



GREATER MANCHESTER'S GREEN ECONOMY

SECTOR MAPPING STUDY

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Business Growth Hub



Greater Manchester
Local Enterprise Partnership

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EXECUTIVE SUMMARY



This report provides an update on the economic size and future potential of Greater Manchester's (GM) green technologies and services sector (GTS) and its contribution to the local, regional and national economy between 2019-2020.

Greater Manchester statistics

- Greater Manchester's GTS Sector generated sales of £8,644m. It comprised 3,144 companies employing 58,736 full time equivalent employees
- Historical growth in Sales over the four-year period between 2015/16 and 2019/20 was 27.9%, equivalent to a compound growth rate of 6.34% per year.
- The GTS sector represents 14.5% of the business base (based on GVA) and 3.2% of Greater Manchester's employment.
- In comparison to standard industry classification (SIC) code groupings, Greater Manchester's GTS sector is larger than Advanced Manufacturing, Digital, Creative and Science and R & D (excl. Manufacturing) sectors combined.

Greater Manchester is a national leader in carbon capture & storage, energy management and renewable energy consultancy; and ranks second in the UK (behind London) for alternative fuel vehicles and carbon finance.

Further details can be found in section 2) Status Update on the sector under the heading Sector Size

National comparisons and statistics

- Greater Manchester's economic performance has remained stable, and it has the largest sector outside of London and the South East with 4% (£8,644m) of GTS sector sales in England.
- Greater Manchester increased its contribution to the North West's GTS sector exports from 43% to 46% (£1,050m) in 2019/20, with the top exporting sub-sector being wind (£210m).
- Greater Manchester's low carbon sector had a slower growth rate (7.1%) than the UK between 2018/19 and 2019/20.

Further details can be found in section 2) Status Update on the GTS Sector under the heading National LEP Ranking (LCEGS)



International comparisons and statistics

- The global low carbon sector grew 14% between 2018-19 and 2019/20
- There was low confidence in global sales growth forecast rates due to the onset of the COVID-19 pandemic.
- UK and Greater Manchester forecast Sales growth rates for the low carbon sector were lower than Global forecasts to 2024/25.
- Internationally, Greater Manchester outperformed Milan, Portland, Copenhagen, Seattle, Berlin, Rome and Stockholm when comparing Sales value in proportion to GDP. (This uses a different definition of the sector used for the C40 Cities project.)

Further details can be found in 2) Status Update on the Sector under the headings.

Future potential of the low carbon sector in Greater Manchester:

The strongest diversification opportunity for existing businesses to enter the GTS sector were found for Engineering Companies diversifying into the renewable energy sector, with a market value of £67,585m. In particular: biomass, wind and geothermal (inc. Heat Pumps) markets.

GTS sub-sectors likely to drive local economic growth and jobs based on existing sector size (sales), forecast growth rate and national/local developments indicating support for these sub-sectors, are:

- Energy efficiency / Housing retrofit (Plumbers, heating engineers, multi-disciplinary engineers)
- Heat networks (Civil and multi-disciplinary engineers)
- Smart Grids (Electrical Engineers, multi-disciplinary engineers, Data specialists)
- Digital Technologies – as applied to all above categories - (Programmers, Systems Analysts, Digital Electronics Engineers)

Further details can be found in section 2) Status Update on the GTS Sector under the heading Diversification opportunities.

Key statistics:

The primary sector definition used in this report is “Low Carbon and Environmental Goods and Services” (LCEGS) and all statistics shown relate to the financial year 2019/20 unless otherwise stated. Green Economy refers to Green Technologies and Services to include climate adaption services and emerging technologies within the definition.





1. INTRODUCTION

Greater Manchester has been at the forefront of sustainable development and support for local economic growth related to this. With increased national emissions reduction commitments in the sixth carbon budget, the Green City Region is stepping up to the challenge and its strong low carbon sector has never been more important.

Continuous measure of the GTS sector

This report adds to previous reports giving a consistent measure the size and progress of the GTS sector in Greater Manchester since 2011/12. For reference, the previous reports showing GTS sector data for previous years can be found online by using the following links:

Year	Report website
2011/12	The ENWORKS project outcomes: Enworks.com/ESTA-project-outcomes/
2015/16	The GC Business Growth Hub Research reports, here: https://www.greenintelligence.org.uk/media/ikpfih4x/executive_summary_new.pdf

Sector definitions

The primary measure which we will be using in this report is the Low Carbon Environmental Goods and Services (LCEGS) sector, defined as Green Technologies and Services (GTS) in this report. In this report economic analysis relies on some definitions of the LCEGS sector. Each definition or taxonomy comprises a tree-like structure which captures a group of activities, or sub-sector, related to the low carbon sector. The primary definitions used are:

- GTS – Green Technologies and Services
- LCEGS - Low Carbon and Environmental Goods and Services
- Filtered LCEGS – which removes some low value-adding activities
- LCEGSS – An update on LCEGS used by the C40 Cities project

Please note that the LCEGS definition was developed in 2007 for Government and reporting has been kept in line with this definition for consistent comparison reasons. LCEGSS represents a more recent international definition of the LCEGS sector with expanded and updated sub-sectors, only used for international comparison in this report. The sector has expanded beyond this definition in the intervening years with significant changes not only within the sub-sectors discussed below but with the addition of sub-sectors, such as climate adaptation and climate services. Green Economy uses the GTS definition to include these developments and low carbon energy emerging sectors, including district heat networks, hydrogen, smart grids and demand response.

Economic metric definitions

The primary metrics used in this report are:

- Companies – Those companies whose activities are wholly or partly part of the low carbon sector definition, (see list above), and year reported
- Employees – A full time equivalent (FTE) approximation of the number of employees involved in activities included in the low carbon sector definition and year reported.
- Sales (£m) – The value of sales that relate to activities included in the low carbon sector definition reported

For more information on the sector and economic metric definitions, please refer to Appendix 1 - Methodology.

2. STATUS UPDATE ON THE SECTOR



This section provides a status update on the GTS sector in GM. The headlines presented are based on analysis of the Low Carbon and Environmental Goods and Services (LCEGS) sector dataset for 2019/20, unless otherwise stated.

This dataset is organised into three Level 1 sub-sectors (Environmental, Low Carbon and Renewable Energy) and a further 24 Level 2 sub-sectors. Further information is provided in Appendix 1 and below.

Sector size

Sector size is measured using three primary metrics: Sales (£m), number of companies, and number of full-time equivalent FTE employees.

LCEGS

Sales

Globally, LCEGS Sales were £7,119,651m in 2019/20, up 14% on the previous year. The GM LCEGS sector had a slower growth rate in Sales (7.1%) than the UK (7.4%) between 2018/19 and 2019/20.

The LCEGS sector in Greater Manchester (GM) had Sales of £8,644m in 2019/20. The sector comprised 3,144 Companies and employed 58,736 full time equivalent (FTE) Employees. The largest level 1 sub-sector in GM is the Low Carbon sub-sector, with Sales of £4,607m in 2019/20 and comprising 1,524 Companies with 29,570 full time equivalent Employees.

Table 1 compares the performance of the GM LCEGS sector in 2019/20 with its performance reported in previous years¹.

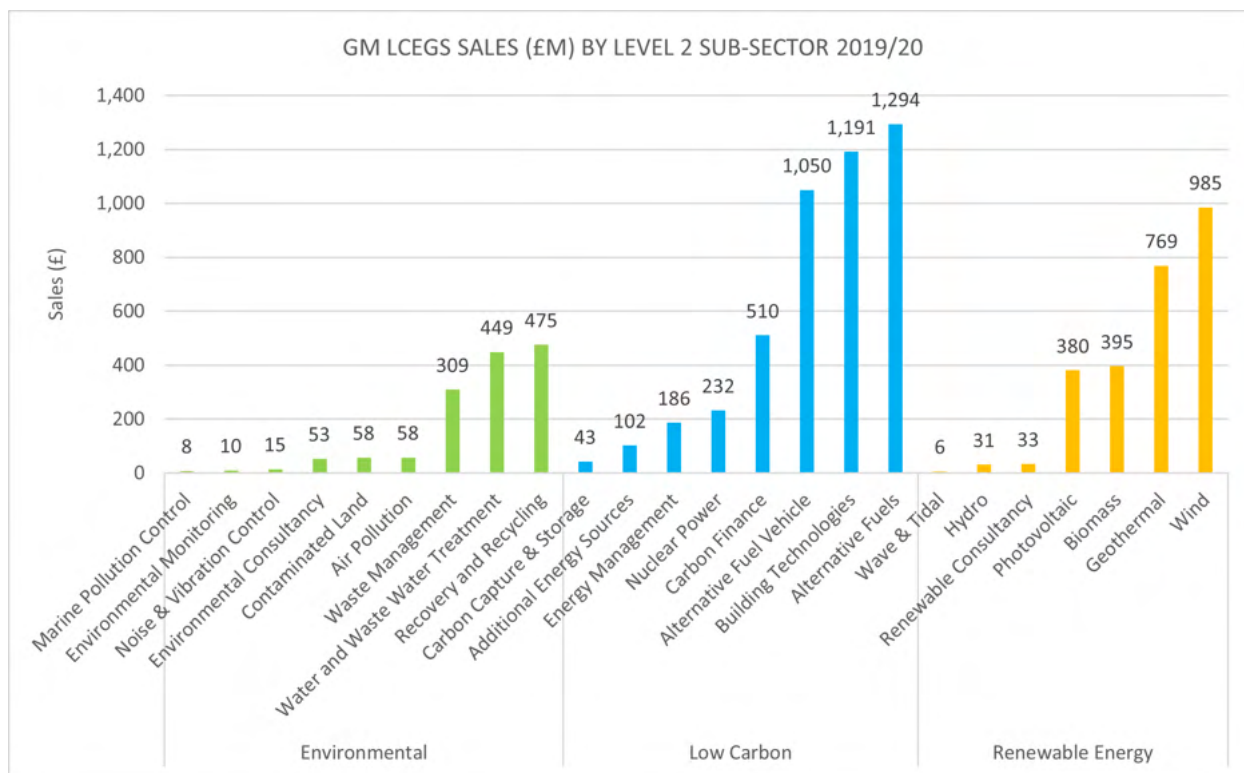
Table 1: Comparison of LCEGS sector performance in 2011/12, 2015/16 and 2019/20

By sector & Level 1 sub-sector		Sales £m	# Companies	# Employees
2019/20	GM LCEGS Sector	8,643.7	3,144	58,736
	Environmental	1,435.9	442	8,811
	Low Carbon	4,607.4	1,524	29,570
	Renewable Energy	2,600.5	1,178	20,355
2015/16	GM LCEGS Sector	6,758.7	2,398	45,115
	Environmental	1,230.9	380	7,583
	Low Carbon	3,572.2	1,172	22,888
	Renewable Energy	1,955.6	846	14,645
2011/12	GM LCEGS Sector	5,433.1	2,063	38,725
	Environmental	989.2	327	6,525
	Low Carbon	2,881.0	1,010	19,589
	Renewable Energy	1,562.8	726	12,611

¹ <http://enworks.com/resources/Economic%20potential%20of%20LCEGS%20Sector%20in%20Greater%20Manchester.pdf>
https://www.greenintelligence.org.uk/media/ikpfih4x/executive_summary_new.pdf

Using the full LCEGS dataset, Sales by Level 2 sub-sector are presented in Figure 1 below.

Figure 1: GM LCEGS Sales (£m) by Level 2 sub-sector 2019/20



Within the Environmental sub-sector, the Level 2 sub-sector Recovery and Recycling is the largest with Sales of £475m in 2019/20. This is up from £384m in 2015/16 and £311m in 2011/12. This is closely followed by the Level 2 sub-sectors Water and Waste Water Treatment as well as Waste Management, with Sales of £449m and £309m in 2019/20, respectively.

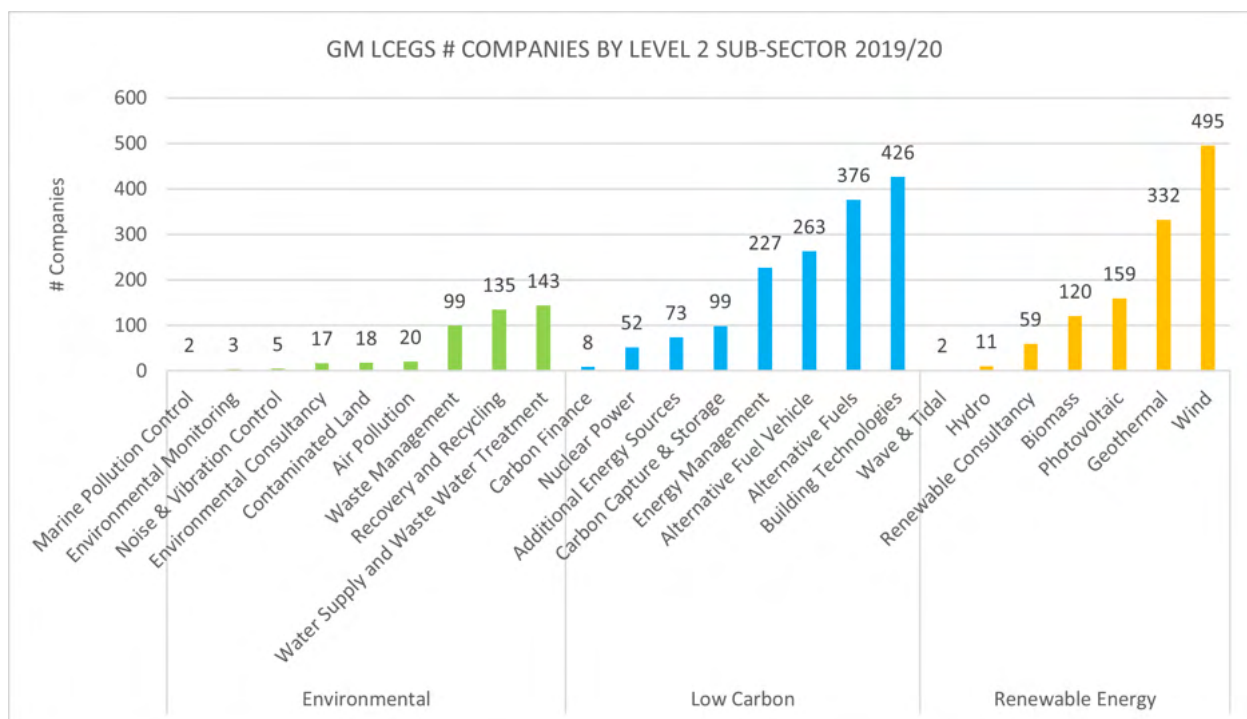
Within the Low Carbon sub-sector, the Level 2 sub-sector Building Technologies is the second largest behind Alternative Fuels, with Sales of £1191m in 2019/20. This is up from £830m in 2015/16 and £668m in 2011/12. This is followed by Alternative Fuel Vehicles and Carbon Finance with Sales of £1049.75m and £510.00m in 2019/20, respectively.

Within Renewable Energy, the Level 2 sub-sector Wind dominates with Sales of £985.13m in 2019/20. This is up from £714m in 2015/16 and £575m in 2011/12. This suggests that the Wind sub-sector is in a relatively ideal position with a high number of Sales. This is followed by Geothermal and Biomass sub-sectors, which had Sales of £768.74m and £395.49m in 2019/20, respectively.

Companies

Using the full LCEGS dataset, the number of Companies by Level 2 sub-sector are presented in Figure 2, below.

Figure 2: GM LCEGS number of Companies by Level 2 sub-sector 2019/20



Within the Environmental sub-sector, the Level 2 sub-sector Water Supply and Wastewater Treatment is the largest with 143 Companies in 2019/20. This is up from 131 in 2015/16 and 112 in 2011/12. This is closely followed by the Level 2 sub-sectors Recovery and Recycling as well as Waste Management, with 135 and 99 Companies in 2019/20, respectively.

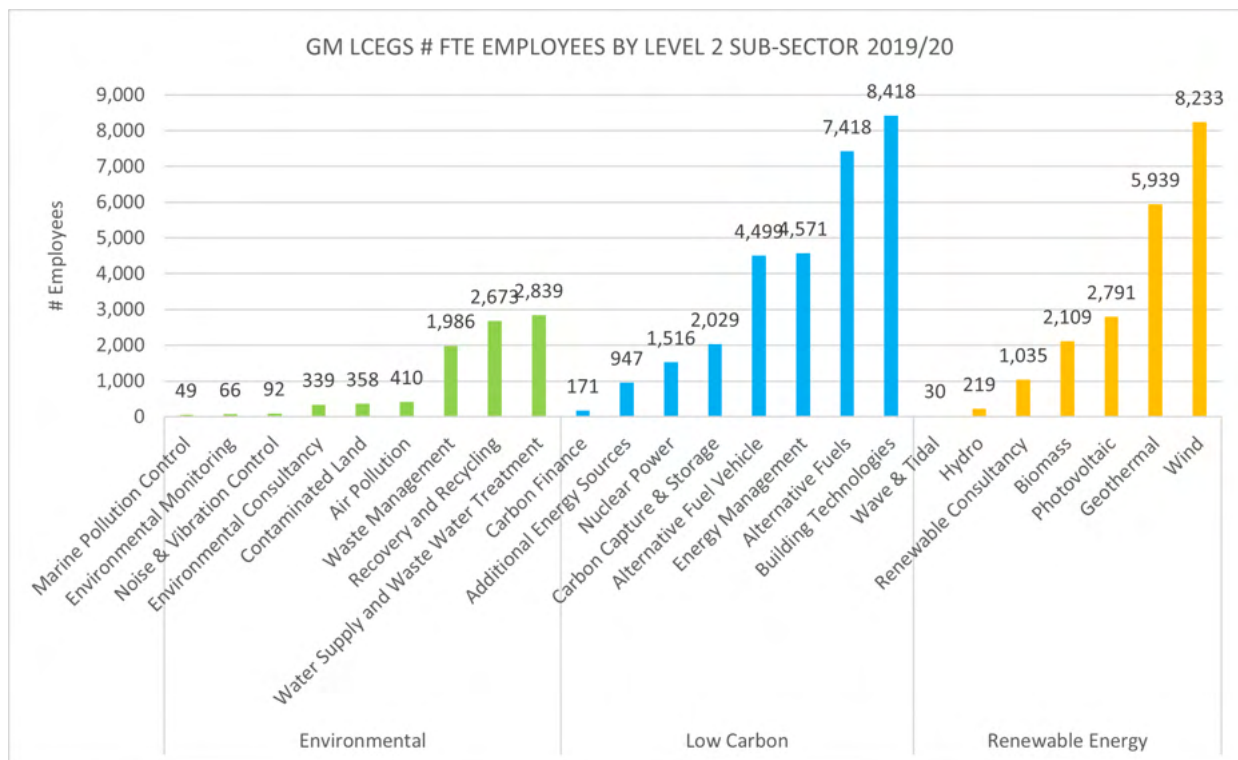
Within the Low Carbon sub-sector, the Level 2 sub-sector Building Technologies is the largest with 426 Companies in 2019/20. This is up from 314 in 2015/16 and 270 in 2011/12. This is followed by Alternative Fuels and Alternative Fuel Vehicles with 376 and 263 Companies in 2019/20, respectively.

Within Renewable Energy, the Level 2 sub-sector Wind dominates with 495 Companies in 2019/20. This is up from 360 in 2015/16 and 308 in 2011/12. This suggests that the Wind sub-sector is in a relatively ideal position with a high number of Companies. This is followed by Geothermal and Photovoltaic sub-sectors, which had 332 and 159 Companies in 2019/20, respectively.

Employees

Using the full LCEGS dataset, the number of FTE Employees by Level 2 sub-sector are presented in Figure 3, below.

Figure 3: GM LCEGS number of FTE employees Level 2 sub-sector 2019/20



Within the Environmental sub-sector, the Level 2 sub-sector Water Supply and Wastewater Treatment is the largest with 2,839 FTE Employees in 2019/20. This is up from 2594 in 2015/16 and 2234 in 2011/12. This is closely followed by the Level 2 sub-sectors Recovery and Recycling as well as Waste Management, with 2,673 and 1,986 FTE Employees in 2019/20, respectively.

Within the Low Carbon sub-sector, the Level 2 sub-sector Building Technologies is the largest with 8,418 FTE Employees in 2019/20. This is up from 6,191 in 2015/16 and 5,322 in 2011/12. This is followed by Alternative Fuels and Energy Management with 7,418 and 4,571 FTE Employees in 2019/20, respectively.

Within Renewable Energy, the Level 2 sub-sector Wind dominates with 8,233 FTE Employees in 2019/20. This is up from 6,005 in 2015/16 and 5,165 in 2011/12. This is followed by Geothermal and Photovoltaic sub-sectors, which had 5,939 and 2,791 in 2019/20, respectively.

Filtered LCEGS

The Filtered LCEGS taxonomy removes low-value-adding fuel supply and distribution activities from two sub-sectors within the Low Carbon sector and gives a more balanced view of low carbon value added to the economy locally².

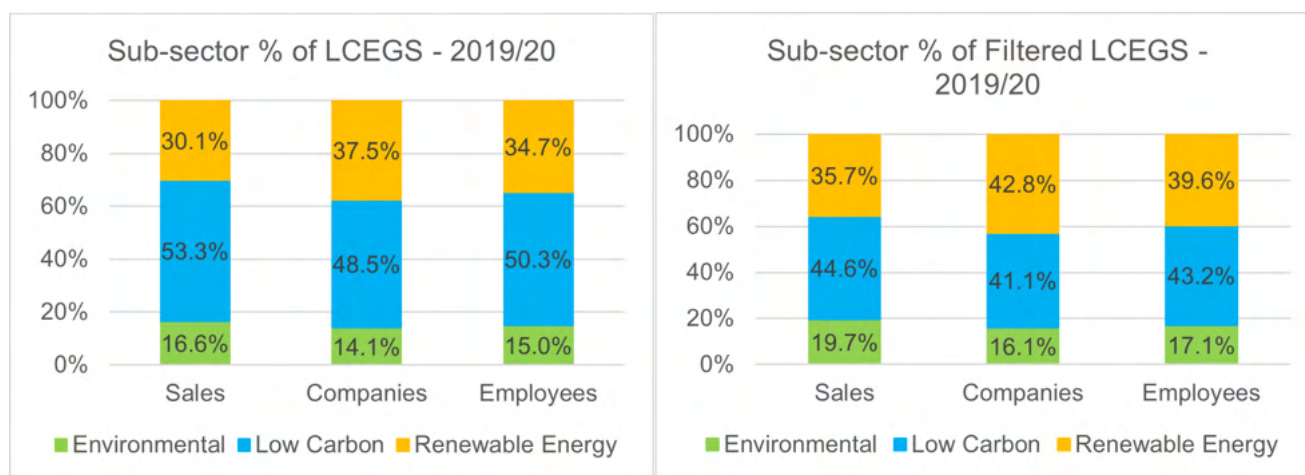
Table 2: Comparison of Filtered LCEGS sector performance in 2011/12, 2015/16 and 2019/20

By sector and level 1 sub		Sales £m	# Companies	# Employees
2019/20	GM Filtered LCEGS Sector	£7,291.0	2,749	51,377
	Environmental	1,435.9	442	8,811
	Low Carbon	3,254.7	1,129	22,211
	Renewable Energy	2,600.5	1,178	20,355
2015/16	GM Filtered LCEGS Sector	£5,666.4	2,086	39,272
	Environmental	1,230.9	380	7,583
	Low Carbon	2,479.8	860	17,044
	Renewable Energy	1,955.6	846	14,645
2011/12	GM Filtered LCEGS Sector	£4,583.1	1,793	33,777
	Environmental	989.2	327	6,525
	Low Carbon	2,031.0	740	14,641
	Renewable Energy	1,562.8	726	12,611

As shown in Table 2 Using Filtered LCEGS, the low carbon economy in GM had Sales of £7,291m in 2019/20 with 2,749 Companies employing 51,377 FTE Employees. This represents a total growth rate in Sales of 28.7% from 2015/16 and 59.1% from 2011/12. Since 2011/12 the number of Companies and full-time equivalent (FTE) Employees in the sector have grown by over 50%.

Figure 4 below compares the GM LCEGS to GM Filtered LCEGS data in 2019/20, showing how the Level 1 sub-sectors contributed to the GM sector overall, as measured in Sales, Employees and Companies.

Figure 4: Sub-sector % contribution using LCEGS and Filtered LCEGS Data - 2019/20



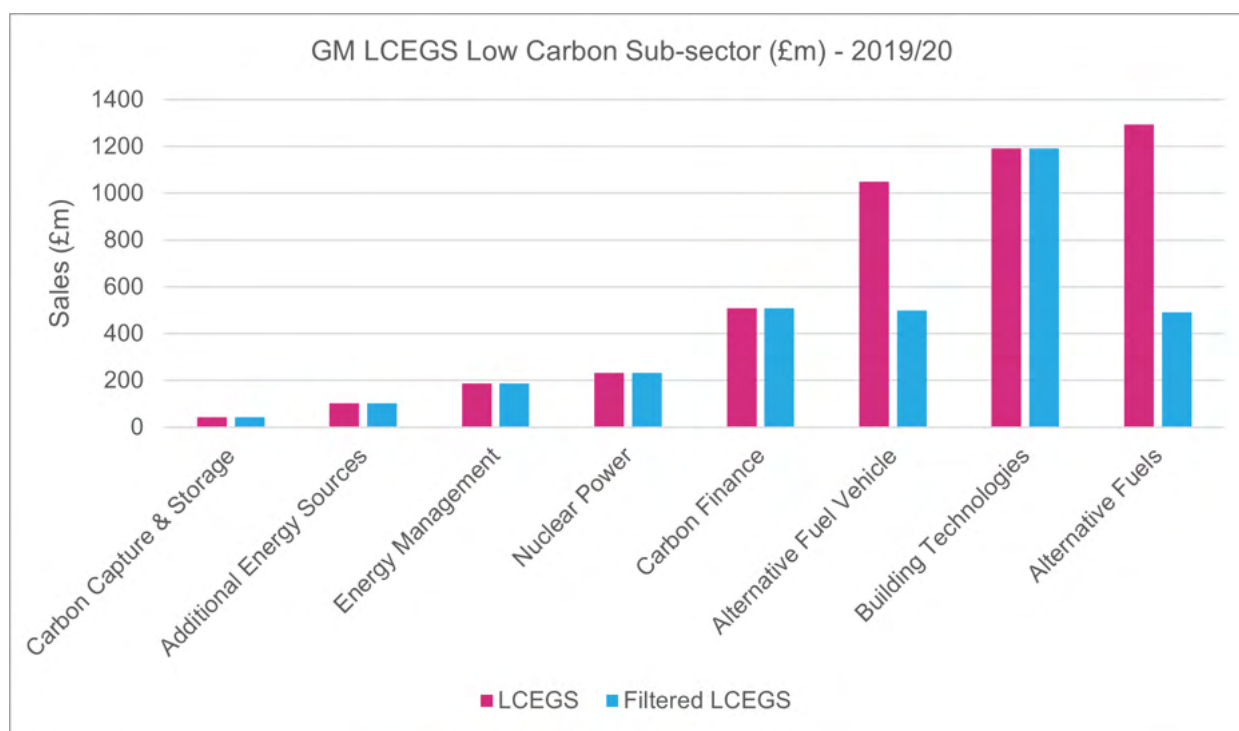
²Data for the Level 1 Low Carbon sub-sector is distorted by a large presence in activities that are generally low value-adding fuel supply and distribution dominated, for example fuel and vehicle delivery at Level 2 in Alternative Fuels and Alternative Fuel Vehicles sub-sectors). These have been removed from the Filtered LCEGS version of the data set to allow for comparisons.

Filtering out the low value-adding activities reduces the size of the Low Carbon sub-sector Sales by £1,353m and gives more relative importance to the Renewable Energy and Environmental sub-sectors.

- The Low Carbon sub-sector Sales reduces from 53.3% of the total to 44.6%
- The number of Companies in the Low Carbon sub-sector reduces from 48.5% of the total to 41.1%.
- The number of FTE Employees in the Low Carbon sub-sector reduces from 50.3% to 43.2% of the total.

Figure 5 below compares Low Carbon Level 1 sub-sector Sales using the LCEGS and filtered LCEGS data to demonstrate the impact on Sales performance of removing low value-adding activities from Alternative Fuels and Alternative Fuel Vehicles Level 2 sub-sectors.

Figure 5: The impact on Sales in the Low Carbon sub-sector of filtering out low-value adding activities – 2019/20



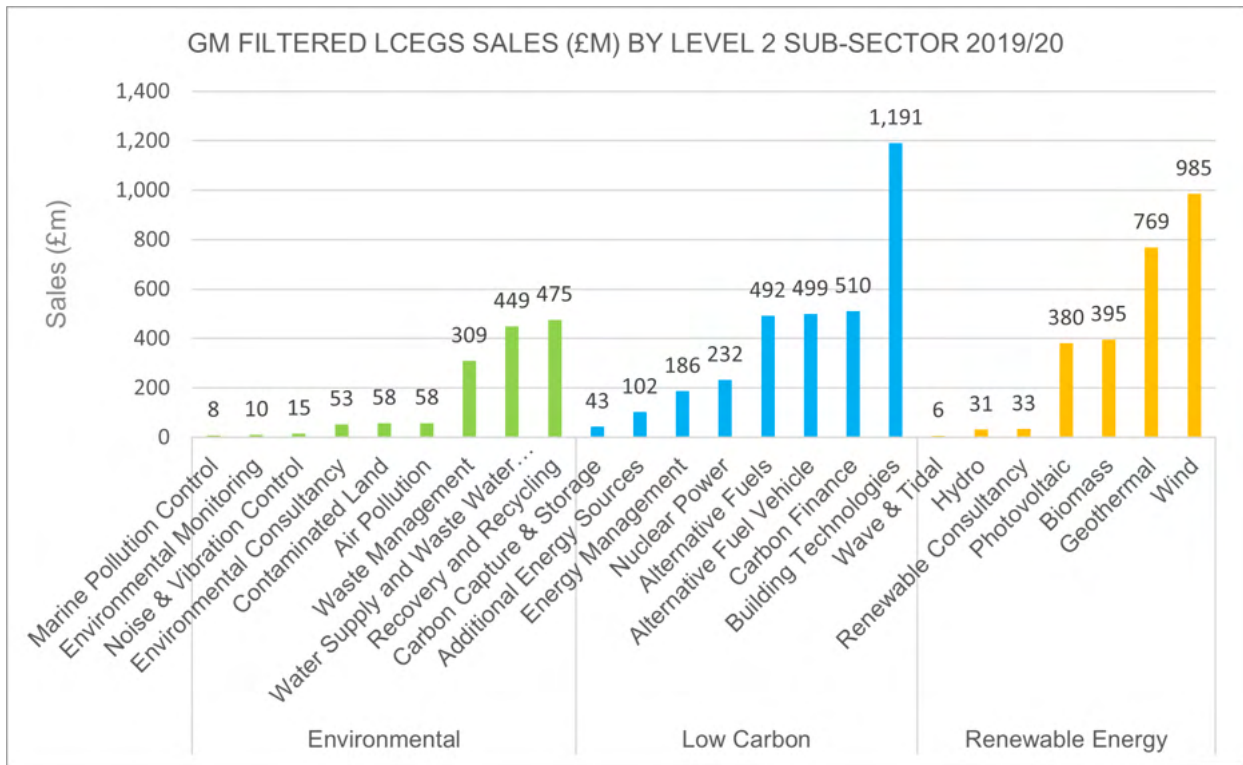
Removing the low-value adding activities from the Alternative Fuels and Alternative Fuel Vehicle sub-sectors demotes them from being the largest and third largest sub sectors by Sales to fourth and third largest respectively.

The impact of removing low value-adding activities on Sales is:

- Alternative fuel vehicles Sales reduces by 47.5%
- Alternative fuels Sales reduces by 38%

Figure 6 below shows the Level 2 sub-sector Sales for GM filtered LCEGS for 2019/20.

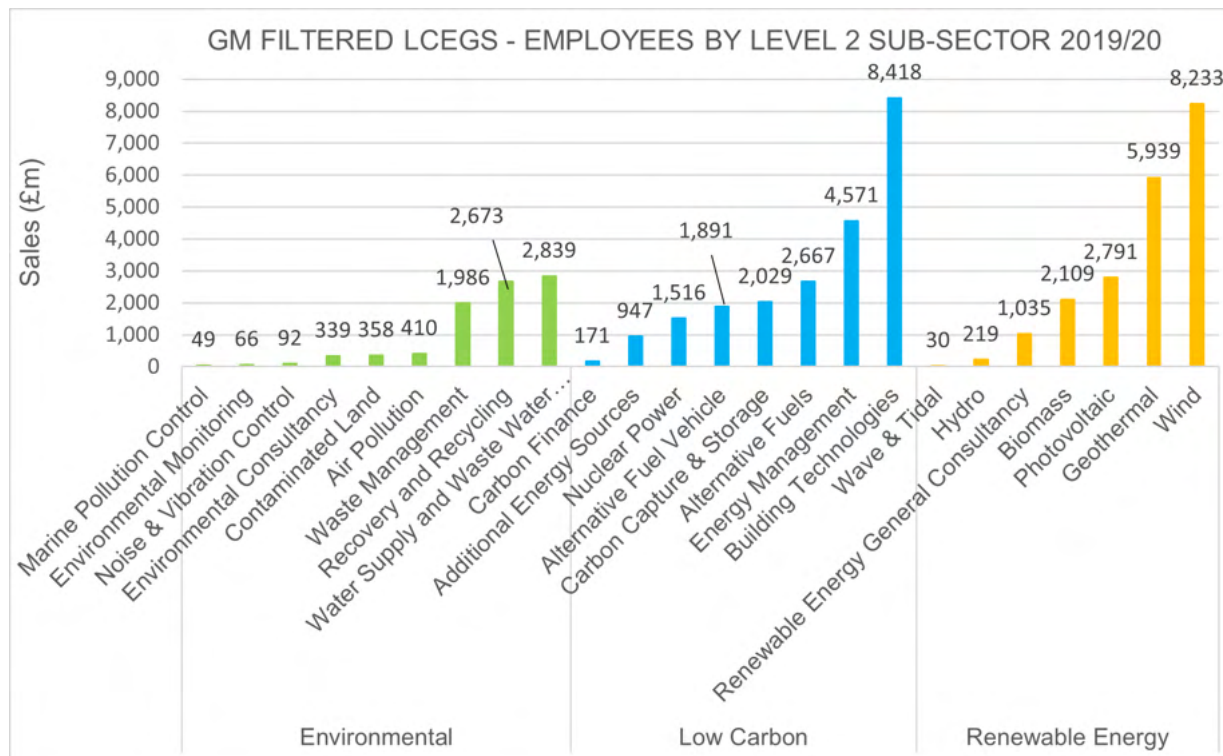
Figure 6: GM Filtered LCEGS Sales (£m) by Level 2 sub-sector 2019/20



The filtered LCEGS data above highlights the largest sectors by Sales, as Building Technologies, Wind, Geothermal, and Geothermal. Carbon Finance is the next largest but is considerably smaller.

Figure 7 below shows the Level 2 sub-sector FTE Employees for GM Filtered LCEGS for 2019/20.

Figure 7: GM Filtered LCEGS FTE Employees by Level 2 sub-sector 2019/20



Whilst the top three sub-sectors by metric Employees match the top three by metric Sales (Building Technologies, Wind and Geothermal), the Energy Management sector has increased importance as the next largest employing sector.

Historical Growth

Table 3 compares the size of the sector using two different sector definitions: LCEGS and filtered LCEGS. All definitions used are described in more detail in Appendix 1.

Table 3: Size of the GM Low Carbon sector by definition – 2011/12, 2015/16 and 2019/20

Year	2011/12		2015/16		2019/20	
	LCEGS	Filtered LCEGS	LCEGS	Filtered LCEGS	LCEGS	Filtered LCEGS
Sales (£m)	£5,433	£4,583	£6,759	£5,666	£8,644	£7,291
# Employees	38,725	33,777	45,115	39,272	58,736	51,377
# Companies	2,063	1,793	2,398	2,086	3,144	2,749

Between 2011/12 and 2019/20 all metrics related to the size of the low carbon sector as defined by LCEGS and Filtered LCEGS (sales, employees, companies) have grown, with compound historic growth rates slightly higher between 2015/16 to 2019/20 than the preceding four years. (5.5% vs. 6.5%).



LCEGS

At the sector level, over the eight years between 2011/12 and 2019/20 LCEGS sales grew in total by 59.1%, equivalent to a compound growth rate of 5.98% p.a, the number of companies increased by 52.4% and FTE employees by 51.7%.

Over the four years between 2015/16 and 2019/20 Sales grew in total by 27.9%, whilst the number of Companies and FTE Employees increased by about 31% and 30% respectively. For Level 1 sub-sectors Low Carbon and Renewable Energy the equivalent compound growth rate was faster between 2015/16 and 2019/20 than between 2011/12 and 2015/16 but the Environmental sub-sector slowed during this period.

At Level 1, the fastest growing LCEGS subsector by all metrics over the eight-year period between 2011/12 and 2019/20 has been the Renewable Energy sub-sector, with a growth in Sales of 66.4%, a growth in Companies of 62.3%, and a growth in Employees of 61.4%. Over the four years between 2015/16 and 2019/20, the Renewable Energy sub-sector also maintained the largest total growth rates in all three categories with a growth in Sales of 33.0%, a growth in Companies of 39.3%, and a growth in Employees of 39.0%.

The fastest growing sub-sectors by Sales at Level 2 were Carbon Capture & Storage, Building Technologies, Alternative Fuel Vehicles and Wind over both four- and eight-year periods. The fastest growing sub-sectors by Employees at Level 2 were Geothermal, Carbon Capture & Storage, Alternative Fuel Vehicles and Wind over both the four- and eight-year period.

Filtered LCEGS

Over the eight years between 2011/12 and 2019/20 Filtered LCEGS Sales also grew in total by 59.1%, equivalent to a compound growth rate of 5.98% p.a, the number of Companies increased by 53.3% and FTE Employees by 52.1%

Over the four years between 2015/16 and 2019/20 Sales grew in total by 28.7%, whilst the number of Companies and FTE Employees increased by about 32% and 31% respectively. There were no further differences at Level 1 or Level 2 to the figures reported above for the LCEGS sector.

Forecast Growth

At the point of measurement (Feb 2021), the forecast Sales growth rates for both LCEGS and Filtered LCEGS in GM to end 2024/25 was around 23%. This was lower than global forecast Sales growth rate of 30% (see Appendix 1 Methodology for further details).

GM forecast growth rates took into account the anticipated effect on the UK of Brexit and COVID-19 and so the forecast growth rate from 2019/20 to 2020/21, in particular, is significantly lower for GM than the global forecast, with a 2.6% growth rate for GM compared to a 6.2% globally. Confidence levels in forecast growth rates were low, globally, throughout 2020/21 due to the ongoing impact of the COVID-19 pandemic and related economic uncertainties³.

Figure 8 on the following page presents Level 2 sub-sector size (Sales £m) and five-year total forecast growth rate in Sales for the sector in GM to identify those sub-sectors with greatest strengths and opportunities. For this analysis we have used Filtered LCEGS Level 2 sub-sector figures as this has greater relevance for GC Business Growth Hub activities/purposes.

³Confidence levels are an indicator of agreement between different data sources on metrics, for instance, forecast growth rates. In fact, the LCEGS sector shrunk in the UK by about 9%* during 2019/20-2020/21 but this was uneven across the UK and across sub-sectors. Likewise, forecast recovery and onward growth rates vary between geographies and sub-sectors. * From: <https://kmatrix.co/uk-lcegs/>



In Figure 8 the columns represent LCEGS Level 2 sub-sector Sales £m in 2019/20 using the left hand axis scale. The red dots represent the Total Forecast Growth % to 2024/25 for each sub-sector using the right hand axis scale.

Circled sub-sectors represent likely growth markets in the GM economy.

The sub-sectors circled in black are in a good position with national potential, based on both Sales over £475m in 2019/20 and a forecast Sales growth of 25% or more over five years to 2024/25. National/local strategy or policy support is aligned for these sub-sectors.

Building Technologies (Low Carbon), Geothermal and Wind (Renewable Energy) stand out in this analysis as the largest existing sub-sectors by Sales with high forecast growth rates. Alternative Fuels, Alternative Fuel Vehicles (Low Carbon sub-sector) also show good potential with high forecast growth rates to grow already significant Sales.

Sub-sectors circled in red are of importance based on forecast growth rates and stated local strategy and policy commitments in GM. This includes Environmental Consulting, Air pollution, Water & Waste Water Treatment, Reuse and Recycling (Environmental) and Solar PV (Renewable Energy) related to the GM Clean Air Policy, commitments to reducing waste (plastic and food) and increasing the City Region's recycling and generation of renewable energy from Solar Photovoltaics.

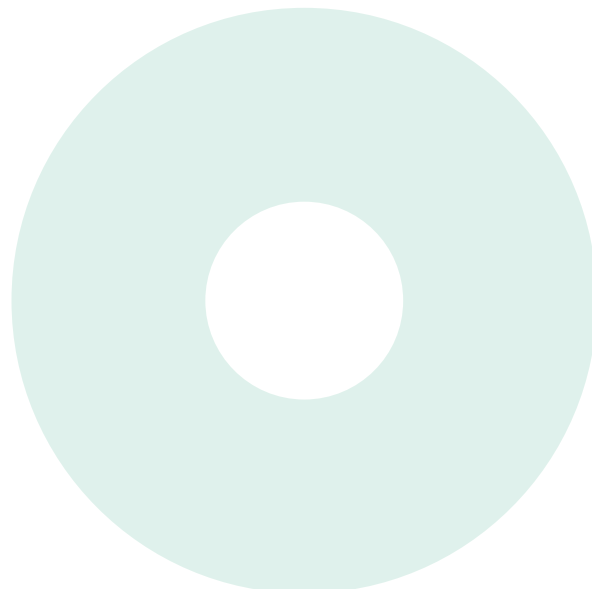
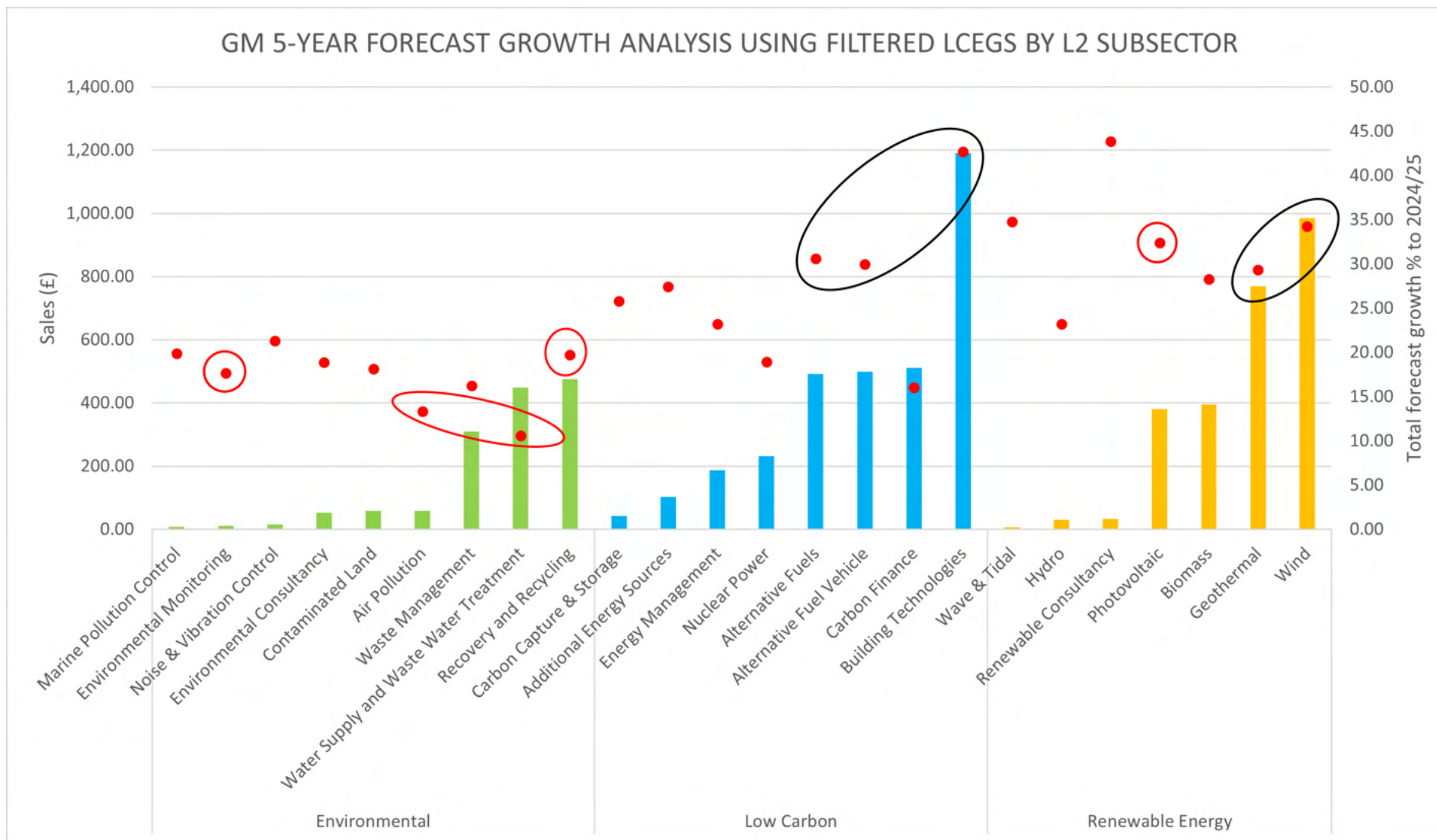




Figure 8: GM 5-year forecast growth analysis using Filtered LCEGS by Level 2 sub-sector



Exports & Imports

Globally, about 5% of LCEGS Sales were exported to or imported by another country in 2019/20. The UK accounted for 5% of all global LCEGS exports and 3% of imports. In absolute terms, the UK was a net exporter of LCEGS.

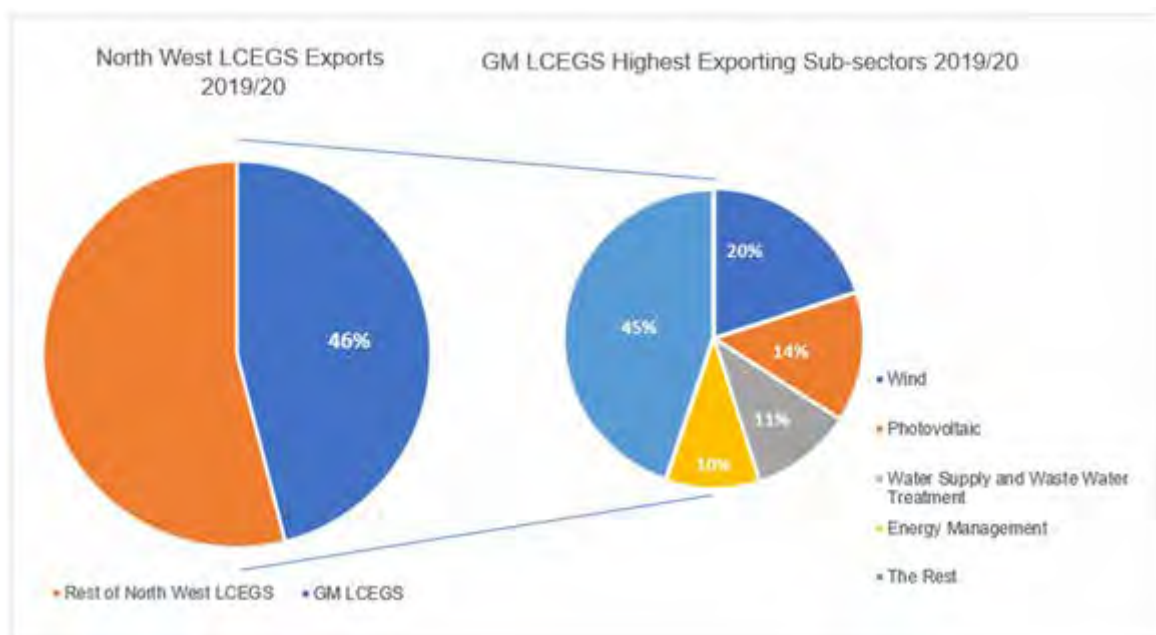
The EU (which included the UK for 2019/20) was responsible for around 33% of all global LCEGS exports but only around 23% of global LCEGS imports. In absolute terms, the EU was a net exporter of LCEGS. The UK accounted for around 14% of EU total global LCEGS exports and 15% of EU global LCEGS imports.

GM LCEGS exports were £1,050m in 2019/20 whilst its imports were £790.7m: GM LCEGS is a net exporter.

▲ GM's contribution to the North West's exports has risen from 43% to 46% since 2015/16.

Figure 9, below, shows that GM contributed 46% of the North West region's LCEGS exports (£1,050m) in 2019/20. Of this, 56.4% of GM exports were from the Renewable Energy sub-sector, 24.5% from the Environmental sub-sector and 19.1% from the Low Carbon sub-sector.

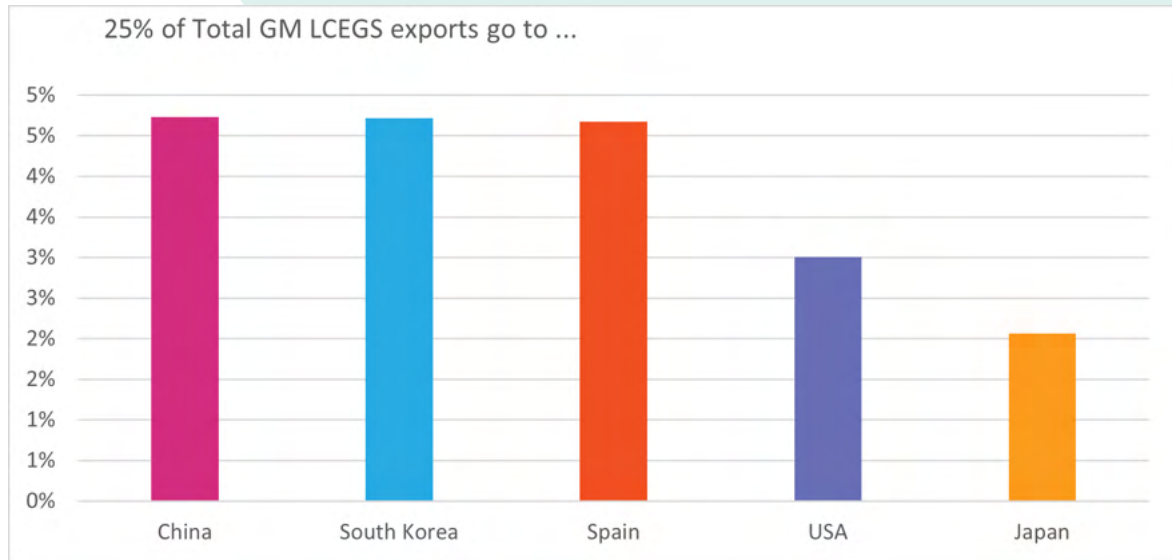
Figure 9: GM LCEGS Exports Analysis 2019/20



The top exporting sub-sector was Wind, exporting around £210m of Sales in 2019/20. (This was also the top importing sub-sector, importing around £120m of Sales in 2019/20). Photovoltaics was the second largest exporting sub-sector with Sales of around £148m (imports of £36m).

The leading destinations making up 25% of GM LCEGS exports during 2019/20 are shown in Figure 10 below. The leading continent is Asia, with China, South Korea and Japan all figuring. The leading destination is China, with 4.7% of GM LCEGS exports going to this country.

Figure 10: Leading destinations for 25% of GM LCEGS exports in 2019/20



GM Low Carbon Sector Comparators

Globally (LCEGSS)

GM has been compared to 21 European and North American cities using an upgraded version of the LCEGS data set: LCEGSS. For a description of the differences between the LCEGS and LCEGSS taxonomies and for the data sources relating to Figure 11, below, please see Appendix 1.

Figure 11: Comparison of GM LCEGSS Sector with leading international cities



Ratio of LCEGSS Sales to GDP:

GM's LCEGSS sector had Sales of £8,459.7m in 2019/20 generated by 3,095 Companies employing 53,626 FTE staff.

The GM's LCEGSS Sales value is proportionally large for its Gross Domestic Product (GDP) (14%) and is therefore above average compared to similar global cities. Only Portland (10%), Milan (11%) and Oslo (15%) share this position with GM. GM is well above average for the Level 1 Low Carbon sub-sector compared to the other cities. Within this, the Level 2 sub-sectors well above average are:

- Additional Energy Sources
- Alternative Fuel Vehicles
- Alternative Fuels
- Carbon Capture & Storage
- Energy Management
- Nuclear Power.

GM is above average for the Level 1 Environmental sub-sector. Within this, Level 2 sub-sectors well above average are:

- Biodiversity
- Contaminated Land
- Energy from Waste

- Marine Pollution Control.

For the Level 1 Renewable Energy sub-sector, GM is average overall. Within this, Level 2 sub-sectors above average are:

- Wave & Tidal
- Wind.

Key changes since 2015/16 in Level 2 sub-sectors relative to other cities:

- ▲ Energy Management has moved from “above average” to “well above average”
- ▲ Bio-diversity has moved from “above average” to “well above average”
- ▲ Environmental Consultancy has moved from “average” to “above average”
- ▼ Waste Management has moved from “above average” to “average”
- ▼ Renewable consultancy has moved from “above average” to “average”
- ▼ Water and Waste Water has moved from “above average” to “average”.

National LEP Ranking (LCEGS)

GM’s ranking amongst English LEPs has remained unchanged since 2015/16:

- 3rd in terms of Sales
- 4th in terms of employment
- 4th in terms of sector Companies

Sales

GM is ranked 3rd for Sales, behind London and the South East with 4% of total LCEGS Sales (£8,644m) compared to £6,759m (5% of total) in 2015/16. Exceptions to this ranking can be found within the Level 2 sub-sectors:

Within Environmental the following sub-sector ranks 4th (behind London, South East and South East Midlands):

- Environmental Monitoring, Instrumentation and Analysis

Within Low Carbon the following sub-sectors rank 2nd (behind London and ahead of South East):

- Alternative Fuel Vehicle
 - Carbon Finance
 - Nuclear Power sub-sectors
- and the following sub-sectors rank 1st (ahead of London and the South East):
- Carbon Capture & Storage
 - Energy Management sub-sectors

Within Renewable Energy the following sub-sector ranks 4th (behind London, South East and Coast to Capital):

- Biomass
- and the following sub-sector is ranked 1st (ahead of London and the South East):
- Renewable Energy General Consultancy

Sector employment

GM is ranked 4th for number of Employees, behind London, South East and Leeds (58,131). There is very little variation to this in the Level 2 sub-sectors.

Change since 2015/16:

- ▼ Reduction from 3rd to 4th ranking for the following
Environmental: Air Pollution



Low Carbon: Alternative Fuels, Carbon Finance, Nuclear, Additional Energy Sources Renewable Energy: Wind

Sector Companies

GM is ranked 4th for number of Companies, behind London, South East and Leeds (3,105). There is no significant variation to this in the Level 2 sub-sectors.

GM business base (LCEGS vs Standard Industry Classification industries and New Economy Industry)

Several different sources of data are used in this analysis in addition to the LCEGS data:

- 1) Standard Industrial Classification (SIC) code⁴ analysis of Regional GVA figures (both published by HM Office for National Statistics)⁵
- 2) Industry Groupings of these SIC codes based on the 2015 New Economy GM Forecasting Model (GMFM)⁶.

The LCEGS and Regional GVA by SIC code datasets both offer a measurement of GM’s overall economy (by GVA) but the SIC code analysis does not identify or measure metrics related to the low carbon sector

The use of two different views of the local economy in this analysis makes it difficult to draw conclusions from any trends shown in the data presented below, since the methodologies behind the data sets are not comparable. Further information about this is provided in Appendix 1

Table 4 shows the size of the Low Carbon Sector .as measured by three definitions using GVA as the comparison metric with the GM economy as a whole.

Table 4: The Low Carbon Sector contribution to the GM economy by GVA - 2019/20

Dataset / Measure	GVA (£m)	% of GM
Total GM economy ¹	73,451	-
LCEGS	10,634	14.48
Filtered LCEGS	8,972	12.21
LCEGSS	12,461	16.97

ONS SIC Code broad industry groupings (“Sections”) were compared to the LCEGS sector, using “% of GM total” based on the metric GVA.

Focusing on the LCEGS definition, representing 14.5% of the GM Economy by GVA, this is bigger than all of the SIC-Code broad industry groupings. For example, in comparison, the largest ONS SIC code grouping is G: Wholesale and retail trade and repair of motor vehicles (11.8%), followed by L: Real estate activities (11.5%) and C: Manufacturing (9.7%)

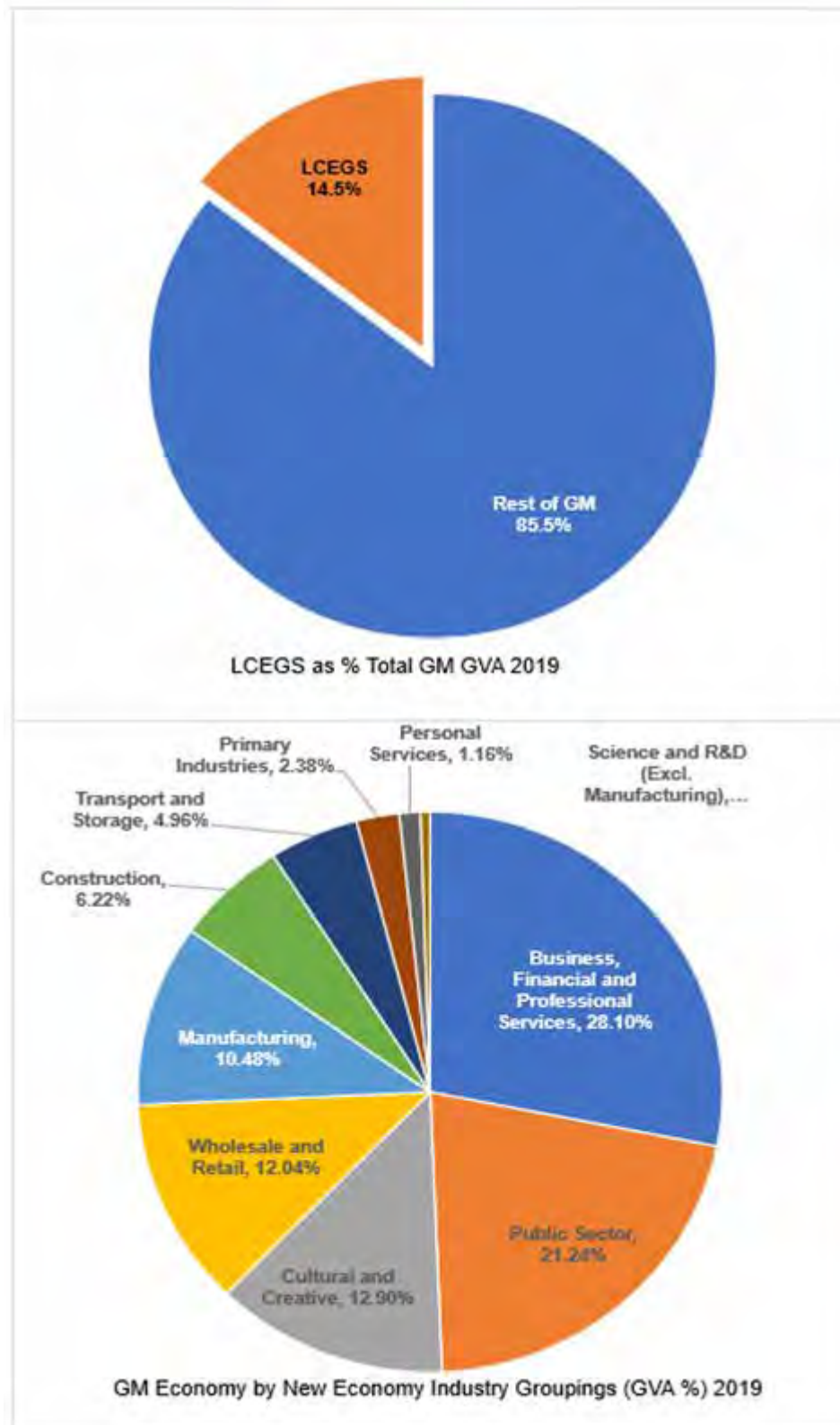
⁴Source: “UK Standard Industrial Classification of Economic Activities (2007) – Summary of Structure”. Accessed July 2021 at: <https://www.ons.gov.uk/methodology/classificationsandstandards/ukstandardindustrialclassificationofeconomicactivities/uksic2007>

⁵Source: “Regional gross value added (balanced) by industry: all International Territorial Level (ITL) regions” as corrected 11th June 2021. Accessed: Oct 2021 at: <https://www.ons.gov.uk/economy/grossvalueaddedgva/datasets/nominalandrealregionalgrossvalueaddedbalancedbyindustry/current>

⁶GMFM series published periodically. Accessed July 2021 at: <https://www.greatermanchester-ca.gov.uk/what-we-do/economy/greater-manchester-forecasting-model/>

⁷ONS Regional Gross Value Added (balanced) by Industry 2021 for calendar year 2019.

Figure 12: New Economy industry groupings and LCEGS contribution to the GM Economy (2019)



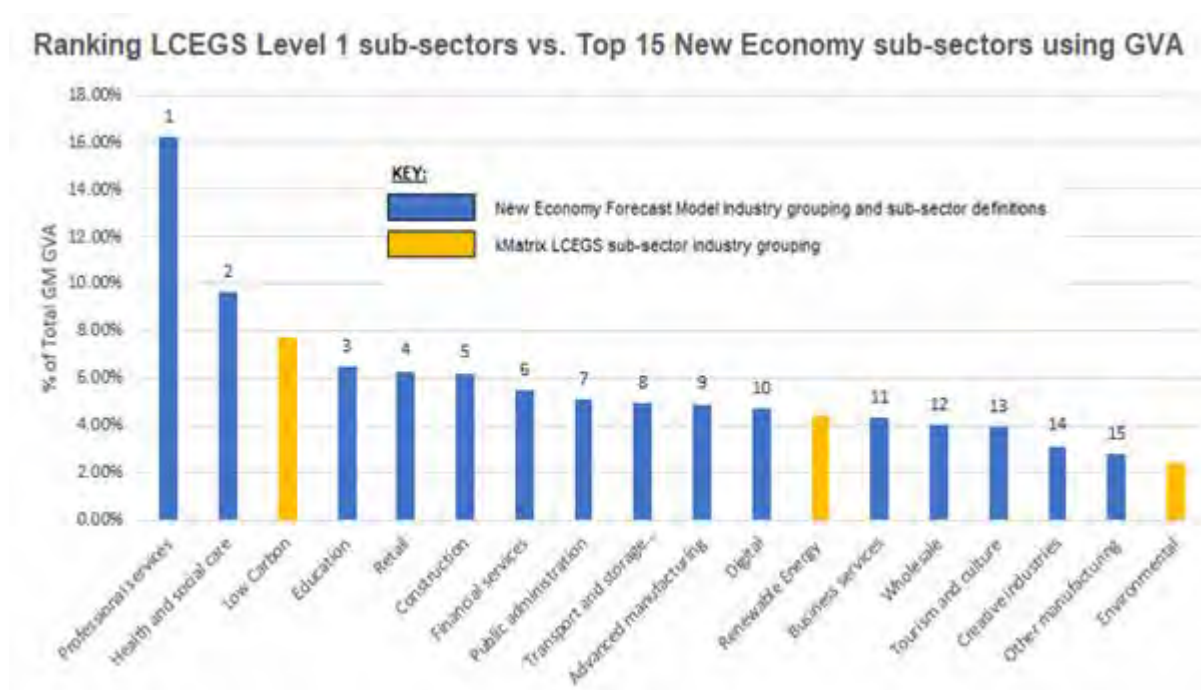
LCEGS' contribution to the whole GM economy has also been compared to the New Economy broad industry groupings, which are groupings of the ONS broad industry groups.

The largest New Economy broad industry groupings are “Business, Financial and Professional Services” at 28.1% and “Public Sector” at 21.2% of total GM GVA respectively. The next largest is the “Cultural and Creative” grouping, at 12.9% of the total GM GVA as shown in Figure 12.

In this analysis, LCEGS is the third largest contributor to the GM economy (by GVA) after the Public Sector and the Business, Financial and Professional Services industry groupings, and ahead of Cultural and Creative grouping.

Figure 13 shows the New Economy sub-sectors ranked by size (% of Total GM GVA) with the LCEGS Level 1 subsectors shown relative to these.

Figure 13: LCEGS L1 sub-sectors and New Economy sub-sectors' contribution to the GM Economy - 2019/20



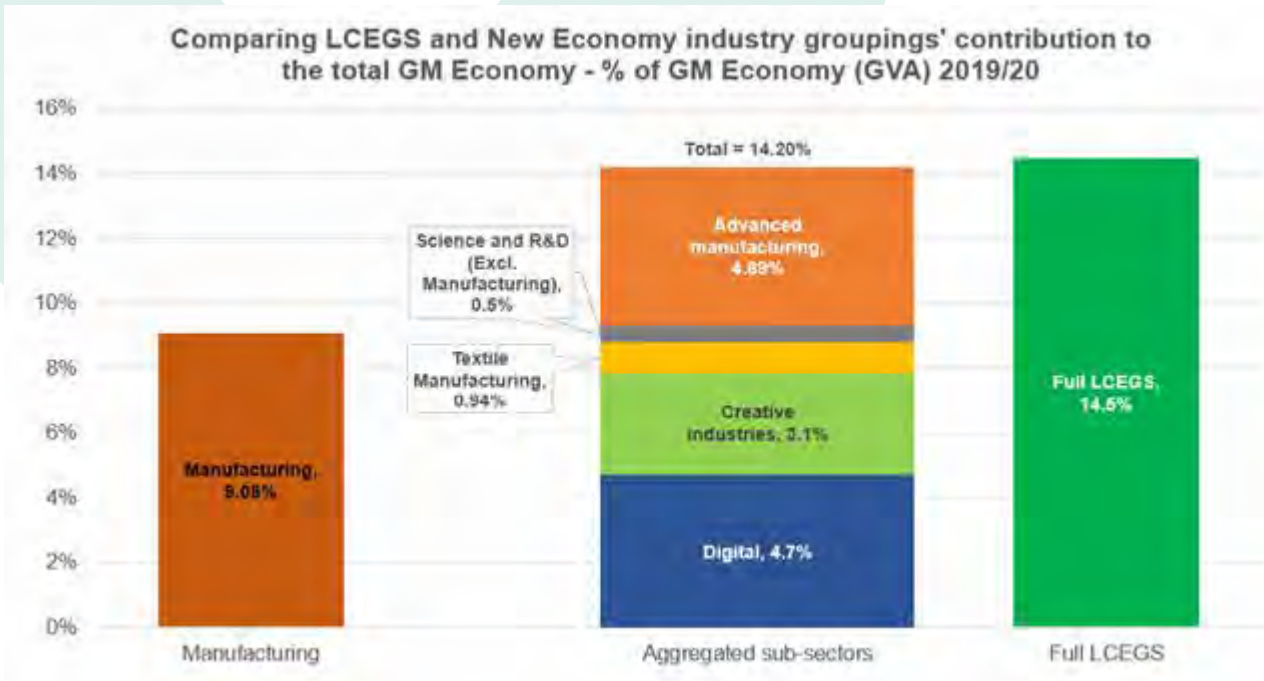
In this analysis:

- The LCEGS Level 1 sub-sector, Low Carbon, is the third largest contributing sub-sector to the GM economy after the Professional services, Health and Social Care sub-sectors, as defined by New Economy.
- The LCEGS Level 1 sub-sector Renewable Energy contributes just a little less than the Digital and Creative industries but more than Business Services, Tourism and culture and Advanced Manufacturing.
- The LCEGS Level 1 sub-sector, Environmental, is just a little smaller than the Other Manufacturing New Economy sub-sector

In Figure 12 the New Economy industry grouping ‘Cultural and Creative’ includes the sub-sectors Creative Industries, Digital, Tourism and Culture shown also in Figure 13. In addition, it includes Sport, which falls outside the top 15 New Economy sub-sectors.

As shown in Figure 14 the GM LCEGS sector remains larger than the SIC code Manufacturing industry grouping and is larger than the combined industry groupings of Advanced Manufacturing, Digital, Creative industries, Textile Manufacturing and Sciences and R & D combined⁸.

Figure 14: Comparing LCEGS and New Economy Industry Groupings' contribution to the total GM Economy (measured as Gross Value Added)



Full ranking of the major industry groupings and sub- sectors is provided in Appendix 1.

⁸In a previous report, GM LCEGS comparisons included GMFM-defined groupings 'Life Sciences' and 'Textiles' for which updated GMFM data is not available at the time of publication.



Diversification opportunities

The LCEGS sector continues to develop its broad band of technologies and skill sets as the sector continues to expand as a key element of the net zero 2050 and 78% reduction in emissions by 2035 targets set by the UK government on the 20th of April 2021.

As the new requirements are introduced for carbon reduction the effects upon the LCEGS sector are significant. As a growing sector, it offers opportunities for Companies with the right core technologies or skills to diversify into new markets.

The analysis undertaken shortlisted Professional Services, Process Industries, Engineering and Manufacturing as having the closest fit with the technology and skill requirements of the LCEGS sector and a significant presence in GM.

Updated analysis shows that the diversification opportunity in GM is valued at £179,238m in 2020/2021. This overall value is based on available market value, which equates to realisable additional Sales opportunity outside of GM, based upon activity in the past year. This opportunity represents 28 LCEGS markets for 17 different industrial and business processes to diversify into. The strongest diversification opportunities are primarily for General Engineering Companies. These are summarised below by Level 2 LCEGS sub-sector.

Renewable energy

Biomass, wind and geothermal/renewable heating (including. heat pumps) – market value is £67,585.76m UK for Companies involved in:

- Fabrication
- Electrical
- Instrumentation
- Design
- Project Management

Environmental

Waste management, water treatment, and recovery & recycling - market value is £29,400m UK for Companies involved in:

- Fabrication
- Machining
- Electrical
- Instrumentation
- Design
- Civil Engineering
- Project Management

Low carbon

Carbon finance and energy management - market value is £16,336.45m UK Companies involved in:

- Professional Services



Other Opportunities

Geothermal

The UK Geothermal sector is worth £19.7bn, of which GM accounts for £675m. This is in line with current trading levels in the region, however there is significant opportunity to further develop this market as skill sets are significantly transferrable within the GM region.

An area of further interest has developed around the geothermal applications in capped mine workings, using the geothermal gradient and heat pumps.

Retrofit

Retrofit of gas boilers (replacement with heat pumps and heat transfer units) has become a priority because of the government's net zero commitments. The UK market had Sales of circa £620m in 2019/20, however, the regional chains and networks of supply in GM lend themselves to diversification into this sector which expects to see some 90% to 120 % plus growth prior to 2029/30⁹.

⁹kMatrix Data Services

3. FUTURE THREATS AND TRENDS



In this section, the main findings presented are from research and assessment of the possible future threats and trends impacting the growth of the GTS sector from three types of development: 1. Policy and legislation 2. Technology and 3. Future GM Policy and future activities.

Summary

The general trends in policy and legislation nationally, and locally, are towards:

- Affordable energy and driving energy efficiency in buildings and processes
- Cost effective transition of energy infrastructure to support low carbon developments (network modernisation, cost of balancing the electricity demand and supply)
- Digitalisation and open data to facilitate better decision making and support investment decisions.
- Decarbonising heat and transport
- Decarbonising energy intensive industry, including through process efficiency and CCS
- Exploiting new technologies such as ultra low emission vehicles, energy storage, innovation in energy management and smart grids
- Use of off-shore wind to generate green hydrogen
- Improving air quality
- Improving the natural environment (e.g. planting more trees, biodiversity net gain)

The threats presented by developments in policy and legislation include:

- The continued uncertainty of business changes arising from BREXIT e.g. shortfall in trained freight drivers for the retail supply chain, increased export paperwork
- Exposure to supply chain failure to increasing threats from the environment (e.g floods, due to climate change and COVID 19 resurgence).
- Rising concerns about the affordability of the many policies required for the UK's carbon commitments after expenditure on COVID-19 measures, which may lead to increases in personal and business tax and energy commodities (e.g an additional tax on gas)
- Building industry uncertainty due to delays in Government strategy related to decarbonising heat in buildings and the new building regulations standard.
- The Committee on Climate Change has highlighted a gap in the government delivery of policy to support achievement of the Sixth Carbon Budget for 2033-37.
- Challenge of attracting sufficient investment in a timely manner to support the GM decarbonisation ambitions.

The opportunities arising from developments in policy and legislation are described in the next section. Table 5, below, summarises these threats and opportunities.

The following sub-sectors are likely to be the most positively affected:

1. Alternative and additional fuel sources
2. Energy efficiency
3. Low emission vehicles and infrastructure
4. Carbon capture and storage
5. Environmental monitoring and management
6. Waste management, recovery* and reuse
7. The new sectors of smart grids, hydrogen and district heat networks



* There is increased focus on the waste management, recovery and recycling sub-sectors as part of the UK’s renewed drive to reduce landfill and associated emissions, through introduction of increased producer responsibilities in the Environment bill and secondary legislation.

Table 5: Partial SWOT analysis showing key threats and opportunities for GM businesses

Partial SWOT Analysis	Threats	Opportunities
Regional	<ul style="list-style-type: none"> • Capital investment required for building energy efficiency and decarbonised heat supply. • Sufficient use of data in decarbonisation planning in order to attract investors for key projects • Increased competition from other Metropolitan Boroughs now getting devolved powers for national funding 	<ul style="list-style-type: none"> • The Towns Fund – decarbonisation economic stimulation projects in Bolton, Cheadle, Oldham and Rochdale • GM Environment Plan • GM 5-year plan (2019-2024) • Local energy efficiency improvements in buildings • Green Hydrogen generation for transport • Diversification opportunities for local general engineering business into the low carbon sector.
National	<ul style="list-style-type: none"> • Supply chain exposure following BREXIT e.g. skills and resource shortages • Supply chain failure due to growing threat of climate change, e.g. flooding • COVID-19 resurgence (nationally or internationally) 	<ul style="list-style-type: none"> • National policy and legislation, as set out below and in the government’s Ten Point Plan; • UK Infrastructure Bank • Digital and data transformation to improve decarbonisation decision-making and to support investors.

National policy and legislation developments

Nationally, the UK was the first major economy to tie themselves to a legal obligation to achieve net zero by 2050. It aims to urge other countries around the world to join them in this target at COP26, establishing the UK as an influencing nation in the global challenge to achieve net zero.

EU-UK Trade and Co-operation Agreement

The EU trade deal¹⁰ was signed on 26th Dec 2020 as the UK left the European Union. Its impact on the green economy can be summarised as follows:

- Zero tariffs or quotas related to clean technologies
- The UK and EU will co-operative on trade policies, promote trade and investments in green goods and services that will lead to a low emissions, resource efficient economy.
- UK has left the EU Internal Energy Market and the EU Emissions Trading Scheme (ETS), the former to be replaced to enable continued use of the energy interconnectors which bring gas and electricity from mainland Europe to the UK. The EU ETS has now been replaced by the UK ETS

¹⁰<https://www.greenintelligence.org.uk/blogs/what-the-eu-trade-deal-means-green-economy>

- Non-regression – The UK has committed not to fall behind EU trading standards for the green / low carbon sector.
- EU Funding – the UK will continue to participate in some EU funding programmes, e.g. Horizon Europe

Modernising Energy Data Access (MEDA) Initiative

Government is working with Ofgem, Innovate UK and other industry stakeholders to implement recommendations from the Energy Data Taskforce (EDT)¹¹ report (Jul 2019) through this initiative. MEDA drives the UK energy networks to use data to enable smart systems and flexibility to optimize the use of existing electricity, gas and other systems for heat and transport, as the UK transitions to NetZero. The key recommendations of the EDT drive for better data and decision-making at national and regional level across a range of subjects related to decarbonisation. Local Authorities across the country are now working with the energy sector and looking at their own datasets related to energy usage to improve Local Area Energy Planning¹² for decarbonisation.

The Ten Point Plan for a Green Industrial Revolution

The Ten Point Plan¹³ was launched in Jun 2021 with the following areas of focus:

- Advancing offshore wind
- Driving the growth of low carbon hydrogen
- Delivering new and advanced nuclear power
- Accelerating the shift to zero emission vehicles
- Green public transport, cycling and walking
- 'Jet zero' and green ships
- Greener buildings
- Investing in carbon capture, usage and storage
- Protecting our natural environment
- Green finance and innovation

The ten-point plan will mobilise £12 billion of government investment, and potentially 3 times as much from the private sector, to create and support up to 250,000 green jobs.

Energy White Paper: Powering our net zero future

The Energy White Paper¹⁴ builds upon the Ten Point Plan and addresses the ways in which the aims of the Ten Point Plan will be achieved. It consists of key commitments which are split into 3 categories:

Transform Energy

Building a cleaner, greener future for our country, our people and our planet, by measures including:

- Targeting 40GW of offshore wind by 2030
- Supporting the deployment of CCUS in four industrial clusters

¹¹Energy Data Taskforce: A Strategy for a Modern Digitalised Energy System (catapult.org.uk)

¹²Developed by the Energy Catapult to help with the ¹²challenge of decarbonising local heat and transport (heat pumps and EV charging impact electricity networks in particular) and with a methodology commissioned by Ofgem

¹³<https://www.gov.uk/government/publications/the-ten-point-plan-for-a-green-industrial-revolution>

¹⁴https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/945899/201216_BEIS_EWP_Command_Paper_Accessible.pdf

- Establishing a new UK Emissions Trading System
- Aiming to bring at least one largescale nuclear project to the point of Final Investment Decision
- Consulting on whether it is appropriate to end gas grid connections to new homes being built from 2025
- Growing the installation of electric heat pumps
- Building world-leading digital infrastructure for our energy system

Support a Green Recovery from COVID-19

Growing our economy, supporting thousands of green jobs across the country in new green industries and creating new export opportunities, by measures including:

- Increasing the ambition in our Industrial Clusters Mission four-fold
- Investing £1 billion up to 2025 to facilitate the deployment of CCUS in two industrial clusters
- Aiming to develop 5GW of low-carbon hydrogen production capacity by 2030.

Creating a Fair Deal for Consumers

Protecting the fuel poor, providing opportunities to save money on bills, giving us warmer, more comfortable homes and balancing investment against bill impacts, by measures including:

- Creating the framework to introduce opt-in switching
- Considering how the current auto-renewal and roll-over tariff arrangements could be reformed
- Assessing what market framework changes may be required to facilitate the development and uptake of innovative tariffs and products
- Ensuring the retail market regulatory framework adequately covers the wider market
- Establishing the Future Homes Standard
- Consulting on regulatory measures to improve the energy performance of homes
- Requiring that all rented non-domestic buildings will be Energy Performance Certificate (EPC) Band B by 2030
- Extending the Energy Company Obligation to 2026

Sixth Carbon Budget

The Carbon Budget Order 2021 enacted the sixth carbon budget for the period 2033-37 as advised to government by the Committee on Climate Change. This cuts the UK's carbon emissions by 78% by 2035 against a 1990 baseline and includes for the first time the UK's share of international aviation and shipping emissions.

Environment Bill

The Environment Bill¹⁵ is a significant new law covering the topics of the natural environment, environmental protection, waste and resource efficiency, air quality, non-compliance product recall, water, nature and biodiversity, conservation covenants, and regulation of chemicals. It is currently progressing through the House of Lords and its measure are expected to come into force in 2022.

¹⁵Environment Bill publications - Parliamentary Bills - UK Parliament



It will establish the Office of Environmental Protection (OEP) and will also create a new Extended Producer Responsibility¹⁶ regime, a binding national target on waste, and new restrictions on single-use plastics (including a proposed ban on plastic cutlery, plates and polystyrene cups). The OEP will establish its strategy for improving environmental protections and monitor and report on environmental improvement plans and targets and implementation of environmental law.

Extended Producer responsibilities may place the entire cost of recycling and recovery of plastics on the packaging producers, offloading local authorities of the recycling collection costs. In addition, there may be, new recycling targets and labelling requirements indicating how to recycle the packaging.

Parallel legislation may introduce consistent recycling collections across households and businesses in England, Deposit Return Schemes and a Plastic Packaging Tax with a scale of fees associated with the ease with which the packaging can be recycled. The Bill will also set out powers to:

- Establish and enforce standards for Air Quality (particulate matter) and species abundance (biodiversity).
- Make biodiversity net gain a condition on certain planning applications.
- Establish and manage water resource, drought, and drainage/sewerage management plans
- Devolve certain decisions, including water quality standards to devolved administrations.

CCUS Infrastructure Fund and Business models

The Government is working on capital and operational expenditure business models to support the rollout of carbon capture and storage (CCS) to decarbonise key energy intensive industries including oil and gas refining, cement and tarmac, petrochemicals, fertilisers and steel manufacture.

The business models specified so far include a Transport and Storage model, a Dispatchable Power Agreement (contract), a Low Carbon Hydrogen contract and an Industrial Carbon Capture model. The Transport and Storage model will enable the creation of a new class of regulated national assets to transport and permanently store carbon emissions for these industries. The scope and responsibilities of a new CO2 Regulator and the design of a Low Carbon Standard are being considered and finalised.

The CCC recommended that all new Energy from Waste plants be designed to include CCS implementation and existing plants be retrofitted from the mid-2020s. Consideration is being given to whether such plant may in the future be exposed to the carbon price through the new UK Emissions Trading Scheme (ETS), now in operation and replacing the EU ETS.

Hydrogen Strategy

The Hydrogen Strategy¹⁷, published in August 2021, sets out the UK's approach to developing a thriving low carbon hydrogen sector with the goal of having 5GW capacity for low carbon hydrogen production by 2030 with Government support for both electrolytic 'green' and carbon capture-enabled 'blue' hydrogen production with a proposed £240m Net Zero Hydrogen Fund and consultation on a UK Low Carbon Hydrogen Standard.

¹⁶Producer Responsibilities apply to manufacturers of packaging, and the distribution and retailer businesses that handle goods using that packaging. These responsibilities were first established in law in 1997 and updated in 2007 and 2015. This legislation placed an obligation on these businesses to ensure that a high proportion of the packaging was diverted from landfill and to pay towards the cost of packaging materials recovery and recycling. Obligated companies provide proof of the volume of packaging being recycled or recovered by purchasing Packaging Recovery Notes (PRN) to demonstrate compliance. Currently, it is estimated that this mechanism only contributes 7% of the total cost of related waste management operations.

¹⁷UK hydrogen strategy - GOV.UK (www.gov.uk)

COP26 Summit

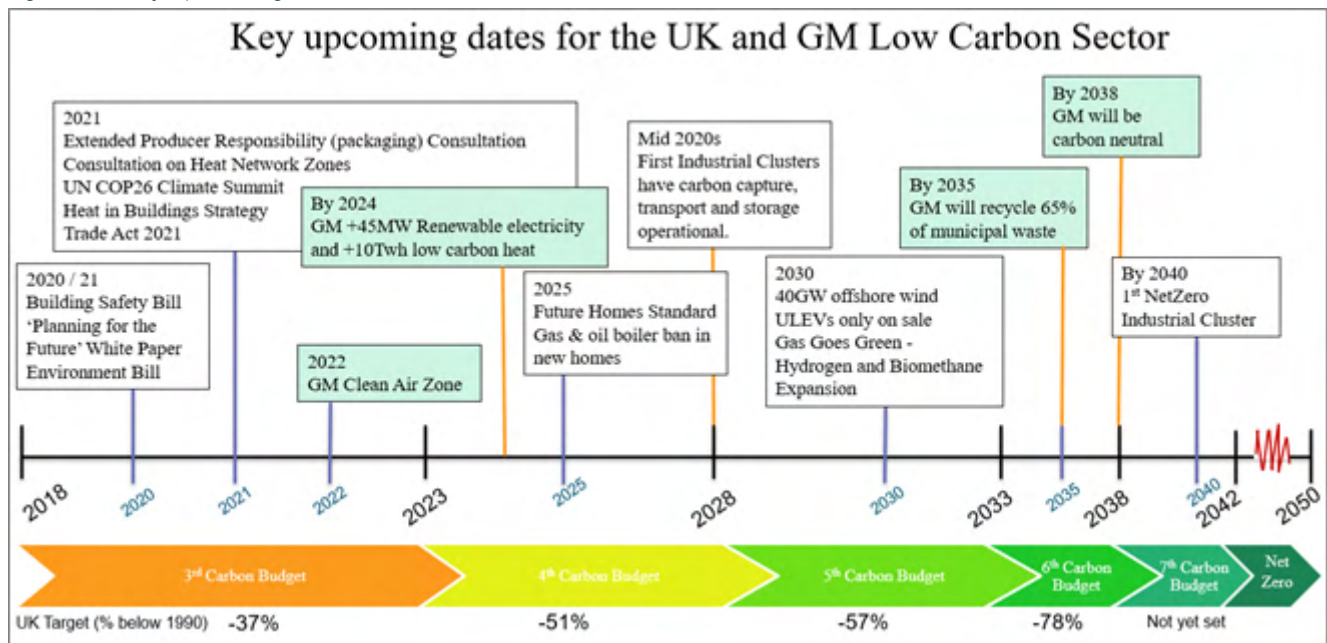
The UK will host the United Nations Conference on climate change, COP26¹⁸, in Glasgow in November 2021 with 197 signatory parties in attendance. In March the UK set out its aims as the host nation:

- For countries to set net zero emissions targets, which governments responsible for two-thirds of global emissions have already done, and to set targets for emissions cuts by 2030
- To formulate plans for countries to adapt to the impacts of the climate crisis
- To encourage rich countries to provide finance to the poor world for emissions cuts and adaptations
- For civil society to take a strong role in the talks

Forthcoming strategies, consultations, key legislative dates

The UK's commitment within its sixth carbon budget is driving continued policy developments and research and innovation associated with the low carbon sector. Some of the key events for the UK and GM are summarised in Figure 15, below.

Figure 15: Key upcoming dates for the UK and GM Low Carbon Sector



Greater Manchester Policy and future activity initiatives

Locally, there is strong political support for the low carbon sector especially due to local regional commitments to decarbonisation and NetZero by 2038. This includes a dedicated support programme run by the GC Business Growth Hub for low carbon sector businesses and a pipeline of projects and activity associated with GM's Environment Plan. Due to this, it is expected that there will be growth opportunities for low carbon sector businesses. Over the next 12 months focus is expected to shift to two key areas: ensuring energy efficient practices are adopted in both

¹⁸HOME - UN Climate Change Conference (COP26) at the SEC - Glasgow 2021 (ukcop26.org)



commercial and domestic building sectors and becoming self-sufficient by generating energy locally and fuels¹⁹.

Greater Manchester Five Year Environment Plan

Greater Manchester's 5-year Environment Plan²⁰ sets out actions which need to be taken in the 5 years (2019-2024) which are key to ensuring that Greater Manchester achieves its long-term plan of being net zero by 2038. GMCA have 5 key aims for this plan:

1. Mitigating climate change

For the Greater Manchester city region to be carbon neutral by 2038 and meet carbon budgets that comply with international commitments.

2. Air quality

To improve Greater Manchester's air quality, meeting World Health Organisation guidelines on air quality by 2030 and supporting the UK Government in meeting and maintaining all thresholds for key air pollutants at the earliest date.

3. Sustainable consumption and production

To put Greater Manchester on a path to being a circular economy, recycling 65% of municipal waste by 2035 and reducing the amount of waste we produce.

4. Natural environment

To protect, maintain and enhance Greater Manchester's natural environment for all our benefit, taking steps to implement and achieve environmental net gain.

5. Resilience and adaptation to climate change

To be prepared for the impacts of climate change and already be adapting to the future changes from any increase in climate shocks and stresses.

The actions set out in the 5-year Environment Plan include focussing on the energy supply increasing local renewable electricity generation, travel and transport including the phasing out of fossil fuelled private vehicles, homes, workplaces and public buildings and the heat demand associated with them. In addition to natural environment targets and climate change targets.

Environment Policy

The Environment policy²¹ is linked closely to the Five-year plan above. With the five overarching ambitions of this policy being

1. To achieve carbon neutrality, ensuring a net-zero carbon footprint
2. To produce zero waste, reusing everything that we can
3. To cause no unnecessary pollution
4. To waste no water
5. To be leaders on sustainability

¹⁹<https://www.businessgrowthhub.com/gmreport2021>

²⁰https://www.greatermanchester-ca.gov.uk/media/1986/5-year-plan-branded_3.pdf

²¹<https://www.greatermanchester-ca.gov.uk/media/3117/environment-policy-2020.pdf>



Greater Manchester transport and travel priorities

- Increasing use of public transport and active travel modes
- Phasing out of fossil-fuelled private vehicles and replacing them with zero emission (tailpipe) alternatives
- Tackling the most polluting vehicles on our roads
- Establishing a zero-emissions bus fleet
- Decarbonising freight transport and shifting freight to rail and water transport

GMCA Energy Supply priorities

- Increasing local renewable electricity generation, adding at least a further 45MW by 2024
- Decarbonising how buildings are heated, adding at least a further 10TWh of low-carbon heating by 2024
- Increasing the diversity and flexibility of our supply, adding at least a further 45MW of diverse and flexible load by 2024.

Stockport - Mayoral development corporation.

Stockport now benefits from mayoral powers. The Mayoral Development Corporation was setup to tackle future housing needs and regenerate Stockport town centre several domestic and commercial property developments and improvements.

Greater Manchester Clean Air Plan

Greater Manchester will be the third UK city to implement a clean air zone after Greater London and Greater Birmingham. All 10 Greater Manchester authorities have worked together to produce the clean air plan which aims to reduce nitrogen dioxide (NO₂) levels to legal limits by 2024. The plan includes a Clean Air Zone, within which some of the most polluting commercial and passenger vehicles will pay a daily charge to travel, and a proposal for more than £150m government funding support to help local businesses prepare for this change.

The final Clean Air Plan is expected to be launched by May 2022.

Technology developments

The general trend in public-funded technology developments is a focus on systems thinking, exploiting data analytics solutions, and a continued focus on advanced technology and material innovation, including:

- **Energy systems optimisation** – these innovations can be applied to Renewable and Low Carbon Energy and Low Emission Vehicles and Infrastructure e.g. flexibility and resilience in energy networks and smarter, greener and more efficient transport systems.
- **Emerging and enabling technologies** – these innovations can be applied to many low carbon sub-sectors e.g. use of sensors and internet of things connected with big data to enable detailed analysis and enhanced decision making in Energy Networks and in emerging Smart Grids. Other related examples include the increased use of biometrics for identity management and increased focus on cyber-security. In manufacturing the use of robotics and autonomous systems in Renewable and Low Carbon Energy, such as the extreme environments associated with nuclear power and offshore wind.
- **Advanced materials and manufacturing techniques** - these innovations can be applied to many low carbon sub-sectors e.g. light-weighting and cost reduction in Renewable and Low Carbon Energy, such as offshore wind, e.g. off-site manufacture of building components to allow automation and reduced waste.



The research showed that UK funding commitments for research and innovation are likely to support the following sub-sectors:

- Renewable and Low Carbon energy generation/ manufacture, including fuels
- Carbon capture at energy intensive industrial sites and supporting infrastructure
- Energy efficiency in buildings
- Low Emission Vehicles and supporting infrastructure
- Smart Grids helping to manage energy usage

The main threats related to technology developments continue to be economic uncertainties, post-Brexit, and the post-COVID-19 recovery. Both of these could affect the UK's access to, and the amount of funding and expertise available for research and innovation in the future. Below are examples of current and upcoming technologies from the low carbon sector.

Siemens EV Charge Points – “Electric Avenue, W9”

Sutherland Avenue in Westminster is the UK's first residential avenue to be fully converted, providing EV charging points in retrofitted lampposts. There are 24 lampposts in total on this avenue, but over 1,300 installations across London by Siemens and ubitricity²². These allow for on street EV charging, increasing the total amount of parking spaces which can be used when charging electric vehicles.

Zoom EV

Zoom EV²³ are an “eMobility-as-a-Service” company, providing flexible use of electric vehicles, helping to reduce CO2 emissions. The use of a service such as Zoom EV would also reduce the NO2 emissions associated with IC Vehicles, helping to achieve the levels targeted in the Clean Air Plan.

Smart Grid Mobile App for EV Charging

Smart charging is the process of shifting the time of day when an EV charges or modulating the rate of charge - will help to reduce and manage the impact of EVs on the electricity system, whilst simultaneously creating benefits for consumers and maximising the use of clean, renewable electricity.

Hydrogen-Blend-Ready Boilers

Worcester Bosch²⁴ and Baxi²⁵ both have developed hydrogen ready boilers that they have trialled in test areas. These boilers can initially be used with a 80:20 split with majority natural gas, and then be used with a 100% hydrogen gas network, with hopes that these systems will be in place by 2025.

Once a 100% hydrogen gas network is in place, this will decarbonise domestic heating CO2 emissions, as hydrogen is a carbon-free fuel source.

Swift Scooters

Swift Scooters²⁶ are a form of transport which offer a low carbon mode of transport which is currently being used in Manchester in windmill green.

²²www.ubitricity.co.uk/b2b-local-authorities/

²³www.zoom-ev.com

²⁴www.worcester-bosch.co.uk/professional/hydrogen-fired-boiler

²⁵<https://www.hvnplus.co.uk/news/baxi-kicks-off-three-year-hydrogen-boiler-demonstration-03-08-2021/>

²⁶<https://swiftscooters.com/pages/swifty-fleets>



LCS Air Quality Sensors – Urecsys

Urecsys provide sensors which use smart algorithms and top of the line measuring equipment can calculate and predict pollution levels in different parts of the city, in real-time. Using this data, the air intake can be controlled so that only the cleanest air enters buildings, resulting in improved health for the occupants of inner city buildings.

QBot Underfloor Insulation

QBot is an innovative solution to the installation of underfloor insulation. It allows for less obtrusive method which doesn't require removing lots of floorboards. QBot is a small robot which is placed under the flooring and sprays insulation foam throughout the entire floor area. They aim to improve the health of our buildings, reducing energy usage and pave the way for a sustainable construction industry.

Salford University Living Lab

Launched in Jun 2021, the Living Lab²⁷ is a lab focused on Nature Based Solutions with installations on its Peel Park campus including an experimental rain garden, large-scale green wall, green roof and sustainable drainage trees, all crucial for urban adaptation to climate change. All the installations will offer data insights into the green infrastructure. The Living Lab is part of the £4 million EU funded IGNITION project that brings together 12 partners across the Greater Manchester region who will collectively work together to establish innovative ways to build resilience to climate change.

Building Renovation Passports

Building Renovation Passports²⁸ (BRPs) are a proposal for each building to have a digital logbook of all renovations of a property, along with historical information about the property, and its operation performance.

They will also include a roadmap for future retrofits which will help to decarbonise the property, reducing the energy demand.

²⁷<https://www.salford.ac.uk/news/launch-ignition-living-lab>

²⁸<https://www.greenfinanceinstitute.co.uk/wp-content/uploads/2021/03/GREEN-FINANCE-BUILDING-RENOVATION-final.pdf>

Funding

GM £78m Decarbonisation Fund

Greater Manchester has been awarded £78m through the government’s public sector decarbonization scheme²⁹. Grant will fund upgrades to public estate across the city-region, including leisure centres, schools, and offices, and support or safeguard around 2,000 jobs. Retrofitting measures will include new heating systems, solar panels, and energy monitoring and control systems.

Buildings and organisations across the public estate set to benefit from retrofitting measures including Manchester University NHS Foundation Trust, Greater Manchester Fire and Rescue Service, Transport for Greater Manchester, Greater Manchester Police, the Royal Northern College of Music, the National Cycling Centre, and facilities including leisure centres, schools, and offices.

The measures will include the installation of air source heat pumps for heating, solar panels to generate and create electricity, insulation and LED lighting to improve energy efficiency, and energy monitoring and control systems to ensure these public facilities can accurately measure their energy usage.

Towns Fund

The towns fund was introduced as part of the governments levelling up agenda as well as to aid recovery from the effects of COVID-19. The aim of the funding is to drive sustainable economic regeneration of towns to deliver long term economic and productivity growth. This funding will support changes to and new public assets and support projects which reinvigorate local economies in the Greater Manchester region. The following local towns have received funding in Mar 2021:

- Bolton £22.9m
- Cheadle £13.9m
- Oldham £24.4m
- Rochdale £23.6m

The National Infrastructure Bank

In March 2021 the Government announced the National Infrastructure Bank with funding of £12bn with another £10bn of government backed guarantees. Two aims of the bank are to invest in projects that (a) tackle climate change and (b) supporting regional and local economic development as part of the government’s ‘levelling up’ agenda.

UK Research & Innovation’s Net Zero Innovation Portfolio

The Net Zero Innovation Portfolio³⁰ is a £1 billion fund, announced in the Prime Minister’s ten-point plan for a green industrial revolution, to accelerate the commercialisation of low-carbon technologies, systems and business models in power, buildings, and industry. Focussed on 10 priority areas, it includes:

- floating offshore wind

²⁹<https://www.greatermanchester-ca.gov.uk/news/green-up-grades-for-greater-manchester-public-buildings-with-78m-decarbonisation-fund/>

³⁰UKRI announces net zero-driven energy data application winners – UKRI

- nuclear advanced modular reactors (supported through the aligned Advanced Nuclear Fund)
- energy storage and flexibility
- bioenergy
- hydrogen
- homes
- direct air capture and greenhouse gas removal (GGR)
- advanced CCUS
- industrial fuel switching
- disruptive technologies

EV Chargepoint funding

Government announced up to £50million in new funding for SMEs to install EV charge points. This will help to move towards zero carbon transport to help achieve the net zero target for 2038. This in addition to the ban on new petrol and diesel cars in the UK from 2030 will help to bring both personal and public transportation down to net zero carbon emissions.

A £20m R & D fund was launched on 15th March 2021 for EV technology innovations which could include new charging technologies, zero-emission vehicles and improvements to the production and disposal processes associated with EV charging to reduce emissions and improve circularity.

Competitions launching throughout 2021.

APPENDIX 1: DEFINITIONS AND METHODOLOGY



Definitions

Universal Filter and Metric Definitions

Table 6 lists definitions used through the main report and this methodology section.

Table 6: Universal Filter and Metric Definitions

Universal Filter	Definition	Notes
<i>Taxonomy</i>	A hierarchical grouping of products and services and their supply chain components, including different activity types, which are to be measured.	e.g. LCEGS, LCEGSS.
<i>Geography</i>	Geography has its own hierarchy and represents the geographic or spatial extent for which data is reported, typically using national and legislative boundaries. i.e. Global -> Continent-> Country -> Country sub-region -> Local Authority (Last two for largest countries only)	E.g. Global -> Europe -> UK -> England -> North-West -> Greater Manchester Combined Authority -> Oldham Council
<i>Year (time period)</i>	A reporting period, typically a tax year, but alternatively a calendar year.	Financial Year used in this report to match previous reports. Other data sources used (e.g. ONS, NOMIS) only available by calendar year.
<i>Level</i>	The taxonomy level, where 0=the Sector, 1 = Highest level sub-sector grouping within the Sector and 2-onwards representing successively smaller embedded sub-sectors.	e.g. Level 0=LCEGS, Level 1= Environmental, Low Carbon and Renewable Energy, etc.
<i>Activity Code</i>	These denote the type of economic activity measured. e.g. R &D, Design, Manufacture, Services, Distribution, Supply, Engineering Services, Maintenance.	There is considerable variation in Activity Codes represented in different Taxonomies and between sub-sectors within the same Taxonomy.
Metric	Definition	Notes
<i>Companies</i>	Those companies whose activities are wholly or partly within the low carbon sector definition for the year reported.	Companies cannot be added across sub-sectors to find the Sector total, as some companies operate in more than one sub-sector.
<i>Employees</i>	A full-time equivalent approximation of the number of employees involved in activities included in the low carbon sector definition for the year reported.	This differs from <i>Employees</i> as counted as persons, as reported in the NOMIS data source used in this report and the New Economy GM Forecasting Model.
<i>Sales</i>	Measured in £m, Sales represents the value of sales that relate to activities included in the low carbon sector or sub-sector definition reported.	This includes the value of Sales to national and international markets. (i.e. includes Exports)
<i>Imports</i>	Measured in £m, Imports represents the value of Sales that relate to activities included in the low carbon sector or sub-sector definition reported that originate from overseas companies.	<i>Market size in any Geography = Sales less Exports plus Imports</i>

<i>Sales</i>	Measured in £m, Sales represents the value of sales that relate to activities included in the low carbon sector or sub-sector definition reported.	This includes the value of <i>Sales</i> to national and international markets. (i.e. includes Exports)
<i>Imports</i>	Measured in £m, Imports represents the value of Sales that relate to activities included in the low carbon sector or sub-sector definition reported that originate from overseas companies.	<i>Market size in any Geography = Sales less Exports plus Imports</i>
<i>Exports</i>	Measured in £m, Exports represents the value of Sales that relate to activities included in the low carbon sector or sub-sector definition reported that are sold outside the <i>Geography</i> being reported.	
<i>Historical Growth Rate %</i>	Demonstrates the change in a Metric (growth or contraction) over a single <i>Year</i> , shown as a percentage.	e.g. Historical Growth % in Sales in 2015/16.
<i>Forecast Growth Rate %</i>	Demonstrates the forecast change in a Metric (growth or contraction) over a single <i>Year</i> , shown as a percentage.	e.g Sales grew by 4.5% in 2018/19
<i>Total xx Growth Rate %</i>	A growth percentage (where xx is Historical or Forecast), equating to the total growth (or contraction) in a Metric forecast over a time period or number of <i>Years</i>	100 units of y in year 1 120 units of y in year 3 Total growth of 20 units = 20% Total growth rate over 2 years
<i>Compound xx Growth Rate %</i>	A growth percentage (where xx is Historical or Forecast), over multiple time periods providing a notional measure of the constant growth of a data series, compounding growth in each successive time period.	100 units of y growing at 5% compound growth rate (r) for 5 years (t): $10y \times (1+r)^t$
<i>Gross Domestic Product (GDP)</i>	The total market value of the goods and services produced within a geography's economy during a specific period of time. The ONS "GDP(O)" output-based definition measures all goods and services in the whole economy as defined by the SIC Code groupings A-T. ³¹	Analogous with "Sales" above.
<i>Gross Value Added (GVA)</i>	The value of the amount of goods and services that have been produced, less the cost of all inputs and raw materials that are directly attributable to that production. In particular, it excludes the impact of taxes and subsidies.	The current ONS measure (Balanced GVA) is a weighted average of two previous measures used (Income vs. Output based measures of GVA) so not directly comparable with the GMFM 2015 figure for GVA.

³¹<https://www.ons.gov.uk/economy/grossdomesticproductgdp/methodologies/outputapproachtogrossdomesticproductgdp>

Sector Taxonomy definitions: Industry groupings

1 LCEGS: Low Carbon and Environmental Goods and Services

This is the original data set developed and updated annually by kMatrix, which was the basis of the previous GM low carbon sector research undertaken in 2013 and national analysis undertaken for the UK government between 2007 – 2013. Its inclusion allows for an uninterrupted data series that can be used to continue the previous trend analysis. It is organised into three Level 1 sub-sectors (Environmental, Low Carbon and Renewable Energy) and a further twenty-four Level 2 sub-sectors

Low Carbon and Environmental Goods and Services (LCEGS) is a blanket term for any activity which may come under the overlapping headings of Enviro, Eco, Renewable Energy, Sustainable Technologies, Clean Tech, Green Tech, Low Carbon, Green Economy, etc.

LCEGS was created to distinguish this area of the economy which is hard to define when looking at the UK Standard Industry Classification (SIC) codes. LCEGS include low carbon, environmental, and renewable energy activities across all SIC codes including transport, manufacture, construction, etc.

LCEGS include three broad sectors (Level 1 markets). These are Environmental, Renewable Energy, and Low Carbon. Within these categories there are 24 subsectors (Level 2 markets) and goes down to level 5 which includes 2,759 subsectors as shown in Table 7.

Table 7: LCEGS Level 2 sub-sectors organised by Level 1 sub-sector

Environmental	Renewable Energy	Low Carbon
<ul style="list-style-type: none"> • Air Pollution • Contaminated Land • Environmental Consultancy • Environmental Monitoring • Marine Pollution Control • Noise & Vibration Control • Recovery and Recycling • Waste Management • Water Supply and Waste-Water Treatment 	<ul style="list-style-type: none"> • Biomass • Geothermal • Hydro • Photovoltaic • Wave & Tidal • Wind • Renewable Consulting • Hydrogen 	<ul style="list-style-type: none"> • Additional Energy Sources • Alternative Fuel/Vehicles • Alternative Fuels • Building Technologies • Carbon Capture & Storage • Carbon Finance • Energy Management • Nuclear Power

Using the LCEGS definition, the sector was measured in two different ways to demonstrate the impact that low value-adding activities (supply and distribution) in Level 2 Alternative Fuels and Alternative Fuel Vehicles sub-sectors, have on overall performance of the sector. The analysis included:

- LCEGS as a whole
- Filtered LCEGS with the low value-added Activity Codes of Distribution and Sales removed for the Alternative Fuels and Alternative Fuel Vehicles sub-sectors.

Data tables and charts presented in this document will therefore refer to LCEGS (a) and Filtered LCEGS (b), where appropriate.



2 LCEGSS: Low Carbon and Environmental Goods and Services Sector (updated and expanded)

LCEGSS is an updated and expanded version of LCEGS. The data set has twenty-six Level 2 sub-sectors due to the addition of Biodiversity and Energy from Waste into Level 1 Environmental, and the addition of new activities to existing sub-sectors. This new version is now more closely compliant with the Eurostat EGSS definition. In 2016, LCEGSS was successfully piloted with all 86 global cities from the C40 Cities Climate Leadership Group.

GM analysis methodology and data

Analysis of the current status and potential for growth in the low carbon sector in Greater Manchester (GM) and nationally was undertaken using the LCEGS taxonomy. The GC Business Growth Hub also made clear that they wish to be able to compare the GM sector internationally; the inclusion of a second taxonomy (LCEGSS) enables a truly international comparison since this definition has been adopted by the C40 Cities Climate Leadership Group representing 86 global cities.

The aim of this multi definition analysis is to enable the GC Business Growth Hub to collect intelligence about the sector in a meaningful way, taking into consideration how the sector is measured by the UK government and at the EU and international level.

In the sector analysis, the LCEGS and LCEGSS taxonomy definitions are classed as 'industry groupings', equivalent to standards industry classification code groupings used in GM economic analysis regularly undertaken by New Economy.

All data sets reported are 2019/20 unless stated otherwise.

LCEGS, Filtered LCEGS and LCEGSS Reported Metrics

From analysis using all sector definitions, the following metrics have been reported:

- Sales (£m) – GM, Global
- Companies – GM
- Employees – GM
- Sector as a % of the GM business base (GVA) and ranking
- Growth rates – forecast growth (historical & forecast growth for LCEGS only), Global, UK, GM

A fuller analysis was completed using the LCEGS data set. Additional metrics reported are:

- Ranking among English LEPs
- Imports – UK, the EU and Global
- Exports – GM, NW Region, UK, Europe and Global
- Current market size – Europe and Global

Breakdown of Level 1 and Level 2 sub-sectors for LCEGS and LCEGSS definitions

Table 8 below shows the differences between the LCEGS and LCEGSS taxonomies at Level 2 sub-sector.



Table 8: Comparison of LCEGS and LCEGSS definitions at Level 2 sub-sector

LCEGS & LCEGSS Level 1	LCEGS Level 2	LCEGSS Level 2
Environmental	<ul style="list-style-type: none"> • Air Pollution 	Everything in LCEGS, with
	<ul style="list-style-type: none"> • Contaminated Land 	Expanded definitions at L3 and L4
	<ul style="list-style-type: none"> • Environmental Consultancy 	
	<ul style="list-style-type: none"> • Environmental Monitoring 	
	<ul style="list-style-type: none"> • Marine Pollution Control 	
	<ul style="list-style-type: none"> • Noise & Vibration Control 	
	<ul style="list-style-type: none"> • Recovery and Recycling 	
	<ul style="list-style-type: none"> • Waste Management 	
	<ul style="list-style-type: none"> • Water and Wastewater Treatment 	PLUS two L2 additional subsectors
Low Carbon	<ul style="list-style-type: none"> • Additional Energy Sources 	Everything in LCEGS, with
	<ul style="list-style-type: none"> • Alternative Fuel Vehicle 	Expanded definitions at L3 and L4
	<ul style="list-style-type: none"> • Alternative Fuels 	
	<ul style="list-style-type: none"> • Building Technologies 	
	<ul style="list-style-type: none"> • Carbon Capture & Storage 	
	<ul style="list-style-type: none"> • Carbon Finance 	
	<ul style="list-style-type: none"> • Energy Management 	
	<ul style="list-style-type: none"> • Nuclear Power 	
Renewable Energy	<ul style="list-style-type: none"> • Biomass 	Everything in LCEGS, with
	<ul style="list-style-type: none"> • Geothermal 	Expanded definitions at L3 and L4
	<ul style="list-style-type: none"> • Hydro 	
	<ul style="list-style-type: none"> • Photovoltaic 	
	<ul style="list-style-type: none"> • Renewable Energy Consultancy 	
	<ul style="list-style-type: none"> • Wave & Tidal 	
	<ul style="list-style-type: none"> • Wind 	



Sector analysis summary (all definitions):

Table 9: GM Economy compared to GM metrics for three Low Carbon Sector definitions (for 2019/20 except as noted below)

GM Economy and Low Carbon Sector definitions Metric	Total GM Economy	LCEGS	Filtered LCEGS	LCEGSS
Sector Sales (£m)		£8,644	£7,291	£8,460
Gross Value Added (£m) (2019)	£73,451			
Gross Value Added (£m)		£10,634	£8,972	£12,461
Sector size as a % of GM Total (GVA)		14.5%	12.2%	17.0%
Ranking vs. GM New Economy Broad Industry Groupings (GVA)		3rd	4th	3rd
*GM Employment (Persons) (2019)	1,385,155			
*GM Employees (Full Time Equivalent Employees)		58,736	51,377	53,626
*Sector size as a % of GM Total (FTE Employees / Employment Persons)		4.2%	3.7%	3.9%

* Note: GM Employment cannot be directly compared to GM Employees as the metric shown is not equivalent.

Table 10: GM Economy compared to GM metrics for LCEGS Level 1 sub-sectors (for 2019/20 except as noted below)

GM LCEGS and Level 1 sub-sector breakdown Metric	Total GM Economy	Environmental	Low Carbon	Renewable Energy
Sector Sales (£m)		£1,436	£4,607	£2,600
Gross Value Added (£m) (2019)	£73,451			
Gross Value Added (£m)		£1,769	£5,662	£3,204
Sector size as a % of GM Total (GVA)		2.4%	7.7%	4.4%
Ranking vs. GM New Economy sub-sectors (GVA)		15th	3rd	11th



Table 11: GM Economy compared to GM metrics Filtered LCEGS Level 1 sub-sectors (for 2019/20 except as noted below)

GM Filtered LCEGS Level 1 sub-sectors breakdown Metric	Total GM Total	Environmental	Low Carbon	Renewable Energy
Sector Sales (£m)		1,435.88	3,254.66	2,600.46
Gross Value Added (£m) (2019)	£73,451			
Gross Value Added (£m)		1,768.51	3,999.40	3,204.10
Sector size as a % of GM Total (GVA)		2.4%	5.4%	4.4%
Ranking vs. GM New Economy sub-sectors (GVA)		15th	7th	11th



LCEGS GM and LEP analysis summary:

Table 12: LCEGS GM Summary including LEP ranking

Full LCEGS Global to Level 1 and 2 Sub-Sector Breakdown	2019/2020									
	Sales and GVA				Employees			Companies		
Geography	Sales (£m)	National Ranking	GVA (£m)	% Geog Totals	#	National Ranking	% Geog Totals	#	National Ranking	% Geog Totals
Global	£7,119,651									
Greater Manchester (& LEP)	£8,644		£10,634	14.5%	58,736			3,144		
LCEGS ranking vs New Econ Broad Industry Groupings		3rd	3rd							
GM Ranking among English LEPs		3rd after				4th after			4th after	
LEPS ahead of GM (Sales)		1) London 2) South East				1) London 2) South East 3) Leeds			1) London 2) South East 3) Leeds	
Sub-sectors within Greater Manchester	Sales (£m)	Sub-sector National Ranking Exceptions	GVA (£m)	% Geog Totals	#	Sub-sector National Ranking Exceptions	% Geog Totals	#	Sub-sector National Ranking Exceptions	% Geog Totals
Environmental	£1,435.88		£1,768.51	16.6	8,811		15.0	442		13.5
Air Pollution	£58.07		£71.49	0.7	410	5th	0.7	20		0.6
Contaminated Land	£57.56		£70.80	0.7	358		0.6	18		0.5
Environmental Consultancy	£52.92		£65.19	0.6	339		0.6	17		0.5
Environmental Monitoring	£10.37		£12.79	0.1	66	5th	0.1	3		0.1
Marine Pollution Control	£8.48		£10.35	0.1	49		0.1	2	5th	0.1
Noise & Vibration Control	£14.98		£18.44	0.2	92	5th	0.2	5		0.1
Recovery and Recycling	£475.46		£585.26	5.5	2,673		4.6	135		4.1
Waste Management	£309.19		£380.86	3.6	1,986		3.4	99		3.0
Water & Waste Water Treatment	£448.85		£553.33	5.2	2,839		4.8	143		4.4
Low Carbon	£4,607.37		£5,661.79	53.2	29,570		50.3	1,524		46.6
Additional Energy Sources	£102.17		£125.88	1.2	947		1.6	73		2.2
Alternative Fuel Vehicle	£1,049.75		£1,287.23	12.1	4,499	6th	7.7	263		8.0
Alternative Fuels	£1,293.66	3rd	£1,591.59	15.0	7,418		12.6	376	3rd	11.5
Building Technologies	£1,190.95		£1,465.41	13.8	8,418		14.3	426		13.0
Carbon Capture & Storage	£42.50		£52.27	0.5	2,029	1st	3.5	99	1st	3.0
Carbon Finance	£510.00		£625.19	5.9	171		0.3	8		0.3
Energy Management	£186.37		£229.35	2.2	4,571	2nd	7.8	227	3rd	6.9
Nuclear Power	£231.97		£284.87	2.7	1,516	6th	2.6	52	9th	1.6
Renewable Energy	£2,600.46		£3,204.10	30.1	20,355		34.7	1,303	3rd	39.9
Biomass	£395.49	4th	£489.48	4.6	2,109	6th	3.6	120		3.7
Geothermal	£768.74	4th	£947.73	8.9	5,939	6th	10.1	332	2nd	10.2
Hydro	£30.75	4th	£37.94	0.4	219	6th	0.4	11		0.3
Photovoltaic	£380.41	4th	£467.91	4.4	2,791		4.8	159		4.9
Renewable Consultancy	£33.49	4th	£41.31	0.4	1,035		1.8	59	1st	1.8
Wave & Tidal	£6.45	4th	£7.91	0.1	30	6th	0.1	2	5th	0.0
Wind	£985.13		£1,212.12	11.4	8,233		14.0	620	2nd	19.0

* Where ranking isn't indicated, the sub-sector is the same as overall LEP ranking (e.g. 2nd for Sales, 4th for Employees and Companies). Where L2 subsector rankings are better than the overall Sector LEP ranking they are highlighted green. Where they are worse, they are highlighted pink/ orange.



GM LCEGS Historical and Forecast Growth Rates:

Table 13: GM LCEGS Historical and Forecast Growth Rates

Metric	Time Period or Year	GM	UK	Global	Comments
<i>Total Historical Growth Rate</i>	2011/12 to 2015/16	24.4%			
Historical growth rate	2015/16 to 2016/17	5.7%			*GM growth rates have lagged behind UK and Global growth rates in the period 2018/19 to 2019/20.
	2016/17 to 2017/18	6.1%			
	2017/18 to 2018/19	6.6%	10.0%		
	2018/19 to 2019/20	7.1%	8.1%	14.0%	
Forecast growth rate	2019/20 to 2020/21	2.6%	2.0%	6.2%	*Confidence levels in forecast growth rates were low in the period 2019/20 to 2020/21 due to the uncertainties created by BREXIT and the COVID-19 pandemic. Confidence in future growth rates is now stronger as the UK economy emerges from COVID-19 lockdown.
	2020/21 to 2021/22	6.0%	6.8%	6.6%	
	2021/22 to 2022/23	6.3%	7.5%	6.9%	
	2022/23 to 2023/24	6.6%	8.4%	7.4%	
	2023/24 to 2024/25	6.9%	9.0%	7.8%	



Filtered LCEGS GM summary:

Table 14: Filtered LCEGS GM Summary

Filtered LCEGS Level 1 and 2 Breakdown	2019-20						
	Sales and GVA			Employees		Companies	
Geography	Sales (£m)	GVA (£m)	% Geog Totals	#	% Geog Totals	#	% Geog Totals
Greater Manchester	£7,291.00	£8,972.01	12.2%	51,377		2,749	
Filtered LCEGS Ranking vs New Econ Industry Groupings (GVA)		3rd					
Forecast growth rate in Sales from 2019/20 to 2020/21				2.6			
Forecast growth rate in Sales from 2020/21 to 2021/22				6.0			
Forecast growth rate in Sales from 2021/22 to 2022/23				6.3			
Forecast growth rate in Sales from 2022/23 to 2023/24				6.6			
Forecast growth rate in Sales from 2023/24 to 2024/25				6.9			
Sub-sectors within Greater Manchester	Sales (£m)	GVA (£m)	% Geog Totals	#	% Geog Totals	#	% Geog Totals
Environmental	£1,435.88	£1,768.51	19.7	8,811	17.1	442	16.1
Air Pollution	£58.07	£71.49	0.8	410	0.8	20	0.7
Contaminated Land Reclamation & Remediation	£57.56	£70.80	0.8	358	0.7	18	0.6
Environmental Consultancy and Related Services	£52.92	£65.19	0.7	339	0.7	17	0.6
Environmental Monitoring, Instrumentation and Analysis	£10.37	£12.79	0.1	66	0.1	3	0.1
Marine Pollution Control	£8.48	£10.35	0.1	49	0.1	2	0.1
Noise & Vibration Control	£14.98	£18.44	0.2	92	0.2	5	0.2
Recovery and Recycling	£475.46	£585.26	6.5	2,673	5.2	135	4.9
Waste Management	£309.19	£380.86	4.2	1,986	3.9	99	3.6
Water Supply and Waste Water Treatment	£448.85	£553.33	6.2	2,839	5.5	143	5.2
Low Carbon	£3,254.66	£3,999.40	44.6	22,211	43.2	1,129	41.1
Additional Energy Sources	102.17	125.88	1.4	947	1.8	73	2.7
Alternative Fuel Vehicle	499.07	610.87	6.8	1,891	3.7	112	4.1
Alternative Fuels	491.63	605.56	6.7	2,667	5.2	132	4.8
Building Technologies	1190.95	1465.41	16.3	8,418	16.4	426	15.5
Carbon Capture & Storage	42.5	52.27	0.6	2,029	3.9	99	3.6
Carbon Finance	510	625.19	7.0	171	0.3	8	0.3
Energy Management	186.37	229.35	2.6	4,571	8.9	227	8.3
Nuclear Power	231.97	284.87	3.2	1,516	3.0	52	1.9
Renewable Energy	£2,600.46	£3,204.10	35.7	20,355	39.6	1,178	42.9
Biomass	395.49	489.48	5.5	2,109	4.1	120	4.4
Geothermal	768.74	947.43	10.6	5,939	11.6	332	12.1
Hydro	30.75	37.94	0.4	219	0.4	11	0.4
Photovoltaic	380.41	467.91	5.2	2,791	5.4	159	5.8
Renewable Energy General Consultancy	33.49	41.31	0.5	1,035	2.0	59	2.2
Wave & Tidal	6.45	7.91	0.1	30	0.1	2	0.1
Wind	985.13	1212.12	13.5	8,233	16.0	495	18.0



GM Filtered LCEGS Historic and Future Growth rates to 2024/25

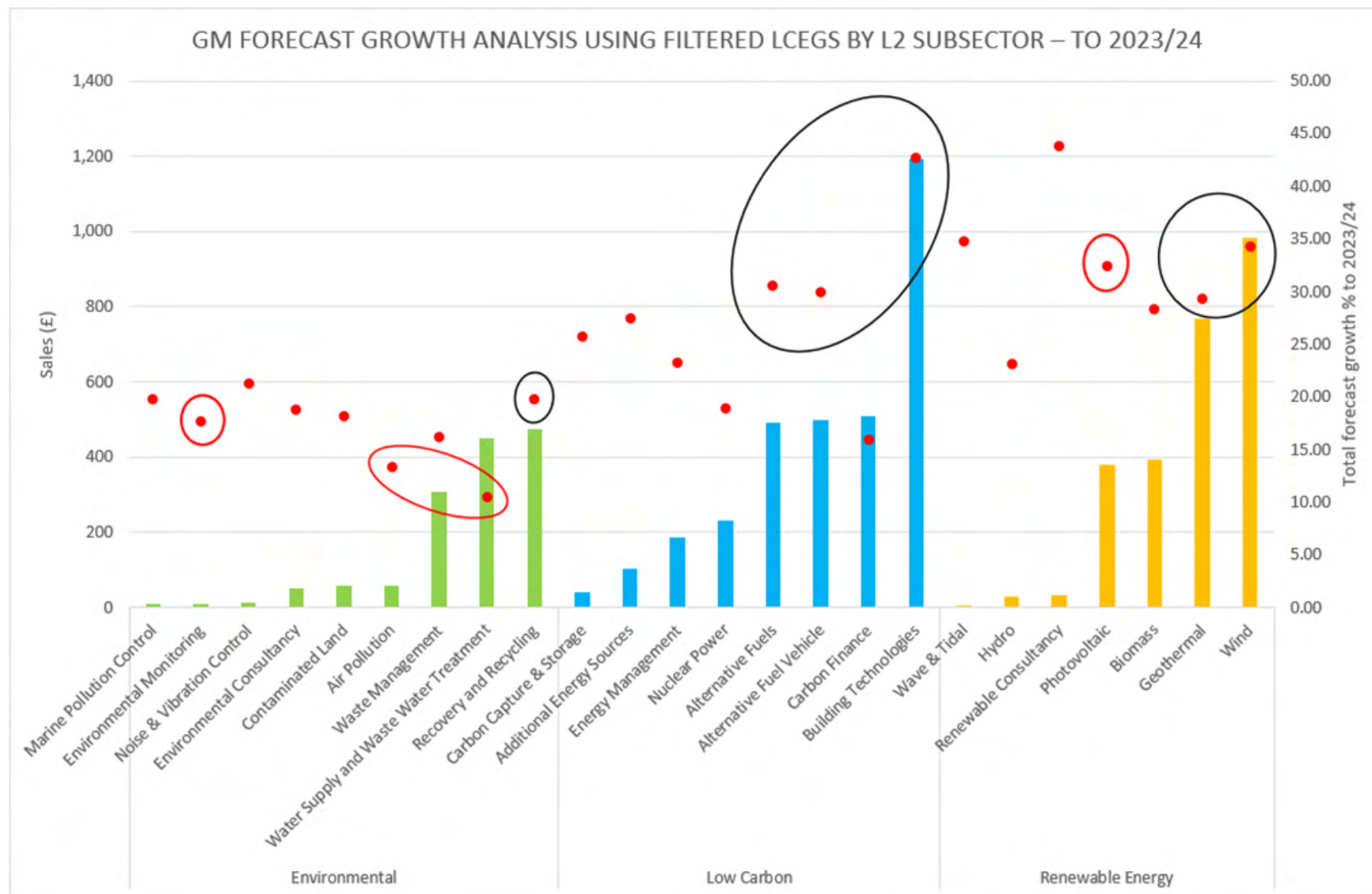
When reviewing historic total growth rate ranking for the 4-year period 2015/16 to 2019/20 an error on the previous report data was identified related to the Employee figures in 2015/16 for the Level 2 sub-sectors Alternative Fuel Vehicle and Alternative Fuels. This did not affect the Level 1 sub-sector or Sector totals and the corrected figures are represented in the 4-year growth rate ranking included in the main report.

Table 15: GM Filtered LCEGS Forecast Growth by Sector and L2 sub-sector

Filtered LCEGS Sector		Sales £m		Total Forecast Growth %
		2019/20	2024/25	19/20 to 24/25
	Whole Sector	7,291.0	8982.77	23.2%
Sub-sector	Level 2	2019/20	2024/25	19/20 to 24/25
Environmental	Marine Pollution Control	8.48	10.16	19.9%
	Environmental Monitoring	10.37	12.20	17.7%
	Noise & Vibration Control	14.98	18.17	21.3%
	Environmental Consultancy	52.92	62.90	18.9%
	Contaminated Land	57.56	68.00	18.1%
	Air Pollution	58.07	65.82	13.3%
	Waste Management	309.19	359.50	16.3%
	Water Supply and Waste Water Treatment	448.85	496.24	10.6%
	Recovery and Recycling	475.46	569.57	19.8%
Low Carbon	Carbon Capture & Storage	42.50	53.46	25.8%
	Additional Energy Sources	102.17	130.21	27.4%
	Energy Management	186.37	229.69	23.2%
	Nuclear Power	231.97	275.88	18.9%
	Alternative Fuels	491.63	641.95	30.6%
	Alternative Fuel Vehicle	499.07	648.70	30.0%
	Carbon Finance	510.00	591.67	16.0%
	Building Technologies	1,190.95	1699.39	42.7%
Renewable Energy	Wave & Tidal	6.45	8.69	34.8%
	Hydro	30.75	37.88	23.2%
	Renewable Consultancy	33.49	48.17	43.8%
	Photovoltaic	380.41	503.69	32.4%
	Biomass	395.49	507.38	28.3%
	Geothermal	768.74	994.23	29.3%
	Wind	985.13	1323.17	34.3%

GM filtered LCEGS Level 2 sub-sectors growth analysis:

Figure 16: GM Filtered LCEGS - Level 2 sub-sectors growth analysis





LCEGSS GM Summary:

Table 16: LCEGSS GM Summary

LCEGSS Level 1 and 2 Breakdown	2019-20						
	Sales and GVA			Employees		Companies	
Geography	Sales (£m)	GVA (£m)	% Geog Totals	#	% Geog Totals	#	% Geog Totals
Greater Manchester	10,687.30	12,460.50	17.0%	69,562		3,957	
LCEGSS Ranking vs New Econ Industry Groupings		3rd					
Forecast growth rate in Sales from 2019/20 to 2020/21				5.2			
Forecast growth rate in Sales from 2020/21 to 2021/22				5.3			
Forecast growth rate in Sales from 2021/22 to 2022/23				5.5			
Forecast growth rate in Sales from 2022/23 to 2023/24				5.7			
Forecast growth rate in Sales from 2023/24 to 2024/25				5.9			
Sub-sectors within Greater Manchester	Sales (£m)	GVA (£m)	% Geog Totals	#	% Geog Totals	#	% Geog Totals
Environmental	£2,671.00	£3,087.40	24.8	14,952	21.5	901	22.8
Air Pollution	84.9	100.7	0.8	447	0.6	24	0.6
Bio-diversity	115.1	134.1	1.1	351	0.5	25	0.6
Contaminated Land Reclamation & Remediation	57	67	0.5	349	0.5	18	0.5
Energy from Waste	580.8	675.8	5.4	3,959	5.7	301	7.6
Environmental Consultancy and Related Services	176.1	204.1	1.6	785	1.1	50	1.3
Environmental Monitoring, Instrumentation and Analysis	10.2	11.9	0.1	66	0.1	3	0.1
Marine Pollution Control	8.4	9.7	0.1	49	0.1	2	0.1
Noise & Vibration Control	22.4	26.2	0.2	115	0.2	6	0.2
Recovery and Recycling	538	625.4	5.0	2,880	4.1	144	3.6
Waste Management	336	392.9	3.2	2,056	3.0	104	2.6
Water Supply and Waste Water Treatment	742.1	839.6	6.7	3,895	5.6	224	5.7
Low Carbon	£5,393.00	£6,300.90	50.6	34,084	49.0	1,907	48.2
Additional Energy Sources	104.1	121.4	1.0	952	1.4	73	1.8
Alternative Fuel Vehicle	1087.7	1293.2	10.4	4,797	6.9	279	7.1
Alternative Fuels	1317.8	1535.6	12.3	7,572	10.9	357	9.0
Building Technologies	1237.9	1453.1	11.7	9,888	14.2	567	14.3
Carbon Capture & Storage	41.8	48.6	0.4	2,040	2.9	98	2.5
Carbon Finance	523.8	579.2	4.6	170	0.2	8	0.2
Energy Management	850.8	1000.5	8.0	7,111	10.2	472	11.9
Nuclear Power	227	267	2.1	1,552	2.2	53	1.3
Photovoltaic	2.1	2.3	0.0	2	0.0	-	0.0
Renewable Energy	£2,623.50	£3,072.40	24.7	20,527	29.5	1,149	29.0
Biomass	401.3	467.3	3.8	2,135	3.1	124	3.1
Geothermal	757.2	898.7	7.2	5,884	8.5	316	8.0
Hydro	31.1	37.5	0.3	215	0.3	11	0.3
Photovoltaic	413.3	486.2	3.9	2,844	4.1	162	4.1
Renewable Energy General Consultancy	33.3	38	0.3	1,044	1.5	58	1.5
Wave & Tidal	6.4	7.3	0.1	29	0.0	1	0.0
Wind	980.9	1137.4	9.1	8,376	12.0	477	12.1

Comparative analysis methodology and data

The GM low carbon sector's performance was compared nationally, globally and with the GM business base. Throughout the analysis, comparative performance was generally only reported where it was above (or significantly below) the national/global/GM average.

Nationally

GM was compared with other English LEPs using the LCEGS definition.

Sector Sales

GM's ranking amongst English LEPs has remained 3rd, behind London and the South East and it holds 4% now rather than 5% in 2015/16. GM is ranked 3rd for Sales, behind London and the South East with 4% of total LCEGS Sales (£8,819.2) compared to £6,759m in 2015/16.

Exceptions to this ranking can be found within the Level 2 sub-sectors:

- Within Environmental, the Environmental Monitoring, Instrumentation and Analysis sub-sector ranks 4th (behind London, South East and South East Midlands).
- Within Low carbon, the Alternative Fuel Vehicle, Carbon Finance, and Nuclear Power sub-sectors rank 2nd (behind London and ahead of South East). Carbon Capture & Storage, and Energy Management sub-sectors rank 1st (ahead of London and the South East).
- Within Renewable Energy, the Biomass sub-sector ranks 4th (behind London, South East and Coast to Capital). Renewable Energy General Consultancy is ranked 1st (ahead of London and the South East).

Sector employment

GM is ranked 4th for number of Employees, behind London, South East and Leeds (58,131). There is no significant variation to this in the Level 2 sub-sectors

Sector Companies

GM is ranked 4th for number of Companies, behind London, South East and Leeds (3,105). There is no significant variation to this in the Level 2 sub-sectors.

Globally

Work previously completed for the C40 Cities Climate Leadership Group made it possible to compare GM with a number of similar sized global cities. The research is based upon comparison between (LC)EGSS Sales and Gross Domestic Product (GDP) figures for 2019/20. All values have been converted to Sterling.

The comparison cities have been drawn from C40 cities in Europe and in North America. The largest cities have been filtered out to ensure that the comparisons are relevant to the size of the GM economy. For example, London would not be comparable in this analysis.

The GC Business Growth Hub requested that GM be compared with eight global cities. Twenty- one cities in total were selected for the comparison, as listed below. Those in black text are the cities that the GC Business Growth Hub specified for previous reports. Those in blue text were also specified but were not comparable in size to GM and therefore could not be included in the analysis.



Amsterdam	Heidelberg	Seattle
Athens	Madrid	Stockholm (4)
Austin	Milan	Toronto
Barcelona	New Orleans	Vancouver
Basel	Portland	Venice
Berlin (2)	Rome (3)	Warsaw (5)
Chicago	Rotterdam	Yokohama
Copenhagen (1)	Oslo	

Mapping 21 cities by LCEGSS total Sales (£m) and total GDP (£m)

The chart in Figure 11 in the main report maps the 21 cities by total LCEGSS Sales on the vertical axis and total GDP on the horizontal axis. The four zones are calculated using the mean value on each axis. A line of best fit runs from bottom left to top right of the chart. The data for each city is shown in Table 17, below.

Table 17: International City Comparison Data

City	GDP £m	LCEGS Sales £m	City	GDP £m	LCEGS Sales £m
Athens	98,180	6,067	New Orleans	60,230	3,293
Austin	114,000	5,273	Oslo	65,930	9,755
Barcelona	131,860	8,195	Portland	125,480	12,900
Basel	31,550	1,508	Rome	120,350	8,076
Berlin	118,250	8,240	Rotterdam	246,520	15,660
Copenhagen	107,400	8,502	Seattle	205,850	13,848
Greater Manchester	74,100	10,687	Stockholm	110,720	7,337
Heidelberg	6,380	429	Toronto	208,080	8,699
Madrid	192,880	13,518	Vancouver	109,700	3,663
Milan	153,620	17,090	Venice	42,300	2,953
			Warsaw	116,820	6,976

Cities such as Copenhagen, Toronto, Madrid, Portland, Austin, Vancouver and New Orleans report GDP figures reliably and 2019 GDP figures were available from reliable sources such as the US Department of Commerce for the USA cities and the European Commission for the European cities.



Unfortunately, many cities do not report their GDPs annually and most do not have a 2019 reported GDP figure available. As such, estimated GDP figures have been calculated by applying the annual growth rates for the country, as reported by the World Bank.

In the case of Basel, the 2018 GDP figure reported by the Swiss Federal Statistics Office was used, with a growth rate of 0.929% for Switzerland applied to calculate the 2019 GDP.

For cities where reliable GDP data from government sources were not available, as the data is based on the C40 Cities project, for cities who do not report GDP figures reliably, such as Rome, Venice and Athens, we have taken the 2016 GDP figures reported on the C40 Cities website and applied the annual growth rates reported by the World Bank for the country from 2016-2019 to provide an estimated 2019 GDP.

When the LCEGSS data is analysed at Level 1 subsector, GM is well above average for Low Carbon, above average for Level 1 Environmental and average for Level 1 Renewable Energy. When the data is filtered by the 27 sub sectors of LCEGSS (including Carbon Finance), then GM performs as shown in Table 18 below. In this table, the following thresholds for analysis have been used:

- Well Above Average = > 140%
- Above Average = between 110% - 140%
- Average = 90% - 110%
- Below Average = <90%

Table 18: LCEGSS Level 2 sub-sector analysis

Well Above Average	Above Average	Average	Below Average
Additional Energy Sources	Air Pollution	Biomass	Photovoltaic
Alternative Fuel Vehicles	Building Technologies	Hydro	Geothermal
Alternative Fuels	Environmental Consultancy	Noise & Vibration Control	
Bio-diversity	Environmental Monitoring	Renewable Consulting	
Carbon Capture and Storage	Recovery and Recycling	Waste Management	
Carbon Finance	Wave & Tidal	Water & Waste Water	
Contaminated Land	Wind		
Energy from Waste			
Energy Management			
Marine Pollution Control			
Nuclear Power			

Key changes since last analysis:

- Energy Management, Bio-diversity have moved from “above average” to “well above average”
- Environmental Consultancy has moved from “average” to “above average”
- Waste Management, Renewable consultancy and Water & Waste Water have moved from above average” to “average”
- Photovoltaic and Geothermal are below average

Further detail is shown in Table 19 and Table 20, below. Percentages are GM LCEGSS Sales compared with the average LCEGSS Sales of the 21 cities.

Table 19: Well Above Average and Above Average performing GM LCEGSS L2 sub-sectors vs. other cities

Well Above Average	Above Average
Additional Energy Sources - 182%	Air Pollution - 129%
Alternative Fuel Vehicle - 192%	Building Technologies - 132%
Alternative Fuels - 174%	Environmental Consultancy - 125%
Bio-diversity - 141%	Environmental Monitoring - 136%
Carbon Capture and Storage - 174%	Recovery and Recycling - 127%
Contaminated Land - 186%	Wave & Tidal - 137%
Carbon Finance (excluded from previous report) 274%	Wind - 124%
Energy from Waste - 164%	
Energy Management - 161%	
Marine Pollution Control - 142%	
Nuclear Power - 167%	

Table 20: Average and Below Average performing GM LCEGSS Level 2 subsectors vs. other cities

Average	Below Average
Biomass - 98%	Photovoltaic - 69%
Hydro - 97%	Geothermal - 79%
Noise & Vibration Control - 104%	
Renewable Consulting - 104%	
Waste Management - 90%	
Water & Waste Water - 107%	

The rest of the GM business base:

It is important to note that this part of the analysis uses several different sources of data:

- 1) LCEGS taxonomy
- 2) Standard Industrial Classification (SIC) code³² analysis of Regional GVA figures (both published by HM Office for National Statistics)³³
- 3) Industry Groupings of these SIC codes based on the 2015 New Economy GM Forecasting Model (GMFM)³⁴.

³²Source: "UK Standard Industrial Classification of Economic Activities (2007) – Summary of Structure". Accessed July 2021 at: <https://www.ons.gov.uk/methodology/classificationsandstandards/ukstandardindustrialclassificationofeconomicactivities/uksic2007>

³³Source: "Regional gross value added (balanced) by industry: all International Territorial Level (ITL) regions" as corrected 11th June 2021. Accessed: Oct 2021 at: <https://www.ons.gov.uk/economy/grossvalueaddedgva/data-sets/nominalandrealregionalgrossvalueaddedbalancedbyindustry/current>

³⁴GMFM series published periodically. Accessed July 2021 at: <https://www.greatermanchester-ca.gov.uk/what-we-do/economy/greater-manchester-forecasting-model/>

4) NOMIS Official Labour Market Statistics (Employment figures)³⁵
(collated for Government by Durham University)

The last three items are substituted in lieu of an updated Greater Manchester Forecasting Model for 2019 at the time of completing this research and analysis.

SIC codes were set up in the 1950s and their static nature present some problems for modern economic reporting as industries evolve, businesses change over time and operate in more than one industry and geographic region.

The low carbon industry has been fast moving, as it explores and delivers new products and services. The SIC codes do not adequately describe key elements of the sector, e.g. renewable power, and hence cannot easily be used to measure the low carbon economy. This section takes these two different views of the GM economy, comparing an analysis by SIC codes and by more modern LCEGS LCEGSS taxonomies.

The SIC Codes do not identify or measure metrics related the Low Carbon Sector but do includes Broad Industry Groupings similar in nature but measuring different industries to those offered by LCEGS and LCEGSS. The Broad Industry Groups are made up of multiple sub-sector groupings similar to the LCEGS / LCEGSS subsectors at Level 1. The following section (SIC Code analysis and groupings) explains more about SIC codes and what each broad industry grouping includes at high level.

Approach

ONS SIC Code Broad Industry Groupings and sub-sector definitions based on the New Economy GMFM 2015 definitions were compared to LCEGS and its sub-sectors at comparable levels, using “% of GM total” based on the metric GVA. The data tables and graphs that follow this present the results of the analysis, showing where LCEGS and its L1 subsectors would rank in comparison to these SIC code groupings when comparing GVA.

SIC Codes, analysis and groupings

SIC codes enable businesses and divisional organisations to categorise the business into one or more of a set of pre-defined activities bands the way. The SIC code comprises a letter an one or more numbers, depending on the level of that activity within the hierarchy.

New Economy previously defined GM-specific groupings of SIC codes to measure and report on the GM economy in terms of GVA and employment in their GM Forecasting Model (GMFM). These groupings are shown in the mapping table, below.

For this report, the 2015 New Economy GMFM industry groupings are replicated, as far as possible, to provide a direct comparison. Certain Broad Industry Groups and sub-sector groupings, however, cannot be directly matched with the previous New Economy work, as the GM-level GVA data was not available at a sufficiently detailed level from public sources and no updated GMFM is available for 2019. Figures 17-19 on the following pages demonstrate this, with affected groupings highlighted and explanatory notes showing the treatment within the following analysis.

³⁵Nomis Official Labour Market Statistics (collated for Government by Durham University). Accessed Oct 2021 at: <https://www.nomisweb.co.uk/>



Figure 17: Part A - GMFM industry groupings to SIC Code mapping and SIC mapping in this report

New Economy / GMFM Description		GMFM 2015 SIC Code mapping		Current Report revised SIC Code mapping		Notes
Boad Industry	Sub-sector	Section / Division	Description	Section / Division	Description	
Business, Financial and Professional Services	Business Services	N 77	Rental and leasing activities	N 77	Rental and leasing activities	
		N 80	Security and investigation activities	N 80	Security and investigation activities	
		N 81	Services to buildings and landscape activities	N 81	Services to buildings and landscape activities	
		N 82	Office administrative, office support and other business support activities	N 82	Office administrative, office support and other business support activities	
		S 34	Activities of membership organisations	S 34	Activities of membership organisations	
		S 99	Activities of extraterritorial organisations and bodies	S 99	Activities of extraterritorial organisations and bodies	
	Employment Activities	N 78	Employment activities	N 78	Employment activities	
	Financial Services	64	Financial service activities, except insurance and pension funding	64	Financial service activities, except insurance and pension funding	
		K 65	Insurance, reinsurance and pension funding, except compulsory social security	K 65	Insurance, reinsurance and pension funding, except compulsory social security	
		66	Activities auxiliary to financial services and insurance activities	66	Activities auxiliary to financial services and insurance activities	
Professional Services	L 68	Real estate activities ("L") including CNS-separated L68IMP Owner-occupiers' imputed rental	L 68	Real estate activities ("L") including CNS-separated L68IMP Owner-occupiers' imputed rental		
	M 69	Legal and accounting activities	M 69	Legal and accounting activities		
	M 70	Activities of head offices; management consultancy activities	M 70	Activities of head offices; management consultancy activities		
	M 743	Translation and interpretation activities			Regional figures not available below 2-digit Divisions. M743 now in Creative Industries	
Public Sector	Education	P 85	Education	P 85	Education	
	Health and Social Care	86	Human health activities	86	Human health activities	
		Q 87	Residential care activities	Q 87	Residential care activities	
Public Administration	88	Social work activities without accommodation	88	Social work activities without accommodation		
Cultural and Creative	Creative Industries	O 84	Public administration and defence; compulsory social security	O 84	Public administration and defence; compulsory social security	
		C 18	Printing and reproduction of recorded media	C 18	Printing and reproduction of recorded media	
		J 58	Publishing activities	J 58	Publishing activities	
		J 59	Motion picture, video and television programme production, sound recording and music publishing activities	J 59	Motion picture, video and television programme production, sound recording and music publishing activities	
		J 60	Programming and broadcasting activities	J 60	Programming and broadcasting activities	
		M 73	Advertising and market research	M 73	Advertising and market research	
		R 90	Creative, arts and entertainment activities	R 90	Creative, arts and entertainment activities	
		M 7111	Architectural activities			Regional figures not available below 2-digit Divisions. M7111 now in Advanced Manufacturing
	M 741	Specialized design activities	M 74	(741, 742 and now including 743 - Translation & interpretation services, 743 - Other professional, scientific and technical activities n.e.c.)	See above, MT4 codes now consolidated here.	
	M 742	Photographic activities				
	Digital	J 61	Telecommunications	J 61	Telecommunications	
		J 62	Computer programming, consultancy and related activities	J 62	Computer programming, consultancy and related activities	
		J 63	Information service activities	J 63	Information service activities	
	Sport	R 93	Sports activities and amusement and recreation activities	R 93	Sports activities and amusement and recreation activities	
Tourism and Culture	I 55	Accommodation	I 55	Accommodation		
	I 56	Food and beverage service activities	I 56	Food and beverage service activities		
	N 79	Travel agency, tour operator and other reservation service and related activities	N 79	Travel agency, tour operator and other reservation service and related activities		
	R 91	Libraries, archives, museums and other cultural activities	R 91	Libraries, archives, museums and other cultural activities		
R 92	Gambling and betting activities	R 92	Gambling and betting activities			



Figure 18: Part B - GMFM industry groupings to SIC Code mapping and SIC mapping in this report

New Economy / GMFM Description		GMFM 2015 SIC Code mapping		Current Report revised SIC Code mapping		Notes
Boad Industry	Sub-sector	Section / Division	Description	Section / Division	Description	
Wholesale and Retail	Motor trades	G 45	Motor trades	G 45	Motor trades	
	Retail	G 47	Retail trade, except of motor vehicles and motorcycles	G 47	Retail trade, except of motor vehicles and motorcycles	
	Wholesale	S 95	Repair of computers and personal and household goods	S 95	Repair of computers and personal and household goods	
Manufacturing	Advanced Manufacturing	G 46	Wholesale trade, except of motor vehicles and motorcycles	G 46	Wholesale trade, except of motor vehicles and motorcycles	
		C 19	Manufacture of coke and refined petroleum products	C 19	Manufacture of coke and refined petroleum products	C19-21 reported as a group at the regional level, so C19 included here.
		C 20	Manufacture of chemicals and chemical products	C 20	Manufacture of chemicals and chemical products	
		C 21	Manufacture of basic pharmaceutical products and pharmaceutical preparations	C 21	Manufacture of basic pharmaceutical products and pharmaceutical preparations	
		C 26	Manufacture of computer, electronic and optical products	C 26	Manufacture of computer, electronic and optical products	
		C 27	Manufacture of electrical equipment	C 27	Manufacture of electrical equipment	
		C 28	Manufacture of machinery and equipment n.e.c.	C 28	Manufacture of machinery and equipment n.e.c.	
		C 29	Manufacture of motor vehicles, trailers and semi-trailers	C 29	Manufacture of motor vehicles, trailers and semi-trailers	
		C 30	Manufacture of other transport equipment	C 30	Manufacture of other transport equipment	
		C 33	Repair and installation of machinery and equipment	C 33	Repair and installation of machinery and equipment	
	C 325	Manufacture of medical and dental instruments and supplies			Regional figures not available below 2-digit Divisions. C325 now in Other Manufacturing M71 codes now consolidated here.	
	M 7112	Engineering activities and related technical consultancy	M 71	M7112 and now M7111 Architectural activities, M7120 Technical testing and analysis		
	Food and drink manufacturing	C 10	Manufacture of food products	C 10	Manufacture of food products	
		C 11	Manufacture of beverages	C 11	Manufacture of beverages	
		C 12	Manufacture of tobacco products	C 12	Manufacture of tobacco products	
Textiles manufacturing	C 13	Manufacture of textiles	C 13	Manufacture of textiles		
	C 14	Manufacture of wearing apparel	C 14	Manufacture of wearing apparel		
Other manufacturing	C 15	Manufacture of leather and related products	C 15	Manufacture of leather and related products		
	C 16	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	C 16	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials		
	C 17	Manufacture of paper and paper products	C 17	Manufacture of paper and paper products	C19-21 reported as a group at the regional level. C19 now included in Advanced Manufacturing.	
	C 19	Manufacture of coke and refined petroleum products				
	C 22	Manufacture of rubber and plastic products	C 22	Manufacture of rubber and plastic products		
	C 23	Manufacture of other non-metallic mineral products	C 23	Manufacture of other non-metallic mineral products		
	C 24	Manufacture of basic metals	C 24	Manufacture of basic metals		
	C 25	Manufacture of fabricated metal products, except machinery and equipment	C 25	Manufacture of fabricated metal products, except machinery and equipment		
	C 31	Manufacture of furniture	C 31	Manufacture of furniture		
	C 321	Manufacture of jewellery, bijouterie and related articles				
	C 322	Manufacture of musical instruments				
	C 323	Manufacture of sports goods				
C 324	Manufacture of games and toys					
C 329	Other manufacturing	C 32	(321, 322, 323, 324, 329 and now including 325 - Manufacture of medical and dental instruments and supplies)	Regional figures not available below 2-digit Divisions. C32 codes now consolidated here.		
Construction	Construction	F 41	Construction of buildings	F 41	Construction of buildings	
		F 42	Civil engineering	F 42	Civil engineering	
		F 43	Specialised construction activities	F 43	Specialised construction activities	



Figure 19: Part C - GMFM industry groupings to SIC Code mapping and SIC mapping in this report

New Economy / GMFM Description		GMFM 2015 SIC Code mapping		Current Report revised SIC Code mapping		Notes
Broad Industry	Sub-sector	Section /	Description	Section /	Description	
Transport and Storage	Transport and storage (including postal)	H 49	Land transport and transport via pipelines	H 49	Land transport and transport via pipelines	
		H 50	Water transport	H 50	Water transport	
		H 51	Air transport	H 51	Air transport	
		H 52	Warehousing and support activities for transportation	H 52	Warehousing and support activities for transportation	
		H 53	Postal and courier activities	H 53	Postal and courier activities	
Primary Industries	Agriculture, forestry and fishing	A 1	Crop and animal production, hunting and related service activities	A 1	Crop and animal production, hunting and related service activities	
		A 2	Forestry and logging	A 2	Forestry and logging	
		A 3	Fishing and aquaculture	A 3	Fishing and aquaculture	
	Mining and quarrying	B 5	Mining of coal and lignite	B 5	Mining of coal and lignite	
		B 6	Extraction of crude petroleum and natural gas	B 6	Extraction of crude petroleum and natural gas	
		B 7	Mining of metal ores	B 7	Mining of metal ores	
		B 8	Other mining and quarrying	B 8	Other mining and quarrying	
		B 9	Mining support service activities	B 9	Mining support service activities	
	Utilities	D 35	Electricity, gas, steam and air conditioning supply	D 35	Electricity, gas, steam and air conditioning supply	
		E 36	Water collection, treatment and supply	E 36	Water collection, treatment and supply	
E 37		Sewerage	E 37	Sewerage		
E 38		Waste collection, treatment and disposal activities; materials recovery Remediation activities and other waste management services. This division includes the provision of remediation services, i.e. the cleanup of contaminated buildings and sites, soil, surface or ground water.	E 38	Waste collection, treatment and disposal activities; materials recovery Remediation activities and other waste management services. This division includes the provision of remediation services, i.e. the cleanup of contaminated buildings and sites, soil, surface or ground water.		
Personal Services	Personal Services	S 96	Other personal service activities	S 96	Other personal service activities	
		T 97	Activities of households as employers of domestic personnel	T 97	Activities of households as employers of domestic personnel	
		T 98	Undifferentiated goods- and services-producing activities of private households for own use	T 98	Undifferentiated goods- and services-producing activities of private households for own use	
Science and R&D (Excl. Manufacturing)	Science and R&D	M 72	Scientific research and development	M 72	Scientific research and development	Regional figures not available below 2-digit Divisions. M7120 now in Advanced Manufact'g See above. M749 now in Creative Industries
		M 75	Veterinary activities	M 75	Veterinary activities	
		M 7120	Technical testing and analysis			
		M 749	Other professional, scientific and technical activities n.e.c.			

As shown in Figures 17-19, above, some of the SIC Codes map directly to New Economy Broad Industry Groupings or sub-sectors reported in the GM Forecasting model, (for example the GMFM Broad Industry Group “Transport and Storage” directly maps to SIC code Section H), whilst others pull together low level SIC codes from different SIC groupings, (e.g. Advanced Manufacturing) as shown above in Figures 16, 17 and 18.

Data is only available at the two-digit level, so three- and four-digit SIC codes have been re-grouped at two-digit level and included in the most logical sub-sector for reporting. This is shown in the columns to the right.

The overall effect is that Science and R & D is likely to be smaller than it would be if lower-level SIC-coded regional statistics were available and Advanced Manufacturing larger. Changes in the Professional Services, Creative Industries and Other Manufacturing sub-sectors are likely to be less significant due to the balancing effect of both removing and adding sub-sectors.



GM Analysis of Gross Value Added by various industry definitions

Figure 20: GM Analysis of GVA by various industry definitions

SIC Code Sections ranked by size (GVA)

SIC07 Section	SIC07 description	2019 GVA £m	% GM Total	Rank
G	Wholesale and retail trade; repair of motor vehicles	8,690	11.83%	1
L	Real estate activities	8,415	11.46%	2
C	Manufacturing	7,111	9.68%	3
Q	Human health and social work activities	7,077	9.63%	4
M	Professional, scientific and technical activities	5,786	7.88%	5
N	Administrative and support service activities	4,926	6.71%	6
P	Education	4,770	6.49%	7
F	Construction	4,568	6.22%	8
J	Information and communication	4,205	5.72%	9
K	Financial and insurance activities	4,011	5.46%	10
O	Public administration and defence	3,753	5.11%	11
H	Transportation and storage	3,641	4.96%	12
I	Accommodation and food service activities	1,984	2.70%	13
R	Arts, entertainment and recreation	1,374	1.87%	14
S	Other service activities	1,315	1.79%	15
E	Water supply; sewerage and waste management	868	1.18%	16
D	Electricity, gas, steam and air conditioning supply	818	1.11%	17
T	Activities of households	79	0.11%	18
A	Agriculture, forestry and fishing	33	0.04%	19
B	Mining and quarrying	27	0.04%	20
Greater Manchester Total - All Industries		73,451	100%	

New Economy Broad Industry Grouping ranked by size

New Economy Broad Industry Grouping	2019 GVA £m	% GM Total	Rank
Business, Financial and Professional Services	20,643	28.10%	1
Public Sector	15,600	21.24%	2
Cultural and Creative	9,477	12.90%	3
Wholesale and Retail	8,842	12.04%	4
Manufacturing	7,701	10.48%	5
Construction	4,568	6.22%	6
Transport and Storage	3,641	4.96%	7
Primary Industries	1,746	2.38%	8
Personal Services	854	1.16%	9
Science and R&D (Excl. Manufacturing)	381	0.52%	10
Greater Manchester Total	73,453	100%	

Low Carbon Sector Definition	2019 GVA £m	% GM Total	Rank
LCEGSS	£12,461	17.0%	1
LCEGS	£10,634	14.5%	2
Filtered LCEGS	£8,972	12.2%	3

LCEGS L1 Sub-sector Definition	2019 GVA £m	% GM Total	Rank
Low Carbon	£5,662	7.7%	1
Renewable	£3,204	4.4%	2
Environmental	£1,769	2.4%	3

New Economy Sub-sectors ranked by size

New Economy Sub-sector	2019 GVA £m	% GM Total	Rank
Professional Services	11,897	16.20%	1
Health and Social Care ("Q")	7,077	9.63%	2
Education ("P")	4,770	6.49%	3
Retail	4,617	6.29%	4
Construction ("F")	4,568	6.22%	5
Financial Services ("K")	4,011	5.46%	6
Public Administration ("O")	3,753	5.11%	7
Transport and storage (including postal) ("H")	3,641	4.96%	8
Advanced Manufacturing	3,593	4.89%	9
Digital	3,472	4.73%	10
Business Services	3,178	4.33%	11
Wholesale	2,955	4.02%	12
Tourism and Culture	2,882	3.92%	13
Creative Industries	2,289	3.12%	14
Other manufacturing	2,050	2.79%	15
Utilities	1,688	2.30%	16
Employment Activities	1,557	2.12%	17
Food and drink manufacturing	1,366	1.86%	18
Motor trades	1,270	1.73%	19
Personal Services	854	1.16%	20
Sport	834	1.14%	21
Textiles manufacturing	692	0.94%	22
Science and R&D	381	0.52%	23
Agriculture, forestry and fishing ("A")	33	0.04%	24
Mining and quarrying ("B")	27	0.04%	25
Greater Manchester Total	73,453	100%	



Industry Grouping ranking and comparison – LCEGS, filtered LCEGS and LCEGSS definitions

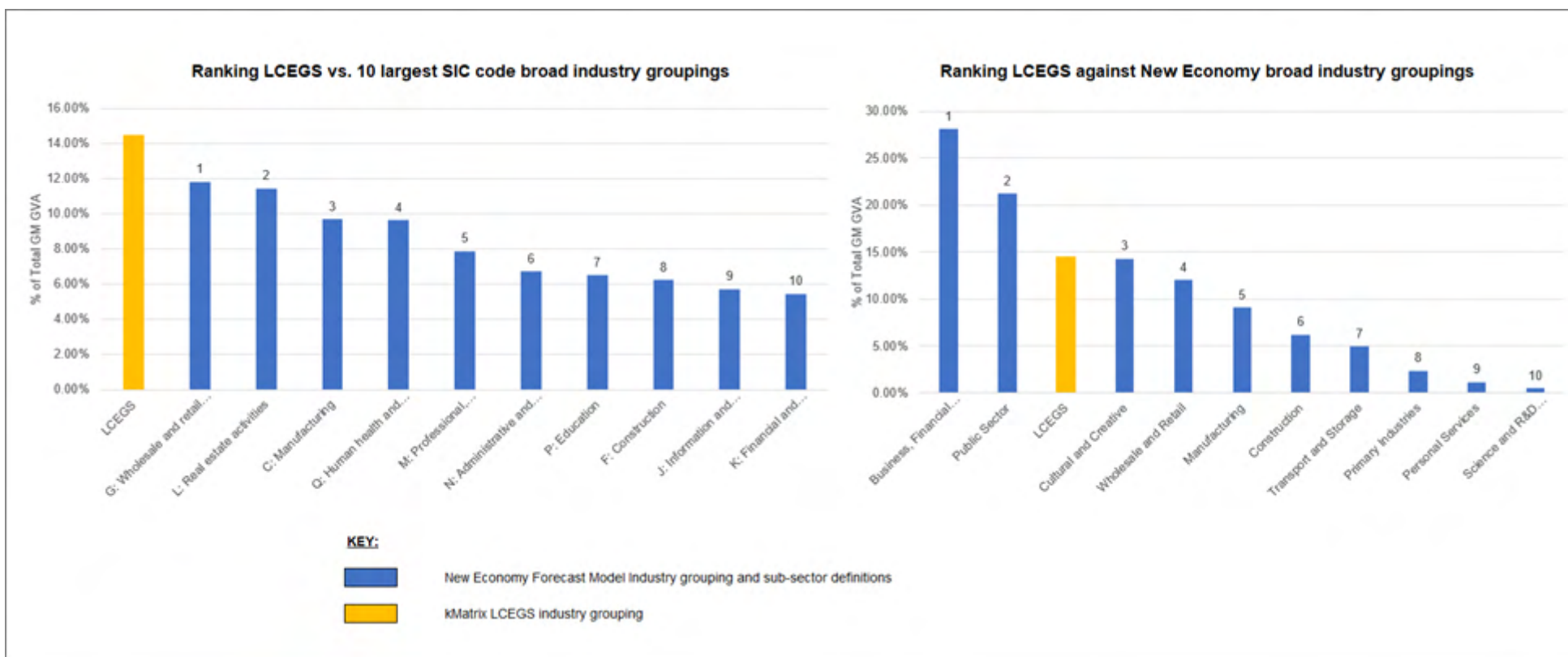
Figure 21: Ranking of Sectors and Sub-sectors by % of GM Total GVA

Low Carbon sector definitions ranking vs. SIC Code (SIC2007) Section Groupings (% of GM Total GVA)		Rank	Low Carbon sector definitions ranking vs. New Economy Broad Industry Groupings (% of GM Total GVA)		Rank	LCEGS Level 1 sub-sector ranking vs. New Economy Broad Industry Groupings Sub-sectors (% of GM Total GVA)		Rank
LCEGSS	17.0%		Business, Financial and Professional Services	28.10%	1	Professional Services	16.20%	1
LCEGS	14.5%		Public Sector	21.24%	2	Health and Social Care ("Q")	9.63%	2
Filtered LCEGS	12.2%		LCEGSS	17.0%		LCEGS Low Carbon	7.7%	
G: Wholesale and retail trade; repair of motor vehicles	11.8%	1	LCEGS	14.5%		Education ("P")	6.49%	3
L: Real estate activities	11.5%	2	Cultural and Creative	12.90%	3	Retail	6.29%	4
C: Manufacturing	9.7%	3	Filtered LCEGS	12.2%		Construction ("F")	6.22%	5
Q: Human health and social work activities	9.6%	4	Wholesale and Retail	12.04%	4	Financial Services ("K")	5.46%	6
M: Professional, scientific and technical activities	7.9%	5	Manufacturing	10.48%	5	Public Administration ("O")	5.11%	7
N: Administrative and support service activities	6.7%	6	Construction	6.22%	6	Transport and storage (including postal) ("H")	4.96%	8
P: Education	6.5%	7	Transport and Storage	4.96%	7	Advanced Manufacturing	4.89%	9
F: Construction	6.2%	8	Primary Industries	2.38%	8	Digital	4.73%	10
J: Information and communication	5.7%	9	Personal Services	1.16%	9	LCEGS Renewable	4.4%	
K: Financial and insurance activities	5.5%	10	Science and R&D (Excl. Manufacturing)	0.52%	10	Business Services	4.33%	11
O: Public administration and defence	5.1%	11				Wholesale	4.02%	12
H: Transportation and storage	5.0%	12				Tourism and Culture	3.92%	13
I: Accommodation and food service activities	2.7%	13				Creative Industries	3.12%	14
R: Arts, entertainment and recreation	1.9%	14				Other manufacturing	2.79%	15
S: Other service activities	1.8%	15				LCEGS Environmental	2.4%	
E: Water supply; sewerage and waste management	1.2%	16				Utilities	2.30%	16
D: Electricity, gas, steam and air conditioning supply	1.1%	17				Employment Activities	2.12%	17
A: Agriculture, forestry and fishing	0.04%	18				Food and drink manufacturing	1.86%	18
B: Mining and quarrying	0.04%	19				Motor trades	1.73%	19
						Personal Services	1.16%	20
						Sport	1.14%	21
						Textiles manufacturing	0.94%	22
						Science and R&D	0.52%	23
						Agriculture, forestry and fishing ("A")	0.04%	24
						Mining and quarrying ("B")	0.04%	25

Key	
Largest	13.20%
2nd Largest	10.76%
3rd Largest	9.32%
4th Largest	6.27%

Ranking LCEGS against SIC code and New Economy broad industry groupings (% total GM GVA)

Figure 22: Ranking LCEGS against various broad industry groupings as % of total GM GVA

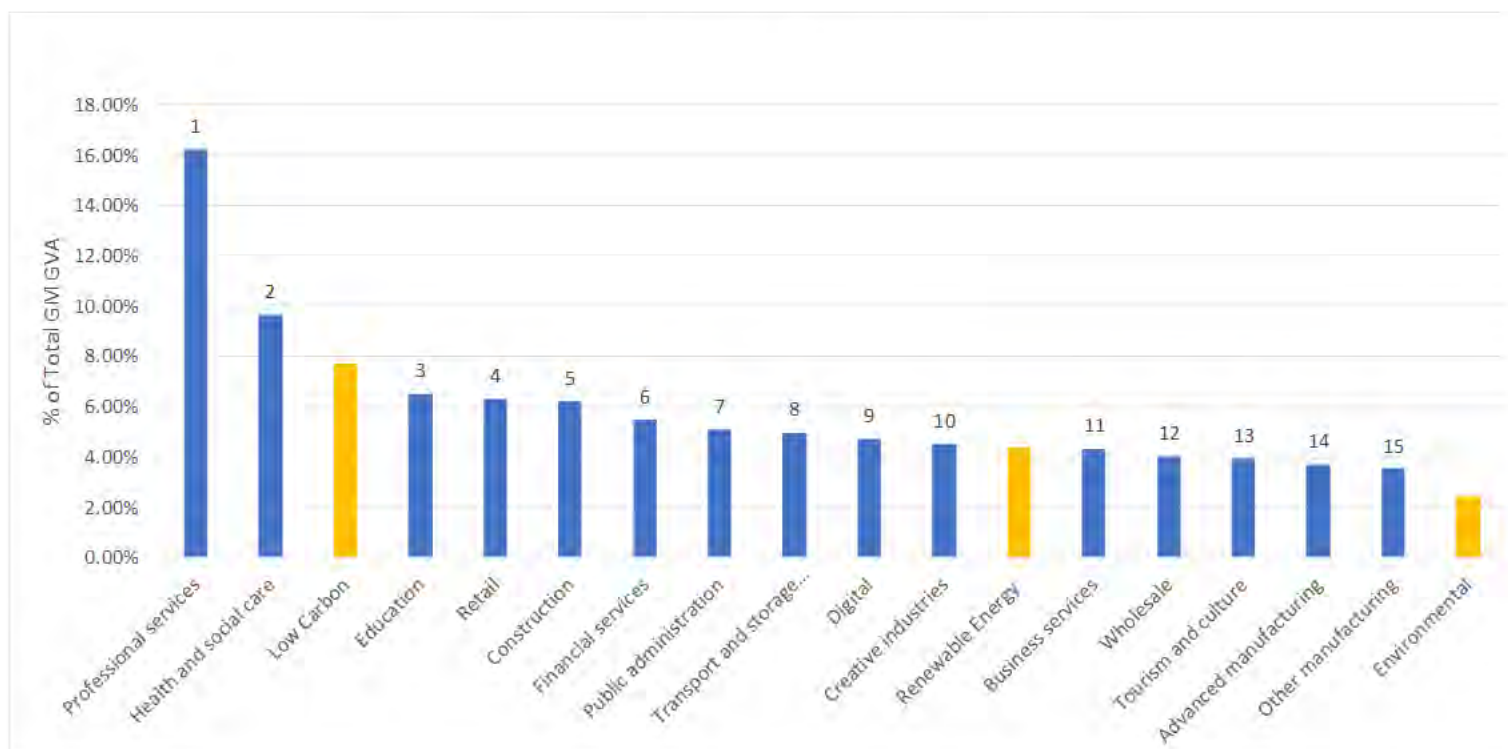




Ranking LCEGS sub-sectors and other low carbon groupings vs. Top 15 New Economy sub-sectors

Figure 23: Ranking LCEGS sub-sectors against New Economy sub-sectors

Ranking LCEGS sub-sectors vs. Top 15 New Economy sub-sectors



KEY:



New Economy Forecast Model industry grouping and sub-sector definitions

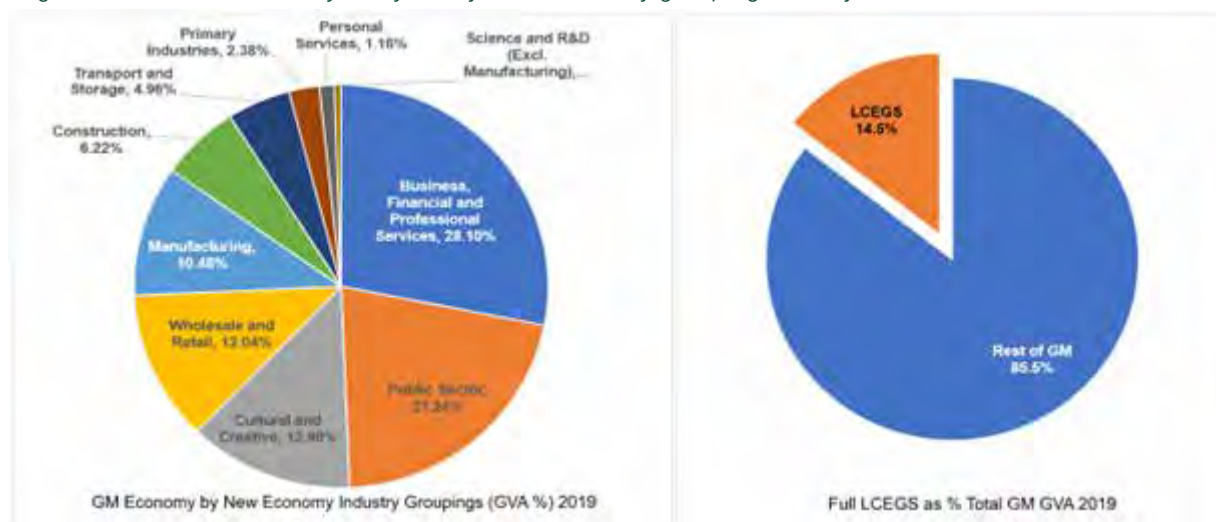


kMatrix LCEGS sub-sector industry grouping

GM LCEGS comparison with New Economy broad industry groupings

Note: In Figure 24 the LCEGS definition of the sector cuts across all the New Economy sector groupings shown on the left, therefore cannot be included in this pie chart.

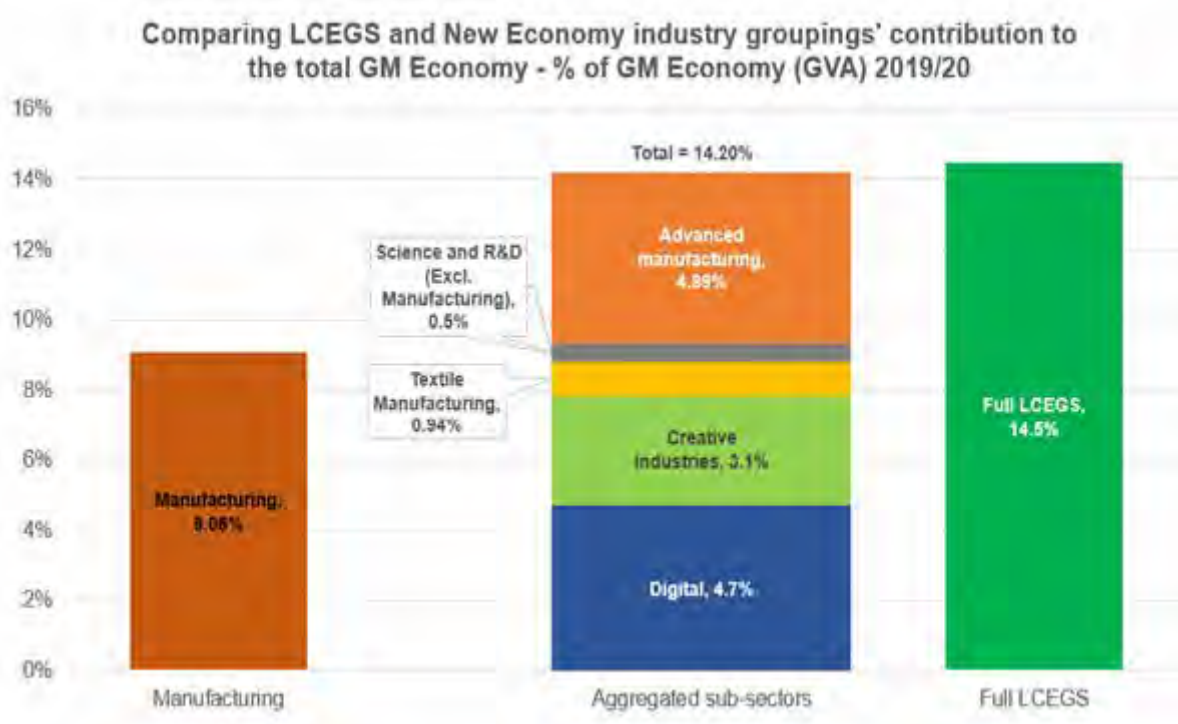
Figure 24: The GM Economy analysed by New Economy groupings and by LCEGS



GM LCEGS comparison with New Economy sub-sectors in aggregate

GM LCEGS is larger than the New Economy Manufacturing industry grouping (14.5 % vs. 9.08%).

Figure 25: Comparing LCEGS and New Economy Industry Groupings' contribution to the total GM Economy



GM LCEGS is larger than the New Economy sub-sectors of Advanced Manufacturing, Creative Industries, Digital and Science & R & D (Excl. manufacturing) COMBINED.

Diversification analysis methodology and data

LCEGS is a very diverse sector that incorporates a wide range of technologies and skills. As a growing sector, it offers opportunities for Companies with the right core technologies or skills to diversify into new markets.

In Diversification Analysis data is analysed through the use of Technology Blocks. Data is held in three Technology blocks:

- Block 1 = technologies and the inter-relationships between technologies including their cross application across sectors, for example waterjet cutting from the mining industry through to waterjet cutting in eye surgery.
 - Block 2 = markets - which includes data on market performance and market developments on a global geographic basis.
 - Block 3 = business models which includes both success and failure data in order to assess not only potentially successful business models per market and technology, but also what to avoid based on failure data.
1. In Block 1, the 128 Level 3 markets within LCEGS along with associated technologies, skills and know-how, alongside chosen adjacent sectors, along with their technologies, skills and know-how. The “fit” between the technologies, skills and know-how across LCEGS and the adjacent sectors is then analysed and expressed in percentage terms i.e. a high percentage equals a good fit between the industrial process and those used within the LCEGS market.
 2. In Block 2, each market/ industry technology is populated with the number of Companies within the GM geography. A single company may appear multiple times in this Block, if it operates in one or multiple industrial processes relevant to one or more LCEGS markets. Many other market metrics are included in this block to provide analysis on market potential in each relevant geography.
 3. The Block 3 data applies a second filter to the intersection of Blocks 1 and 2 adding a likelihood of business success / failure to certain diversification routes.
 4. To create a “diversification index” the percentage “fit” is applied to the company numbers, producing a number between 0 (low diversification potential) and 1.0 (high diversification potential).

Updated diversification analysis was requested based on the requirements in GM for:

- a) Retrofit of buildings for energy efficiency
- b) Decarbonisation of heat, transport and buildings
- c) Improving the natural environment (e.g. Air Quality)

The analysis undertaken shortlisted Professional Services, Process Industries, Engineering and Manufacturing as having the closest fit with the technology and skill requirements of the LCEGS sector and also have a significant presence in GM.

Updated analysis shows that the diversification opportunity in GM is valued at £179,238m in 2020/2021. This overall value is based on available market value, which equates to realizable additional Sales opportunity outside of GM, based upon activity in the past year.

The opportunity represents 28 LCEGS markets for 17 different industrial and business processes to diversify into. The strongest diversification opportunities are primarily for Engineering Companies. Further details are included within the main report.

GREATER MANCHESTER'S GREEN ECONOMY

SECTOR MAPPING STUDY

Report provided by Ove Arup and Partners with kMatrix Data services. Published October 2022



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