London’s Low Carbon Market Snapshot - 2013

London’s Low Carbon and Environmental Goods and Services - Updated Report

August 2013

By kMatrix

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kMatrix

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1. Executive Summary

The value of London's Low Carbon and Environmental Goods and Services sector in 2011/12 was worth £25.4bn to London's economy, as indicated by the value of the sales in the sector, and contained over 9,200 companies employing over 163,500 people.

This sector has and continues to enjoy considerable levels of growth at a time when the general economy has been going through the most serious economic downturn since the 1930s. The Low Carbon and Environmental Goods and Services sector has grown over the last five years from £20.9bn in 2007/08 to £22.9bn in 2009/10 and has now reached £25.4bn in 2011/12.The sector has grown by more than 5% in each of the last two years and this rate of growth is faster than the UK average for the same period. It is forecast to continue to grow until the end of the decade by over 5% if you exclude carbon finance and by over 6% if you include carbon finance.

Employment in London's Low Carbon and Environmental Goods and Services sector in 2011/12 was 163,563. This has increased from 159,715 in 2009/10 and annual growth in employment has been 2.5% between 2009/10 and 2010/11 and 0% between 2010/11 and 2011/12. This uneven annual growth in employment is mirrored in the rest of the UK.

The number of companies in London's Low Carbon and Environmental Goods and Services sector in 2011/12 was 9,211. There has been negligible growth in the number of companies operating in the Low Carbon and Environmental Goods and Services sector during the three years both in London and the UK as a whole.

In 2011/12 London's Low Carbon and Environmental Goods and Services sector was made up by the following proportions: Low Carbon 52%, Renewable Energy 32% and Environmental 16%.

The largest sub-sectors in the Low Carbon and Environmental Goods and Services sector by sales are in Carbon Finance £6.52bn, Geothermal £2.74bn, Wind £2.53bn and Building Technologies £2.28bn, and these four sub-sectors account for 56% of London's total Low Carbon and Environmental Goods and Services sector sales. The Low Carbon and Environmental Goods and Services sector in London is different to the rest of the UK because 97% of the Carbon Finance sub-sector is contained within London.

These four largest sectors by sales have all enjoyed good growth since 2009/10 with Carbon Finance growing from £5.72bn to £6.52bn, Geothermal from £2.47bn to £2.74bn, Wind from £2.22bn to £2.53bn and Building Technologies from 2.07bn to £2.28bn.

The value of London's Low Carbon and Environmental Goods and Services sector Exports in 2011/12 was £2.2bn, which was up from £1.9bn in 2009/10. This made up 18% of the UK's Low Carbon and Environmental Goods and Services exports in 2011/12 and was slightly less than London's 20% share of the UK's Low Carbon and Environmental Goods and Services sector Sales but it was consistent with its' percentage share of companies and employment.

2. Introduction to the Low Carbon and Environmental Goods and Services Sector

This report updates the previous London Low Carbon Market Snapshot that was published in October 2011 that assessed the size and nature of London's Low Carbon and Environmental Goods and Services sector for the fiscal years 2007/08, 2008/09 and 2009/10. This report brings that dataset right up to date by analysing data from 2009/10 to 2011/12.

The London Low Carbon Market Snapshot 2011 can be found on the GLA website using the following link:
http://www.london.gov.uk/sites/default/files/archives/London%20LCEGS%20Sector%20Study%20December%202011.pdf

The data used in this report and the previous report is based upon kMatrix's work for UK Government where it has been reported annually by BIS since 2008/ 09. The recently published BIS 2011/12 Low Carbon and Environmental Goods and Services (LCEGS) report provides a deeper analysis of Low Carbon and Environmental Goods and Services (LCEGS) markets from both a global and a more local UK perspective.

The Low Carbon and Environmental Goods and Services (LCEGS) sector has been defined using 24 sub-sectors (or Level 2 markets). These are grouped into three broad categories - Environmental, Renewable Energy and Low Carbon - the addition of the Renewable Energy and Low Carbon groupings illustrates the evolution of the current LCEGS sector definition from its original Environmental roots.

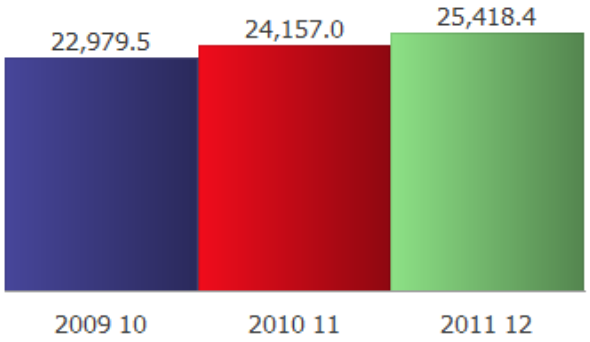
The current definition includes 2,800 product and service activities that derive from sector supply chain activities (componentry & assemblies) and value chain activities (R&D, Supply & Training). A glossary of economic activities included for each sub-sector of the LCEGS is included as Appendix 1 and an explanation of the LCEGS methodology in Appendix 2.

3. London's LCEGS Analysis

3.1 LCEGS Compared by Year

In this section of the report London's Low Carbon and Environmental Goods and Services (LCEGS) performance is compared for the last three years for the three key measures of Sales, Employment and Growth.

Figure 1: Sales 2009/ 10 to 2011/12 in £m

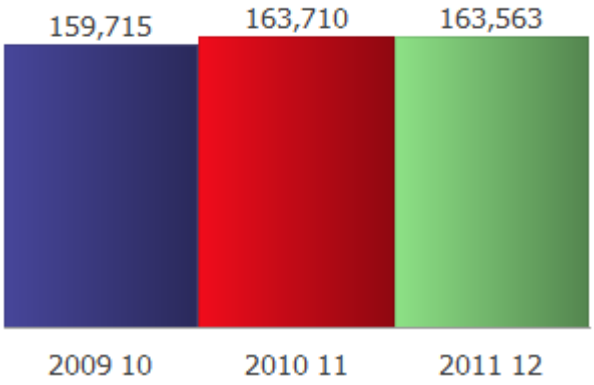


London's LCEGS Sales in 2011/12 was £25.4bn.

Annual growth in London LCEGS was 5.12% between 2009/10 and 2010/11 and 5.22% between 2010/11 and 2011/12.

In comparison UK growth in LCEGS was 4.55% and 4.84% respectively.

Figure 2: Employment 2009/ 10 to 2011/12

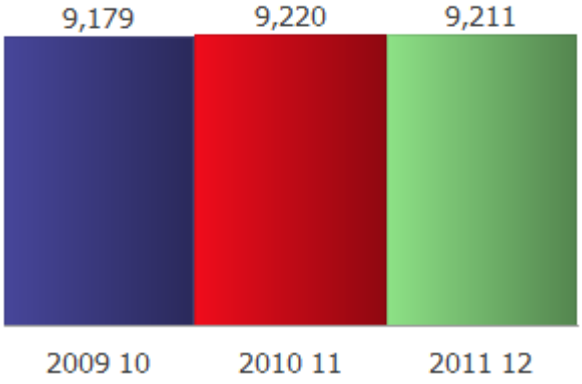


London's LCEGS Employment in 2011/ 12 was 163, 563.

Annual growth in London LCEGS was 2.5% between 2009/10 and 2010/11 and 0% between 2010/11 and 2011/12.

In comparison UK growth in LCEGS was 2.6% and 0% respectively

Figure 3: Companies 2009/ 10 to 2011/12



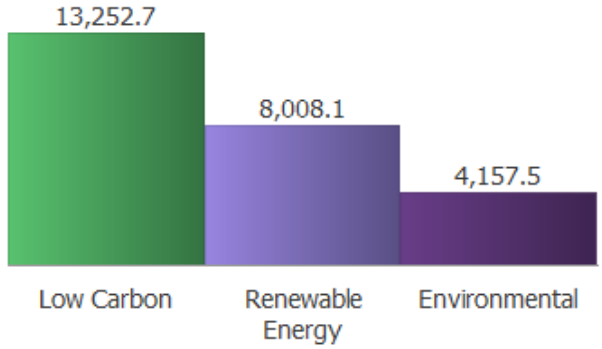
London's LCEGS Company count in 2011/12 was 9,211.

Growth in the number of LCEGS companies across the three years has been negligible for London and the UK as a whole.

3.2 London's LCEGS at Level 1

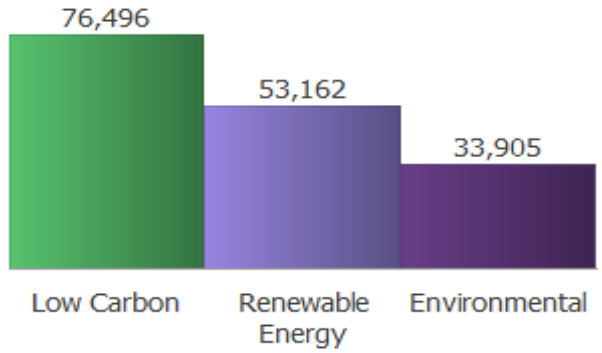
The analysis in this section of the report focuses on the Level 1 and Level 2 split of LCEGS in London.

Figure 4: Sales 2011/12 in £m



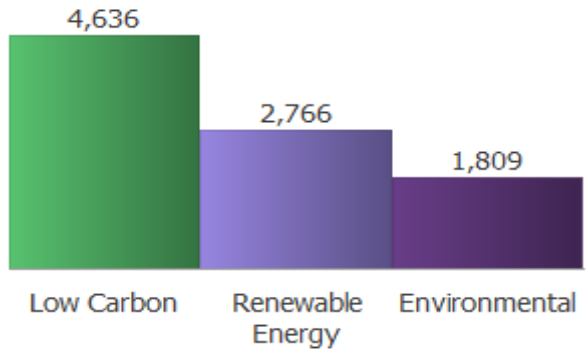
Sales for the LCEGS sector in 2011/12 were £25,418.4m (£25.4 bn). This value is made up by contributions from Level 1 sub-sectors as follows: 52% Low Carbon, 32% Renewable Energy and 16% Environmental.

Figure 5: Employment 2011/12



The employment count for the LCEGS sector in 2011/12 was 163,563. This value is made up by contributions from Level 1 sub-sectors as follows: 47% Low Carbon, 33% Renewable Energy and 20% Environmental.

Figure 6: Companies 2011/12



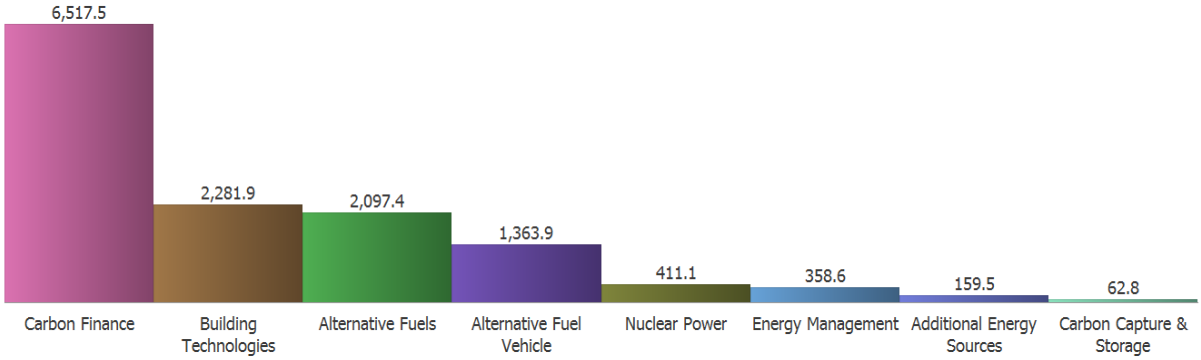
The company count for the LCEGS sector in 2011/12 was 9,211. This value is made up by contributions from Level 1 sub-sectors as follows: 50% Low Carbon, 30% Renewable Energy and 20% Environmental.

In 2011/12 London's LCEGS Sales is split- Low Carbon 52%, Renewable Energy 32% and Environmental 16%. The split for the UK as a whole is 50%, 31% and 19% respectively. The difference in profile is mostly accounted for by the Carbon Finance sub-sector (within Low Carbon), which is almost totally contained within London.

This split between the three Level 1 sub-sectors in London has remained broadly consistent for the past three years

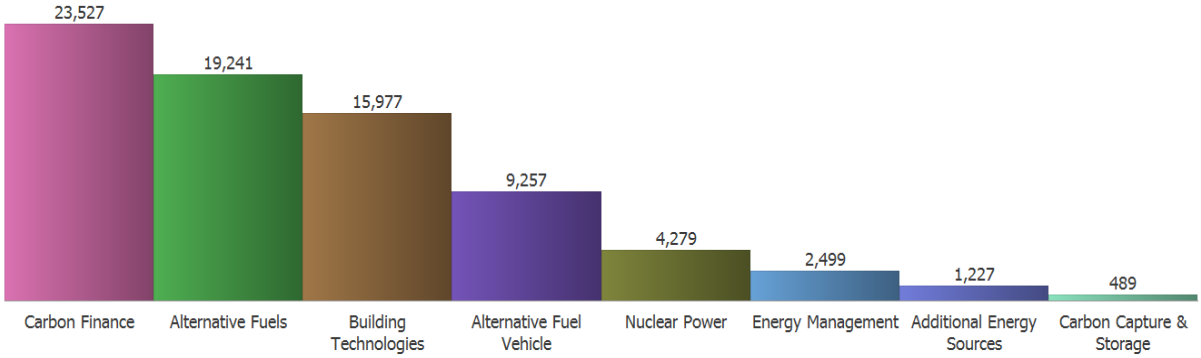
3.3 London's LCEGS at Level 2 - Low Carbon

Figure 7: Sales 2011/12 in £m



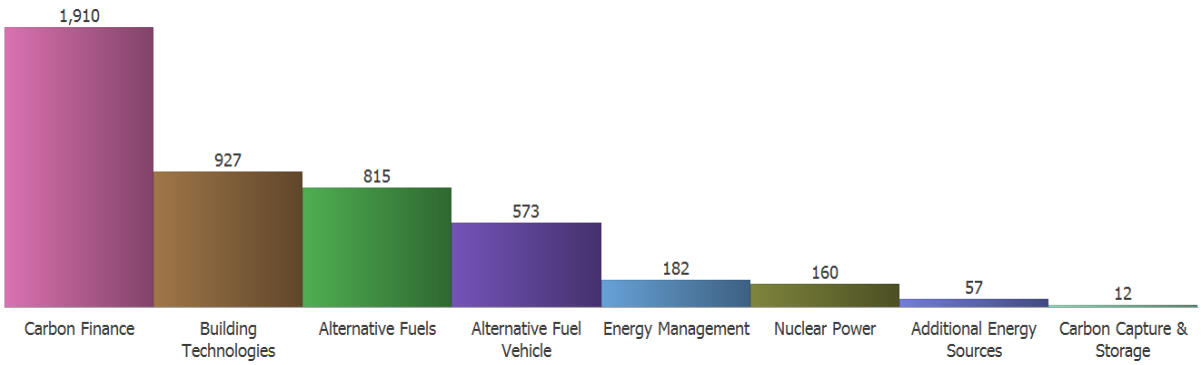
Low Carbon is the further sub-divided into eight sub-sectors, of which four account for 92% of Sales. These four are made up of Carbon Finance 49%, Building Technologies 17%, Alternatives Fuels 16% and Alternative Fuelled Vehicles 10%.

Figure 8: Employment 2011/12



The same four sub-sectors account for 89% of Employment. They are Carbon Finance 31%, Alternatives Fuels 25%, Building Technologies 21% and Alternative Fuelled Vehicles 12%.

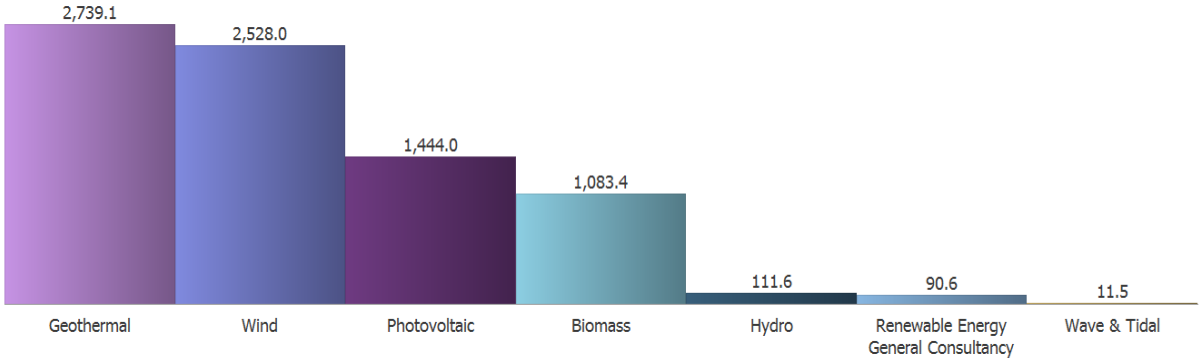
Figure 9: Companies 2011/12



And again the same four sub-sectors account for 91% of Companies. They are Carbon Finance 41%, Building Technologies 20%, Alternatives Fuels 18% and Alternative Fuelled Vehicles 12%.

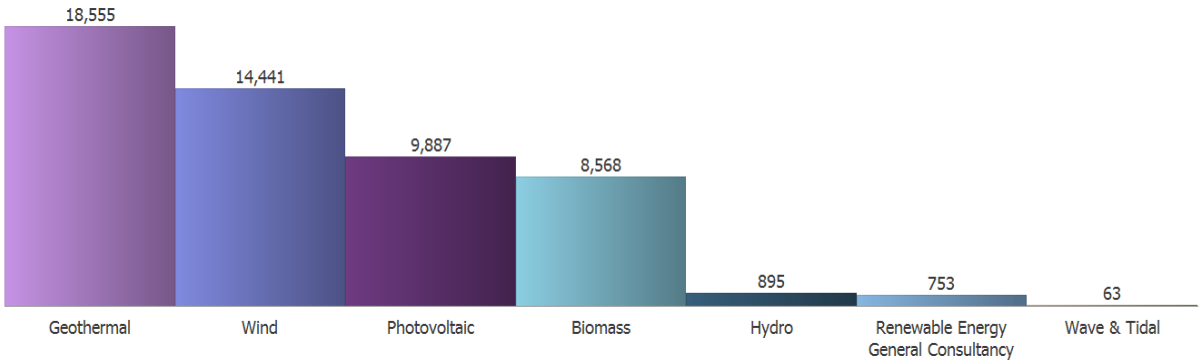
3.4 London's LCEGS at Level 2- Renewable Energy

Figure 10: Sales 2011/12 in £m



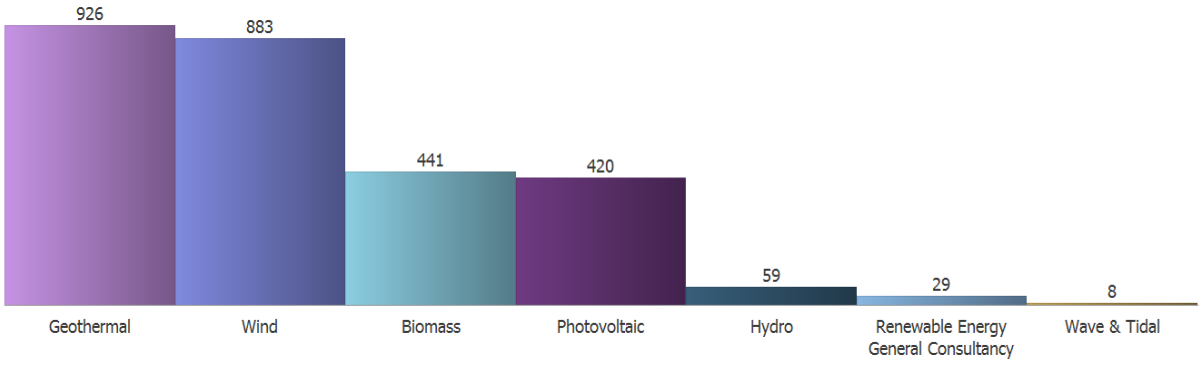
Renewable Energy is then split into seven sub-sectors, of which four account for 98% of Sales. These fours are made up by Geothermal 34%, Wind 32%, Photovoltaic 18% and Biomass 14%.

Figure 11: Employment 2011/12



The same four sub-sectors also account for 98% of Employment. They are made up of Geothermal 35%, Wind 27%, Photovoltaic 19% and Biomass 19%.

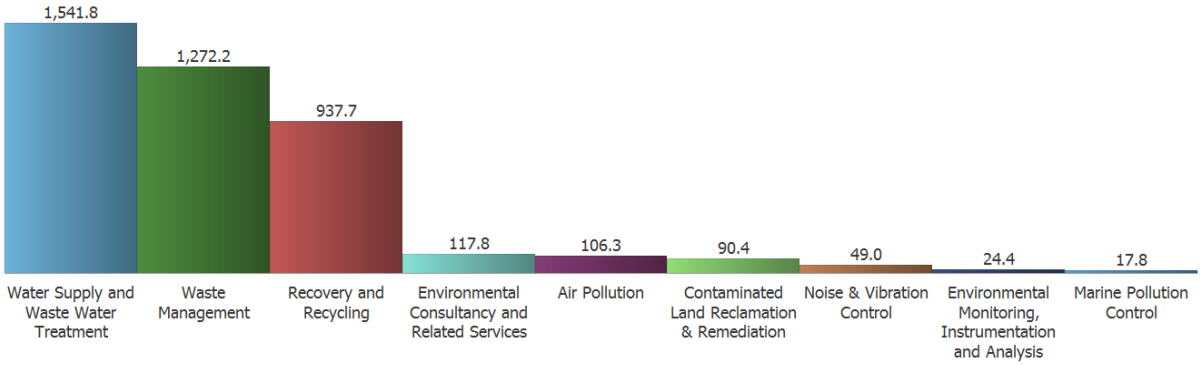
Figure 12: Companies 2011/12



And the same four sub-sectors account for 98% of Companies. They are made up of Geothermal 33%, Wind 32%, Biomass 16% and Photovoltaic 15%.

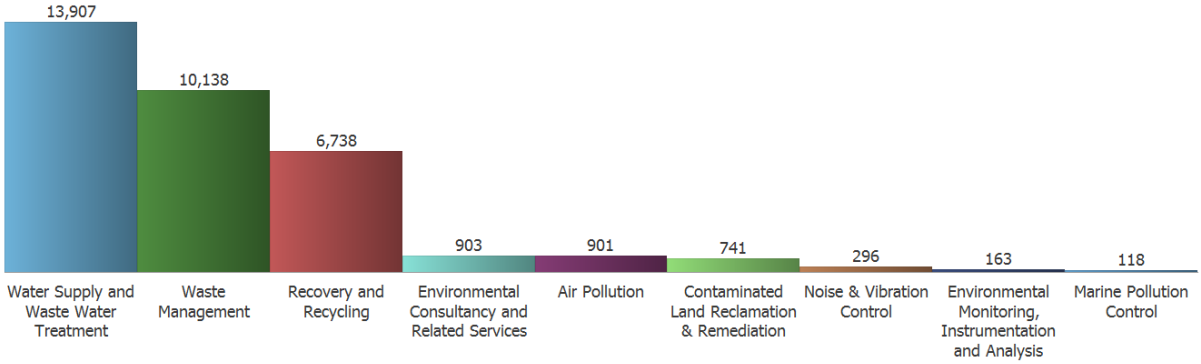
3.5 London's LCEGS at Level 2- Environmental

Figure 13: Sales 2011/12 in £m



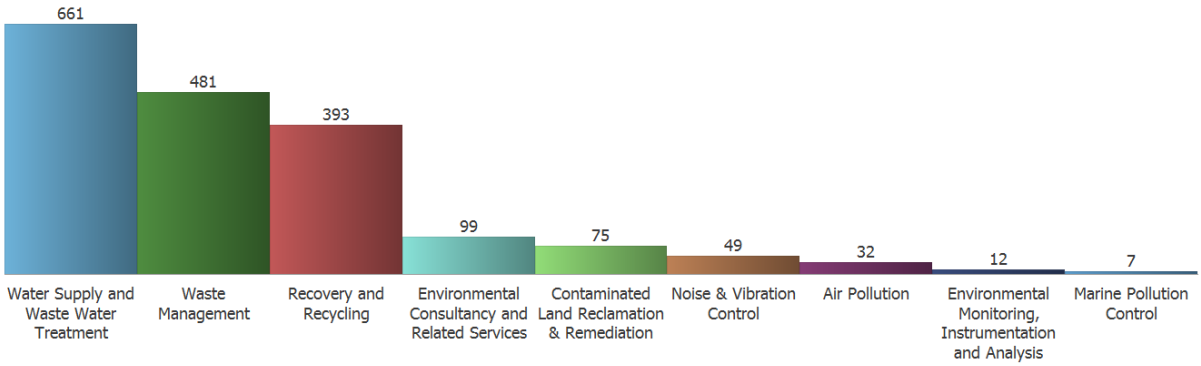
Environmental is split up into nine sub-sectors, of which three account for 91% of Sales. These three are made up of Water Supply & Waste Water 37%, Waste Management 31% and Recovery & Recycling 23%.

Figure 14: Employment 2011/12



The same three sub-sectors account for 91% of Employment and they are Water Supply & Waste Water 41%, Waste Management 30% and Recovery & Recycling 20%

Figure 15: Companies 2011/12

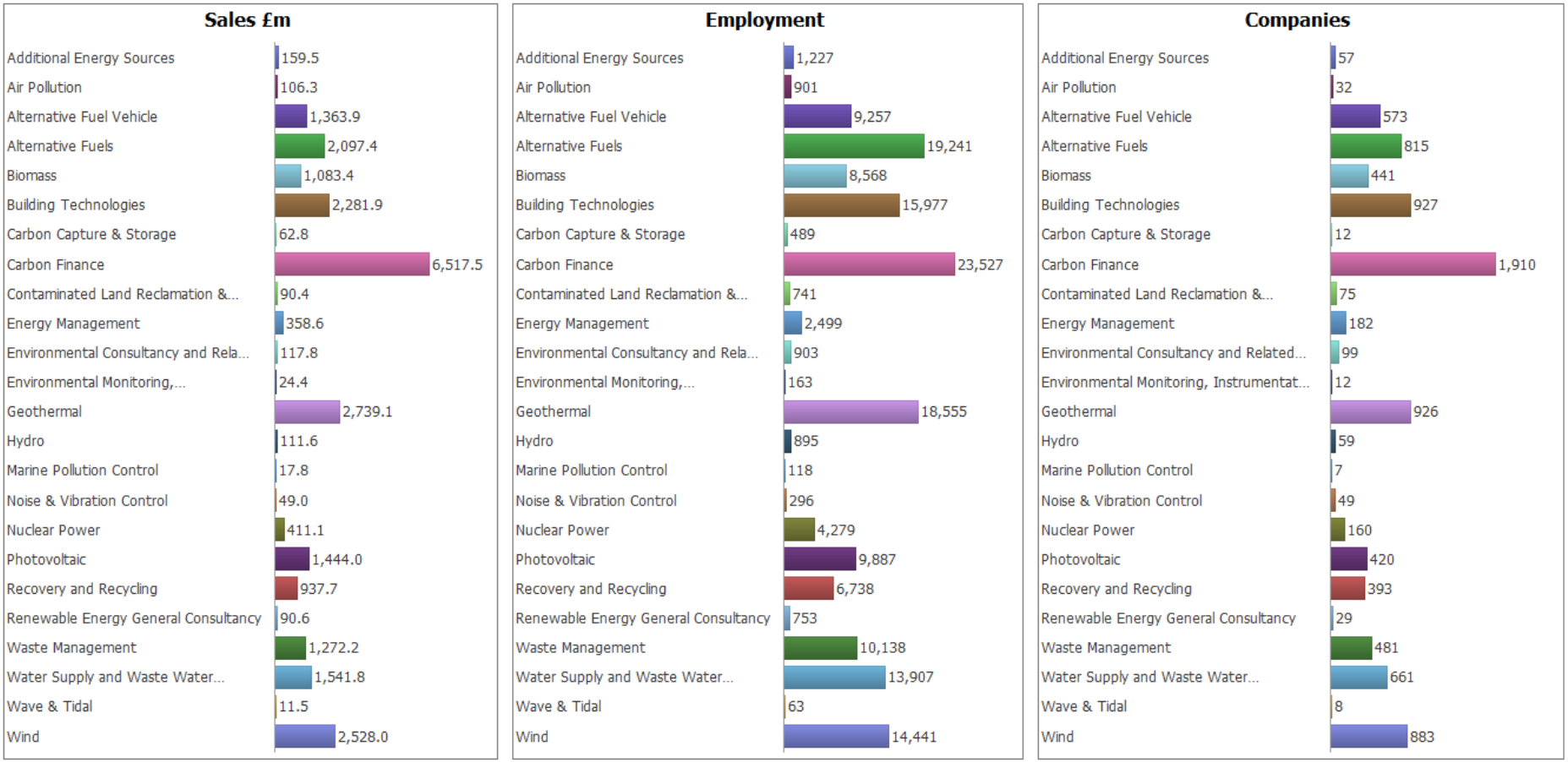


The same four sub-sectors also account for 86% of companies and they are Water Supply & Waste Water 37%, Waste Management 27% and Recovery & Recycling 22%.

3.6 London's LCEGS Summary

Figure 16 compares all 24 sub-sectors of LCEGS and shows that Carbon Finance (26%), Geothermal (11%), Wind (10%) and Building Technologies (9%) have the largest share in terms of Sales, Employment and Companies and accounted for 56% of London's LCEGS sector activity in 2011/ 12.

Figure 16: LCEGS Summary



3.7 London's LCEGS Compared with the UK

Figure 17: London Sales 2011/12 by Level 2

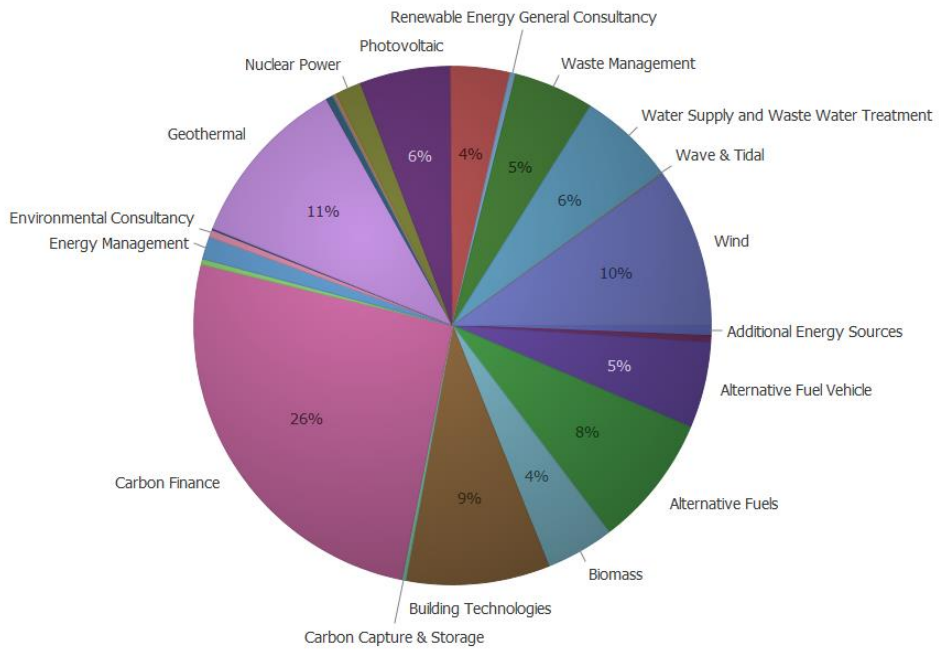
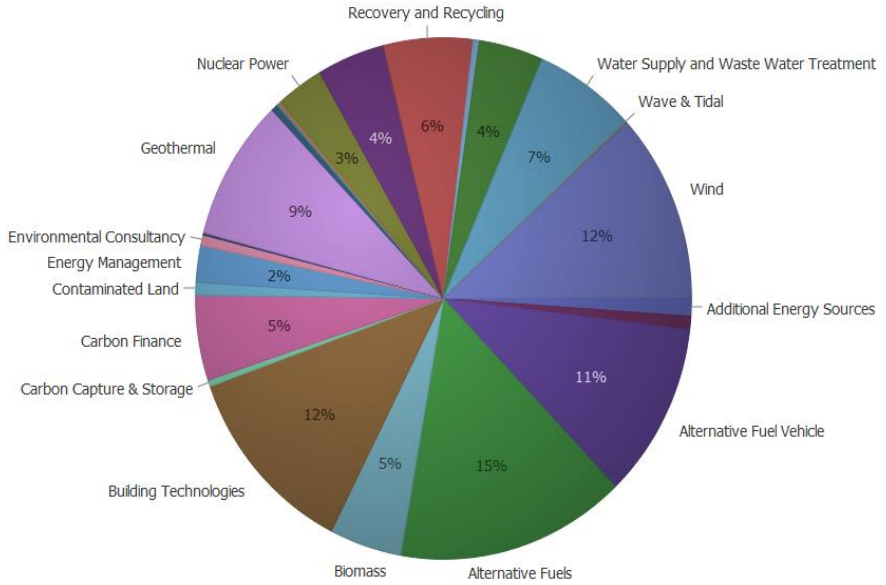


Figure 18: UK Sales 2011/12 by Level 2



Figures 17 and 18 compare the profile of London and UK's LCEGS activities at Level 2 for Sales. There are significant differences between the two. These are that Carbon Finance is a function of the financial services sector in the City and Canary Wharf and shows negligible activity outside of London, Building Technologies are a very strong feature of the South East Region and then Alternative Fuels and Alternative Fuel Vehicles are a very strong feature of the East of England, West Midlands and the North West.

Figure 19: Sales 2011/12 as % of UK

Figure 20: Employment 2011/12 as % of UK

Figure 21: Companies 2011/12 as % of UK

Figures 19-21 are100% Bar Charts for the "old" UK regions and the Devolved Administrations and compare Sales, Employment and Companies. London accounts for 20% of Sales, 17% of Employment and 18% of Companies.

Figure 22 then compares the same regions, but this time by Level 2 sub-sector. This graphic shows how London's 20% of UK Sales is made up from a range of contributions from Carbon Finance up at 97% to Contaminated Land down at 9%.

Figure 22: Sales 2011/12 London as % of UK at Level 2

3.8 London's LCEGS Growth

In Section 3.1 the annual Sales growth in London's LCEGS was 5.12% between 2009/10 and 2010/11 and then 5.22% between 2010/11 and 2011/12. Table 1 compares Sales for Level 2 sub-sectors for each of the past three years and shows the growth between these years in red.

Table 1: London's LCEGS Actual Sales (£m) Growth 2009/10 to 2011/12

Level 1	Level 2	2009 10	% Growth	2010 11	% Growth	2011 12
Environmental	Air Pollution	101.97	2.11	104.12	2.11	106.32
Environmental	Contaminated Land Reclamation & Remediation	84.95	3.13	87.61	3.21	90.42
Environmental	Environmental Consultancy and Related Services	110.42	3.24	114	3.37	117.84
Environmental	Environmental Monitoring, Instrumentation and Analysis	22.7	3.30	23.45	4.14	24.42
Environmental	Marine Pollution Control	16.61	3.49	17.19	3.37	17.77
Environmental	Noise & Vibration Control	45.16	4.16	47.04	4.25	49.04
Environmental	Recovery and Recycling	877.23	3.39	907	3.39	937.72
Environmental	Waste Management	1,207.62	2.67	1,239.92	2.60	1,272.16
Environmental	Water Supply and Waste Water Treatment	1,490.71	1.69	1,515.89	1.71	1,541.83
Low Carbon	Additional Energy Sources	148.07	3.78	153.66	3.81	159.52
Low Carbon	Alternative Fuel Vehicle	1,254.23	4.24	1,307.44	4.32	1,363.91
Low Carbon	Alternative Fuels	1,904.14	4.98	1,998.95	4.92	2,097.39
Low Carbon	Building Technologies	2,073.34	4.89	2,174.63	4.93	2,281.93
Low Carbon	Carbon Capture & Storage	59.03	3.07	60.84	3.19	62.78
Low Carbon	Carbon Finance	5,723.21	6.64	6,103.11	6.79	6,517.51
Low Carbon	Energy Management	334.15	3.56	346.04	3.63	358.59
Low Carbon	Nuclear Power	388.85	2.79	399.7	2.85	411.1
Renewable Energy	Biomass	976.88	5.36	1,029.25	5.26	1,083.42
Renewable Energy	Geothermal	2,473.62	5.14	2,600.87	5.31	2,739.08
Renewable Energy	Hydro	106.12	2.53	108.8	2.53	111.55
Renewable Energy	Photovoltaic	1,260.67	6.88	1,347.38	7.17	1,443.97
Renewable Energy	Renewable Energy General Consultancy	85.58	2.92	88.08	2.84	90.58
Renewable Energy	Wave & Tidal	10.23	5.87	10.83	6.19	11.5
Renewable Energy	Wind	2,224.00	6.62	2,371.20	6.61	2,528.02
Total		**22979.49**	**5.12**	**24157**	**5.22**	**25418.37**

Table 1 shows that the highest levels of actual growth occurred in Carbon Finance, Photovoltaics, Wind and Wave & Tidal (Marine Renewables).

Table 2, below, shows growth forecasts (annual percentage growth from the previous year) for 2011/12 right through to 2019/ 20. Forecast growth for the majority of sub-sectors is generally consistent with levels of historical growth, but as would be expected as the forecasts stretch out beyond 2014 they inevitably tend to be less robust. The exception to this is for Carbon Finance, the forecast double-digit growth appears to be very high for the next eight years but this is due to substantial forecast increases in Carbon Credit Finance & Funding and Carbon Market Intelligence when compared with historical growth of 7%.

Figure 23 shows the annual forecast growth for London's LCEGS to 2019/20 based upon the values in Table 2, which includes the high forecast for Carbon Finance. Figure 24 shows forecast growth for London if Carbon Finance is excluded altogether. This demonstrates the impact that Carbon Finance has on London's LCEGS growth overall.

If growth in Carbon Finance was to remain in line with current actual growth, that is between 7% and 8%, then the effect would be to reduce the annual growth rates shown in Figure 23 by between one and one and a half percent, bringing forecast annual growth more into line with the current growth level of 5.22%. Even with this level of adjustment in growth

expectation, London's LCEGS are forecast to continue to grow at an annual rate in excess of 5% and will continue to grow faster than the UK as a whole.

Table 2: London's LCEGS Forecast Sales (£m) Growth 2011/12 to 2019/20

Level 2	Growth % 2011/ 12	Growth % 2012/ 13	Growth % 2013/ 14	Growth % 2014/ 15	Growth % 2015/ 16	Growth % 2016/ 17	Growth % 2017/ 18	Growth % 2018/ 19	Growth % 2019/ 20
Air Pollution	2.1	2.3	2.3	2.4	2.4	2.5	2.6	2.7	2.8
Contaminated Land Reclamation & Remediation	3.4	3.5	3.6	3.8	3.6	3.7	3.7	3.9	4.2
Environmental Consultancy and Related Services	3.6	3.5	3.6	3.4	4.0	3.9	3.9	4.6	4.2
Environmental Monitoring, Instrumentation and Analysis	3.6	3.7	4.0	4.1	4.2	4.2	4.3	4.4	4.6
Marine Pollution Control	4.1	4.2	3.8	4.2	4.7	4.2	5.2	4.9	4.6
Noise & Vibration Control	4.0	4.4	4.7	4.9	4.8	5.0	4.9	5.2	5.4
Recovery and Recycling	3.7	3.9	3.8	4.1	4.4	4.7	4.8	5.0	5.1
Waste Management	2.8	3.2	2.8	3.1	3.4	3.7	3.8	3.8	3.8
Water Supply and Waste Water Treatment	1.7	1.8	1.9	1.9	2.1	2.1	2.2	2.3	2.5
Additional Energy Sources	3.9	4.2	3.8	4.7	4.0	4.3	4.6	4.4	5.3
Alternative Fuel Vehicle	4.1	4.5	4.6	4.4	4.7	4.8	5.1	5.6	5.7
Alternative Fuels	4.9	6.0	5.6	6.2	5.7	5.0	5.8	6.4	7.0
Building Technologies	4.9	5.1	5.2	5.6	5.7	6.2	6.2	6.2	6.8
Carbon Capture & Storage	3.3	3.3	3.2	3.6	3.2	3.8	4.0	4.2	4.8
Carbon Finance	13.0	10.9	10.6	10.1	12.6	11.5	12.6	14.5	8.2
Energy Management	3.3	3.6	4.0	3.9	4.2	4.2	4.4	4.4	4.7
Nuclear Power	3.5	3.9	4.1	4.3	5.2	5.6	5.6	6.1	7.4
Biomass	5.8	5.4	5.5	5.7	6.5	6.1	7.0	6.6	6.5
Geothermal	5.7	6.2	5.6	6.3	5.8	6.7	6.0	7.1	7.1
Hydro	2.7	2.5	2.9	3.2	3.1	3.3	3.2	3.4	3.5
Photovoltaic	6.5	7.1	7.0	7.0	8.1	8.0	7.6	8.3	8.5
Renewable Energy General Consultancy	2.6	2.7	2.8	3.1	3.3	3.2	3.2	3.4	3.1
Wave & Tidal	6.1	6.5	6.1	6.2	7.1	7.1	6.8	7.0	8.0
Wind	6.8	7.0	7.1	7.4	7.2	8.2	8.2	8.2	8.7

Figure 23: London's LCEGS Forecast Sales Growth 2011/12 to 2019/20 (including Carbon Finance)

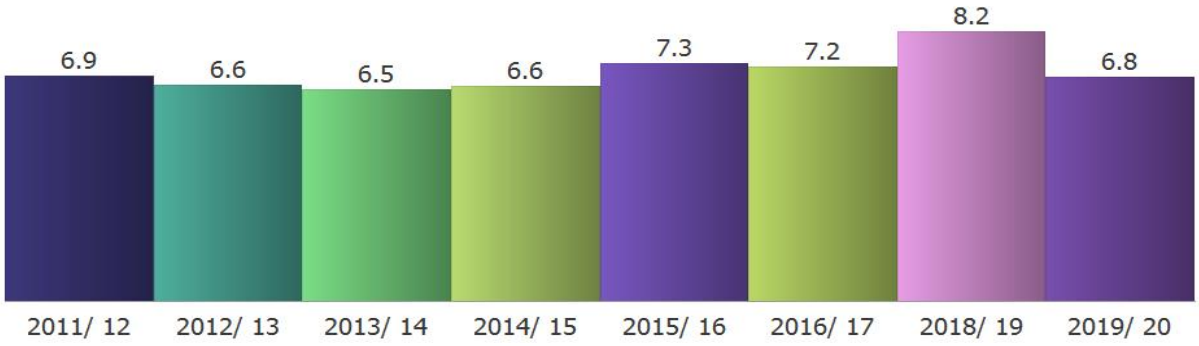
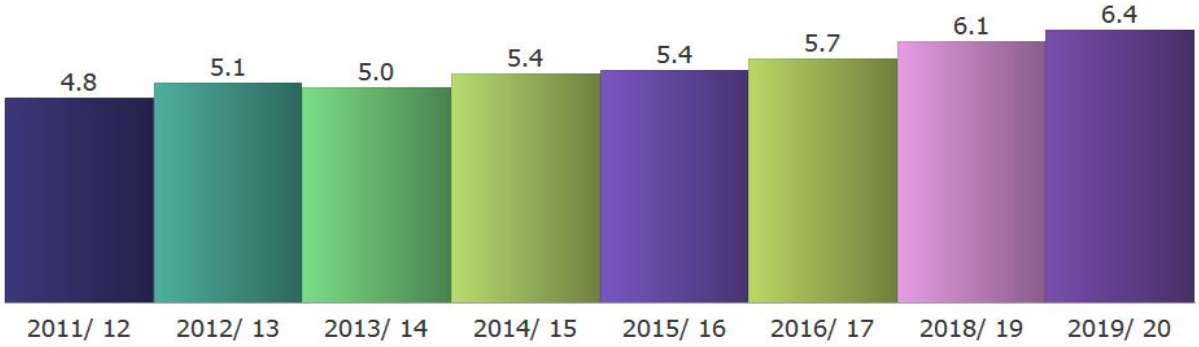


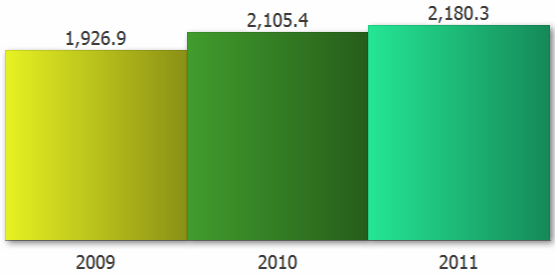
Figure 24: London's LCEGS Forecast Sales Growth 2011/12 to 2019/ 20 (excluding Carbon Finance)



4. London's LCEGS and International Trade

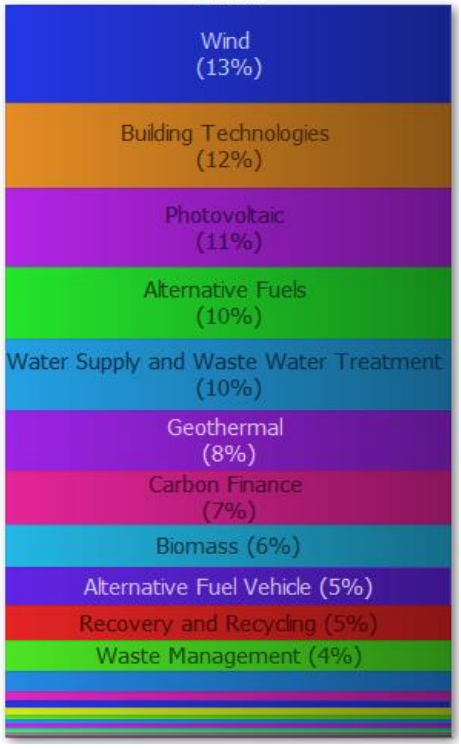
This section of the report addresses London's LCEGS Exports over the past three years when compared with UK totals and then identifies leading LCEGS export products and services and their destination markets.

Figure 25: London's Exports (£m) for 2009/10 to 2011/ 12



The value of London LCEGS Exports in 2011/12 was £2.2bn. Growth between 2009/10 and 2010/11 was 9.26% and growth between 2010/11 and 2011/ 12 was 3.56%. This is compared with UK growth of 3.92 and 3.75% respectively[1].

Figure 26: London's Exports (%) 2011/12



London made-up 18% of all UK LCEGS exports in 2011/12. This is below London's 20% of UK Sales. This means that London's companies have a slightly smaller share of the export market than they do of the UK market.

Figure 26 shows the proportion of London LCEGS exports by Level 2 sub-sector, with Wind, Building Technologies, Photovoltaic, Alternative Fuels and Water Supply/ Waste Water Treatment being the leading sub-sectors.

In Table 3 London's LCEGS exports are expressed as a percentage of their LCEGS Sales. The overall average for 2011/ 12 was 8.6% which is slightly down on the previous year. Carbon Finance, which is a large part of London's LCEGS sector shows a very low export rate of 2.6% and this would explain why London exports are less than the UK average.

[1] The abnormal increase in London exports is due to a significant increase in Carbon Credits Trading in 2010/ 11 that levelled out in 2011/ 12.

The sub-sector's with the highest export to sales ratio are Air Pollution, Contaminated Land Remediation, Energy Management and Photovoltaics.

Table 3: London's LCEGS Exports as a % of Sales

		2010 11			2011 12		
Level 1	Level 2	Sales £m	Exports £m	Exports as % of Sales	Sales £m	Exports £m	Exports as % of Sales
Environmental	Air Pollution	104.1	28.7	27.6	106.3	29.7	27.9
Environmental	Contaminated Land	87.6	15.5	17.7	90.4	16.0	17.7
Environmental	Environmental Consultancy	114.0	7.0	6.1	117.8	7.3	6.2
Environmental	Environmental Monitoring	23.5	3.4	14.6	24.4	3.5	14.5
Environmental	Marine Pollution Control	17.2	0.5	2.7	17.8	0.5	2.7
Environmental	Noise & Vibration control	47.0	5.7	12.1	49.0	5.9	12.0
Environmental	Recovery and Recycling	907.0	99.6	11.0	937.7	103.1	11.0
Environmental	Waste Management	1239.9	88.6	7.1	1272.2	91.7	7.2
Environmental	Water and Waste Water Treatment	1515.9	205.8	13.6	1541.8	213.1	13.8
Low Carbon	Additional Energy Sources	153.7	21.1	13.7	159.5	21.9	13.7
Low Carbon	Alternative Fuel Vehicle	1307.4	108.5	8.3	1363.9	112.3	8.2
Low Carbon	Alternative Fuels	1999.0	208.3	10.4	2097.4	215.6	10.3
Low Carbon	Building Technologies	2174.6	242.5	11.1	2281.9	251.1	11.0
Low Carbon	Carbon Capture & Storage	60.8	8.5	14.0	62.8	8.9	14.1
Low Carbon	Carbon Finance	6103.1	156.5	2.6	6517.5	162.4	2.5
Low Carbon	Energy Management	346.0	58.4	16.9	358.6	60.5	16.9
Low Carbon	Nuclear Power	399.7	18.0	4.5	411.1	18.7	4.5
Renewable Energy	Biomass	1029.3	123.3	12.0	1083.4	127.6	11.8
Renewable Energy	Geothermal	2600.9	171.6	6.6	2739.1	177.8	6.5
Renewable Energy	Hydro	108.8	11.5	10.6	111.6	11.9	10.7
Renewable Energy	Photovoltaic	1347.4	227.9	16.9	1444.0	235.6	16.3
Renewable Energy	Renewable Consulting	88.1	10.7	12.1	90.6	11.1	12.3
Renewable Energy	Wave & Tidal	10.8	1.4	13.0	11.5	1.5	12.7
Renewable Energy	Wind	2371.2	282.5	11.9	2528.0	292.6	11.6
Total		**24157.0**	**2105.4**	**8.7**	**25418.4**	**2180.3**	**8.6**

The top 10 destinations for London's LCEGS exports are shown in Figure 27. China and Hong Kong, which is an interim destination for Far East exports, lead the way. These areas are then followed by Spain, South Korea, Taiwan, India, Pakistan, Poland, Italy and UAE. These 10 destinations are also the top 10 destinations for the UK but they are not in the same order.

The USA, Germany and France, three of the UK's largest trading partners, are conspicuously absent from the top 10 destinations for LCEGS and this has been a feature of international trade in LCEGS since 2007/08 when the analysis first began. The LCEGS has a very different trading pattern to all other UK sectors.

Figure 27: Top 10 Export Destinations

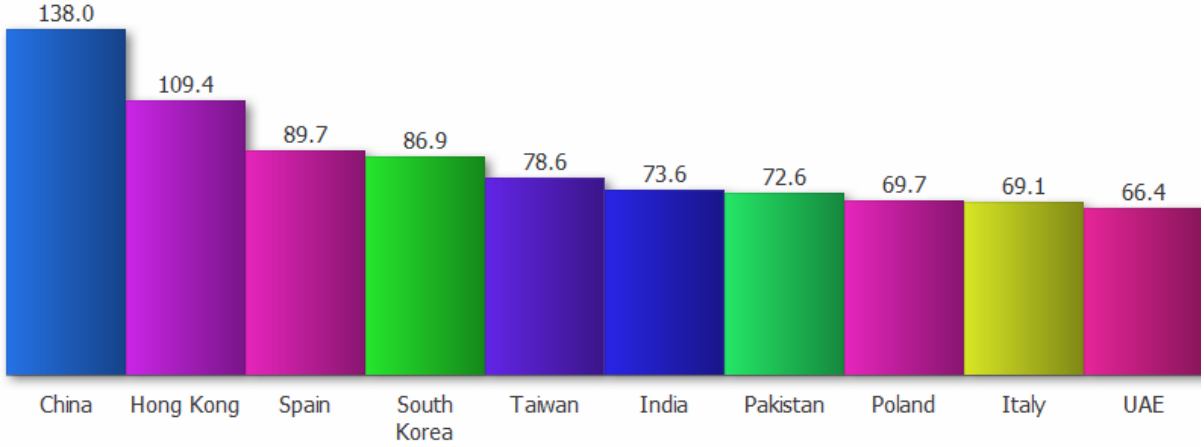


Table 4 combines analysis of London's LCEGS product and service exports with destination countries using a heat map. The table shows the value of exports in £m and then colour codes the values - Green for higher values and Red for lower values. The table has been simplified by excluding the lowest value destination countries and lowest value products/services. The results show the top 32 export destinations and the top 12,out of 24, sub-sectors.

Table 4: London's Level 2 Exports by Country for 2011/12 in £m

Level 1	Level 2	Brazil	Canada	Chile	China	Denmark	France	Germany	Hong Kong	Hungary	India	Indonesia	Italy	Japan	Malaysia	Mexico	Netherlands
Environmental	Recovery and Recycling	2	2	3.1	6.2	4.2	3.4	2.3	4.1	3.5	2.8	3.6	3.2	3.4	2.9	1.8	1.6
Environmental	Waste Management	2	1.5	2.3	6	3.1	1.9	2	6.7	0.8	3.2	3.8	1.7	1	2.7	1.7	1.9
Environmental	Water/ Waste Water Treatment	4.7	3.4	8.4	9	4.4	7.6	2.6	12.2	5	7.4	13.9	4.7	5.2	4.3	4.7	5.6
Low Carbon	Alternative Fuel Vehicle	1.2	1.4	6.5	5.4	9.7	1.1	2.7	8.5	1.3	3.4	1.2	2	3.4	2.6	1.6	0.8
Low Carbon	Alternative Fuels	5	6.5	1.3	15.6	4.3	3.5	4.8	11.6	4.7	14.6	3.1	5.1	3.2	7.1	2.7	4.4
Low Carbon	Building Technologies	5.2	4.1	6.4	13.6	1.5	5.4	5.9	14.1	7.6	4.8	6.2	14.7	11	6.2	8.2	3.4
Low Carbon	Carbon Finance	2.3	10.6	0.6	1.9	0.6	0.8	7	7	2.2	1.4	4.5	6.3	3.9	1.1	2.9	5.5
Low Carbon	Energy Management	0.9	1.2	0.7	4.7	1.8	1.7	1.5	2.5	1.3	2.1	1.1	1.5	1.4	2.1	1	1.9
Renewable Energy	Biomass	1.7	3.7	1.2	8.1	2.4	4.7	3	5.4	3.4	6.8	1.5	2.7	4	3.9	2.8	0.5
Renewable Energy	Geothermal	3.6	2.2	2.9	16.7	2.8	4.8	4.8	8.2	2.6	6.9	2.8	5.6	3.6	7.6	4	9.2
Renewable Energy	Photovoltaic	5.3	3.5	1.9	22.3	0.7	8.9	6.7	11.4	2.8	7.8	1.1	9.4	10.4	11.3	6.9	4.6
Renewable Energy	Wind	6	4.9	9.8	21.7	19.2	2.9	7.6	11.8	8.3	8.6	9.3	7.8	10.3	9.9	4.9	11.4

Level 1	Level 2	Pakistan	Poland	Portugal	Romania	Russia	Saudi	Singapore	South Africa	South Korea	Spain	Sweden	Taiwan	Thailand	Turkey	UAE	US
Environmental	Recovery and Recycling	3.8	4	1.6	3	2.9	2.7	3	2.2	2.8	4.7	1.7	1.9	3.8	3.1	2.9	3.9
Environmental	Waste Management	3.1	2.4	3	2.5	4.2	5.7	2.6	1.4	4.7	5.1	1.8	2.3	1	2.2	1.1	3.3
Environmental	Water/ Waste Water Treatment	4.1	7.7	13.9	5.6	3.1	10.1	2	4.5	9.5	7.6	0.3	8.4	11.3	2.8	9	6.2
Low Carbon	Alternative Fuel Vehicle	6.5	2.9	4.5	3.5	1.3	5	4.2	2.6	4.8	1.9	3.3	1.8	5.1	2.3	2	2.9
Low Carbon	Alternative Fuels	11.6	6.2	4.1	4.9	3.2	8.4	6.2	2.7	4.3	15.7	2.6	10.4	9.5	7.9	7.5	4.1
Low Carbon	Building Technologies	8.6	9.5	2.5	8	4.2	4.4	12.3	3.1	8.9	14.1	2.4	11.8	6.1	6.4	11.6	7.2
Low Carbon	Carbon Finance	1.2	4.9	4.3	3.3	4.7	3	7	11.2	3.1	2.1	6	5.2	0.6	5.4	1	0.9
Low Carbon	Energy Management	1	1.5	1.6	1.1	2.4	1.9	1.8	0.4	2.9	3.4	1.6	3.1	0.7	1.8	2.2	2.9
Renewable Energy	Biomass	7.2	4	1.1	3	6.1	2.9	2.8	4	6.3	3.6	1.8	4.3	5	5	3.8	4.2
Renewable Energy	Geothermal	1	4.4	2.3	6.3	4.4	5.3	4.3	3.6	7.5	8.7	2.4	8.1	4.2	4.8	10.3	6.1
Renewable Energy	Photovoltaic	12.1	8.9	4.5	9.2	7.3	1.4	6.3	5.4	11	10.7	2.4	7.6	0.5	8	7.1	7.8
Renewable Energy	Wind	8.1	8.8	12.2	7.2	8.1	5.3	4.8	4.7	15.8	8.8	7.1	8.3	13.2	7.6	5.3	5.6

Table 4 can be read horizontally to identify the strongest exporting subsectors i.e. Wind vertically to identify the strongest trading partners i.e. China, and using both vertical and horizontal you can identify strong niches like Alternative Fuels to Spain and Building Technologies to Singapore.

Tables 5a and 5b apply the same conventions as Table 4, but this time broken down to Level 3,which reveals priority exports in more detail. The tables show the same 32 destination countries but for 60 out of the total of 126 Level 3 market activities).

Table 5a: London's Level 3 Exports by Country for 2011/12 in £m

Level 2	Level 3	Brazil	Canada	Chile	China	Denmark	France	Germany	Hong Kong	Hungary	India	Indonesia	Italy	Japan	Malaysia	Mexico	Netherlands
Recovery and Recycling	Waste Collection	0.89	0.87	1.33	2.64	1.81	1.63	0.96	1.83	1.50	1.20	1.60	1.37	1.55	1.26	0.79	0.69
Waste Management	Construction & Operation of Waste Facilities	0.94	0.73	1.14	2.60	1.38	0.92	0.83	3.00	0.34	1.36	1.78	0.76	0.43	1.25	0.79	0.88
Waste Management	Equipment For Waste Treatment	0.59	0.43	0.58	1.98	0.85	0.52	0.63	1.80	0.25	1.02	1.05	0.59	0.30	0.73	0.47	0.54
Water/ Waste Water Treatment	Engineering	1.13	0.94	2.07	2.23	1.04	1.92	0.68	2.83	1.37	1.77	3.57	1.15	1.32	1.09	1.09	1.32
Water/ Waste Water Treatment	Water Treatment and Distribution	3.46	2.36	6.10	6.60	3.24	5.54	1.84	9.11	3.47	5.47	9.95	3.39	3.72	3.09	3.44	4.10
Alternative Fuel Vehicle	Alternative Fuels (main Stream) for Vehicles	1.02	1.22	5.50	4.62	8.31	0.96	2.32	7.23	1.14	2.85	1.06	1.74	2.79	2.22	1.39	0.71
Alternative Fuel Vehicle	Other Fuels and Vehicles	0.18	0.19	1.02	0.83	1.43	0.18	0.42	1.23	0.17	0.53	0.18	0.30	0.59	0.40	0.20	0.09
Alternative Fuels	Bio Fuels Alternative for Vehicles Only	0.06	0.07	0.35	0.36	0.54	0.06	0.15	0.43	0.06	0.22	0.06	0.12	0.22	0.14	0.08	0.05
Alternative Fuels	Main Stream Bio Fuels	0.50	0.66	0.10	1.56	0.40	0.46	0.52	0.97	0.48	1.35	0.30	0.47	0.35	0.80	0.26	0.32
Alternative Fuels	Other Bio Fuels	3.71	4.93	0.75	11.49	2.73	2.46	3.62	8.79	3.51	11.20	2.33	3.86	2.08	5.19	2.16	3.43
Alternative Fuels	Other Fuels	0.65	0.69	0.09	1.94	0.55	0.46	0.48	1.23	0.52	1.63	0.32	0.53	0.46	0.81	0.21	0.57
Building Technologies	Doors	1.41	0.88	1.53	3.45	0.38	1.48	1.46	3.03	1.69	1.34	1.56	3.60	2.94	1.54	1.84	0.82
Building Technologies	Insulation and Heat Retention Materials	1.81	1.49	1.97	5.08	0.54	1.93	1.85	5.06	2.63	1.75	2.14	4.71	3.73	2.32	3.02	1.12
Building Technologies	Monitoring and Control Systems	0.54	0.46	0.72	1.60	0.20	0.54	0.73	1.80	0.88	0.58	0.71	1.93	1.32	0.72	0.93	0.40
Building Technologies	Windows	1.41	1.26	2.18	3.45	0.39	1.42	1.84	4.20	2.44	1.15	1.82	4.42	2.99	1.64	2.43	1.05
Carbon Finance	Carbon Credits Trading	2.00	9.00	0.48	1.66	0.50	0.68	6.01	5.92	1.88	1.17	3.82	5.34	3.30	0.93	2.47	4.71
Energy Management	Gas Supply	0.29	0.35	0.22	1.25	0.63	0.49	0.46	0.80	0.37	0.63	0.33	0.49	0.47	0.56	0.33	0.55
Biomass	Biomass Energy Systems	0.82	1.74	0.55	3.74	1.13	2.21	1.43	2.29	1.46	2.90	0.68	1.12	1.78	1.79	1.25	0.21
Biomass	Biomass Furnace Systems	0.18	0.56	0.19	1.03	0.34	0.76	0.38	0.84	0.44	1.05	0.20	0.32	0.59	0.47	0.38	0.07
Biomass	Boilers and related Systems	0.49	1.07	0.38	2.56	0.69	1.39	0.87	1.76	1.11	2.04	0.48	0.92	1.18	1.23	0.86	0.15
Geothermal	Consulting & Related Services	0.50	0.35	0.46	2.11	0.41	0.68	0.75	1.19	0.40	0.87	0.36	0.77	0.49	1.07	0.54	1.52
Geothermal	Manufacture and Supply of Specialist Equipment	0.68	0.38	0.56	2.79	0.54	0.84	0.88	1.38	0.44	1.36	0.59	1.02	0.68	1.50	0.76	2.00
Geothermal	Suppliers of Systems	0.69	0.40	0.59	2.95	0.58	0.85	0.91	1.58	0.43	1.18	0.57	1.06	0.62	1.38	0.87	1.75
Geothermal	Whole Systems Manufacture	1.67	1.02	1.30	8.68	1.23	2.38	2.16	3.94	1.29	3.43	1.24	2.67	1.82	3.56	1.80	3.89
Photovoltaic	Other Related Equipment and Chemicals	1.36	0.72	0.42	4.55	0.18	2.09	1.55	2.52	0.62	1.72	0.25	2.04	2.23	2.24	1.42	1.14
Photovoltaic	Photovoltaic Cells	1.16	0.87	0.48	5.20	0.17	2.14	1.35	2.84	0.77	1.87	0.30	2.34	2.36	2.78	1.79	1.02
Photovoltaic	Systems & Equipment	2.45	1.74	0.87	11.40	0.35	4.09	3.42	5.35	1.28	3.72	0.48	4.48	5.19	5.72	3.35	2.16
Wind	Large Wind Turbine	2.07	1.83	3.46	8.16	6.79	1.00	2.51	3.98	3.03	3.07	3.58	2.84	3.50	3.66	1.77	3.94
Wind	Small Wind Turbine	1.43	1.06	2.15	4.59	4.92	0.55	1.64	2.62	1.57	1.98	2.19	1.70	2.43	2.15	1.08	2.37
Wind	Wind Farm Systems	2.47	2.00	4.16	8.94	7.50	1.33	3.51	5.24	3.68	3.54	3.49	3.30	4.35	4.13	2.02	5.06

At Level 3 greater levels of detail are created that reveal more niche export markets, i.e. Other Bio Fuels to India, Water Treatment and Distribution to Indonesia and Portugal, Carbon Credit Trading to South Africa and Photovoltaic Systems Equipment to Spain.

Table 5b: London's Level 3 Exports by Country for 2011/12 in £m

Level 2	Level 3	Pakistan	Poland	Portugal	Romania	Russia	Saudi	Singapore	South Africa	S Korea	Spain	Sweden	Taiwan	Thailand	Turkey	UAE	US
Recovery and Recycling	Waste Collection	1.76	1.79	0.72	1.36	1.18	1.20	1.37	0.93	1.17	1.96	0.77	0.60	1.75	1.36	1.34	1.81
Waste Management	Construction & Operation of Waste Facilities	1.52	1.08	1.22	1.11	1.80	2.66	1.14	0.62	2.31	2.44	0.87	0.95	0.44	0.86	0.46	1.44
Waste Management	Equipment For Waste Treatment	0.84	0.81	0.97	0.72	1.33	1.61	0.81	0.46	1.43	1.49	0.58	0.55	0.35	0.70	0.30	1.02
Water/ Waste Water Treatment	Engineering	0.99	1.65	3.52	1.28	0.91	2.21	0.50	1.21	2.28	1.86	0.09	5.41	2.83	0.73	2.07	1.48
Water/ Waste Water Treatment	Water Treatment and Distribution	2.98	5.82	9.97	4.19	2.08	7.62	1.40	3.20	6.98	5.52	0.25	2.56	8.13	1.98	6.68	4.55
Alternative Fuel Vehicle	Alternative Fuels (main Stream) for Vehicles	5.68	2.46	3.77	3.01	1.06	4.27	3.59	2.22	4.08	1.53	2.77	1.57	4.42	1.96	1.76	2.50
Alternative Fuel Vehicle	Other Fuels and Vehicles	0.84	0.39	0.76	0.45	0.20	0.76	0.63	0.33	0.71	0.37	0.48	0.28	0.69	0.35	0.23	0.43
Alternative Fuels	Bio Fuels Alternative for Vehicles Only	0.39	0.15	0.24	0.16	0.07	0.27	0.23	0.11	0.26	0.96	0.18	0.10	0.25	0.14	0.11	0.18
Alternative Fuels	Main Stream Bio Fuels	1.34	0.52	0.49	0.43	0.36	0.80	0.74	0.27	0.36	6.50	0.30	1.17	0.80	0.71	0.70	0.41
Alternative Fuels	Other Bio Fuels	8.38	4.50	2.99	3.62	2.26	5.97	4.27	1.95	3.08	7.63	1.80	7.28	6.88	5.96	5.90	3.09
Alternative Fuels	Other Fuels	1.32	0.97	0.32	0.63	0.46	1.20	0.86	0.32	0.55	0.02	0.28	1.69	1.43	0.93	0.69	0.33
Building Technologies	Doors	2.28	1.98	0.71	1.63	0.89	0.89	3.14	0.68	2.16	2.10	0.57	3.13	1.60	1.17	3.18	1.84
Building Technologies	Insulation and Heat Retention Materials	2.79	3.64	0.77	3.23	1.66	1.61	4.27	1.18	3.35	2.92	0.81	3.69	1.99	2.41	4.31	2.59
Building Technologies	Monitoring and Control Systems	0.98	1.09	0.29	1.00	0.47	0.57	1.33	0.33	1.04	0.96	0.28	1.55	0.69	0.77	1.25	0.87
Building Technologies	Windows	2.53	2.74	0.72	2.18	1.15	1.28	3.55	0.94	2.32	8.14	0.71	3.47	1.80	2.00	2.81	1.90
Carbon Finance	Carbon Credits Trading	0.98	4.20	3.65	2.86	3.99	2.55	6.02	9.59	2.63	1.77	5.15	4.40	0.55	4.61	0.81	0.81
Energy Management	Gas Supply	0.34	0.50	0.45	0.31	0.69	0.48	0.50	0.12	0.83	1.12	0.43	0.35	0.21	0.53	0.67	0.85
Biomass	Biomass Energy Systems	3.34	1.76	0.54	1.43	2.66	1.39	1.06	1.84	2.91	1.15	0.78	2.07	2.43	2.23	1.90	1.95
Biomass	Biomass Furnace Systems	0.96	0.53	0.14	0.37	0.89	0.33	0.39	0.51	0.80	0.32	0.26	0.57	0.60	0.72	0.45	0.62
Biomass	Boilers and related Systems	2.25	1.29	0.30	0.90	1.97	0.93	1.06	1.28	1.89	1.88	0.53	1.15	1.47	1.52	1.17	1.27
Geothermal	Consulting & Related Services	0.15	0.64	0.28	0.95	0.58	0.65	0.64	0.47	1.22	1.06	0.37	1.09	0.61	0.68	1.55	0.87
Geothermal	Manufacture and Supply of Specialist Equipment	0.19	0.89	0.49	1.18	0.89	0.96	0.91	0.68	1.36	0.86	0.48	1.35	0.75	0.94	1.83	1.10
Geothermal	Suppliers of Systems	0.18	0.79	0.43	1.16	0.86	0.92	0.79	0.67	1.42	0.63	0.44	1.51	0.76	0.94	1.76	1.02
Geothermal	Whole Systems Manufacture	0.43	2.05	1.08	2.92	2.02	2.75	1.94	1.72	3.47	6.05	1.09	4.03	2.02	2.17	5.08	3.03
Photovoltaic	Other Related Equipment and Chemicals	2.62	2.17	0.86	2.07	1.58	0.34	1.45	1.21	2.55	0.83	0.50	1.75	0.11	1.75	1.52	1.76
Photovoltaic	Photovoltaic Cells	3.20	1.94	1.24	2.47	1.78	0.30	1.43	1.33	2.61	0.92	0.56	1.67	0.11	1.94	1.71	2.05
Photovoltaic	Systems & Equipment	5.56	4.29	2.15	4.08	3.53	0.65	3.14	2.48	5.04	8.68	1.21	3.72	0.25	3.88	3.39	3.39
Wind	Large Wind Turbine	2.76	2.98	4.41	2.63	2.81	1.70	1.62	1.72	5.29	2.42	2.57	3.13	3.88	2.81	1.90	1.73
Wind	Small Wind Turbine	1.88	2.06	2.38	1.50	1.92	1.22	1.05	0.99	3.81	1.10	1.56	1.81	3.21	1.61	1.18	1.22
Wind	Wind Farm Systems	3.48	3.72	5.41	3.08	3.39	2.33	2.08	2.03	6.74	5.28	3.01	3.38	6.07	3.15	2.20	2.63

Appendix 1

LCEGS Sector Definition

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

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

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

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

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

- Air Pollution includes indoor and industrial air quality and emissions control.
- Contaminated Land Reclamation/ Remediation includes Decommissioning of Nuclear Sites.
- Environmental Consulting includes consulting, training & other services.
- Environmental Monitoring includes analysis, monitoring and instrumentation.
- Marine Pollution and Noise & Vibration Control both include abatement, consulting and R&D.
- Recovery & Recycling includes Waste Collection and various recycling processes
- Waste Management includes Waste Treatment Facilities & Equipment, consulting and R&D
- Water Supply and Waste Water Treatment includes treatment, distribution, consulting and R&D.

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

- Carbon Finance includes Credits Finance, Fund Management, Trading and Research
- Carbon Capture & Storage includes Capture, Pipeline, Storage and Engineering.
- Energy Management includes Lighting, Heating & Ventilation and Engineering.
- Nuclear Power includes Construction, Commissioning, Operations, Engineering and Testing Services.
- Additional Energy Sources include Energy Storage Research, Fuel Cells & Hydrogen.
- Alternative Fuels & Vehicles includes main stream and other vehicle fuels.
- Alternative Fuels includes Main Stream and other Bio Fuels, Batteries and Other Fuels.
- Building Technologies includes Doors, Windows, Monitoring & Control Systems and Insulation/ Heat Retention Materials.

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

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

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

Environmental

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

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

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

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

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

Environmental Consulting and Services sub-sector includes consulting, training and management services that are specific to the environmental sector. It includes:

- Specialist consulting- habitat assessment, regulations, compliance and management systems, audits and impact assessment, eco design, eco- investment, climate change modelling, insurance and bio- diversity advice & assessment.
- Manpower and executive recruitment, temporary and permanent recruitment, contracted and interim management services.
- Management services- general consulting, financial, IT, software and marketing services.
- Training and education- publications, online publications, teaching aids, newsletters and courses for waste management, waste water treatment etc.

Environmental Monitoring, Instrumentation and Analysis sub-sector includes activities that measure water, soil and air quality and that support wider pollution control activities in other land, water, marine or air- based environmental sub-sectors. It includes:

- Environmental monitoring- development of cleaner monitoring processes and technologies, vehicle testing, oil spill detection, food testing, nitrate levels, meteorological, water/soil/air quality testing and monitoring.
- Instrumentation equipment & control manufacture, supply, maintenance and development of instrumentation, laboratory equipment and software for environmental/ air/ water/ land/ marine analysis.
- Environmental analysis- laboratory testing, data logging & recording, quality reporting, collection & collation of samples, auto sampling systems, in-field measurement and reporting and R&D in water, soil and emissions analysis.

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

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

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

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

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

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

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

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

Water Supply and Waste Water Treatment sub-sector includes activities relating to the treatment of pollutants in the water supply. It includes:

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

Renewable Energy

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

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

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

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

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

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

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

- Nuclear safety engineering services, regulatory compliance, reactor management, fail-to-safety engineering.
- Nuclear power plant operations management, engineering and PR.
- Nuclear cooling equipment- manufacture, installation and maintenance.
-

- Construction of plant and equipment- site development, reactor and buildings and power plant/ equipment construction.
- Commissioning engineering services- cooling & thermal control, engineering maintenance, instrumentation, power distribution, reactor & plant commissioning.
- Sampling & testing services- thermal control testing, remote monitoring, back-up plant monitoring and effluent discharge testing.
- Nuclear scientific services- research, laboratory testing and fuel management.

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

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

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

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

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

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

Wind Energy sub-sector includes all activities that convert wind power into usable energy. This includes wind farm systems, large and small wind turbines. The sub sector is divided by size of turbine rather than location (onshore and offshore) because it is easier to differentiate and map supply chain activities in this way. It includes:

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

Low carbon

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

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

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

Alternative Fuel and Vehicles sub-sector includes Low Carbon Fuel and technology activities that relate to (predominantly) automotive transport. It is divided into Alternative Fuels (main stream) and Other Fuels and Vehicles. This sub sector does not include bio diesel (see Alternative Fuels). It includes:

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

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

- Batteries- chemicals, chargers, controllers, cables, connectors, containers, suppliers and testing equipment.
- Bio fuels for Vehicles- bio diesel, butanol, ethanol and vegetable oils.
- Mainstream Bio fuel applications (non transport)- bio diesel, butanol and ethanol.
- Other Bio fuels- biomass, methane, peanut oil, vegetable oil, wood and woodgas.

- Other fuels- Hydrogen.

Building Technologies sub-sector includes main stream building materials and systems that contribute to reduced energy use and to lowering the carbon footprint of buildings. It includes:

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

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

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

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

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

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

- R&D into high efficiency lighting, heating & ventilation, power, lighting, equipment & pumps and advance management systems.
- Gas Supply- monitoring, meterage, leak detection & maintenance, gas supply control and manufacture of high efficiency consumer equipment and devices.
- Lighting- manufacture, supply, distribution and installation of energy saving light bulbs & tubes, lighting and control systems.

- Heating & Ventilation- manufacture, supply, distribution and installation of energy saving equipment and systems.
- Electrical- manufacture, supply and installation of energy saving power control, building control, power consumption control & monitoring systems.
- Consulting and other services - advice & consultancy, publication, training and design of management systems.

Appendix 2

kMatrix's Methodology

2.1 Introduction

This sector is not well documented by government statistics, so the methodology works beyond standard industrial and market classifications and looks for multiple sources of industrial- based evidence to quantify market values. kMatrix is unique in how it identifies, assembles, evaluates, monitors and develops rules for the use of those sources to quantify 'difficult-to-measure' markets.

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

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

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

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

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

2.2 Measures

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

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

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

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

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

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

2.3 kMatrix's Methodology

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

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

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

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

a) Can exclude the research bias that often occurs from focusing on a single sector in a single sector and
b) Ensure that they are effectively monitoring a sector that is still evolving by absorbing activities often included in other sectors.

Sales

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

As they derive the financial value for the sector they also assemble and assess the UK company base that is contributing to this value. In the first case they identify all “significant” or “specialist” companies, these are companies where LCEGS account for over 80% of company sales, and then the supply/value chain companies where LCEGS sales is an important and measurable component of their overall sales- (over 20%). These percentages are indicative and vary for different LCEGS activities.

Companies

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

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

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

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

Employment

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

From these different sources we calculate employment numbers for LCEGS sector activities, taking into account how staff can operate processes that produce products for different markets. We, therefore, measure our employment numbers in Whole Time Equivalents (WTE).

Growth

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

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

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

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

Geography

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

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

There are some limits to what economic measures can be meaningfully or accurately applied at the local level. This is due to the range and specificity of data sources. Most of the economic development measures within this dataset can be accurately represented at a local level. Growth is an exception because rates cannot meaningfully be differentiated at a local level, therefore we apply regional growth rates throughout.