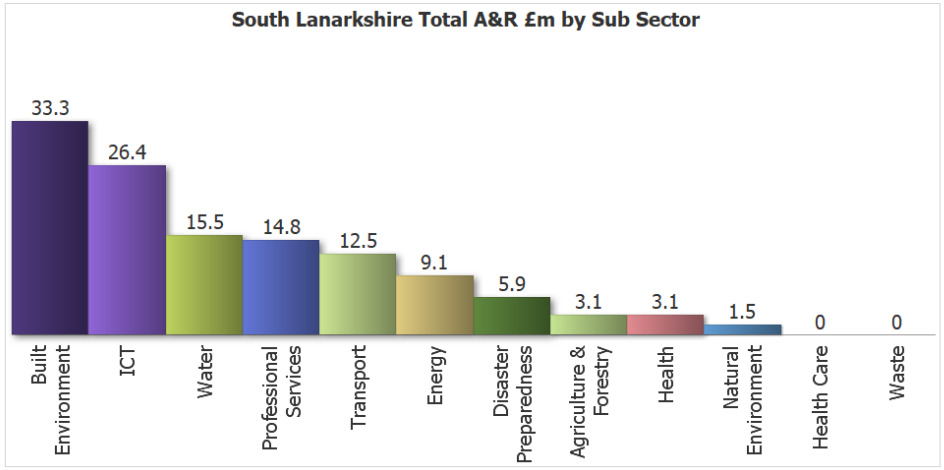
Renfrewshire A&RCC Growth
0.004
0.004
0.004
0.004
0.005
2016/17
2017/18
2018/19
2019/20
2020/21

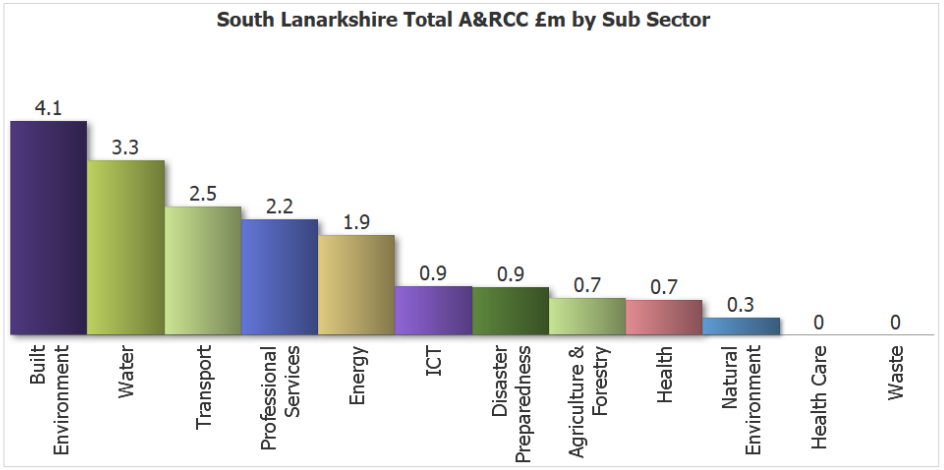
Renfrewshire A&RCC New Products Market Growth
0.001
0.001
0.001
0.001
0.001
2016/17
2017/18
2018/19
2019/20
2020/21

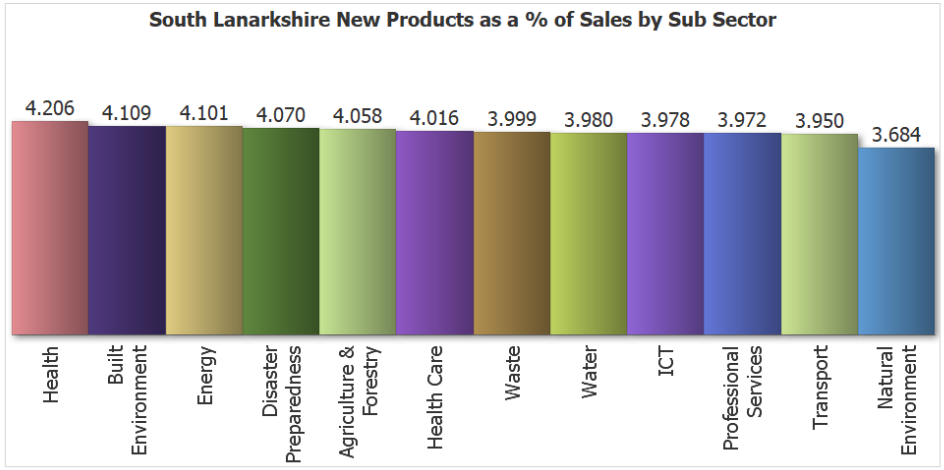
Renfrewshire Spend on R&D as a Percentage of Sales
2.7
2.6
2.6
2.6
2.5
2.5
2.5
2.5
2.5
2.4
2.4
2.4
Health
Disaster Preparedness
Built Environment
Agriculture & Forestry
Health Care
Professional Services
Transport
Water
ICT
Waste
Energy
Natural Environment

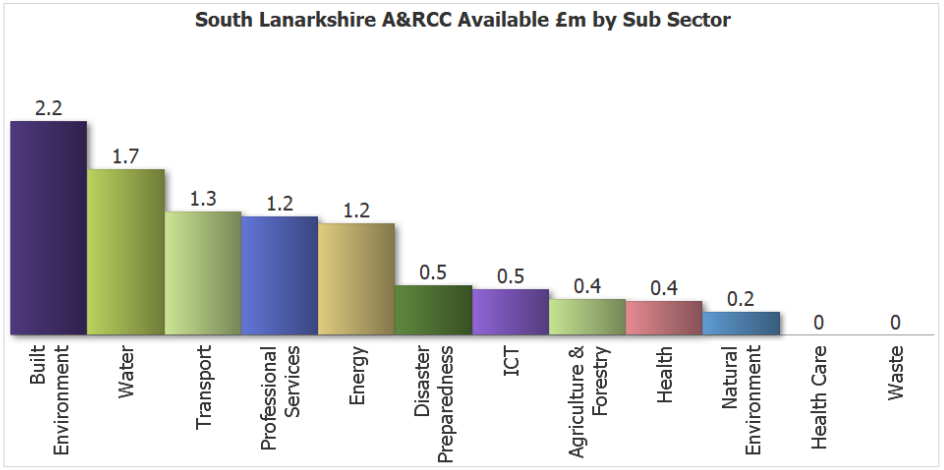
Renfrewshire Average ROS %
4.3
4.1
4.1
4.0
4.0
4.0
4.0
4.0
3.9
3.9
3.9
3.7
Disaster Preparedness
Health
Built Environment
Waste
Agriculture & Forestry
Health Care
ICT
Transport
Professional Services
Energy
Water
Natural Environment

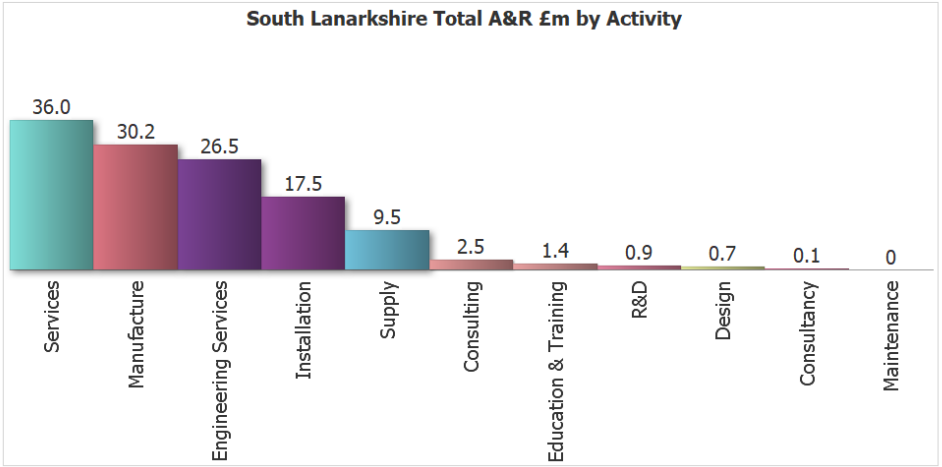
F7: South Lanarkshire

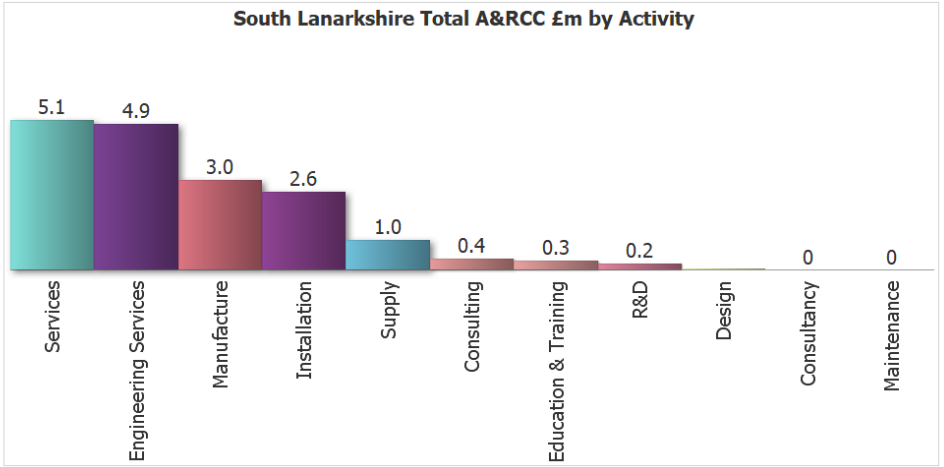


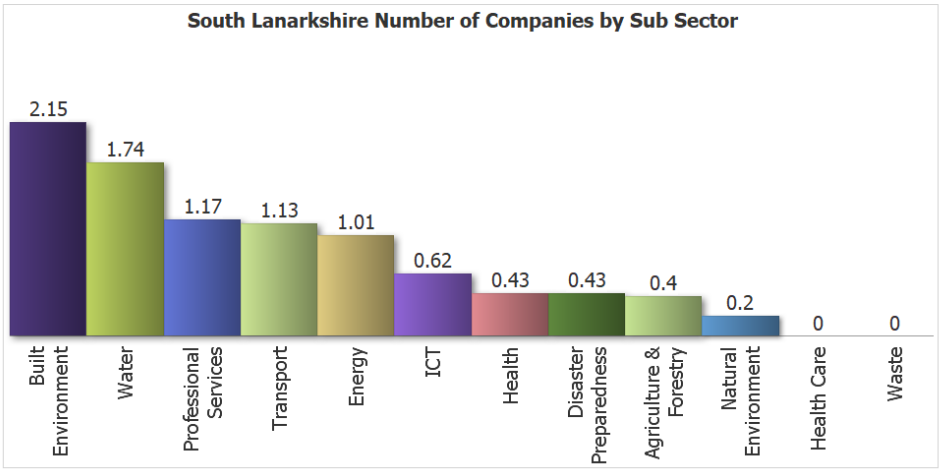


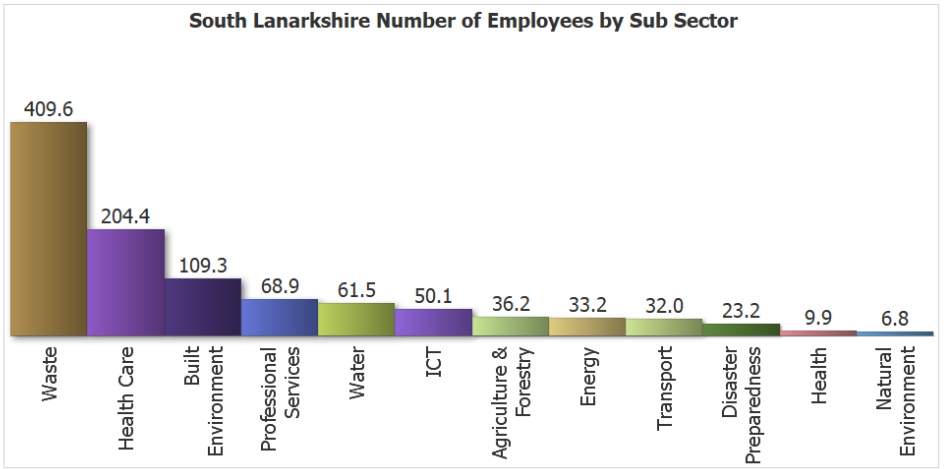


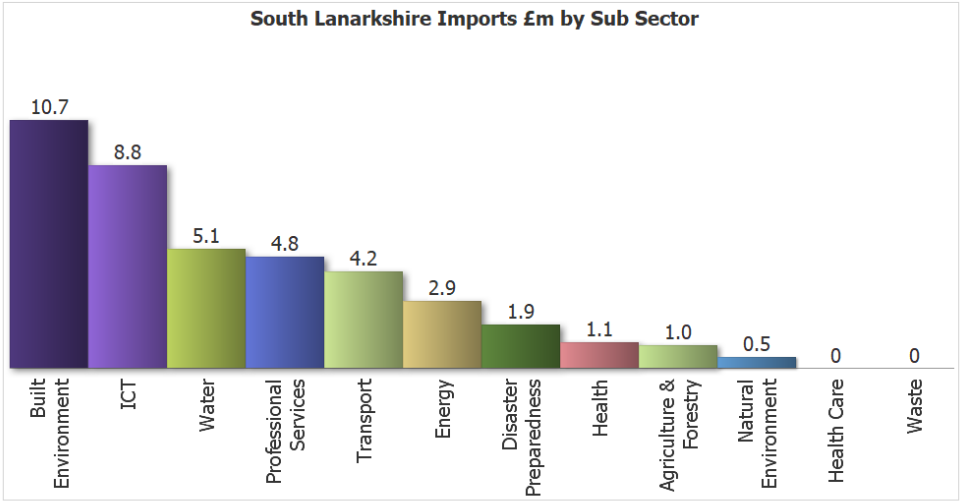


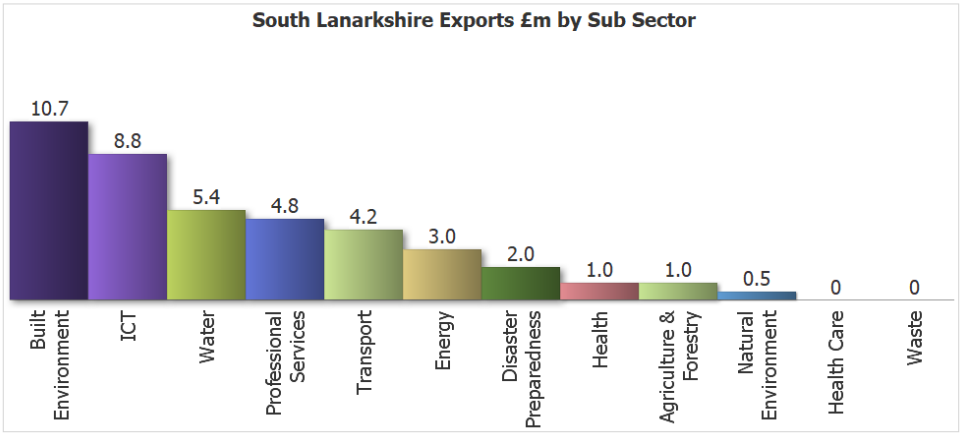

South Lanarkshire Total A&R £m by Activity
36.0
30.2
26.5
17.5
9.5
2.5
1.4
0.9
0.7
0.1
0
Services
Manufacture
Engineering Services
Installation
Supply
Consulting
Education & Training
R&D
Design
Consultancy
Maintenance

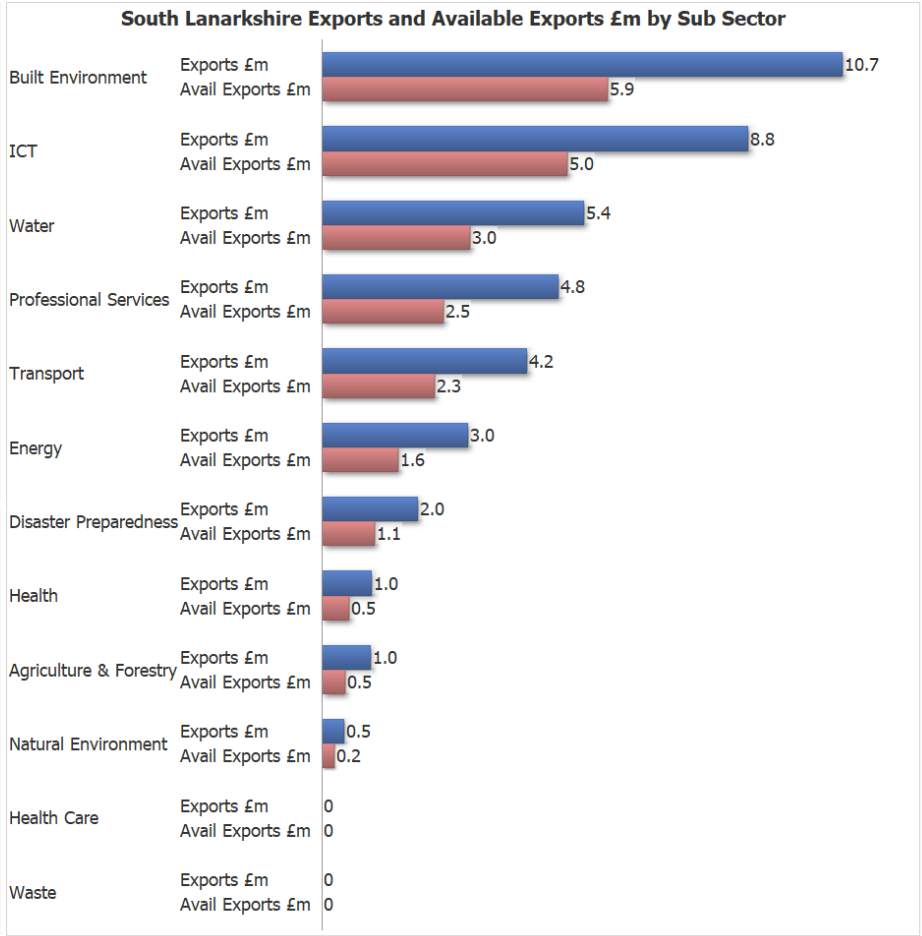

South Lanarkshire Total A&RCC £m by Activity
5.1
4.9
3.0
2.6
1.0
0.4
0.3
0.2
0
0
Services
Engineering Services
Manufacture
Installation
Supply
Consulting
Education & Training
R&D
Design
Consultancy
Maintenance

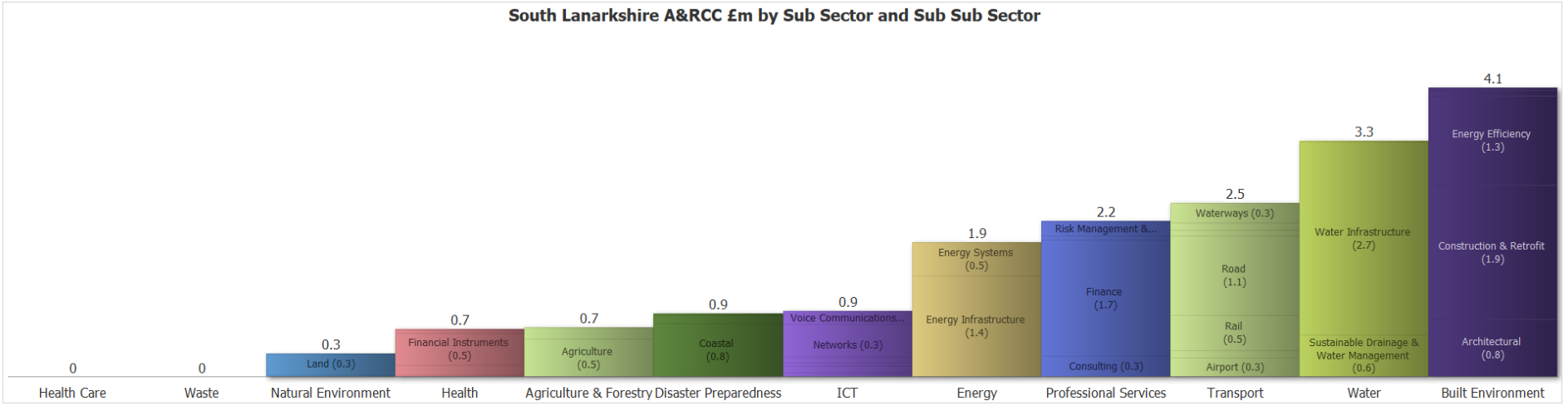

South Lanarkshire Number of Companies by Sub Sector
2.15
1.74
1.17
1.13
1.01
0.62
0.43
0.43
0.4
0.2
0
0
Built Environment
Water
Professional Services
Transport
Energy
ICT
Health
Disaster Preparedness
Agriculture & Forestry
Natural Environment
Health Care
Waste

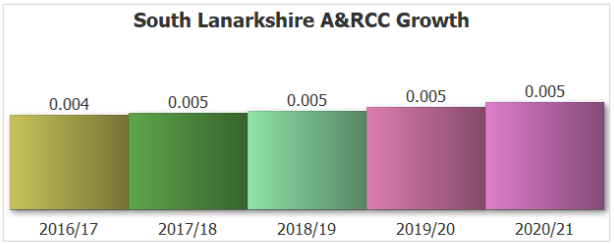

South Lanarkshire Number of Employees by Sub Sector
409.6
204.4
109.3
68.9
61.5
50.1
36.2
33.2
32.0
23.2
9.9
6.8
Waste
Health Care
Built Environment
Professional Services
Water
ICT
Agriculture & Forestry
Energy
Transport
Disaster Preparedness
Health
Natural Environment

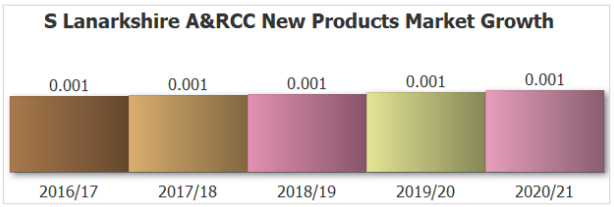

South Lanarkshire Imports £m by Sub Sector
10.7
8.8
5.1
4.8
4.2
2.9
1.9
1.1
1.0
0.5
0
0
Built Environment
ICT
Water
Professional Services
Transport
Energy
Disaster Preparedness
Health
Agriculture & Forestry
Natural Environment
Health Care
Waste

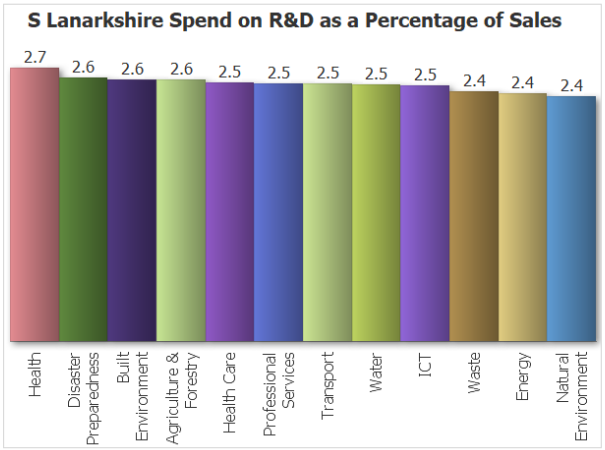

South Lanarkshire Exports £m by Sub Sector
10.7
8.8
5.4
4.8
4.2
3.0
2.0
1.0
1.0
0.5
0
0
Built Environment
ICT
Water
Professional Services
Transport
Energy
Disaster Preparedness
Health
Agriculture & Forestry
Natural Environment
Health Care
Waste

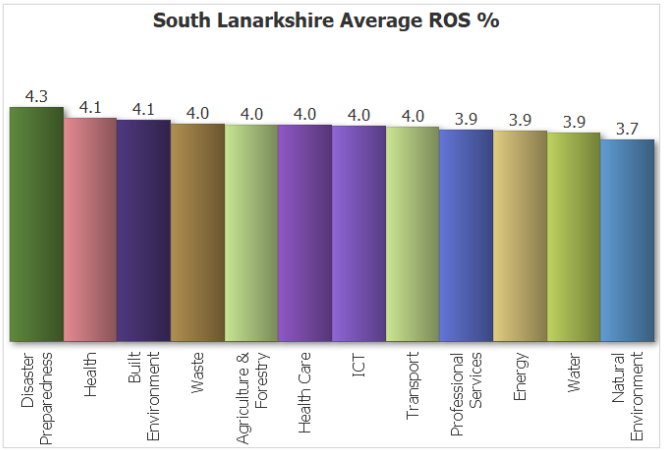

South Lanarkshire Exports and Available Exports £m by Sub Sector
Built Environment
Exports £m 10.7
Avail Exports £m 5.9
ICT
Exports £m 8.8
Avail Exports £m 5.0
Water
Exports £m 5.4
Avail Exports £m 3.0
Professional Services
Exports £m 4.8
Avail Exports £m 2.5
Transport
Exports £m 4.2
Avail Exports £m 2.3
Energy
Exports £m 3.0
Avail Exports £m 1.6
Disaster Preparedness
Exports £m 2.0
Avail Exports £m 1.1
Health
Exports £m 1.0
Avail Exports £m 0.5
Agriculture & Forestry
Exports £m 1.0
Avail Exports £m 0.5
Natural Environment
Exports £m 0.5
Avail Exports £m 0.2
Health Care
Exports £m 0
Avail Exports £m 0
Waste
Exports £m 0
Avail Exports £m 0


South Lanarkshire A&RCC £m by Sub Sector and Sub Sub Sector
0
Health Care
0
Waste
0.3
Land (0.3)
Natural Environment
0.7
Financial Instruments (0.5)
Health
0.7
Agriculture (0.5)
Agriculture & Forestry
0.9
Coastal (0.8)
Disaster Preparedness
0.9
Voice Communications...
Networks (0.3)
ICT
1.9
Energy Systems (0.5)
Energy Infrastructure (1.4)
Energy
2.2
Risk Management &...
Finance (1.7)
Consulting (0.3)
Professional Services
2.5
Waterways (0.3)
Road (1.1)
Rail (0.5)
Airport (0.3)
Transport
3.3
Water Infrastructure (2.7)
Sustainable Drainage & Water Management (0.6)
Water
4.1
Energy Efficiency (1.3)
Construction & Retrofit (1.9)
Architectural (0.8)
Built Environment

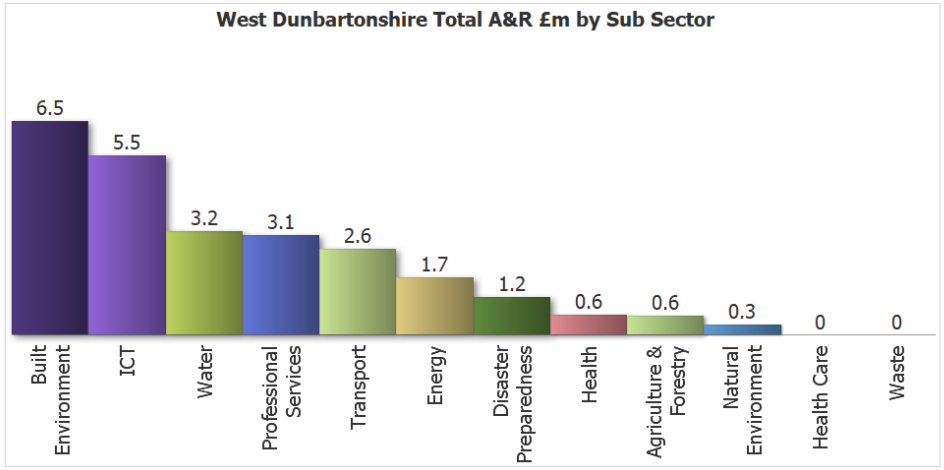

South Lanarkshire A&RCC Growth
0.004
0.005
0.005
0.005
0.005
2016/17
2017/18
2018/19
2019/20
2020/21

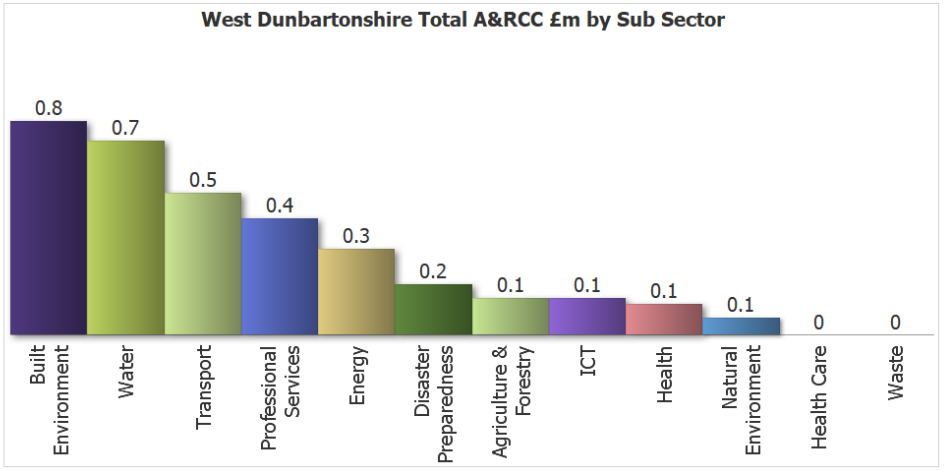

S Lanarkshire A&RCC New Products Market Growth
0.001
0.001
0.001
0.001
0.001
2016/17
2017/18
2018/19
2019/20
2020/21

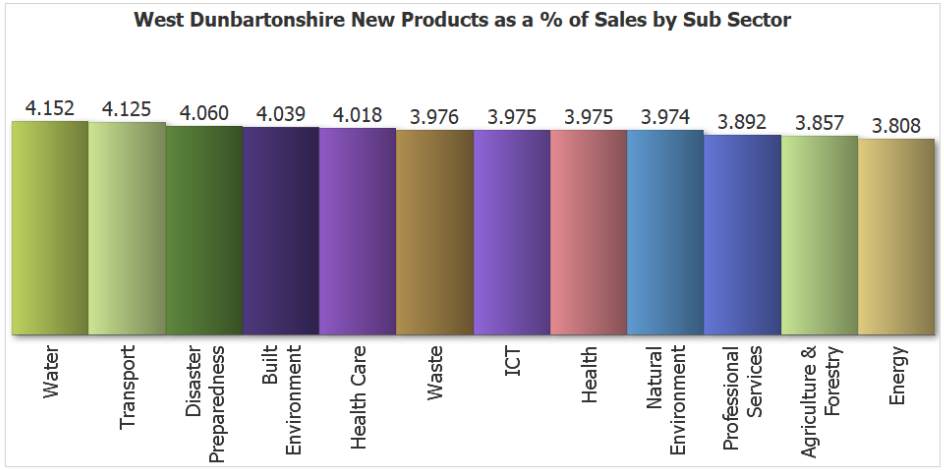

S Lanarkshire Spend on R&D as a Percentage of Sales
2.7
2.6
2.6
2.6
2.5
2.5
2.5
2.5
2.5
2.4
2.4
2.4
Health
Disaster Preparedness
Built Environment
Agriculture & Forestry
Health Care
Professional Services
Transport
Water
ICT
Waste
Energy
Natural Environment

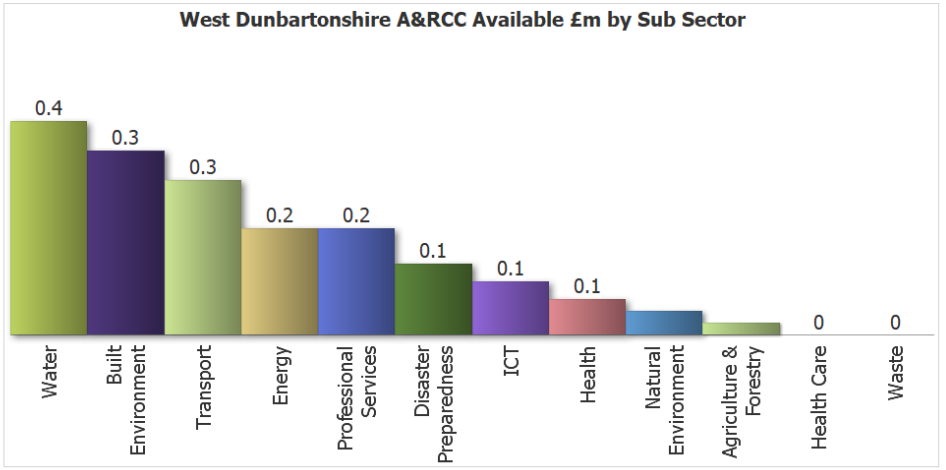

South Lanarkshire Average ROS %
4.3
4.1
4.1
4.0
4.0
4.0
4.0
4.0
3.9
3.9
3.9
3.7
Disaster Preparedness
Health
Built Environment
Waste
Agriculture & Forestry
Health Care
ICT
Transport
Professional Services
Energy
Water
Natural Environment

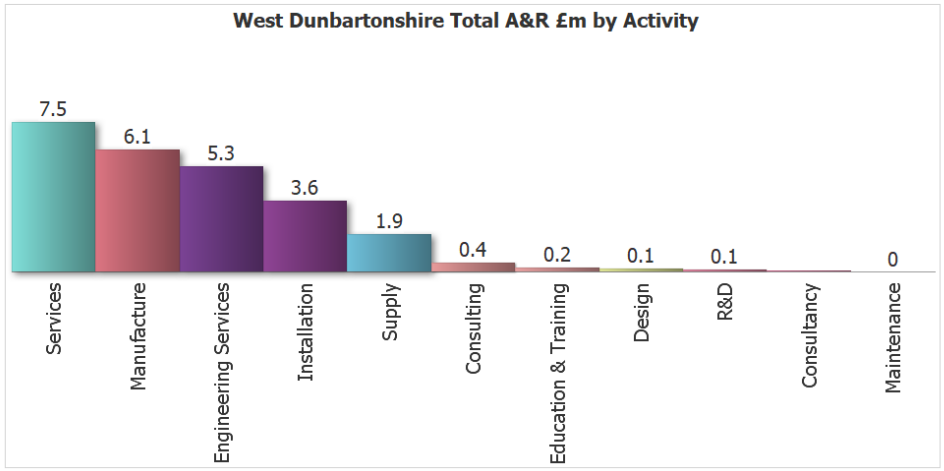
F8: West Dunbartonshire

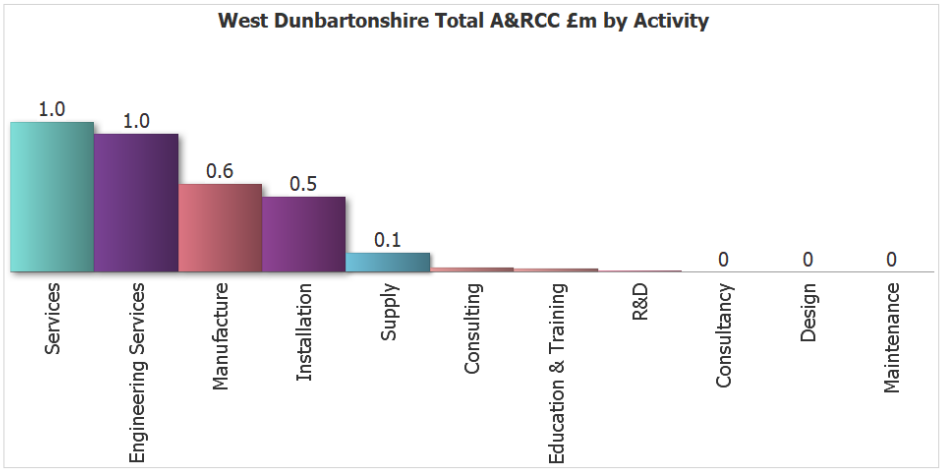


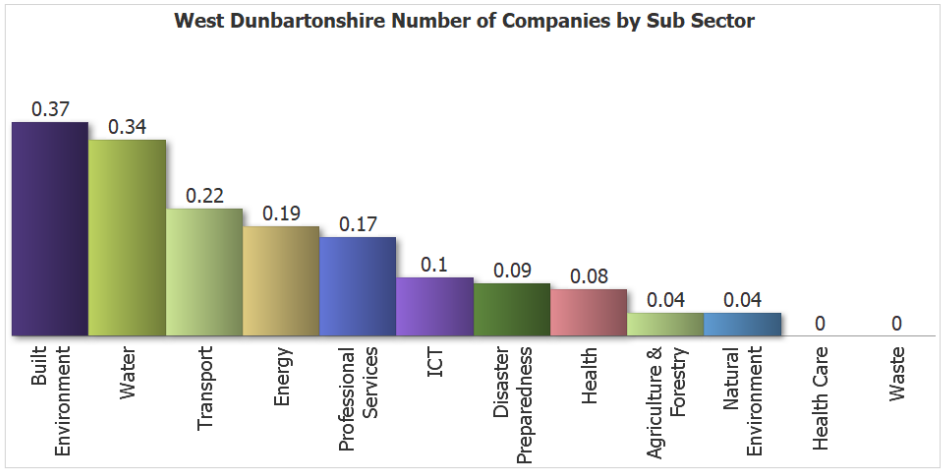


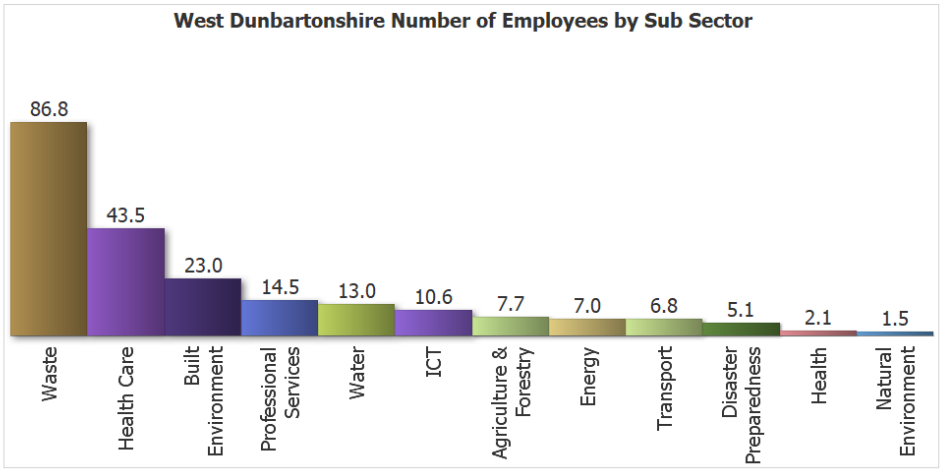


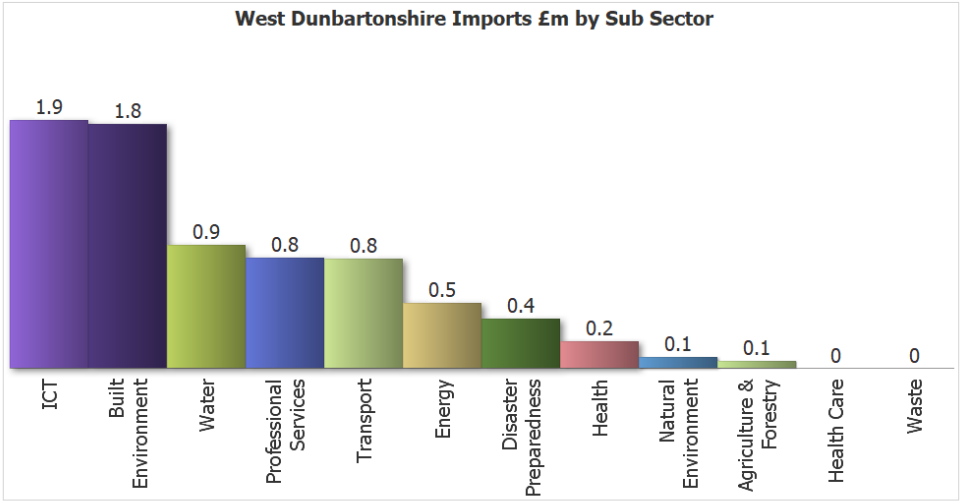


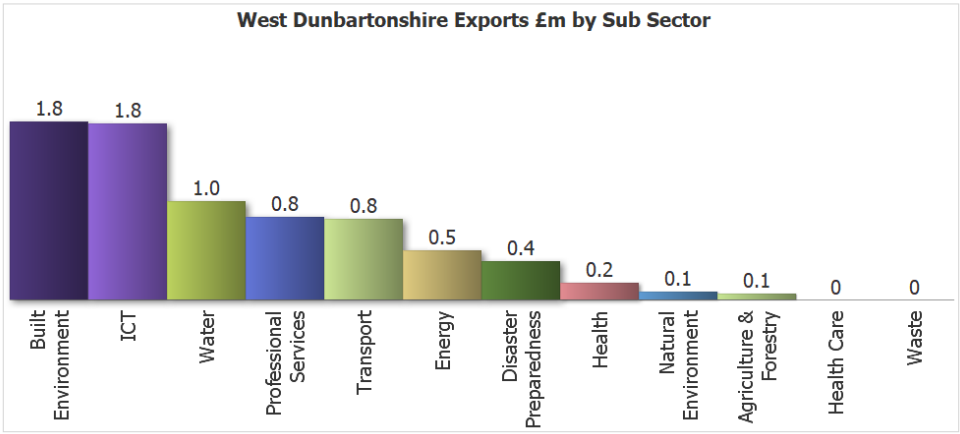

West Dunbartonshire Total A&R £m by Activity
7.5
6.1
5.3
3.6
1.9
0.4
0.2
0.1
0.1
0
Services
Manufacture
Engineering Services
Installation
Supply
Consulting
Education & Training
Design
R&D
Consultancy
Maintenance

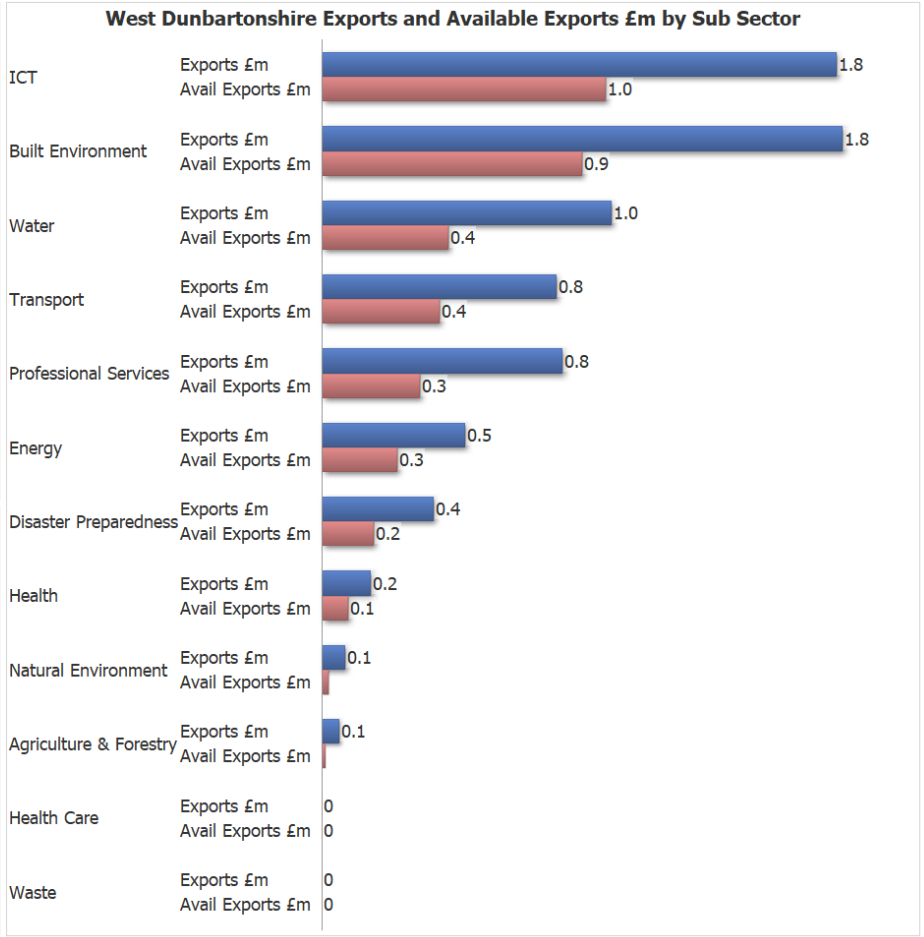

West Dunbartonshire Total A&RCC £m by Activity
1.0
1.0
0.6
0.5
0.1
0
0
0
Services
Engineering Services
Manufacture
Installation
Supply
Consulting
Education & Training
R&D
Consultancy
Design
Maintenance

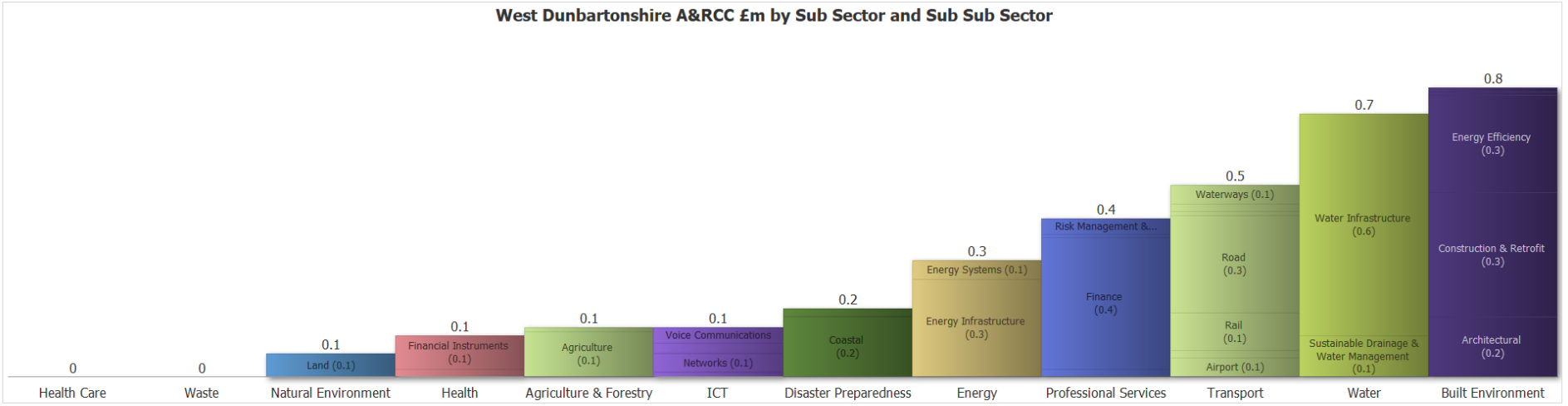

West Dunbartonshire Number of Companies by Sub Sector
0.37
0.34
0.22
0.19
0.17
0.1
0.09
0.08
0.04
0.04
0
0
Built Environment
Water
Transport
Energy
Professional Services
ICT
Disaster Preparedness
Health
Agriculture & Forestry
Natural Environment
Health Care
Waste

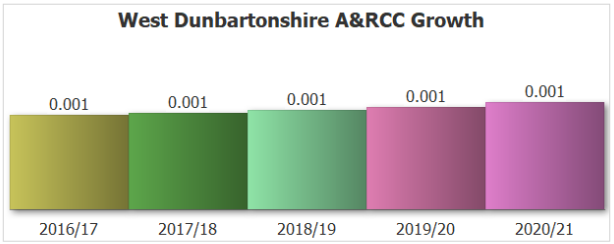

West Dunbartonshire Number of Employees by Sub Sector
86.8
43.5
23.0
14.5
13.0
10.6
7.7
7.0
6.8
5.1
2.1
1.5
Waste
Health Care
Built Environment
Professional Services
Water
ICT
Agriculture & Forestry
Energy
Transport
Disaster Preparedness
Health
Natural Environment

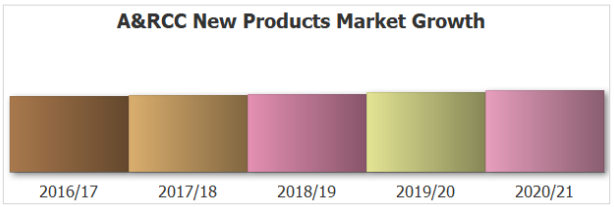

West Dunbartonshire Imports £m by Sub Sector
1.9
1.8
0.9
0.8
0.8
0.5
0.4
0.2
0.1
0.1
0
0
ICT
Built Environment
Water
Professional Services
Transport
Energy
Disaster Preparedness
Health
Natural Environment
Agriculture & Forestry
Health Care
Waste

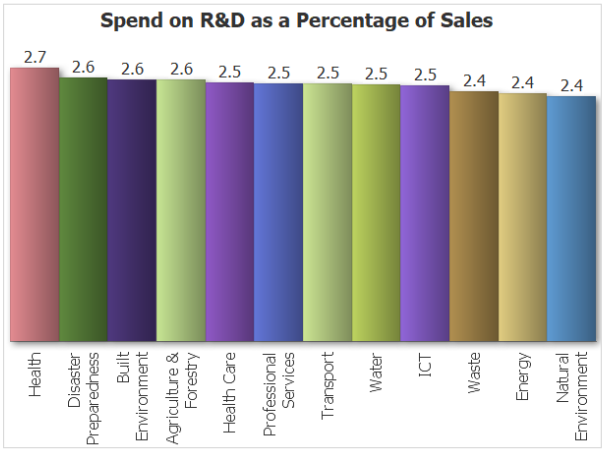

West Dunbartonshire Exports £m by Sub Sector
1.8
1.8
1.0
0.8
0.8
0.5
0.4
0.2
0.1
0.1
0
0
Built Environment
ICT
Water
Professional Services
Transport
Energy
Disaster Preparedness
Health
Natural Environment
Agriculture & Forestry
Health Care
Waste

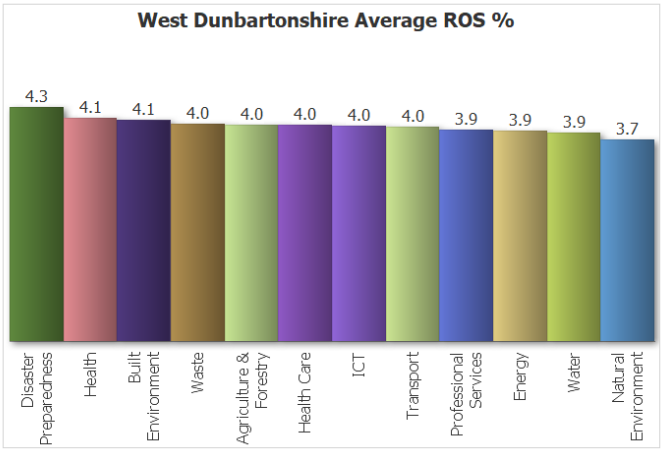

West Dunbartonshire Exports and Available Exports £m by Sub Sector
ICT
Exports £m 1.8
Avail Exports £m 1.0
Built Environment
Exports £m 1.8
Avail Exports £m 0.9
Water
Exports £m 1.0
Avail Exports £m 0.4
Transport
Exports £m 0.8
Avail Exports £m 0.4
Professional Services
Exports £m 0.8
Avail Exports £m 0.3
Energy
Exports £m 0.5
Avail Exports £m 0.3
Disaster Preparedness
Exports £m 0.4
Avail Exports £m 0.2
Health
Exports £m 0.2
Avail Exports £m 0.1
Natural Environment
Exports £m 0.1
Avail Exports £m
Agriculture & Forestry
Exports £m 0.1
Avail Exports £m
Health Care
Exports £m 0
Avail Exports £m 0
Waste
Exports £m 0
Avail Exports £m 0


West Dunbartonshire A&RCC £m by Sub Sector and Sub Sub Sector
0
0
0.1
Land (0.1)
0.1
Financial Instruments (0.1)
0.1
Agriculture (0.1)
0.1
Voice Communications
Networks (0.1)
0.2
Coastal (0.2)
0.3
Energy Systems (0.1)
Energy Infrastructure (0.3)
0.4
Risk Management &...
Finance (0.4)
0.5
Waterways (0.1)
Road (0.3)
Rail (0.1)
Airport (0.1)
0.7
Water Infrastructure (0.6)
Sustainable Drainage & Water Management (0.1)
0.8
Energy Efficiency (0.3)
Construction & Retrofit (0.3)
Architectural (0.2)
Health Care
Waste
Natural Environment
Health
Agriculture & Forestry
ICT
Disaster Preparedness
Energy
Professional Services
Transport
Water
Built Environment


West Dunbartonshire A&RCC Growth
0.001
0.001
0.001
0.001
0.001
2016/17
2017/18
2018/19
2019/20
2020/21


A&RCC New Products Market Growth
2016/17
2017/18
2018/19
2019/20
2020/21


Spend on R&D as a Percentage of Sales
2.7
2.6
2.6
2.6
2.5
2.5
2.5
2.5
2.5
2.4
2.4
2.4
Health
Disaster Preparedness
Built Environment
Agriculture & Forestry
Health Care
Professional Services
Transport
Water
ICT
Waste
Energy
Natural Environment


West Dunbartonshire Average ROS %
4.3
4.1
4.1
4.0
4.0
4.0
4.0
4.0
3.9
3.9
3.9
3.7
Disaster Preparedness
Health
Built Environment
Waste
Agriculture & Forestry
Health Care
ICT
Transport
Professional Services
Energy
Water
Natural Environment

Annex I – Glossary - Sector Definition

The Adaptation Economy defined within this report is sub divided into 12 core activity areas. These are Agriculture & Forestry, Built Environment, Disaster Preparedness, Energy, Health, Healthcare, ICT, Natural Environment, Professional Services, Transport, Water and Waste. For each core area or sub sector only activities (or proportions of activities) that can be demonstrated to relate to Adaptation & Resilience (including Adaptation & Resilience to Climate Change) have been included.

Sub Sector	Description
Agriculture & Forestry	Agriculture includes: Adaptation and Management of Farm Equipment, Crop and Soil Management, Cultivation of New Crops Enabled by Climate Change, Development of Drought-Resistant Seeds, Education, Improvements in Agricultural Management and Pest Suppression Systems and Practices. Forestry includes: Forestry Services, Improved New Species and Improvements in Forest Management
Built Environment	Built Environment includes: • Architecture- Design Services, Engineering and Project Management • Construction & Retrofit- Adaptive Civil Engineering Services, Urban Enviro Redesign & Re Engineering, Manufacture of Retrofit Engineering Equipment, Manufacture of Retrofit Materials and Retrofit Building Services • Energy Efficiency for thermal comfort- Adaptation of Buildings, Cooling of Buildings, Green and Reflective Roofing • Technical Services- Assessing Green Spaces • Water Efficiency- Water Supply and Use
Disaster Preparedness	Disaster Preparedness includes: Coastal and Inland Waterways Defence and Protection, Protection of Critical Buildings and Installations, Emergency Response and Early Warning Systems, Provision of Flood Barrier and Water Ingress Equipment, Relocation of Exposed Settlements, Manufacture and Supply of Sand Bags and Advanced Risk Modelling
Energy	Energy Infrastructure include: Flood Protection for Power Stations and Hydropower Reservoir Stations, Increased Robustness of Transmission Grids and Underground Cable Installation Energy Systems include: Climate Change Risk Planning, Energy Efficient Ventilation Systems, Generation with Minimal Cooling Water, Manufacture and Supply of Small Scale Energy Systems, New Distribution Systems. New Transmission Systems and New Cooling Systems
Health	Health includes: Research & Planning for Disease Monitoring, Energy Efficient Hospitals, Specialist Developers of Green & Blue Spaces and Specialist Health Education Services
Health Care	Health Care Includes: Alternative Therapies, NHS, Private healthcare, Voluntary Organisations, Medical Services, General Medical equipment and consumables, Orthopaedic Surgery & Equipment Medical ICT Equipment Scanners and X-ray,

	Laboratory and Test Equipment, Dental and Ophthalmic Equipment Disabled Equipment, General Medical equipment and consumables, Orthopaedic Surgery & Equipment, Over the counter prescribed and non-prescribed pharmaceuticals
ICT	ICT includes: Communications, Control Systems, Data Management, ICT Installations, Information Systems, Networks, RF Communications. Transaction Management and Voice Communications
Natural Environment	Natural Environment includes: Weather Station Services, Supply of Retrofit Engineering Equipment, Landscape Design, Maintenance of Green Areas, Planting Trees and Survey & Mapping for Environment and Conservation
Professional Services	Professional Services includes: • Climate Change Consultancy to a wide range of industries • Finance- Banking Services, Disaster Preparedness Finance, Environmental Finance, Equity Investment Services • Insurance • Risk Management & Business Continuity
Transport	Transport includes: Airport/ Bridge/ Rail/ Road and Waterways Infrastructure, Transport Services and Vegetation Management
Waste	Waste 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	Water includes Sustainable Drainage & Water Management, Water Infrastructure and Water Irrigation, incorporating Advanced Water Management Technologies, Leakage Control in Water Distribution System, River Basins Management and Storm Water Management, Treatment and Planning.

Annex J – Glossary - Economic Measures

This report uses a range of economic and market metrics to measure Adaptation products and services. Each one is defined briefly below and in more detail in Annex F as part of the general research methodology. All metrics relate to the annual fiscal year data.

Measure	Description
Sales £	Measure of economic activity by identified companies and their supply chain within a defined geographic area, based upon where the economic activity is delivered from rather than where it is reported.
Employment	Measure of the level of employment, in Full Time Equivalents (FTEs), across core and supply chain companies involved in delivering sector products & services.
Companies	Measure of the total number of companies in a country that are either core to the delivery of sector products & services or form an integral part of the supply chain. This measure will be split between large firms and SMEs.
Market Growth	Forecast measure of the annual percentage rate of change in sales.