



Department for
Business, Energy
& Industrial Strategy



LOCAL AUTHORITY CARBON DIOXIDE EMISSIONS ESTIMATES 2016

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Executive Summary

This National Statistics publication provides the latest estimates of carbon dioxide emissions for Local Authority (LA) areas for 2005-2016. This report explains the background to the estimates, summarises the key results, and discusses some of the issues which need to be considered when using the data. Full details of the results and methodology are available in the Technical Report and accompanying spreadsheet, which can be found at the link below:

<https://www.gov.uk/government/collections/uk-local-authority-and-regional-carbon-dioxide-emissions-national-statistics>

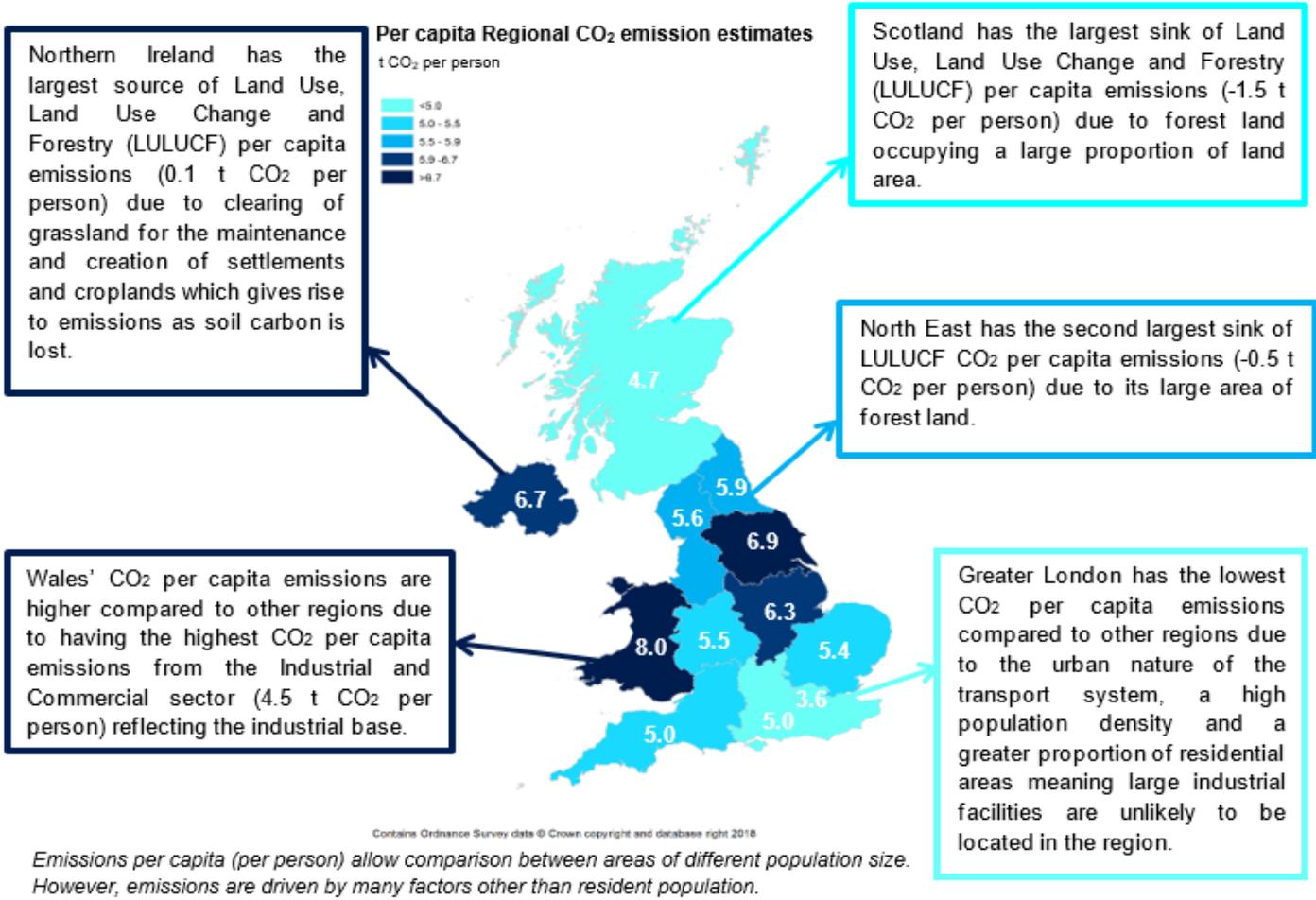
Emissions on an end-user basis (i.e. where emissions are distributed according to the point of energy consumption or point of emission if not energy related) have been assigned to all 391 Local Authorities in the UK: 326 of these are in England, 32 in Scotland, 22 in Wales and 11 in Northern Ireland.

Main Findings:

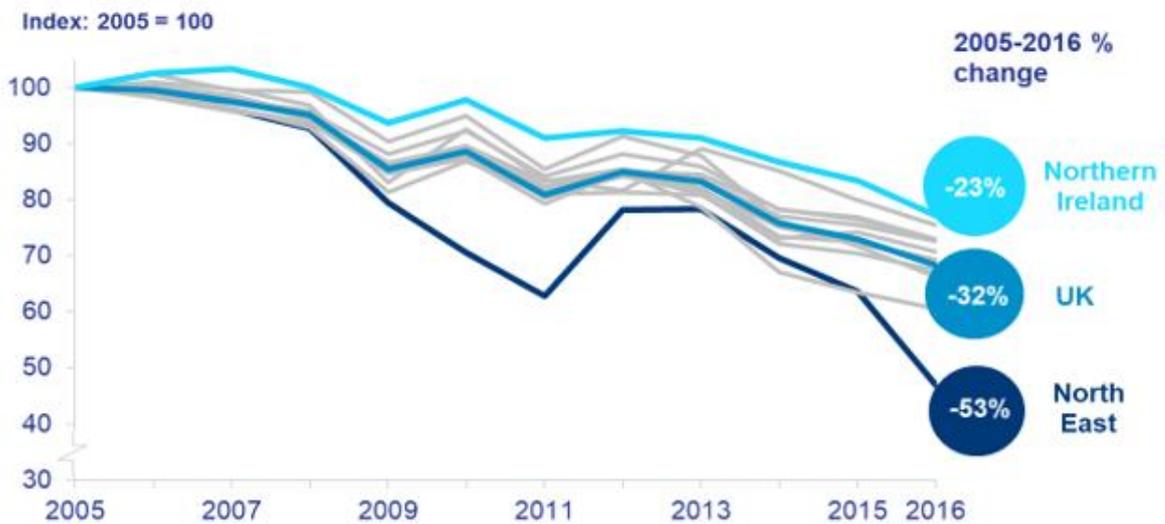
- Since 2015, emissions have decreased in 370 out of the 391 Local Authorities (95 per cent). This is consistent with the decrease in overall UK emissions from 2015 to 2016. The main drivers of the decrease in UK emissions in 2016 were a change in the fuel mix for electricity generation, with a decrease in the use of coal and more use of gas and renewables.
- Overall in 2016, 38 per cent of end-user emissions assigned to Local Authority areas (excluding emissions from Land Use, Land Use Change and Forestry (LULUCF)) were attributed to the industry and commercial sector, 28 per cent to the domestic sector, and 35 per cent to transport. There are wide local variations on this mainly because of the economy and geography of different local areas.
- The transport sector had the highest share of end-user emissions in 49 per cent of authorities. The industrial and commercial sector had the highest share in 28 per cent and the domestic sector had the highest share in 23 per cent of authorities.
- In 2016, about 59 per cent of domestic end-user emissions came from gas use and 31 per cent were due to electricity consumption.

Figure 1: Summary of key findings

Greater London has the smallest and Wales has the largest CO₂ per capita emissions for 2016



The North East experienced the largest percentage reduction in CO₂ emissions from 2005 to 2016 due to industry closures



Introduction

The UK compiles an annual inventory of its greenhouse gas (GHG) emissions in order to monitor progress against domestic and international targets such as the Kyoto Protocol. Disaggregated versions of the UK inventory are also produced for England, Scotland, Wales and Northern Ireland, along with maps estimating the geographical distribution of the sources of emissions.

Carbon dioxide (CO₂) is the main greenhouse gas, accounting for about 81 per cent of the UK greenhouse gas emissions in 2016. This publication combines data from the UK's GHG inventory with data from a number of other sources, including local energy consumption statistics, to produce a nationally consistent set of carbon dioxide emissions estimates at Local Authority level.

The statistics show emissions allocated on an “end-user” basis where emissions are distributed according to the point of energy consumption (or point of emission if not energy related). Except for the energy industry, emissions from the production of goods are assigned to where the production takes place. Therefore, emissions from the production of goods which are exported will be included, and emissions from the production of goods which are imported are excluded.

The statistics are largely consistent with the UK national GHG inventory and with the Devolved Administration GHG inventories, but there are some minor methodological differences which are explained later in this publication. If you are looking for emissions figures at UK or DA level, you should use the UK¹ or DA² inventories rather than this publication.

These statistics cover the period from 2005 to 2016. A consistent time series has been produced by re-calculating the 2005 to 2015 estimates to reflect the methodological changes used in calculating the 2016 estimates. This is important as it allows changes to be monitored over time.

Full details of the results and methodology are available in the supplementary reports and files published alongside this statistical release.

¹ Final UK greenhouse gas emissions, 1990-2016

<https://www.gov.uk/government/collections/final-uk-greenhouse-gas-emissions-national-statistics>

² Devolved Administration Greenhouse Gas Inventories

http://naei.beis.gov.uk/reports/reports?report_id=958

Use of the Estimates

The purpose of these estimates is to assist those wishing to understand and assess changes in Local Authority emissions. Local Authorities are not mandated to have greenhouse gas emissions reductions targets, but some Local Authorities do have such targets. These statistics allow Local Authorities to track their GHG emissions trends over time, and measure progress against any targets they have. While Local Authorities are the main users of the statistics, other users include non-profit organisations, the Devolved Administrations, government departments, and academia.

It is important to bear in mind that circumstances vary greatly between authorities, and that Local Authorities have relatively little influence over some types of emissions. For all these reasons, these statistics should be interpreted with caution. However, used with care they can provide help in setting priorities. In particular, the dataset is sufficiently robust to set a baseline against which action on climate change can be monitored at a local level.

It should be noted that the results for regional level, which are also available from the dataset, are much more robust. Most of the difficulties in allocating data to Local Authorities have little impact at regional level. Problems of interpretation, such as economic activity or transport taking place across boundaries, still exist but are less acute at the regional level than at the local level.

There are some important limitations that users of these estimates should be aware of. These include:

- Unallocated electricity where electricity sales within the sub-national dataset cannot be successfully allocated to specific LAs, due to lack of information.
- Transport emission estimates rely on national traffic statistics, and distribution of traffic on minor roads has had to be imputed at local level from regional level data.
- The local distribution of emissions from sources other than gas, electricity generation or transport largely has to be estimated from proxy information such as population or employment data.
- Some of the key sources used for mapping emissions do not cover the whole of the UK, and therefore alternative methods have had to be used for authorities in Northern Ireland.

Further details on data quality and the methods used are available in the supplementary reports published alongside this statistical release.

2016 Emissions

Estimates of carbon dioxide emissions have been produced for each Local Authority in the UK from the following broad source categories:

- Industry, commercial & public sector (including electricity-related emissions)
- Domestic (including electricity-related emissions)
- Transport
- Land use, land use change and forestry (including removals of carbon dioxide from the atmosphere, so that net emissions from this sector can sometimes be negative)

The level of sectoral detail is constrained by that available in the BEIS statistics on local electricity and gas use. To estimate a further breakdown would have involved further general assumptions about energy use for different sectors, since local data is not available. However, further details, mostly in terms of fuel types, are shown in the Technical Report in order to provide additional insight into how the estimates are constructed.

2016 emissions by region

Table 1 and Figure 2 shows a summary of the end-user emissions by region. Results for individual Local Authorities can be found in the spreadsheet published alongside this statistics release. There is a great deal of variation between LAs. In particular a significant amount of industrial emissions are concentrated in a few areas, so the contribution of industrial and commercial emissions in 2016 for specific Local Authorities may be different from the regional averages in Table 1.

Table 1: End-user carbon dioxide emissions

Regional Summary, 2016

	Industrial & commercial	Domestic	Transport	LULUCF	Total	MtCO ₂ Change from previous year
UK ²	143.0	102.4	128.1	-16.0	357.5	-6%
Wales ¹	14.1	5.2	6.4	-0.8	24.9	-5%
Scotland ¹	13.3	9.3	10.9	-8.3	25.2	-4%
N. Ireland ¹	4.7	3.4	4.1	0.2	12.4	-8%
England ¹	107.7	84.3	106.7	-6.3	292.2	-6%
North East	8.1	4.3	4.5	-1.4	15.5	-26%
North West	15.5	11.3	13.8	-0.3	40.2	-4%
Yorkshire and the Humber	18.0	8.7	11.0	-0.3	37.4	-5%
East Midlands	11.9	7.6	10.7	-0.4	29.8	-5%
West Midlands	11.1	8.9	12.6	-0.4	32.2	-4%
East of England	9.8	9.5	14.1	-0.4	33.0	-5%
Greater London	11.7	11.5	8.0	-0.1	31.2	-8%
South East	12.9	14.1	20.1	-2.1	45.1	-4%
South West	8.7	8.2	11.9	-0.9	27.8	-5%

Source: [2005 to 2016 UK local and regional CO2 emissions –data tables](#)

Notes:

1. These data are not fully consistent with the equivalent data for the Devolved Administrations. A reconciliation of these sets of figures can be found in the England Reconciliation, Wales Reconciliation, Scotland Reconciliation and Northern Ireland Reconciliation sheets.
2. Sum of Local Authority emission estimates are not fully consistent with the official inventory for the UK (see Table 11 for details).

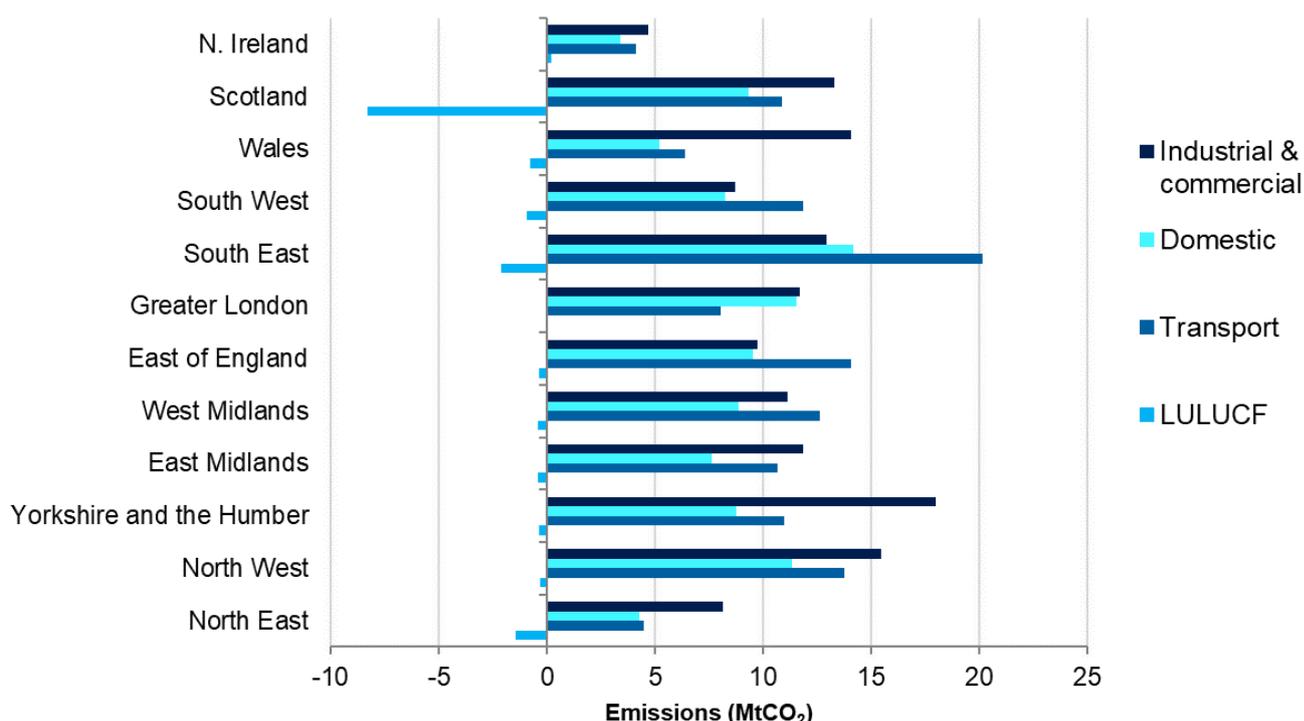
Figure 2: 2016 end-user carbon dioxide emissions by region and sectorSource: [2005 to 2016 UK local and regional CO2 emissions –data tables](#)

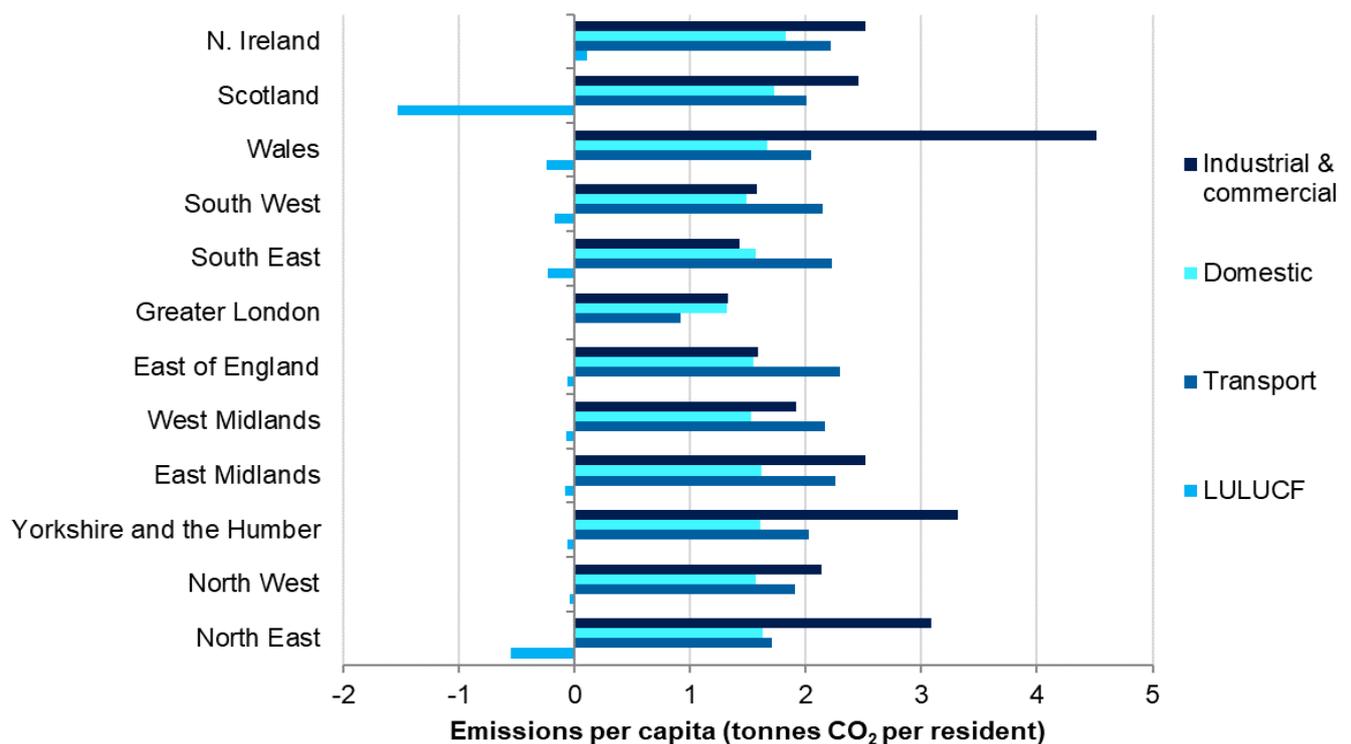
Table 2 and Figure 3 shows emissions per capita in order to make some allowance for the different size of regions. However, it should be noted that while emissions per capita may be a useful measure for domestic emissions, emissions from industry and transport are driven by many factors other than resident population. Therefore industrial and commercial, and transport emissions per capita should be interpreted with caution.

Table 2: End-user carbon dioxide emissions per capita

Regional Summary, 2016

	t CO ₂ per person					
	Industrial & commercial	Domestic	Transport	LULUCF	Total	Change from previous year
UK ²	2.2	1.6	2.0	-0.2	5.4	-7%
Wales ¹	4.5	1.7	2.1	-0.2	8.0	-6%
Scotland ¹	2.5	1.7	2.0	-1.5	4.7	-5%
N. Ireland ¹	2.5	1.8	2.2	0.1	6.7	-8%
England ¹	1.9	1.5	1.9	-0.1	5.3	-7%
North East	3.1	1.6	1.7	-0.5	5.9	-27%
North West	2.1	1.6	1.9	0.0	5.6	-5%
Yorkshire and the Humber	3.3	1.6	2.0	-0.1	6.9	-5%
East Midlands	2.5	1.6	2.3	-0.1	6.3	-6%
West Midlands	1.9	1.5	2.2	-0.1	5.5	-5%
East of England	1.6	1.6	2.3	-0.1	5.4	-6%
Greater London	1.3	1.3	0.9	0.0	3.6	-9%
South East	1.4	1.6	2.2	-0.2	5.0	-5%
South West	1.6	1.5	2.2	-0.2	5.0	-5%

Source: [2005 to 2016 UK local and regional CO2 emissions –data tables](#)

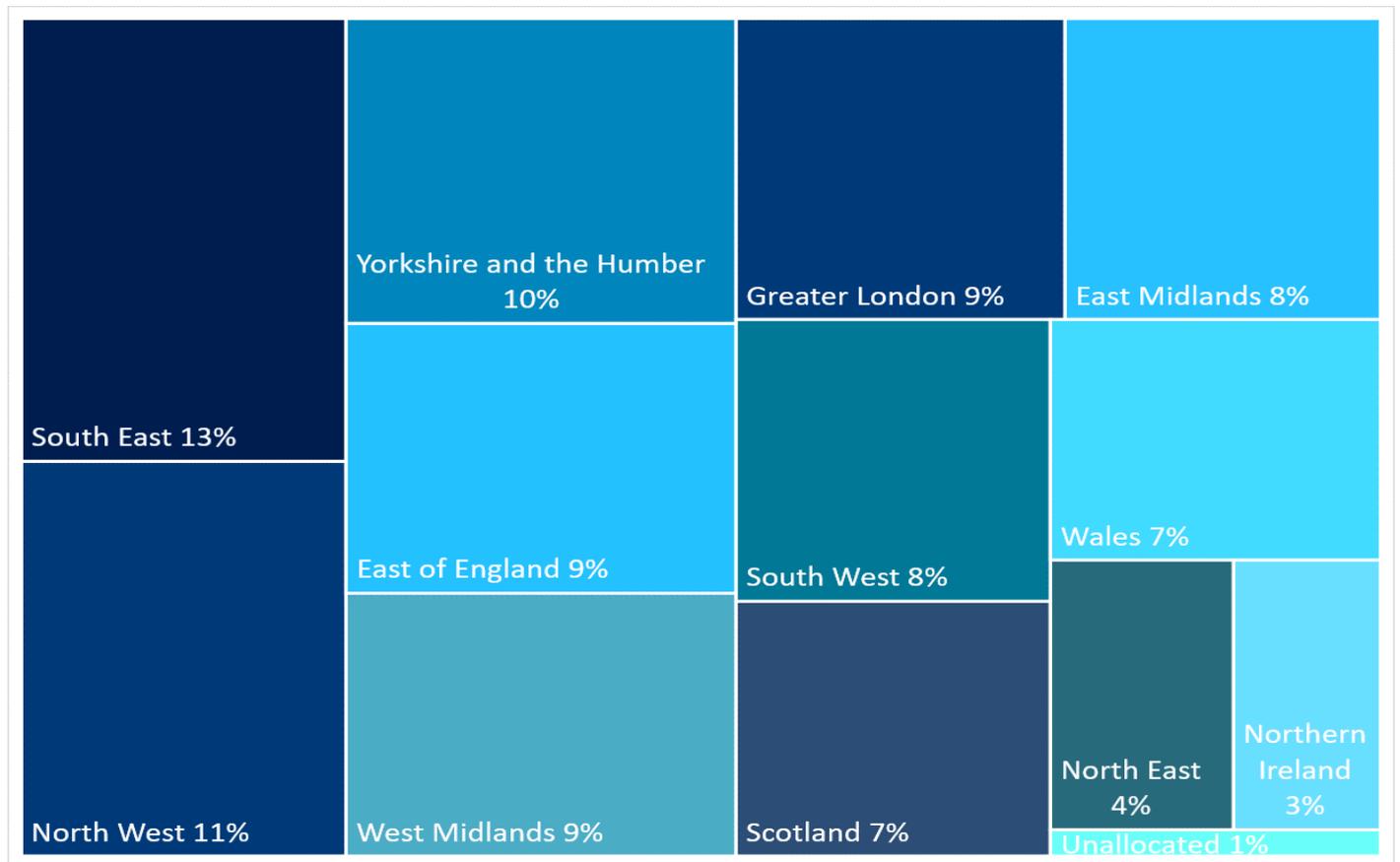
Figure 3: 2016 per capita end-user carbon dioxide emissions by region and sector

Source: [2005 to 2016 UK local and regional CO2 emissions –data tables](#)

Emissions per capita allow comparison between areas of different population size. Wales, Yorkshire and the Humber and Northern Ireland have the highest emissions per capita. This is mainly due to higher emissions per capita from the industrial and commercial sector reflecting the industrial base present in these regions, except for Northern Ireland where industrial and commercial per capita emissions are close to the UK average, but per capita emissions from the LULUCF sector are higher than average. Greater London has the lowest per capita emissions, as the urban nature of the transport system and the high population density of Greater London results in lower emissions than the UK average when total emissions, including non-domestic emissions, are spread across residents. Additionally in Greater London there are a greater proportion of residential areas which means that large industrial facilities are unlikely to be located there, which contributes to the low per capita emissions.

Figure 4 shows how total emissions are split across the various regions.

Figure 4: 2016 Proportion of emissions across regions



Source: [2005 to 2016 UK local and regional CO2 emissions –data tables](#)

2016 emissions by sector

Table 3 and Figure 5 below show the number of Local Authorities with different proportions of emissions coming from the different sectors. The proportion of emissions attributable to the industrial and commercial, domestic and transport sectors differs considerably across the Local Authorities. For the majority there is no single sector that accounts for more than 50 per cent of emissions.

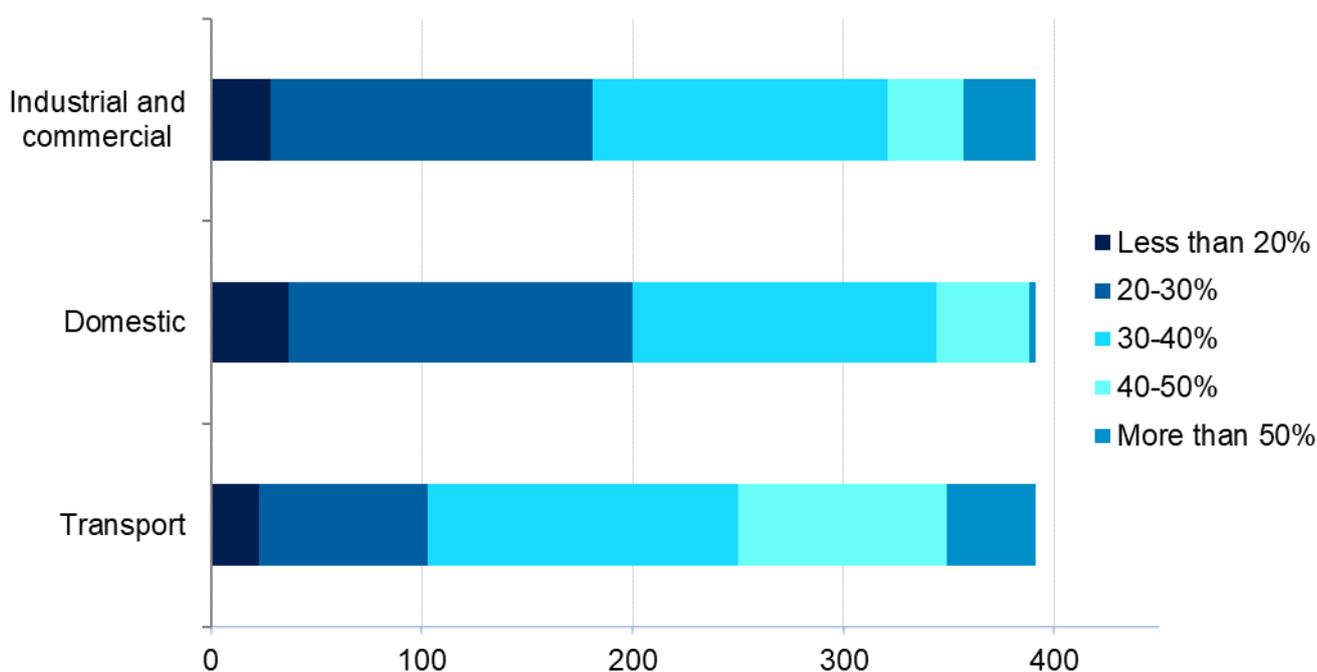
Table 3: Sectoral breakdown of emissions: Number of Local Authorities with a given proportion of emissions (excluding LULUCF)

Local Authorities, 2016

Proportion of emissions	Number of Local Authorities, excluding LULUCF		
	Sector (number of Local Authorities where sector accounts for corresponding proportion of emissions)		
	Transport	Domestic	Industrial and commercial
Less than 20%	23	37	28
20-30%	80	163	153
30-40%	147	144	140
40-50%	99	44	36
More than 50%	42	3	34
Total	391	391	391

Source: [2005 to 2016 UK local and regional CO2 emissions –data tables](#)

Figure 5: Sectoral breakdown of emissions: Number of Local Authorities with a given proportion of emissions in 2016 (excluding LULUCF)



Source: [2005 to 2016 UK local and regional CO2 emissions –data tables](#)

Domestic sector

In 2016, domestic sector emissions for per cent all Local Authorities were lower than in 2015. The main driver for this was a decrease in the use of coal for electricity generation, which led to a decrease in emissions for domestic electricity. In 2016, about 59 per cent of domestic end-user emissions arose from gas use, 31 per cent from electricity, and 11 per cent from consumption of other fuels.

Looking at longer term trends, national emissions from the domestic sector have decreased since 2005 and the same is true for all Local Authorities. The Local Authorities with the largest decrease in domestic sector end-user emissions since 2005 are Isles of Scilly, Shetland Islands and Blackpool where there has been a reduction of more than 40 per cent.

Emissions per capita vary least between areas for the domestic sector, and are dominated by gas and electricity consumption, for which real local data are available. BEIS publishes domestic energy consumption data to regional and Local Authority level³. These data have been used to estimate emissions for the domestic sector for all Local Authorities, related to gas and electricity consumption. Domestic emissions here represent emissions from energy consumption in and around the home, including emissions attributable to the use of electricity, but not activities by private individuals elsewhere, such as personal travel. Table 4 shows the range of emissions per capita in this sector across Local Authorities, there are more Local Authorities in the lower categories than in 2015, this is due in part to emissions re-allocated to this sector from electricity generation from the national totals which has decreased since 2015.

Table 4: Breakdown of Local Authorities by carbon dioxide emissions per capita in the domestic sector

Local Authorities, 2015-2016

Tonnes per person	tCO ₂ per person, number of Local Authorities and percentages			
	Number of LAs 2015	Percentage of LAs 2015	Number of LAs 2016	Percentage of LAs 2016
Less than 1	1	<1%	2	1%
1 to 1.5	60	15%	109	28%
1.5 - 2	288	74%	264	68%
2 - 2.5	39	10%	15	4%
more than 2.5	3	1%	1	<1%

Source: [2005 to 2016 UK local and regional CO2 emissions –data tables](#)

For 23 per cent of Local Authorities (91 of 391) the domestic sector was the greatest contributor to end-use emissions in 2016. This sector can be influenced by the fuel types used, the type and condition of the housing (including its insulation), the average temperature

³ <https://www.gov.uk/government/collections/total-final-energy-consumption-at-sub-national-level>

(urban areas can be much warmer and therefore easier to heat than rural areas), average household size, type of household and the income and preferences of the occupiers.

Transport sector

Transport emissions include freight and passenger transport, both private and for business purposes. The estimates are made on the basis of the distribution of traffic, therefore some of the emissions within an authority represent through traffic, or part of trips into or out of the area, whether by residents or non-residents. In some authorities this can be particularly significant, and the issue has to be borne in mind when looking at either totals or per capita estimates. The Technical Report shows how the estimates break down between major and minor roads, to help with consideration of this point. On the end-user basis, transport emissions include a share of emissions from oil refineries.

National transport emissions showed a small increase in 2016 and this is reflected in the emission for Local Authorities where 95 per cent (370 out of 391) had an increase in emissions (average increase of 2.0 per cent).

Since 2005 national transport emissions have decreased, even though there has been an increase in both the number of passenger vehicles⁴ and the vehicle kilometres travelled⁵. This is due to lower petrol consumption by passenger cars outweighing an increase in diesel consumption and improvements in fuel efficiency of both petrol and diesel cars⁶. This is reflected in Local authorities where 90 per cent (353 out of 391) have seen a decrease in emissions since 2005.

Industrial, commercial and public sector

These emissions are dominated by industrial and commercial electricity consumption. The estimates are based on sub-national electricity consumption data published by BEIS⁷, which have been used to map carbon dioxide emissions from electricity generation to the point of consumption. For some Local Authorities, emissions from large industrial installations will be the dominant factor, and these have been mapped using the National Atmospheric Emissions Inventory database of point sources.

Most Local Authorities (372 out of 391) in the UK have experienced a decrease in emissions from this sector between 2015 and 2016. This is consistent with national trends where emissions decreased due to a decrease in the use of coal for electricity generation. Looking at longer term trends, all but 2 Local Authorities have seen decreases in emissions from this sector since 2005.

⁴ <https://www.gov.uk/government/statistical-data-sets/tsqb09-vehicles>

⁵ <https://www.gov.uk/government/statistical-data-sets/tsqb01-modal-comparisons>

⁶ <https://www.gov.uk/government/statistical-data-sets/tsqb03>

⁷ <https://www.gov.uk/government/collections/sub-national-electricity-consumption-data>

Local Authorities with large changes in emissions since 2015

Overall, emissions decreased in 370 out of 391 Local Authorities since 2015 reflecting a 6.3 per cent decrease in national emissions totals between 2015 and 2016. For many Local Authorities the sub-sectors largely responsible for the changes in emissions from 2015 were Industrial and Commercial Electricity and Gas. This reflects changes in emissions at the National level mainly due to a decrease in the use of coal for electricity generation. The exceptions to this are those Local Authorities that have shown changes in large industrial installations following closures of large industrial sites in those areas. Table 5 shows some examples of Local Authorities that had particularly big increases or decreases in emissions and the sub-sector(s) driving this change. The largest fall between 2015 and 2016 was seen in Redcar and Cleveland following the closure of SSI steelworks in late 2015. Allerdale saw a 22 percent fall in emissions since 2015 following particularly high levels of industrial and commercial gas consumption in 2015.

Table 5: Local Authorities that had the largest changes in emissions

Local Authorities, 2015-2016

Local Authority	Percentage change	Percentages
		Sub-sector most responsible for decreases and increases in that area
Redcar and Cleveland	61% decrease	Large Industrial Installations
Allerdale	22% decrease	Industrial and Commercial Gas
Dumfries and Galloway	19% decrease	Industrial and Commercial Electricity
Sheffield	9% increase	Industrial and Commercial Gas
Hartlepool	11% increase	Industrial and Commercial Gas

Source: [2005 to 2016 UK local and regional CO2 emissions –data tables](#)

Methodological improvements since last year and revisions to the data for 2005 to 2016

In the production of the 2016 estimates, new data were introduced, together with some improvements to the underlying methodology. In order to ensure that the data for 2005 to 2015 are consistent with the data now available for 2016, the estimates for these years have been revised to incorporate both the new data and the improvements in the underlying methodology. For some LAs, these revisions have resulted in noticeable changes to the emissions estimates in the earlier years for some sectors. More information and specific examples are given in the Technical Report.

Large Industrial Installations

Improved data has been identified and reconciled with improved inventory methodology as well as changes to the activity allocation for point source emissions.

Industrial and commercial other fuels

A number of changes have been made to reflect changes at the national level that affect both the overall emissions and the distribution of emissions.

Land Use, Land Use Change and Forestry

A number of changes have been made to reflect changes at the national level that affect both the overall emissions and the distribution of emissions.

Emissions trends since 2005

When the Local Authority emissions are aggregated, estimated total CO₂ emissions decreased by around 32 per cent since 2005 (the earliest year for which data are available at Local Authority level) – falling from 523 million tonnes to 357 million tonnes. Whilst emissions have decreased over time there have been periods of fluctuation, with emissions increasing between 2009 and 2010 (largely due to exceptionally cold weather in 2010 and relatively low emissions in 2009 as a consequence of economic factors) and between 2011 and 2012 (largely due to variations in temperature). For information on the drivers of trends at national level, see National Statistics on Final UK Greenhouse Gas Emissions⁸.

Regional trends since 2005

Table 6: End-user carbon dioxide emissions 2005 and 2016

Regional Summary, 2005 and 2016

Region / country	2005		2016		MtCO ₂ /tCO ₂
	Total emissions (MtCO ₂)	Per capita (tCO ₂)	Total emissions (MtCO ₂)	Per capita (tCO ₂)	Percentage change between 2005 and 2016 total emissions
UK ²	523	8.7	357	5.4	-32%
Wales ¹	33	11.1	25	8.0	-24%
Scotland ¹	42	8.1	25	4.7	-39%
N. Ireland ¹	16	9.3	12	6.7	-23%
England ¹	428	8.5	292	5.3	-32%
North East	33	12.9	15	5.9	-53%
North West	60	8.7	40	5.6	-33%
Yorkshire and the Humber	53	10.3	37	6.9	-29%
East Midlands	41	9.4	30	6.3	-27%
West Midlands	44	8.2	32	5.5	-27%
East of England	45	8.1	33	5.4	-27%
Greater London	47	6.3	31	3.6	-34%
South East	65	7.9	45	5.0	-31%
South West	40	7.9	28	5.0	-31%

Source: [2005 to 2016 UK local and regional CO₂ emissions –data tables](#)

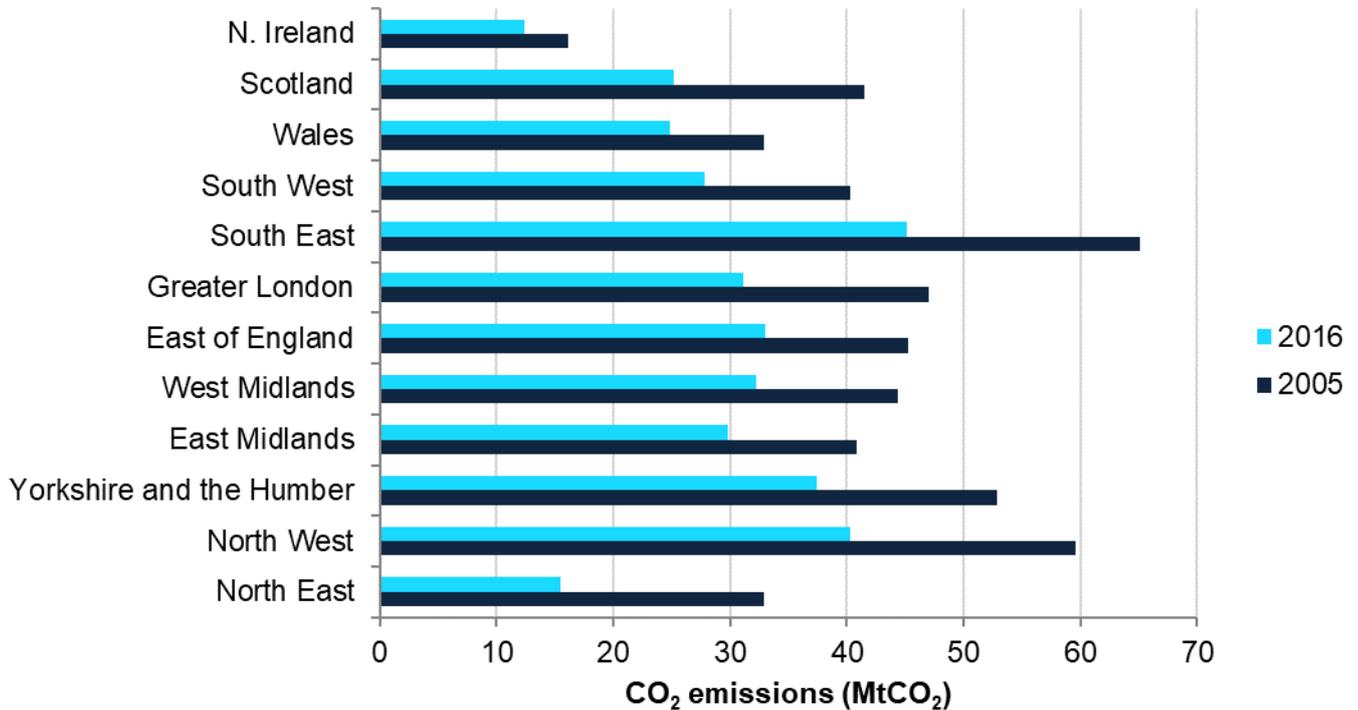
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2. Sum of Local Authority emission estimates are not fully consistent with the official inventory for the UK (see Table 11 for details).

⁸ <https://www.gov.uk/government/collections/final-uk-greenhouse-gas-emissions-national-statistics>

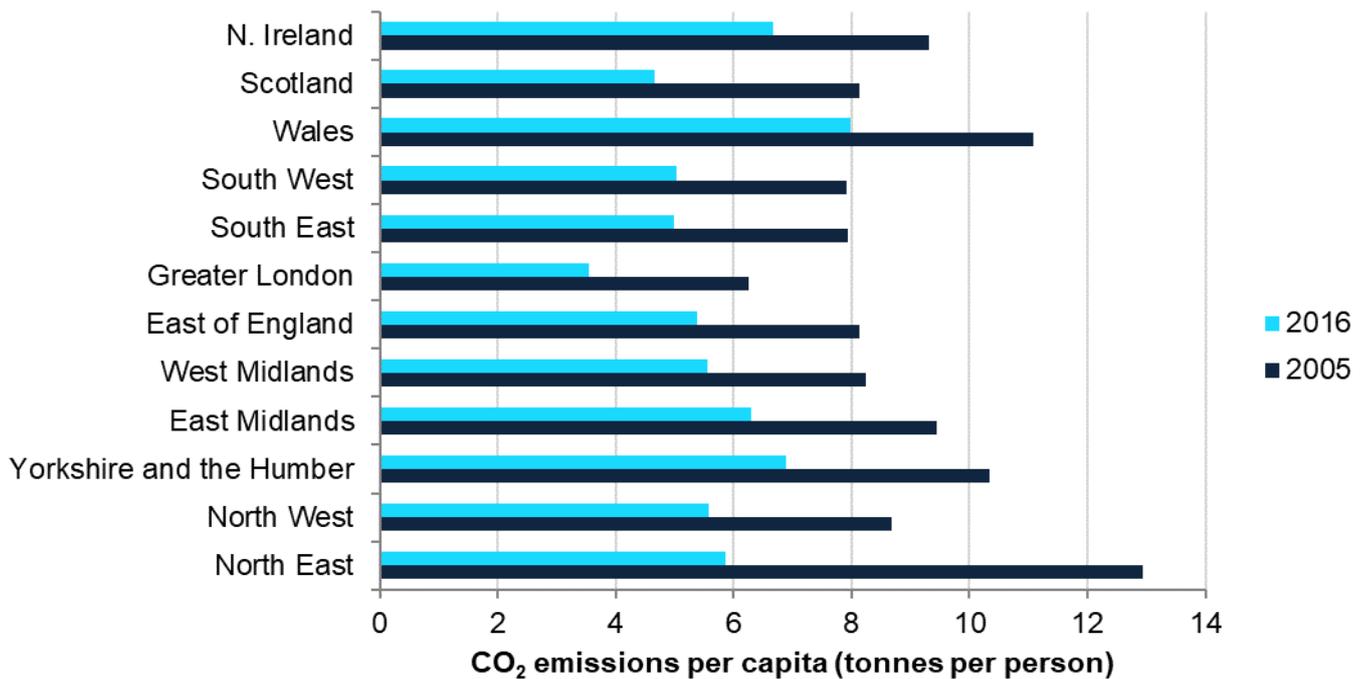
Emissions have decreased in all regions since 2005. The largest percentage decrease in emissions (53 per cent) and the largest decrease in per capita terms of 7.1 tonnes per person were seen in the North East. The smallest decreases in per capita terms of 2.6 tonnes per person were seen in Northern Ireland.

Figure 6: Regional emissions in 2005 and 2016



Source: [2005 to 2016 UK local and regional CO2 emissions –data tables](#)

Figure 7: Regional emissions per capita in 2005 and 2016



Source: [2005 to 2016 UK local and regional CO2 emissions –data tables](#)

Local Authority trends since 2005

There is more variation in trends at Local Authority level than at regional level as seen in Table 7. In particular, emissions for many Local Authorities are heavily influenced by activities at industrial sites, and changes at a single site can have a big impact on emissions trends.

All of the 391 Local Authorities have shown a decrease in total emissions between 2005 and 2016. This reflects the decrease in overall emissions for the UK during this period driven mainly by reductions in emissions from power stations, industrial combustion and LULUCF. The reduction from power stations is driven by change in the fuel mix used for electricity generation with a reduction in the amount of coal, which is a carbon intensive fuel. The reduction in industrial combustion is largely driven by the closure or reduced activity of industrial plants, a large portion of which occurred during 2009, likely due to economic factors.

From 2005 to 2016, the largest percentage decrease:

- In total emissions was in Argyll and Bute due to total emissions changing from a net source in 2005 to a net sink in 2016. This is due to the LULUCF sink increasing whilst industrial and commercial electricity consumption has fallen due to decarbonisation of the electricity grid.
- In emissions from the industrial and commercial sector was in Gravesham (down 88 per cent) due to the closure of a cement works during 2008.
- In emissions from the domestic sector was in Isles of Scilly (down 43 per cent) due to reductions in electricity and gas consumption.
- In emissions from transport was in the City of London (down 31 per cent). This was due to a reduction in traffic counts⁹ on major roads.

From 2005 to 2016, the largest percentage increase:

- In total emissions and the domestic sector no local authorities showed an increase.
- In the industrial and commercial sector was in Slough (up 5 per cent); due to increases in electricity consumption at industrial and commercial sites.
- In the transport sector was Eilean Siar (up 10 per cent) due to an increase in traffic counts⁹ on major roads.

⁹ <http://www.dft.gov.uk/traffic-counts>

Table 7: Breakdown of size of decrease in emissions since 2005

Local Authorities, 2005 – 2016

Change in emissions since 2005	Number of Local Authorities
Decrease of more than 40%	25
Decrease of 35-40%	61
Decrease of 30-35%	103
Decrease of 25-30%	103
Decrease of 20-25%	65
Decrease of 0-20%	34
Increase	0

Source: [2005 to 2016 UK local and regional CO2 emissions –data tables](#)

Sub-Sectoral Trends since 2005

When Local Authority figures are aggregated, 2016 emissions are lower than 2005 emissions in all sectors and sub-sectors except for Diesel Railways and Transport Other (combustion of lubricants, LPG vehicles, inland waterways, coal railways and aircraft support vehicles).

The 3 largest absolute decreases were in the following sub-sectors:

- Industry and commercial electricity (-59.1 million tonnes)
- Domestic electricity (-32.5 million tonnes)
- Large industrial installations (-26.1 million tonnes)

Changes by sector at the Local Authority level

Tables 8 below provides some information on the Local Authorities that have experienced the largest percentage decreases and increases in emissions since 2005, and the sub-sectors responsible.

Table 8: Local Authorities that had the largest decreases in emissions between 2005 and 2016

Local Authorities, 2005-2016

Local Authority	Percentage decrease	Percentages
		Sub-sector most responsible for decreases in that area
Argyll and Bute	-652% ¹	LULUCF
Highland	-295% ¹	LULUCF
Dumfries and Galloway	-180% ¹	LULUCF
Northumberland	-84%	Large industrial installations
Redcar and Cleveland	-74%	Industrial and Commercial Electricity

Source: [2005 to 2016 UK local and regional CO2 emissions –data tables](#)

Notes:

1. Argyll and Bute, Highland and Dumfries and Galloway have large percentage decreases from 2005-2016 as emissions have gone from being a net source in 2005 (0.06, 0.4 and 0.4 MtCO₂e respectively) to a net sink of emissions in 2016 (-0.4, -0.8 and -0.3 MtCO₂e respectively).

For some LAs, particularly in Scotland, a growing LULUCF (land use and land use change and forestry) sink is a big factor in the trend of their emissions. At national level, the size of the LULUCF sink increased from 2005 up to 2016. For the 2016 inventory there were methodological changes to the way LULUCF emissions were calculated, which led to all years becoming a net sink.

Carbon dioxide emissions within the scope of influence of Local Authorities

Alongside the full dataset, we have also published a subset which represents carbon dioxide emissions within the scope of influence of Local Authorities. The full dataset includes all the emissions that occur within the boundaries of each Local Authority; however, the dataset of emissions within the scope of Local Authorities excludes emissions that Local Authorities don't have direct influence over. The emissions that are removed from the full dataset are:

- Motorways – all emissions from the “Transport (motorways)” sector have been removed.
- EU Emissions Trading System (EU ETS) sites – these emissions have been removed from the “Large industrial installations” sector, with the exception of energy suppliers (e.g. power stations), whose emissions are indirectly included via the end-user estimates for electricity use. Note that not all the emissions from the “Large industrial installations” sector are produced by EU ETS installations, hence the fact that there are emissions remaining in this sector in the subset.
- Diesel railways – all emissions from the “Diesel Railways” sector have been excluded;
- Land Use, Land Use Change, and Forestry – all emissions belonging to the “LULUCF Net emissions” sector have been excluded.

Removing these emissions has a much bigger impact on some Local Authorities than others, as some Local Authorities have a much bigger proportion of emissions from the above sources than others. Table 9 shows the Local Authorities with the largest decrease in emissions within the scope of influence of the Local Authority between 2005 and 2016. Only one of these were among the top 5 Local Authorities for decreases in overall emissions (which are shown in Table 8 in the previous section). This is because the largest decreases in overall emissions were driven by the large industrial installations sub-sector, large aspects of which are considered to be outside the scope of influence of LAs.

Table 9: Local Authorities that had the largest decreases in emissions within the scope of influence of the Local Authority between 2005 and 2016

Local Authorities, 2005-2016

Local Authority	Percentage decrease	Percentages
		Sub-sector most responsible for decreases in that area
Thurrock	-49%	Industrial and Commercial Gas
City of London	-48%	Industrial and Commercial Electricity
Exeter	-44%	Industrial and Commercial Gas
Blackburn with Darwen	-44%	Industrial and Commercial Electricity
Halton	-44%	Industrial and Commercial Electricity

Source: [2005 to 2016 UK local and regional CO2 emissions –data tables](#)

No Local Authorities had an increase in emissions within the scope of the Local Authority between 2005 and 2016.

Looking at changes in emissions within the scope of influence of Local Authorities between 2015 and 2016, 14 Local Authorities had increases in their emissions over this period. Table 10 shows the Local Authorities with the biggest percentage changes to the emissions within their scope of influence between 2015 and 2016. Some of these Local Authorities also appear in the list of Local Authorities with the biggest changes to overall emissions over this period (as shown in Table 5). Some do not as the drivers of some of the largest emissions changes (such as the opening or closing of large industrial installations) may be outside the scope of influence of Local Authorities.

Table 10: Local Authorities that had the largest increases or decreases in emissions within the scope of influence of the Local Authority between 2015 and 2016

Local Authorities, 2015-2016

Local Authority	Percentage change	Percentages
		Sub-sector most responsible for decreases and increases in that area
Stockton-on-Tees	26% decrease	Large industrial installations
Exeter	21% decrease	Industrial and Commercial Gas
Allerdale	21% decrease	Industrial and Commercial Gas
Sheffield	10% increase	Industrial and Commercial Gas
Hartlepool	10% increase	Industrial and Commercial Gas

Source: [2005 to 2016 UK local and regional CO2 emissions –data tables](#)

Reconciliation with the UK inventory

Reconciliation Table

These local estimates are designed to be as consistent as possible with the national inventory for the UK. However, some differences are unavoidable.

A number of emission sources included in the UK inventory are not included in the local estimates, as there is no obvious basis for doing so. Excluded sources are principally linked to aviation and shipping.

A small proportion of the gas and electricity consumption allocated to the domestic sector in these estimates is attributed to business in the UK inventory. This is because it is not possible to distinguish between domestic customers and smaller businesses in the meter point consumption data used in these local estimates.

Table 11 shows a summary of the reconciliation between the UK inventory and the local inventory. The different elements of this reconciliation should be interpreted as follows:

- **"Excluded"** are the sectors that have been deliberately excluded from the local level allocation, as it would not have been appropriate to include them;
- **"Unallocated methodological differences"** are differences which have become apparent due to the different methodological approaches used in deriving the UK Inventory and local level estimates. These include gas and electricity consumption which cannot be allocated to Local Authorities due to confidentiality concerns at high emitting sites, and harvested wood products.
- **"Methodological differences"** are the differences that have caused the discrepancies between the national inventories and the Local Authority carbon dioxide dataset. These are explained after the UK reconciliation table.

Table 11: Reconciliation of 2016 local emission estimates with UK inventory

UK, 2016

		MtCO ₂
<i>End-user emissions</i>	End-user allocation to local areas	354.7
	Unallocated consumption	1.8
	Large electricity users with unknown location	1.0
	Total UK end-user emissions (local method)	357.5
<i>Excluded from local allocation</i>	Domestic shipping	5.5
	Domestic aviation	1.6
	Military transport	1.7
	Exports	7.3
	International aviation and shipping	4.2
Total excluded	20.3	
<i>Methodological differences</i>	Domestic sector	-1.0
	Industrial and commercial sector	1.8
	Transport sector	0.0
	Agriculture sector	-0.6
	LULUCF sector	0.9
Total methodological differences	1.1	
UK total CO₂ emissions		378.9

Source: [2005 to 2016 UK local and regional CO2 emissions –data tables](#)

Main differences between the Local Authority (LA) dataset and the Devolved Administrations (DA) datasets

This section of the report describes where there are unavoidable differences between the methodologies used in the estimation of emissions for this Local Authority carbon dioxide (CO₂) emissions dataset, and for the Devolved Administration emissions datasets.

The following section sets out where and why these differences occur.

Gas and Electricity Consumption data

The definitions used for domestic and industrial and commercial consumers differ between the two datasets. In the Local Authority CO₂ dataset, the split is as defined by the BEIS sub-national energy consumption dataset which are not fully consistent with the national energy data presented in Digest of UK Energy Statistics (DUKES)¹⁰. The Devolved Administration greenhouse gas inventory (DA GHGI), however, is based on DA-wide electricity consumption statistics which are available in the electricity generation and supply section of BEIS's Energy Trends¹¹ publication and are fully consistent with DUKES data for major power producers. These two underlying datasets are not fully consistent, and therefore result in differences between the Local Authority dataset and the DA inventories for gas and electricity use, as described below.

Unallocated Gas and Electricity Consumption data

In the sub-national energy datasets, some gas data cannot be allocated to LAs, due to reasons of confidentiality. In part, these gaps in the emissions estimates are filled through the point source database (mentioned above). However, in doing so, this introduces some uncertainty. In the DA inventory though, there is no unallocated consumption; point source data is supplemented by employment and other surrogate data to allocate all of the national fuel use between the four DAs.

In the Local Authority dataset, some electricity consumption data cannot be allocated to LAs. This is due to both commercial confidentiality concerns for high-consuming sites, and also where it is not possible to map these data. In these instances, these data are therefore assigned to the 'unallocated' category. The DA inventory, on the other hand, reports emissions against a wider geographical coverage, effectively negating the data disclosure concerns, and hence there is no need to exclude specific emissions from the DA inventories.

Unallocated LULUCF data

Harvested wood products can be allocated to particular DAs but not to particular Local Authorities. Within the Local Authority carbon dioxide dataset, these emissions/removals are therefore assigned to the 'unallocated' category. These are the differences which can be

¹⁰ <https://www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes>

¹¹ <https://www.gov.uk/government/collections/energy-trends>

seen in each of the DA reconciliation tables. All other LULUCF estimates are fully consistent across UK, DA and Local Authority data.

Use of additional gas data for Northern Ireland

Both datasets now include consideration of new gas consumption data supplied by Northern Ireland energy suppliers, which shows a large growth in gas use within Northern Ireland from 2006 onwards. The DA inventory approach includes estimates for the fuel-switching from oil and solid fuels that this growth in gas use has displaced. In the Local Authority carbon dioxide data, these estimates of fuel switching have not been possible, given the greater level of detail required by the data, and the UK emissions distribution grids have been used solely.

Distribution of 'Other Fuels' across DAs

There are some areas where emissions mapping methods differ between the two datasets due to the availability of data.

In the iron and steel sector, the methodology used for the Local Authority carbon dioxide emissions assumes that all emissions from the iron and steel sector from industrial process, process gases and solid fuels occur at large point sources. Emissions from the consumption of oil in the iron and steel sector are mapped using a combination of point sources and area sources (as described in the Technical Report). In the DA inventory, fuel use data supplied by the Iron and Steel Statistics Bureau (ISSB) is used, since it is available on a DA basis.

There is also a difference in the estimation of emissions from peat in the domestic sector. In the Local Authority carbon dioxide emissions methodology, peat use is mapped using the domestic fuel use mapping grids which are produced by Ricardo Energy and Environment as part of the mapping process for the National Atmospheric Emissions Inventory programme. For the DA inventory, this is mapped using a DA specific distribution calculated by Centre for Ecology and Hydrology (CEH).

For domestic oil combustion, the allocation of emissions to Local Authorities uses separate emissions distribution grids for LPG and other oils. The mapping grids are unchanged from last year's publication. For the DA inventory, LPG grids were not available therefore all domestic oil emissions are mapped using the same distribution grid.

For domestic coal combustion, the DA inventory estimates have been revised in the latest submission to use the energy modelling work based on the 2011 census which also underpins the Local Authority CO₂ estimates. This has resulted in more consistent reporting between Local Authority CO₂ emissions and the DA inventory emissions. However, some differences remain for solid and liquid fuels due to different compilation methods and fuel aggregations; the Local Authority CO₂ dataset takes a more bottom-up approach to disaggregating smokeless solid fuels according to the location of smokeless zones, for example.

Point Sources

There are also some differences between the estimates of emissions at large point sources and those in the national totals. An explanation for these differences is provided in the Technical Report.

UK maps

A range of maps showing 2016 carbon dioxide emissions per capita at Local Authority level are presented on the following pages.

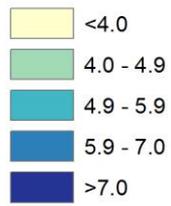
As Figures 8 to 12 show, emissions per capita can vary noticeably between regions in the UK. This is particularly evident in the domestic and LULUCF sectors.

As Figure 9 shows, in 2016, for the domestic sector, emissions per capita were higher in Scotland, Northern Ireland, and Wales compared than the rest of the UK. Per capita emissions are high in Northern Ireland predominantly because there is limited availability of natural gas in these areas; this results in the combustion of more carbon intensive fuels instead, such as coal, burning oil and gas oil, which are assigned to the domestic 'other fuels' sector. Wales also has a higher proportion of emissions from 'other fuels' than the rest of the UK, though to a lesser extent.

There are less clear trends in the industrial and commercial, and transport sectors. As Figures 10 and 11 show, within all regions there is a mixture of areas with high, medium and low carbon dioxide emissions per capita. With respect to the industrial and commercial sector, this is expected, since emissions from this sector are heavily dependent on whether there are large industrial sites situated in that area. This is why we see higher CO₂ emissions per capita in Wales, Scotland and the North of England compared to Greater London which has a higher population density and a greater proportion of residential areas meaning that industrial sites are unlikely to be located here. It is more difficult to identify reasons behind the variations observed in the transport sector, since there are numerous factors (such as composition of the vehicle fleet and average annual daily statistics by vehicle type) which feed into these estimates. Further information on how transport emissions have been estimated is available in section 10 of the Technical Report.

In the LULUCF sector, there are clear regional trends in per capita emissions (Figure 12). In large parts of Scotland, Wales, and the North East in particular there are large sinks of carbon dioxide. In other parts of the UK, such as in Northern Ireland and East England LULUCF is a large source of carbon dioxide emissions. Northern Ireland has the highest LULUCF emissions per capita, due to the clearing of land for the maintenance and creation of settlements and croplands.

Figure 8: Emissions of carbon dioxide per capita by Local Authority (tonnes CO₂ per capita), excluding LULUCF for 2016



There are an equal number of Local Authorities in each category

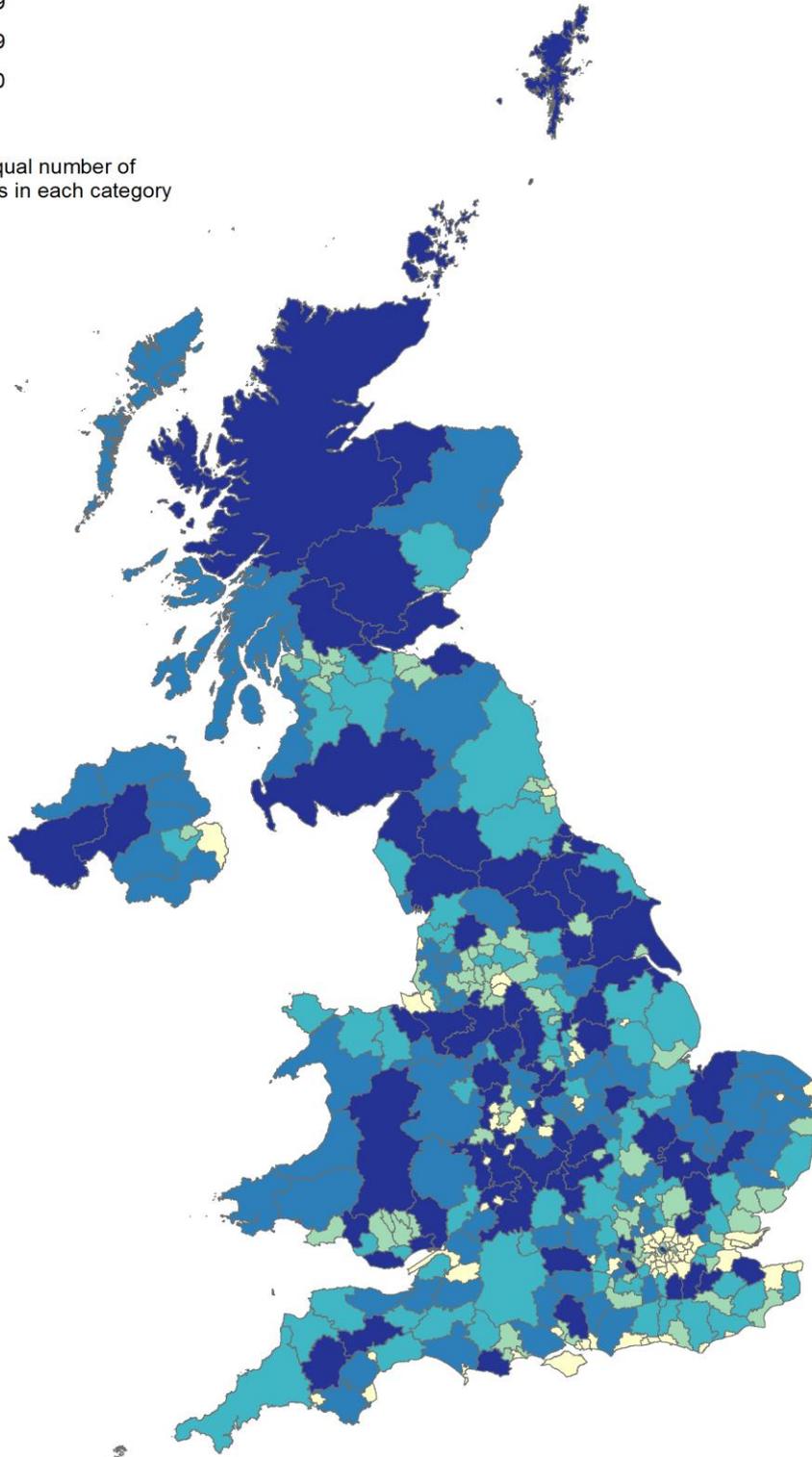
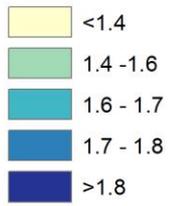


Figure 9: Domestic CO₂ per capita emissions by Local Authority (tonnes CO₂ per capita) for 2016



There are an equal number of Local Authorities in each category

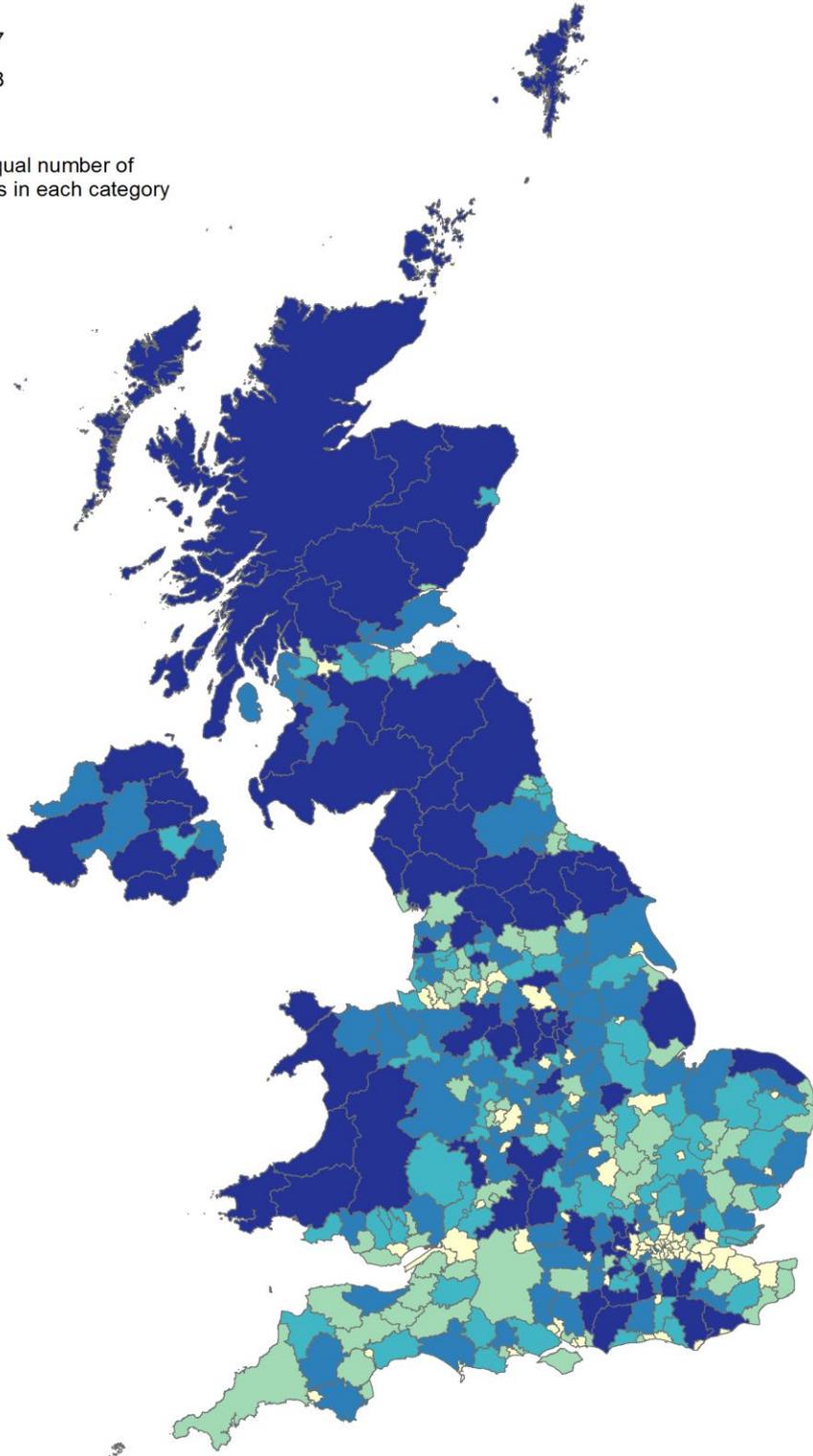
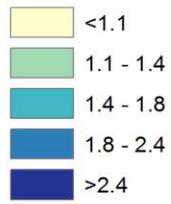


Figure 10: Industrial and commercial per capita CO₂ emissions by Local Authority (tonnes CO₂ per capita) for 2016



There are an equal number of Local Authorities in each category

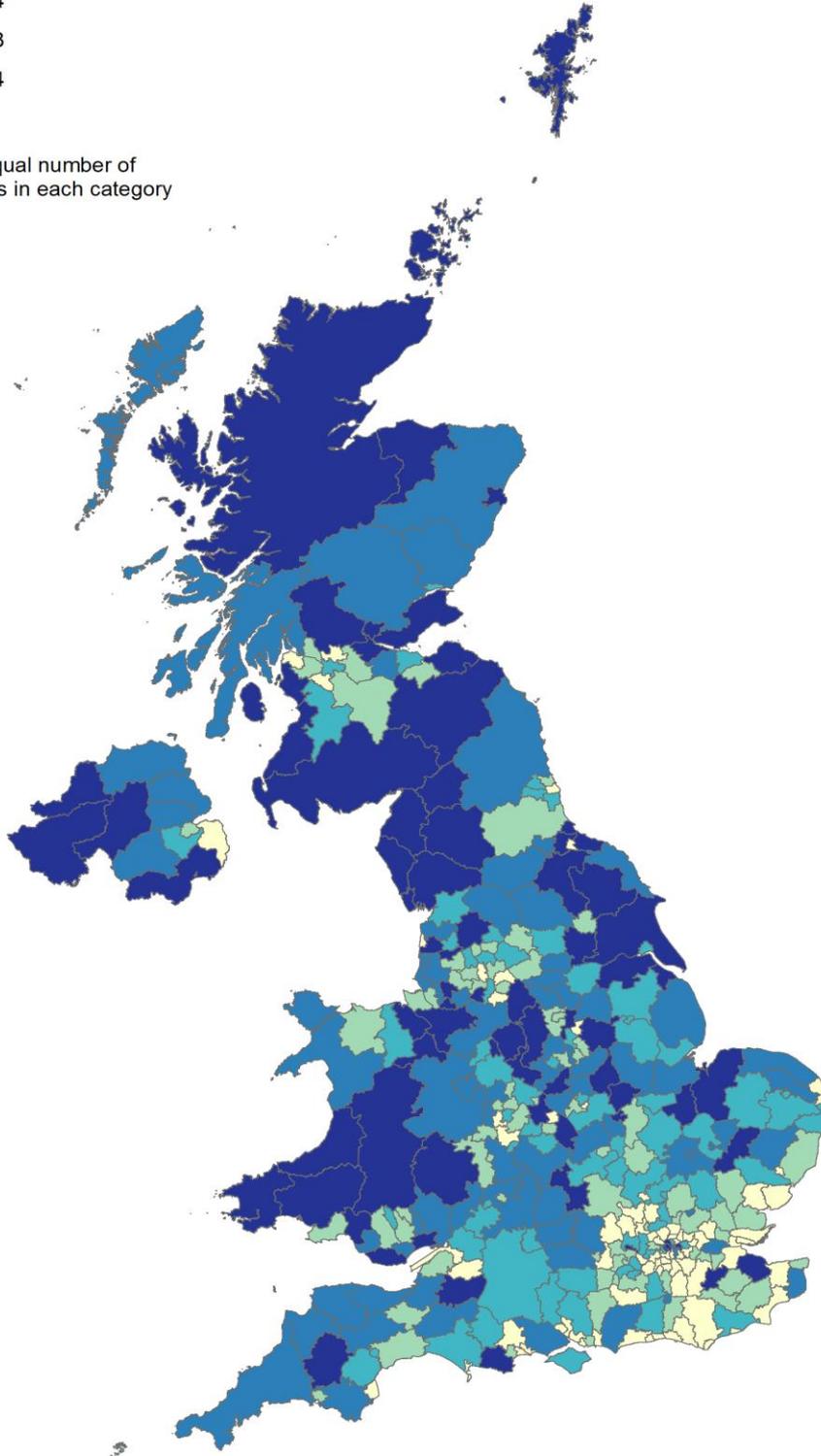
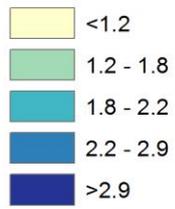


Figure 11: Transport CO₂ emissions per capita by Local Authority (tonnes CO₂ per capita) for 2016



There are an equal number of Local Authorities in each category

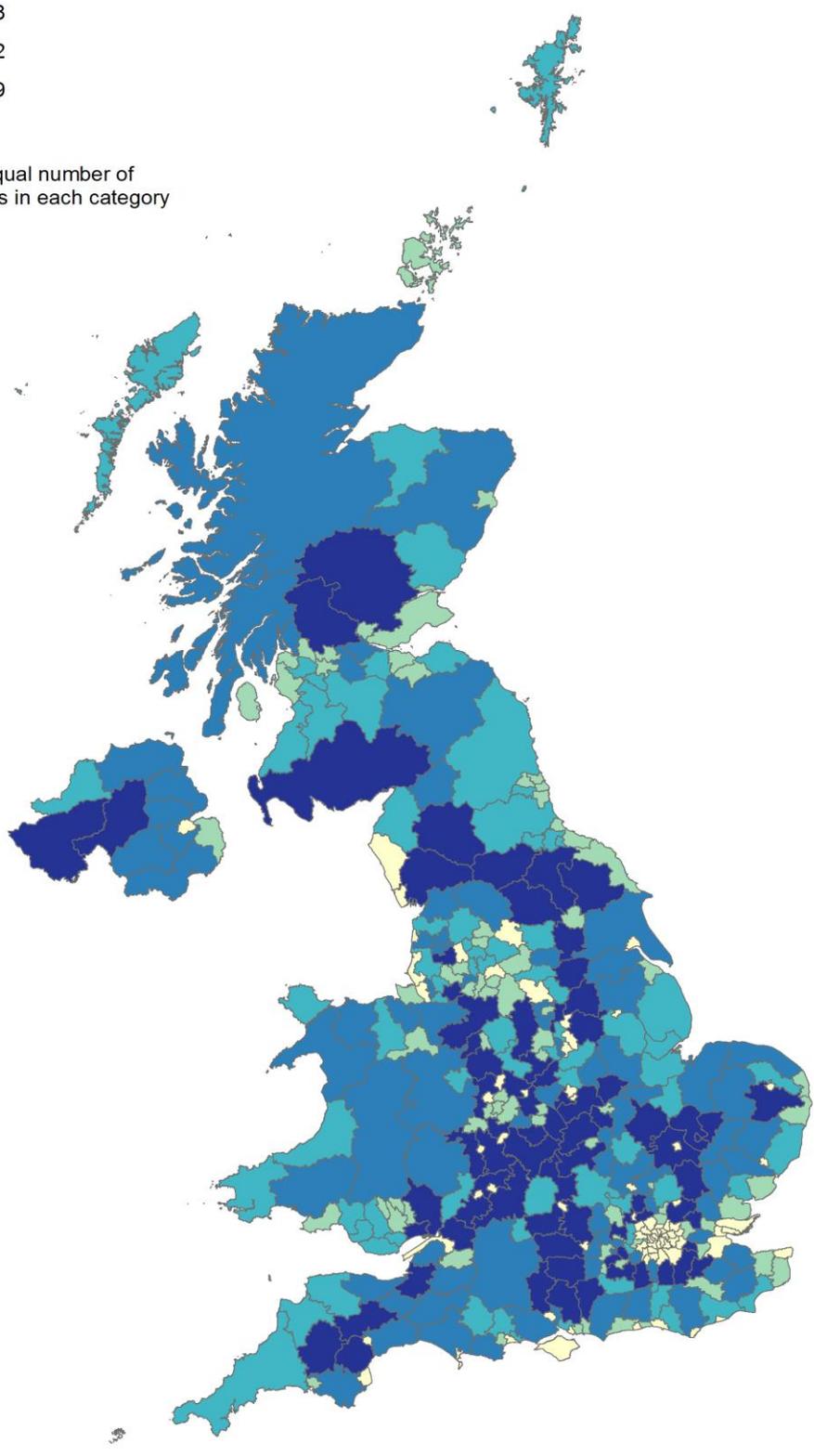
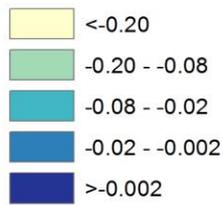
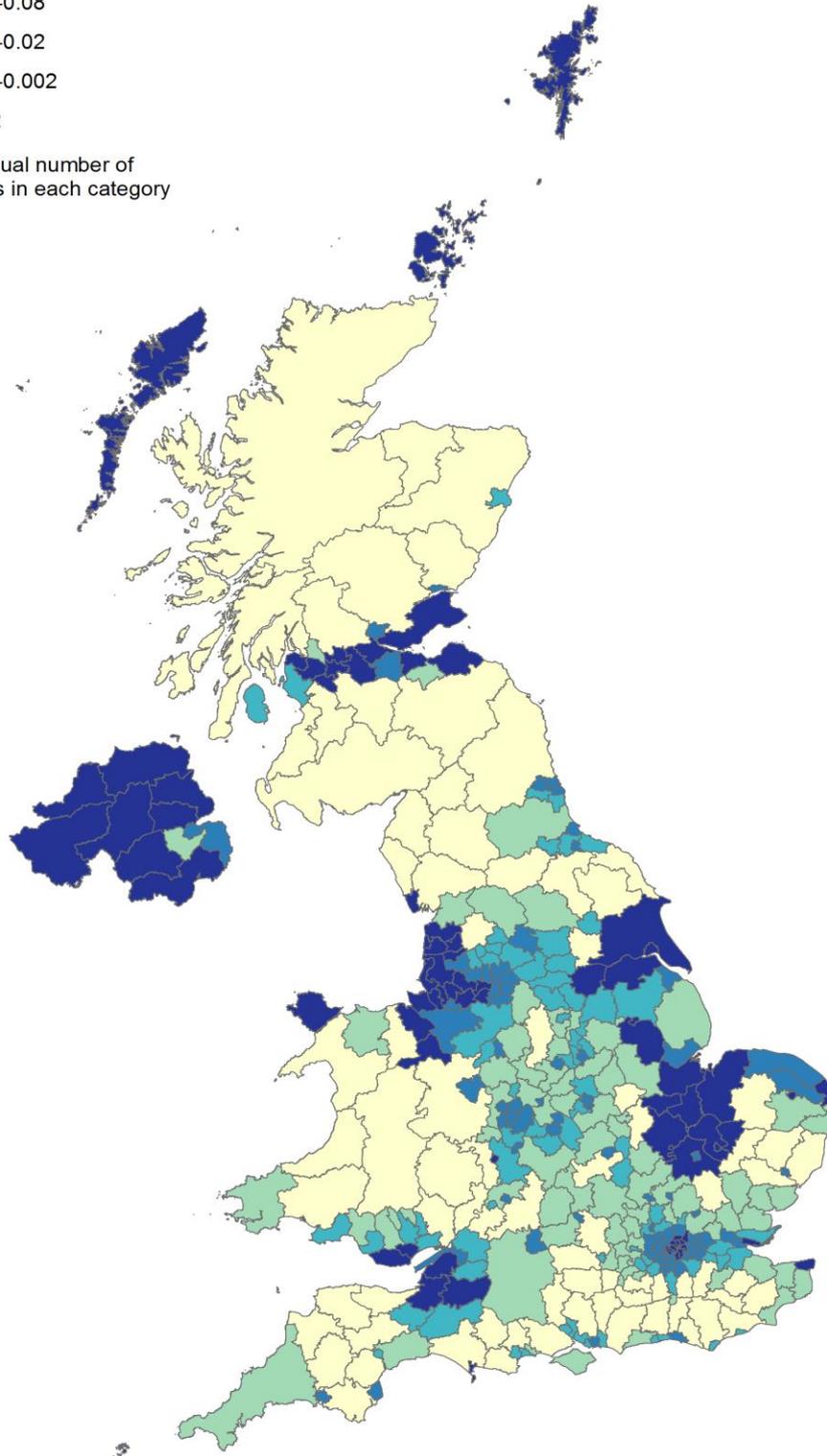


Figure 12: Land Use, Land Use Change and Forestry CO₂ emissions per capita by Local Authority (tonnes CO₂ per capita) for 2016



There are an equal number of Local Authorities in each category



Further Information

The following information is available alongside this statistical release at the location below.

<https://www.gov.uk/government/collections/uk-local-authority-and-regional-carbon-dioxide-emissions-national-statistics>

Datasets are available for Local Authority emissions:

2005 to 2016 UK local and regional CO₂ emissions estimates Data tables

A number of supplementary reports are also available for Local Authority emissions. These are for users to refer to if they want more information on the methodology for producing the estimates:

- **2005 to 2016 UK local and regional CO₂ emissions: technical report**
Report on the methodology used to produce the emissions estimates.
- **Employment based energy consumption mapping in the UK**
A report which outlines the methodology used to map emissions from smaller industrial and commercial sources.
- **Mapping carbon emissions & removals for the Land Use, Land Use Change & Forestry (LULUCF) sector**
A report looking at LULUCF emissions and removals at the Local Authority level.

The following user guidance is available for sub-national emissions:

[Sub-national emissions statistics: Frequently asked questions](#)

The following emissions outputs may also be of interest:

- [Devolved Administration Greenhouse Gas Inventories](#)
Greenhouse gas emissions inventories are available for England, Scotland, Wales and Northern Ireland.
- [Final UK greenhouse gas emissions, 1990-2016](#)
This publication provides the latest estimates of UK greenhouse gas emissions by source sector from 1990-2016.

Given the number of LAs, this statistical release does not provide a detailed explanation of all revisions to the historical data series or the year on year changes for each Local Authority. However, explanations of the reasons for any changes are available on request; any such requests should be sent to the following email address:

climatechange.statistics@beis.gov.uk

Future updates to emissions estimates

The next National Statistics on Local Authority carbon dioxide emissions estimates, covering the period 2005-2017, will be published in June 2019.

Notes for Editors

1. The full set of data tables and methodology documents that accompany this statistics release can be found at: <https://www.gov.uk/government/collections/uk-local-authority-and-regional-carbon-dioxide-emissions-national-statistics>
2. Further information on UK greenhouse gas emissions statistics, including Excel tables with additional data on UK emissions, can be found on the Gov.uk website at: <https://www.gov.uk/government/collections/uk-greenhouse-gas-emissions-statistics>
3. This Statistical Release and the related data tables are part of the National Atmospheric Emissions Inventory (NAEI) for 1970-2016, produced for BEIS and the Devolved Administrations by Ricardo Energy and Environment For further information on the UK Greenhouse Gas Inventory, see the NAEI website <http://naei.defra.gov.uk/>.
4. The latest UK sub-national energy statistics including revisions to earlier years' data, can be found at the gov.uk website <https://www.gov.uk/government/organisations/department-of-energy-climate-change/about/statistics>.

