Statistical bulletin

Low carbon and renewable energy economy, UK: 2019

Estimates of the size of the UK's green economy from the Low Carbon and Renewable Energy Economy Survey, including turnover, employment and trade.

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Table of contents

1 . Main points

- Turnover in the UK low carbon and renewable energy economy (LCREE) was estimated to be £42.6 billion in 2019.

- Employment in the UK LCREE was estimated to be 202,100 full-time equivalent (FTE) in 2019.

- The LCREE as a whole has seen no significant change in size since the survey began in 2014.

- Businesses with 250 or more employees, saw growth of 9% turnover and 3% employment in their activities related to LCREE between 2018 and 2019.

- The low emission vehicles and infrastructure sector has seen growth, with turnover and employment increasing by 15% and 13% respectively between 2018 and 2019, to £6.0 billion and 16,000 FTE.

- Businesses classified within the manufacturing, energy supply and construction industries accounted for 82% of all UK LCREE turnover in 2019, and 74% of all employment.

2 . The low carbon and renewable energy economy in 2019

Businesses active in the UK low carbon and renewable energy economy (LCREE) generated £42.6 billion in turnover in 2019, with employment of 202,100 full-time equivalent (FTE) employees (Table 1).

Exports of goods and services by businesses active in the UK LCREE are estimated to be £7.0 billion in 2019, the majority of which was from the export of goods and services in the low emission vehicles sector (£4.2 billion).

Imports of goods and services by businesses active in the UK LCREE are estimated to be £6.0 billion in 2019. The largest proportion of expenditure on imports of goods and services was also within the low emission vehicles sector, which accounted for just over one-third of the total UK LCREE imports in 2019 (£2.0 billion).

The LCREE accounted for around 1% of total UK non-financial employment in 2019 and around 1% of total UK non-financial turnover in 2018, the latest time period for which a comparison for turnover is possible. Non-financial industries cover non-financial services, distribution, production, construction and agriculture.

All estimates in this bulletin are given in current prices as provided by the LCREE Survey respondents, with no adjustments made to account for the effects of inflation.

Table 1: In 2019, businesses active in the UK low carbon and renewable energy economy (LCREE) generated £42.6 billion in turnover and employed 202,100 employees (FTE).
Low carbon and renewable energy economy, turnover, employment, imports and exports estimates (and confidence intervals), UK and constituent countries, 2019

		Turnover (£ billions)	Employment (FTE)	Imports (£ billions)	Exports (£ billions)
UK estimates		42.6	202,100	6.0	7.0
	Lower CI	39.9	176,800	5.4	6.4
	Upper CI	45.2	227,300	6.5	7.7
England estimate		33.7	165,600	5.1	6.0
	Lower CI	31.2	142,100	4.7	5.4
	Upper CI	36.1	189,200	5.5	6.6
Scotland estimate		5.7	21,400	0.4	0.4
	Lower CI	5.2	17,300	0.3	0.3
	Upper CI	6.2	25,500	0.6	0.5
Wales estimate		2.1	9,700	0.3	0.4
	Lower CI	1.9	8,100	0.3	0.4
	Upper CI	2.4	11,400	0.3	0.4
Northern Ireland estimate		1.1	5,300	0.1	0.2
	Lower CI	0.9	3,700	0.1	0.2
	Upper CI	1.3	6,900	0.1	0.2

Source: Office for National Statistics - Low Carbon and Renewable Energy Economy Survey

Notes

1. Figures may not sum because of rounding.

2. Confidence intervals (CI), a standard way of expressing the statistical accuracy of a survey based estimate, are provided in the table. A 95 per cent confidence interval is a range within which the true population would fall for 95 per cent of the times the survey was repeated. If an estimate has a high error level, the corresponding confidence interval will be very wide.

3. Coefficients of variation (CVs), which provide another indicator of the quality of these estimates can be found in the datasets accompanying this release.

4. Figures for turnover, imports and exports have been rounded to the nearest £0.1 billion in the table but are available to the nearest £500,000 in the datasets accompanying this release. Figures for Employment have been rounded to the nearest 100.

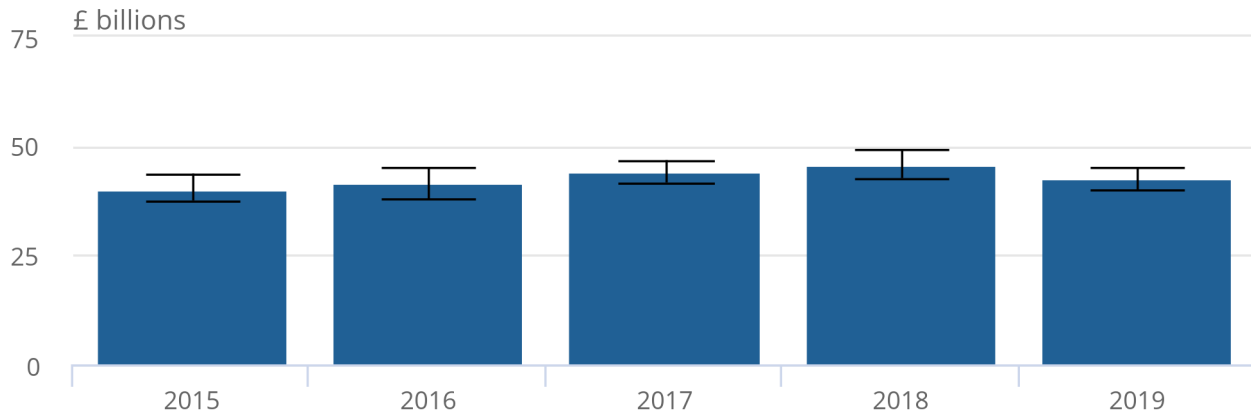# 3 . The low carbon and renewable energy economy over time

Activity in the low carbon and renewable energy economy (LCREE) is spread across a wide range of industries. Many sectors are small and for many businesses, LCREE activity is secondary rather than primary. This variability is reflected in the uncertainty around the estimates. Figures 1 and 2 show that there has been no significant change in the size of the LCREE between 2015 and 2019; that is, changes are not greater than the level that is explained by sampling variability. As the LCREE grows in size it will become easier to monitor changes over time.

Figure 1: There has been no significant change in turnover generated by the low carbon and renewable energy economy between 2015 and 2019

Low carbon and renewable energy economy, turnover estimates and confidence intervals (CIs), UK, 2015 to 2019

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Low carbon and renewable energy economy, turnover estimates and confidence intervals (CIs), UK, 2015 to 2019

Source: Office for National Statistics - Low Carbon and Renewable Energy Economy Survey
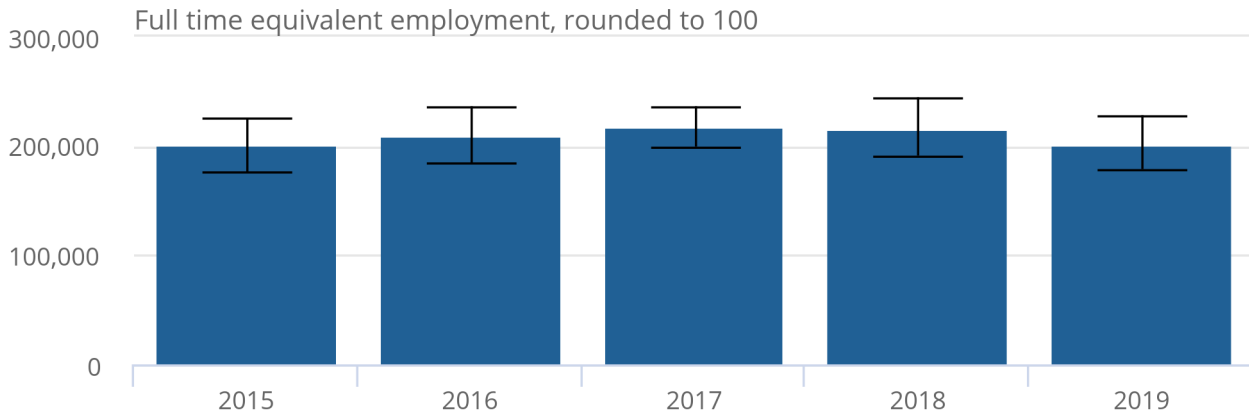
Notes:

1. The chart shows the time series of UK turnover in the low carbon economy, with confidence intervals displayed for each year's estimate. Data for the constitute countries can be found in the dataset accompanying this release.

2. 95% confidence intervals (CI), a standard way of expressing the statistical accuracy of a survey-based estimate, are provided in the table. A 95% confidence interval is the range within which the true population value would fall for 95% of the time, if the survey was repeated. If an estimate has a high error level, the corresponding confidence interval will be very wide.

3. Figures have been rounded to the closest £0.1 billion, but are available to the nearest £500,000 in the dataset accompanying this release.

4. Coefficients of variation (CVs), which provide another indicator of the quality of these estimates can be found in the dataset accompanying this release.

Figure 2: Between 2015 and 2019, employment in the low carbon and renewable energy economy has remained relatively stable

Low carbon and renewable energy economy, employment with confidence intervals (CIs), UK, 2015 to 2019 (FTE)

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Low carbon and renewable energy economy, employment with confidence intervals (CIs), UK, 2015 to 2019 (FTE)

Source: Office for National Statistics - Low Carbon and Renewable Energy Economy Survey

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3. Figures have been rounded to the closest 100 .

4. Coefficients of variation (CV's), which provide another indicator of the quality of these estimates can be found in the dataset accompanying this release.

A sector within the LCREE that has seen growth is low emission vehicles and infrastructure. In 2019, turnover generated by the low emissions vehicle sector was £6.0 billion, up around 15% on 2018 when turnover was £5.2 billion. The number of employees in this sector also increased, from 11,600 in 2018 to 16,000 in 2019, a 13% rise. As with all of low carbon turnover and employment, this increase could relate to the creation of new jobs or it could reflect the transfer from more traditional industries, in this case petrol and diesel cars. More data on the different low carbon and renewable energy economy sectors, including measures of uncertainty, can be found in the dataset accompanying this bulletin.

4 . Low carbon and renewable energy economy sectors

The energy efficient products sector (which excludes energy efficient lighting) was the largest sector of the UK low carbon and renewable energy economy (LCREE) in 2019. It accounted for around 31% (£13.2 billion) of UK LCREE turnover and 40% (81,300 full-time equivalent (FTE)) of LCREE employment (Figure 3). The energy efficient products sector has been the largest sector since the survey began in 2014 (see dataset). Examples of activity within this sector includes the design, manufacture or installation of energy efficient doors, windows and insulation. For full sector definitions of what is included in each LCREE sector, please see Table 2 of the Low Carbon and Renewable Energy Economy (LCREE) Survey Quality Methodology Information report.

The second-largest sector in terms of LCREE turnover in 2019 was the low emission vehicles sector, which includes the design and manufacture of vehicles with specific technology to significantly reduce or remove emissions. This sector accounted for 14% (£6.0 billion) of LCREE turnover. It was the fourth-biggest sector in terms of employment, accounting for around 8% of total LCREE employment (around 15,900 FTE) in 2019.
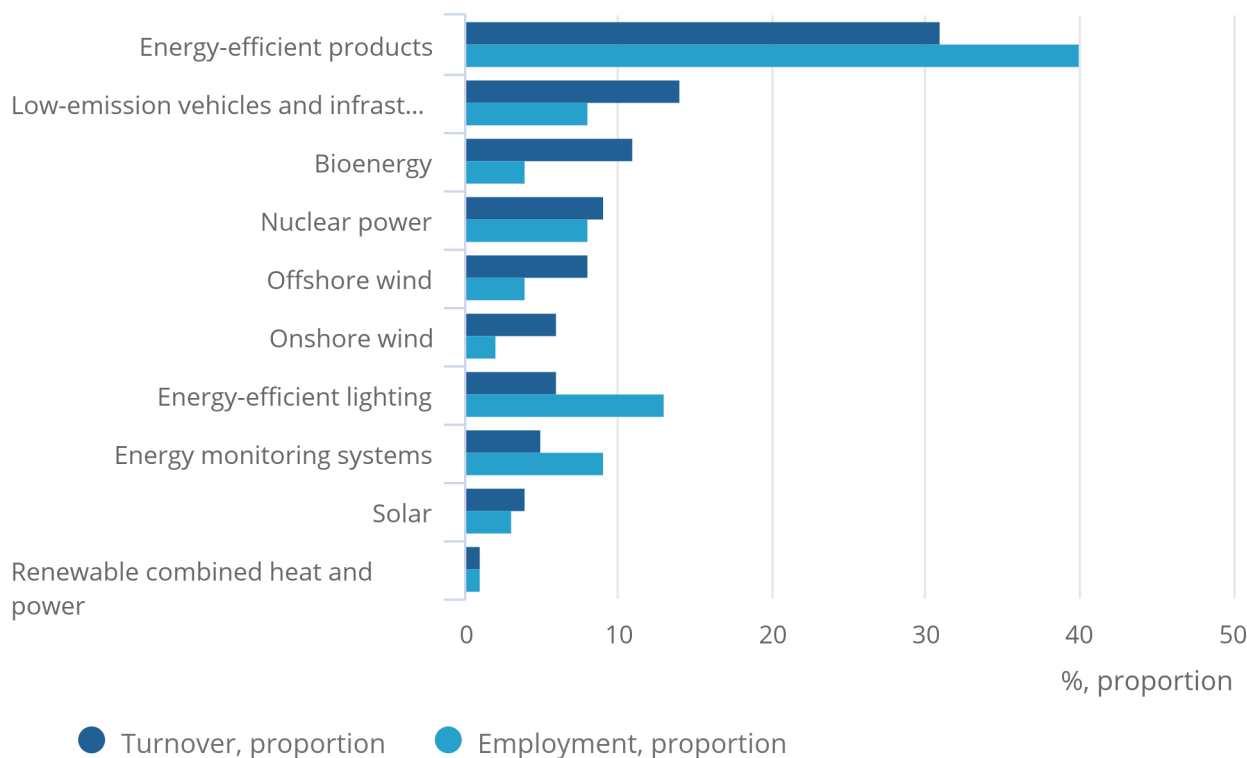
The top five sectors contributing to employment in the LCREE in 2019 differ from those which account for the most turnover, as can be seen in Figure 3. The energy efficient products, energy efficient lighting and energy monitoring sectors accounted for 63% of all LCREE employment in 2019, compared with 41% of LCREE turnover. Activities within these sectors tend to be more labour intensive when compared with other sectors such as bioenergy, and onshore and offshore wind.

Figure 3: The energy-efficient products sector was the largest sector for turnover and employment in 2019

Proportion of low carbon and renewable energy (LCREE) turnover and employment, selected sectors, UK 2019

Legend: Turnover, proportion · Employment, proportion

X-axis: %, proportion (0 to 50)

Sectors (top to bottom): Energy-efficient products, Low-emission vehicles and infrast..., Bioenergy, Nuclear power, Offshore wind, Onshore wind, Energy-efficient lighting, Energy monitoring systems, Solar, Renewable combined heat and power

Source: Office for National Statistics - Low Carbon and Renewable Energy Economy Survey

Notes:

1. The chart shows the 10 largest low carbon sectors in 2019. The level of uncertainty around the estimates means that rankings of the smaller sectors are indicative only. Data for other sectors are available in the dataset, along with confidence intervals and coefficients of variation (CVs) for all estimates.

2. For full sector definitions of what is included in each LCREE sector, please see Table 2 of the Quality and Methodology Information Report.

3. Figures are a percentage of the total LCREE turnover and employment. Actual figures can be found in the dataset.

4. Energy monitoring systems covers energy monitoring, saving or control systems.

5 . Low carbon and renewable energy economy by industry

The majority of low carbon and renewable energy activity in 2019 took place in businesses classified (according to Standard Industrial Classification 2007) within manufacturing, energy supply and construction industries. Businesses within these industries accounted for 82% of all low carbon and renewable energy economy (LCREE) turnover and 74% of employment (Figure 4).

Businesses within the manufacturing industry generated the largest proportion of LCREE turnover and employment compared with any other industry in 2019. This industry generated £15.5 billion turnover and employed 69,300 full-time equivalent (FTE) employees, around 36% of total UK LCREE turnover and 34% of employment in 2019. This was mostly from businesses active in the energy efficient products and low emission vehicles sectors.

The energy efficient products sector was also the largest LCREE sector within the construction industry in 2019. Businesses classified within the construction industry generated around £8.4 billion LCREE turnover in 2019 and employed 62,800 FTE employees in jobs relating to low carbon and renewable energy activity. The energy efficient products sector accounted for £5.4 billion of this turnover and 34,100 FTE employees.

Businesses classified within the energy supply industry can include activities relating to the generation of energy from sources such as wind, nuclear and bioenergy. These activities can be less labour intensive. This is reflected in the fact that while businesses in this industry accounted for around 26% (£11.0 billion) of all LCREE turnover, they only accounted for around 8% of total LCREE employment (16,800 FTE employees).

Figure 4: Businesses in the manufacturing industry contributed the most to the LCREE in 2019

The top four industry sections that contributed to the UK LCREE in 2019, as a proportion of total LCREE turnover and employment

Figure 4: Businesses in the manufacturing industry contributed the most to the LCREE in 2019

The top four industry sections that contributed to the UK LCREE in 2019, as a proportion of total LCREE turnover and employment
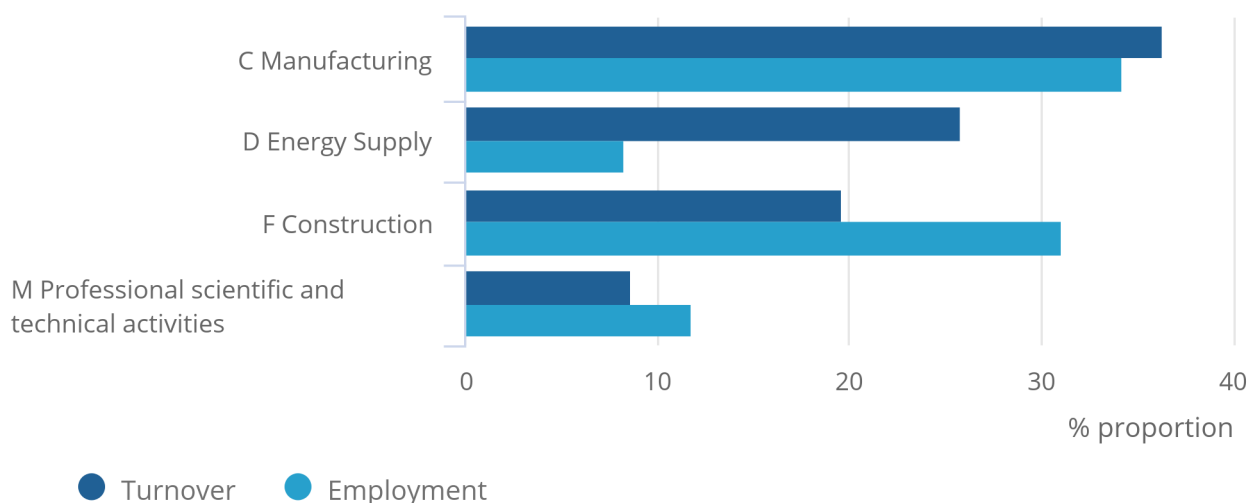
Source: Office for National Statistics - Low Carbon and Renewable Energy Economy Survey

Notes:

1. The chart shows the four largest sections in 2019. Because of the level of uncertainty around the data, rankings are indicative only. Data for other sections are available in the dataset, along with confidence intervals and coefficients of variation (CVs) for all estimates.

2. For full section definitions please see SIC 2007.

3. Figures are a percentage of the total LCREE figures.

4. For simplicity, the electricity, gas, steam and air conditioning supply category is referred to as "Energy Supply"

6 . Low carbon and renewable energy economy activity in businesses with 250 or more employees

All businesses with 250 or more employees are selected every year for the Low Carbon and Renewable Energy Economy Survey, so are not subject to sampling variability as the whole population is surveyed. It is therefore possible to compare these businesses over time without taking into consideration uncertainty measures. The estimates may still be subject to other errors, such as inaccurate reporting by businesses.

Activity relating to the low carbon and renewable energy economy (LCREE) in businesses with 250 or more employees has generally been increasing over time. Between 2018 and 2019, LCREE turnover generated by businesses with 250 or more employees grew by 9%, from £22.2 billion in 2018 to £24.2 billion in 2019.

It is important to note that these businesses only make up a part of the LCREE and are likely to act differently to small and medium-size businesses. Turnover from businesses with 250 or more employees accounted for 57% of total LCREE turnover in 2019 and 48% in 2018.

Businesses may also change size and drop in or out of the "businesses with 250 or more employees" category but remain in the wider LCREE, meaning it is not a static group. For these reasons, movements by this group are indicative only and it is not possible to make inferences about the whole economy from these movements.

Businesses with 250 or more employees accounted for 36% of total LCREE employment in 2019, employing 73,400 full-time equivalent (FTE) employees in LCREE activities. This represents an increase from 2018, when businesses with more than 250 employees accounted for 33% of total LCREE employment (71,100 FTE employees).

The increase in LCREE turnover and employment in businesses with 250 or more employees was largely because of the low emissions vehicles sector. Businesses with more than 250 employees in this sector saw an increase in turnover of £0.9 billion between 2018 and 2019, from £5.0 billion to £5.9 billion. Employment also increased during this time period for these businesses, by 2,200 FTE employees, to 13,900 FTE employees. The low emissions vehicles sector is dominated by large businesses; in 2019 over 90% of turnover generated by the low emission vehicles sector came from businesses with 250 or more employees. The movements of these businesses can therefore be seen as indicative of the overall LCREE low emissions vehicles sector.
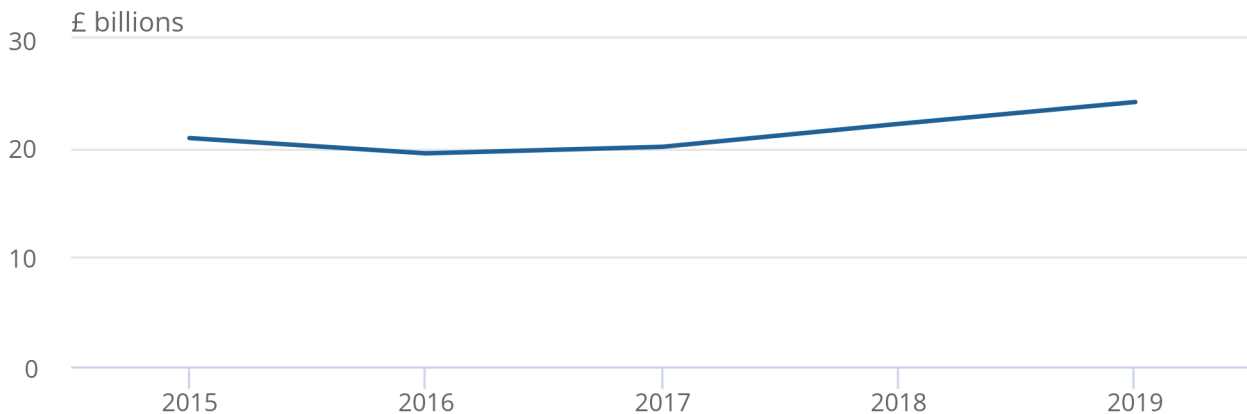
All estimates in this bulletin are given in current prices as provided by the LCREE Survey respondents, with no adjustments made to account for the effects of inflation.

Figure 5: LCREE turnovergenerated by businesses with 250 or more employees increased between 2018 and 2019

Low carbon and renewable energy economy, turnover estimates for businesses classified as having 250 or more employees, UK, 2015 to 2019

Figure 5: LCREE turnover generated by businesses with 250 or more employees increased between 2018 and 2019

Low carbon and renewable energy economy, turnover estimates for businesses classified as having 250 or more employees, UK, 2015 to 2019

£ billions

[Line chart showing LCREE turnover in £ billions from 2015 to 2019. Values start around 21 in 2015, dip to about 19.5 in 2016, rise gradually to about 20 in 2017, then increase to about 23 in 2018 and about 24.5 in 2019. Y-axis ranges from 0 to 30.]

Source: Office for National Statistics - Low Carbon and Renewable Energy Economy Survey

Notes:

1. The chart shows the time series of UK turnover generated by businesses with 250 or more employees in the low carbon economy. Data for each constitute country can be found in the dataset accompanying this release.

2. Figures for turnover have been rounded to the closest £0.1 billion, but are available to the nearest £500,000 in the dataset accompanying this release.

3. All businesses in the target population classified as having 250 or more employees are selected for the low carbon and renewable energy economy, so these estimates are not subject to sampling variation.

The fall in turnover between 2015 and 2016 was because of a number of factors, including a fall in activity in the bioenergy and onshore wind sectors. Production of electricity from wind fell in 2016 because of adverse weather conditions (less wind). Both the onshore and offshore wind sectors can be volatile, with respondents reporting a lot of contract work that can fluctuate year to year.

Figure 6: Employment in LCREE-related activitiesby businesses with 250 or more employees has been increasing since 2015

Low carbon and renewable energy economy, employment estimates for businesses with 250 or more employees, UK, 2015 to 2019 (FTE)

Figure 6: Employment in LCREE-related activities by businesses with 250 or more employees has been increasing since 2015

Low carbon and renewable energy economy, employment estimates for businesses with 250 or more employees, UK, 2015 to 2019 (FTE)

Full time equivalent, rounded to closest 100

	2015	2016	2017	2018	2019
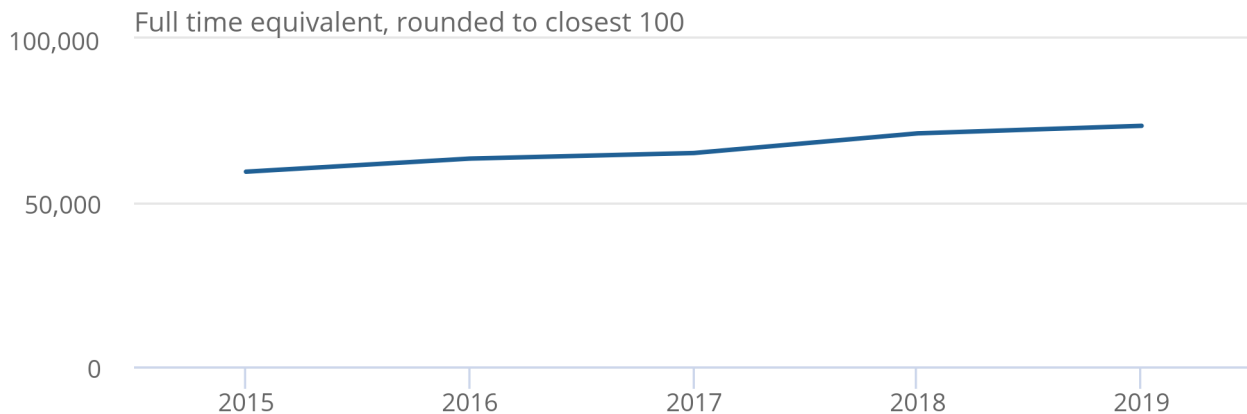
Source: Office for National Statistics - Low Carbon and Renewable Energy Economy Survey

Notes:

1. The chart shows the time series of UK employment for businesses with 250 or more employees active in the low carbon economy. Data for each constitute country can be found in the dataset accompanying this release.

2. Figures for employment have been rounded to the closest 100.

3. All businesses in the target population classified as having 250 or more employees are selected for the low carbon and renewable energy economy, so these estimates are not subject to sampling variation.

7 . Low carbon and renewable energy economy data

Low carbon and renewable energy economy estimates
Dataset | Released on 29 March 2021
Annual estimates of low carbon and renewable energy economy activity in the UK and constituent countries: turnover, employment, exports, imports, acquisitions, disposals and number of businesses.

8 . Glossary

Employment

Employment is measured in terms of full-time equivalent (FTE) employees, where one FTE employee may be thought of as one person working full-time for a year.

Industry

Businesses are classified into an industry using the current Standard Industrial Classification 2007 by the type of economic activity in which they are engaged.

Low carbon and renewable energy economy

Economic activities that deliver goods and services that are likely to help the UK generate lower emissions of greenhouse gases, predominantly carbon dioxide.

Low carbon and renewable energy sector

The LCREE Survey asks UK businesses to self-classify themselves into 17 low carbon and renewable energy sectors. A list of these sectors can be found in Section 9: Measuring the data. A business can be active in more than one sector.

Turnover

The amount received in sales from goods and services in a defined time period. It is a useful measure of the health of a business or an economy.

9 . Measuring the data

Data sources and collection

The Low Carbon and Renewable Energy Economy (LCREE) Survey was designed to provide greater detail on the low carbon and renewable energy economy in the UK. The survey was despatched for the sixth time in 2020, for the reporting year 2019, to a sample of around 24,000 businesses.

The survey collects information on turnover, imports, exports, employment, and acquisitions and disposals of capital assets, for 17 low carbon sectors. These are:

- offshore wind

- onshore wind

- solar photovoltaic

- hydropower

- other renewable electricity

- bioenergy

- alternative fuels

- renewable heat

- renewable combined heat and power

- energy efficient lighting

- other energy efficient products

- energy monitoring, saving or control systems

- low carbon financial and advisory services

- low emission vehicles and infrastructure

- carbon capture and storage

- nuclear

- fuel cells and energy storage

Coverage

Only the portion of economic activity of a business that directly relates to low carbon activities is included. This bulletin discusses estimates from the UK LCREE Survey for 2019 and revised figures for 2016 to 2018. Data for 2014, the first year of the survey, are included in the dataset only – see "Comparability with 2014 estimates" in Section 10: Strength and limitations

Revisions

This release contains revisions to estimates for the years 2016 to 2018 since they were last published in January 2020. Revisions are not unusual in the first few years of a new survey and result from a variety of factors, including:

- the incorporation of additional data received from businesses who have been sampled in multiple years of the survey

- changes to data as a result of businesses revising their previous submissions

- developments in methodology

For this release a new method of imputation was implemented for businesses with 250 and over employees and those on the "reference list" (businesses sampled each year). A ratio of means imputation method was chosen for this group, bringing the LCREE survey in line with best practice in other Office for National Statistics business surveys. An impact assessment found that while this method improves the top-level estimates, the actual changes were minimal. For this reason, the new methodology has only been applied from 2017 onwards.

Table 2 shows the effect of revisions to 2018 data on estimates of UK turnover, employment, imports and exports. Revisions have also been made to 2016 and 2017 data.

Revisions may continue to be made to the entire data time series if the survey methodology changes in the future.

Table 2: Revisions to Low Carbon and Renewable Energy Survey estimates, UK, 2018

	Latest estimate	Previously published estimate	Percentage change
Turnover (£ billions)	45.8	46.7	-2.0
Employment (FTE)	215,800	224,800	-4.0
Imports (£ billions)	5.9	6.1	-4.1
Exports (£ billions)	5.2	5.3	-2.0

Source: Office for National Statistics - Low Carbon and Renewable Energy Economy Survey

Notes

1. Number of full time equivalent (FTE) employees is rounded to the nearest 100.

2. All other variables are rounded to the nearest £0.1 billion.

3. Percentage change is calculated on the figures as published in the dataset.

Quality and methodology

More quality and methodology information on the strengths, limitations, appropriate uses, and how the data were created is available in the [Low Carbon and Renewable Energy Economy (LCREE) Survey QMI](). This includes further detail on the methods used to calculate business counts for sectors within the LCREE.

10 . Strengths and limitations

Limitations

Activity in the low carbon and renewable energy economy (LCREE) is spread across a wide range of industries. Many sectors are small but growing, and for many businesses LCREE activity is secondary rather than primary. For this reason, estimates of the number of businesses are subject to volatility and, though provided in the datasets, are not directly considered within this statistical bulletin.

Uncertainty

The figures in this bulletin are survey-based estimates and gather information from a sample rather than the whole population. This means that they are subject to measurable sampling uncertainty, which has an effect on how changes in the estimates should be interpreted. Estimates of the level of uncertainty associated with all figures (coefficients of variation and confidence intervals) reported are presented in the bulletin and datasets to aid interpretation. These uncertainty measures take into account both the variability in the estimate of the proportion of businesses active in the LCREE economy and the variability of the estimate of those active businesses. The former can be particularly variable because of sampling, as can be seen in the fluctuation in the estimates of the number of businesses and the higher level of uncertainty around them.

In general, changes in the estimates reported in this statistical bulletin are not usually greater than the level that is explainable by sampling variability. This means movements in the estimates should be treated as indicative only. Similarly, there will be some uncertainty around any proportions or rankings presented in this bulletin.

Sample size

The LCREE Survey was despatched for the sixth time in 2020, for the reporting year 2019, to a sample of 24,560 businesses. It achieved a response rate of 68% and of those responding, 2,331 businesses were operating in the LCREE sectors captured by the survey.

The response rate for 2019 data was lower than usual because of the coronavirus (COVID-19) pandemic. In 2018, the response rate was 81%. This means that the estimates in this statistical bulletin may be subject to more uncertainty than usual because of fewer respondents on which to base the survey results. However, analysis of results by different groups, such as employment size band, region and Standard Industrial Classification, found non-response was spread fairly evenly across these groups so non-response bias is not thought to be an issue in the top-level estimates.

The Office for National Statistics (ONS) has released a public statement on COVID-19 and the production of statistics. Specific queries must be directed to the Media Relations Office.

We designed the survey to provide greater detail on the UK LCREE. Results from the survey can be used to show business activity in 17 low carbon sectors which can be aggregated to show activity in six low carbon groups (in the dataset). More information on the sample, groups and sectors is available in the Low Carbon and Renewable Energy Economy (LCREE) Survey QMI.

Comparability with 2014 estimates

Estimates for 2014 are provided in the dataset accompanying this statistical bulletin. Comparing estimates from 2014 with estimates from later years of the survey should be treated with caution because of changes in the sample methodology in 2015.

The survey sample size was reduced from around 40,000 in 2014 to around 14,000 in 2015. To enhance the sample for 2015, a number of businesses that were known to have activity in the LCREE were selected. As they were not selected through random sampling, the weight applied to them to estimate for non-response is lower than it was in 2014. This partially explains why the estimates for the LCREE are generally lower in 2015 compared with 2014.

This does not apply to estimates for businesses with more than 250 employees, as all businesses of this size within the target population are selected every year.

11 . Related links

Environmental protection expenditure, UK: 2018
Bulletin | Released 6 May 2020
Estimates of environmental protection expenditure by UK general government and industries for 2018.

UK Environmental Accounts: 2020
Bulletin | Released 3 June 2020
Measuring the contribution of the environment to the economy, the impact of economic activity on the environment, and society's response to environmental issues. Satellite accounts to the main UK National Accounts.

Environmental goods and services sector (EGSS) estimates
Dataset | Released 3 June 2020
Estimates of the UK's environmental goods and services sector: output, gross value added, employment and exports, 2010 to 2017 and (provisional) 2018.