Department for Energy Security & Net Zero

UK local authority greenhouse gas emissions estimates 2021

29 June 2023 **National Statistics**

This publication presents the latest estimates of end-user greenhouse gas emissions for local authority areas in the UK for 2005-2021. This publication now includes emissions estimates for methane (CH_4) and nitrous oxide (N_2O) in addition to carbon dioxide (CO_2) from 2005 onwards, having last year only included estimates for some CH_4 and N_2O emissions sources from 2018.

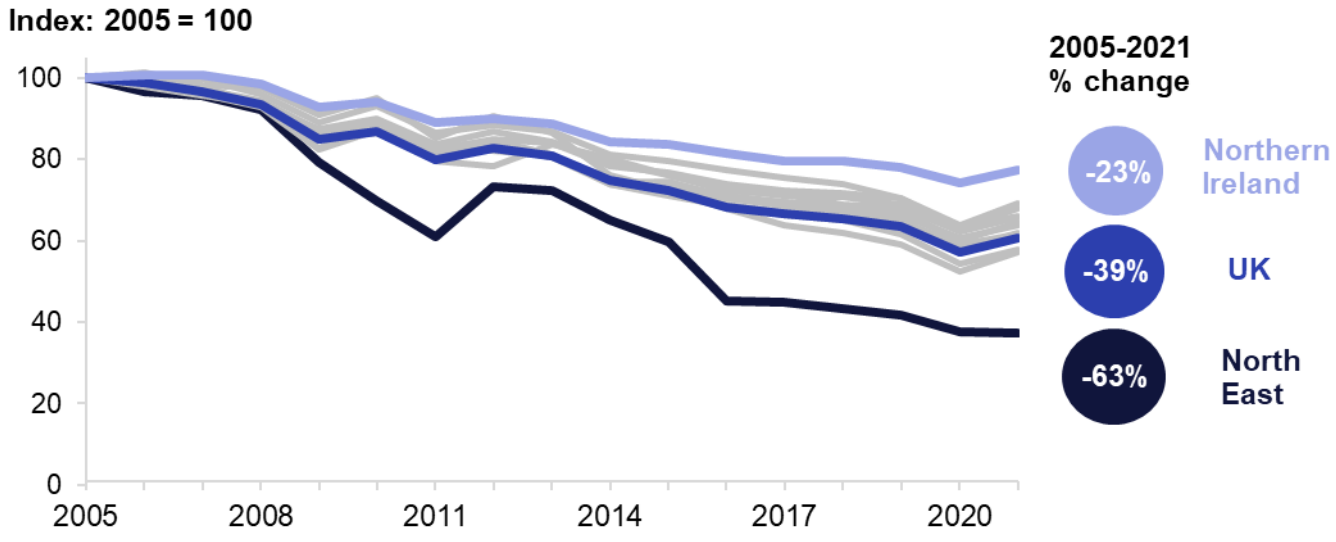
The main findings from the statistics are:

- Between 2020 and 2021, greenhouse gas emissions increased in 358 out of the 374 local authorities in the UK (96%). This is consistent with the increase in overall UK emissions in 2021, which increased by 5% largely due to COVID-19 restrictions easing and colder temperatures increasing the use of heating in buildings, though emissions were still lower in 330 local authorities (88%) than they were in 2019.

- Overall in 2021, 28% of end-user greenhouse gas emissions assigned to local authority areas were attributed to transport, 24% to the domestic sector, 21% to industry, 13% to agriculture and 5% to the waste management sector. There are wide local variations, mainly because of the economy and geography of different local areas. The transport sector had the highest share of end-user greenhouse gas emissions in 41% of authorities, the domestic sector had the highest share in 34%, the agriculture sector in 15% and the industrial sector in 8% of authorities.

- Between 2005 and 2021 end-user greenhouse gas emissions fell by 23% in Northern Ireland, 34% in Wales, 39% in England and by 35% in Scotland. The North East of England was the region with the largest fall in emissions over this period at 63%, in part due to industrial closures.

Figure 1: End-user greenhouse gas emissions by region



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Introduction

This National Statistics publication provides the latest estimates of territorial greenhouse gas emissions for local authority and National Park areas for 2005-2021. 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 accompanying tables and the Technical Report, which can be found at the link below: https://www.gov.uk/government/collections/uk-local-authority-and-regional-greenhouse-gas-emissions-national-statistics

This is the second year we have included estimates of methane (CH_4) and nitrous oxide (N_2O) emissions in these statistics, in addition to carbon dioxide (CO_2) emissions estimates which were published previously. Emissions estimates for methane and nitrous oxide now go back to 2005 in all sectors, in line with carbon dioxide estimates, although a significant proportion of landfill methane emissions in England in 2005-2009 could not be allocated to local authorities so the landfill emissions estimates shown will be underestimates for some local authorities in the early part of the time series. Emissions of fluorinated gases are not available at a local authority level so are excluded from these statistics. In our latest UK territorial greenhouse gas emission statistics they accounted for around 3% of greenhouse gas emissions in the UK in 2021.

In accordance with international reporting and carbon trading protocols, emissions from each of the gases is weighted by its global warming potential (GWP)[1], so that total greenhouse gas emissions can be reported on a consistent basis. The GWP for each gas is defined as its warming influence relation to that of carbon dioxide over a 100-year period. Greenhouse gas emissions are then presented in carbon dioxide equivalent units (CO_2e). The GWPs used in these statistics have been updated this year, more information about this change can be found on page 36.

Emissions have been assigned to all 374 local authorities in the UK: 309 of these are in England, 32 in Scotland, 22 in Wales and 11 in Northern Ireland[2]. The statistics show emissions allocated on an “end-user” basis where emissions are distributed to sectors and locations 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.

Emissions from waste management have been spatially distributed using an approach analogous to the fuel end-user basis, distributing UK total emissions from waste management proportionally to the waste arising in each local authority, rather than to the location of waste management facilities. For example, emissions from landfills are distributed based on estimates of biogenic waste arising in each local authority.

The UK compiles an annual inventory of its greenhouse gas emissions to monitor progress against its domestic and international targets. Disaggregated versions of the UK inventory are

[1] The global warming potentials (GWPs) used are from Working Group 1 of the IPCC Fifth Assessment Report: Climate Change 2013 and shown in table 6.4 in our Final UK greenhouse gas emissions statistics, 1990 to 2021: https://www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-to-2021

[2] The local authorities shown in this publication are based on administrative boundaries as of 1 April 2022.

also produced for England, Scotland, Wales and Northern Ireland, along with maps estimating the geographical distribution of the sources of emissions. This publication combines data from the UK's greenhouse gas inventory with data from a number of other sources, including local energy consumption statistics, to produce a nationally consistent set of greenhouse gas emissions estimates at local authority level.

The statistics are largely consistent with the UK national greenhouse gas inventory and with the Devolved Administration (DA) greenhouse gas 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 UK[3] or DA[4] inventories rather than this publication.

These statistics cover the period from 2005 to 2021. A consistent time series has been produced by re-calculating the 2005 to 2020 estimates to reflect the methodological changes used in calculating the 2021 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.

Use of the estimates

The purpose of these estimates is to assist those wishing to understand the sources and assess changes in emissions from local authority areas. 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 greenhouse gas 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 be aware 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:

[3] Final UK greenhouse gas emissions statistics, 1990-2021: https://www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-to-2021
[4] Devolved Administration Greenhouse Gas Inventories: https://naei.beis.gov.uk/reports/reports?section_id=4

- Unallocated electricity and landfill emissions, where electricity sales and waste sent to landfill within the sub-national dataset cannot be successfully allocated to specific local authorities due to lack of information.
- Road transport emission estimates rely on national road traffic estimates, 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 smaller emission sources 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.

2021 emissions

Estimates of greenhouse gas emissions have been produced for each local authority and National Park in the UK from the following broad source categories:

- Industry (including electricity-related emissions)
- Commercial (including electricity-related emissions)
- Public sector (including electricity-related emissions)
- Domestic (including electricity-related emissions)
- Transport
- Land use, land use change and forestry (LULUCF) (including removals of carbon dioxide from the atmosphere, so that net emissions from this sector can sometimes be negative)
- Agriculture (including electricity-related emissions)
- Waste management (distributed based on the waste arising in each local authority)

The level of sectoral detail available is constrained by the data available for local electricity and gas use. To estimate a more detailed breakdown would involve 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.

2021 emissions by region

The overall increase since 2020 in end-user greenhouse gas emissions allocated to local authorities in the UK was 5.9%, largely as a result of the easing of restrictions associated with the COVID-19 pandemic and colder temperatures increasing the use of heating in buildings. Figure 2 shows a comparison of end-user greenhouse gas emissions by region for 2019, 2020 and 2021. The largest overall increase in emissions since 2020 was seen in London (up 9.0%), this was largely due to an increase in transport emissions following the rise in road traffic. The only region to reduce its emissions since 2020 was the North East, down 1.4%, mainly due to a fall in industrial emissions. However, compared to 2019, the last full year before the pandemic, all regions have seen a reduction in their emissions.

Figure 2: End-user greenhouse gas emissions by region, 2019, 2020 and 2021

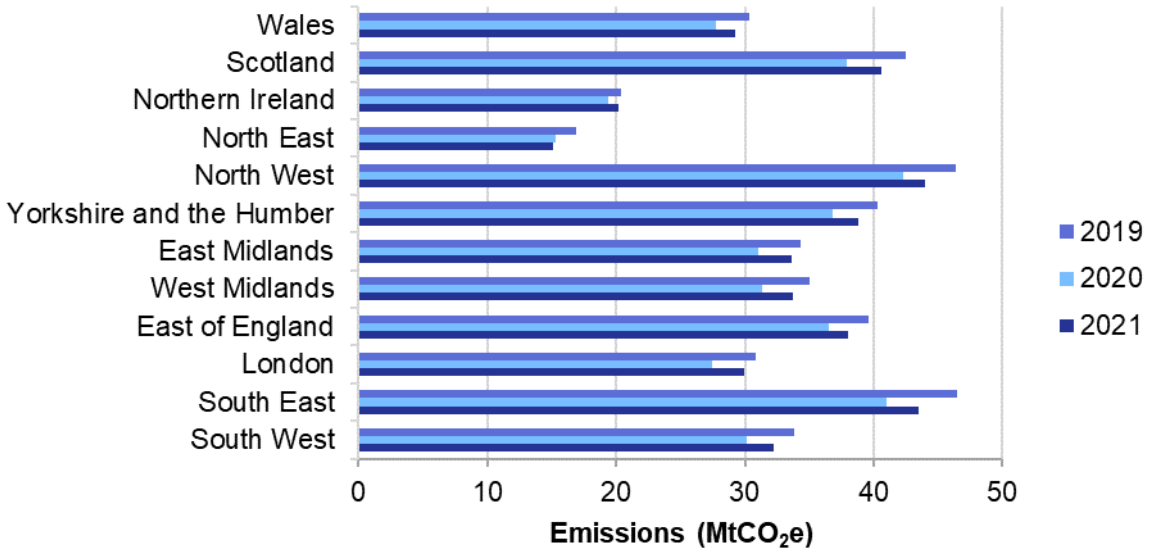


Figure 3 shows a summary of the end-user greenhouse gas emissions by region and sector. Results for individual local authorities can be found in the spreadsheet published alongside this statistics release. There is a great deal of variation between local authorities. In particular a significant amount of industrial emissions are concentrated in a few areas, so the contribution of industrial and commercial emissions for specific local authorities may be different from the regional averages.

Figure 3: End-user greenhouse gas emissions by region and sector, 2021

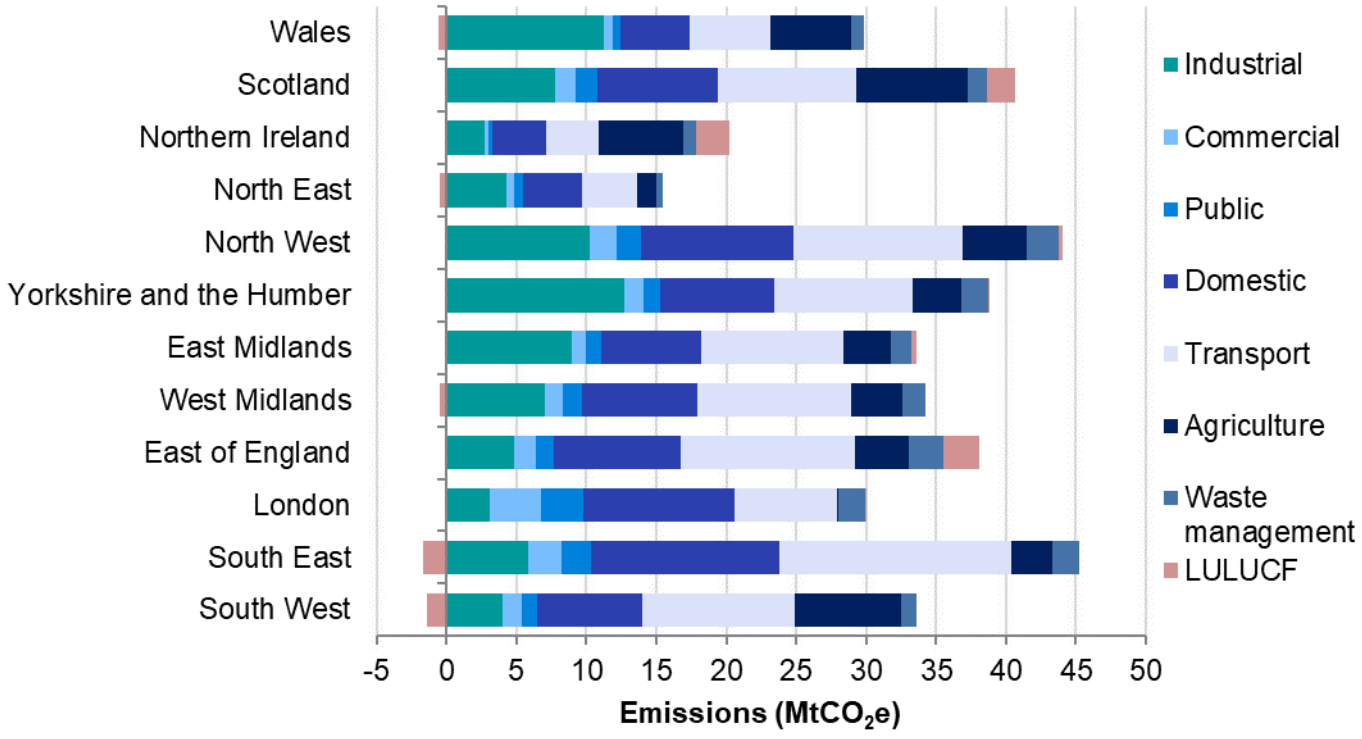


Figure 4 shows annual greenhouse gas emissions per capita to make some allowance for the different sizes of regions. However, it should be noted that while greenhouse gas emissions

per capita may be a useful measure for domestic emissions, emissions from other sources are driven by many factors other than resident population. Therefore, industrial, commercial, public and transport emissions per capita should be interpreted with caution.

Emissions per capita allow comparison between areas of different population size. There was an overall increase in end-user greenhouse gas emissions per capita in the UK of 5.9% in 2021. Northern Ireland, Wales, and Scotland have the highest annual emissions per capita. This is mainly due to higher emissions per capita from the industrial and agriculture sectors, while in Northern Ireland the per capita emissions from the domestic and LULUCF sectors are also higher than the UK average.

London has the lowest per capita emissions, as the urban nature of the transport system and the high population density results in lower emissions than the UK average when total emissions, including non-domestic emissions, are spread across residents. Additionally, in 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: Annual per capita end-user greenhouse gas emissions by region and sector, 2021

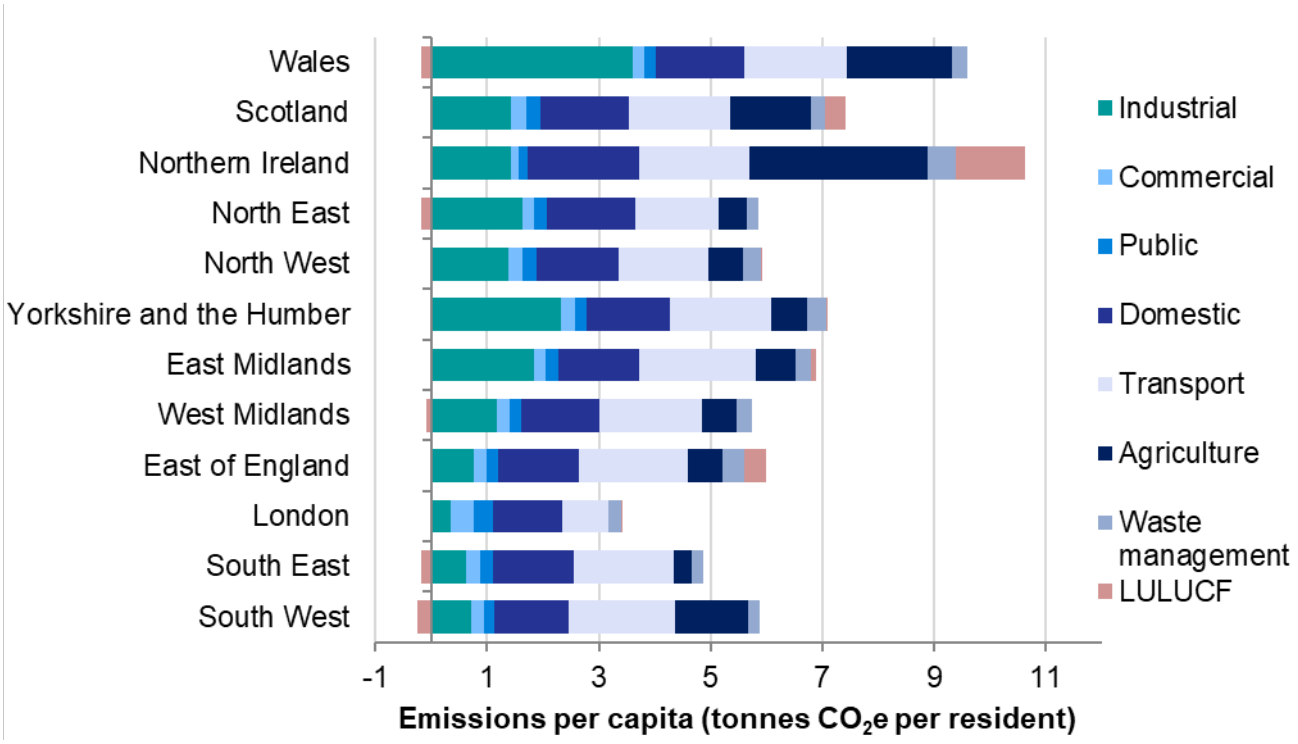
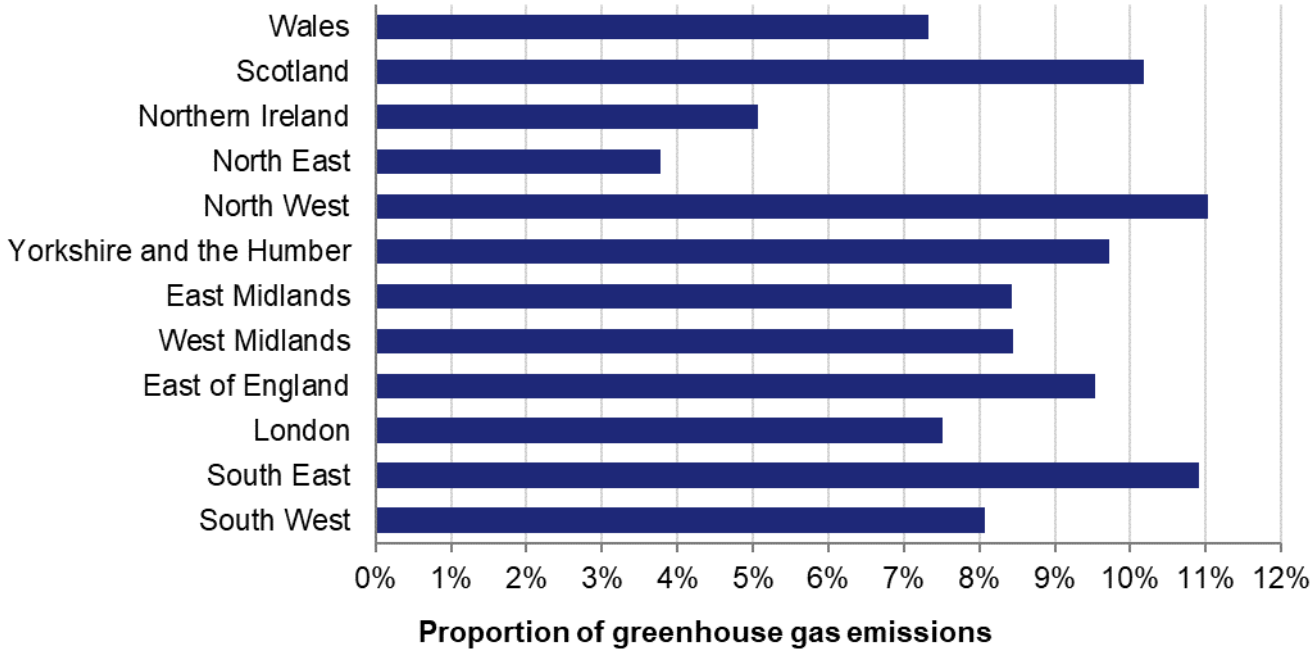


Figure 5 shows how total emissions are split across the various regions. The highest emission totals are in the North West and South East of England, each accounting for around 11% of emissions in the UK, while the smallest emission totals are in the North East (4% of the UK total) and in Northern Ireland (5%).

Figure 5: Proportion of UK end-user greenhouse gas emissions in each region: 2021



Note: Unallocated emissions are not shown in this figure.

2021 emissions by local authority

As the map in Figure 7 on the next page shows, annual emissions per capita can vary noticeably between regions in the UK. When looked at on this basis, the local authority areas with the highest emissions per capita are a mixture of those with large industrial sites and those with relatively low populations compared to the size of the area or the activities that take place there that produce emissions. The latter group are often in more rural areas, although the local authority with the highest greenhouse gas emissions per capita in 2021 was the City of London, with 73.8 tCO_2e per person, which has a very high level of commercial activity compared to its resident population. The second highest greenhouse gas emissions per capita in 2021 was Neath Port Talbot (50.1 tCO_2e), mainly due to its high level of emissions from industrial installations. Conversely, the areas with the lowest emissions per capita are typically built-up areas with high resident populations, with the lowest level of emissions in 2021 being in Hackney, which had emissions of 2.3 tCO_2e per person.

Emissions can also be looked at relative to the area of each local authority, as shown in Figure 8. On this basis the local authorities with the highest emissions per km^2 of area are a mixture of built-up city areas and those with large industrial sites, while the authorities with the lowest emissions per km^2 are in more rural areas. The City of London is also the local authority with the highest emissions on this basis, with greenhouse gas emissions of 202.0 tCO_2e per km^2, followed by Westminster with emissions of 75.9 tCO_2e per km^2. Whilst the authority with the lowest figure was Argyll and Bute with emissions of less than 0.1 tCO_2e per km^2.

Figure 6 shows for each sector the number of local authorities with different proportions of greenhouse gas emissions coming from that sector (once LULUCF emissions and sinks have been excluded, since these can give a negative net total). The proportion of emissions attributable to each sector differs considerably across the local authorities. In 2021 there were

15 local authorities (4%) where industry accounted for over 50% of emissions, 10 (3%) where transport did, and 8 (2%) where agriculture did.

Figure 6: Sectoral breakdown of emissions: Number of UK local authorities by proportion of greenhouse gas emissions in each sector (excluding LULUCF), 2021

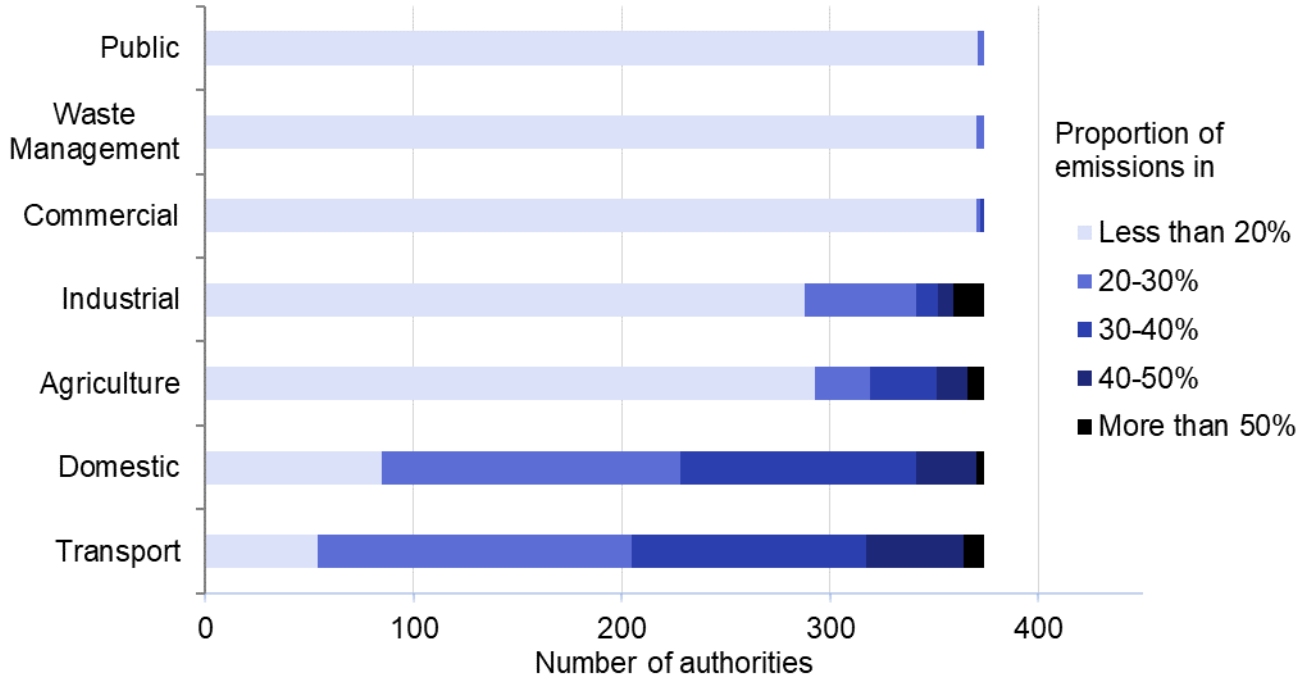


Figure 7: Net emissions of greenhouse gases per capita by local authority (tonnes CO_2e per capita) in 2021

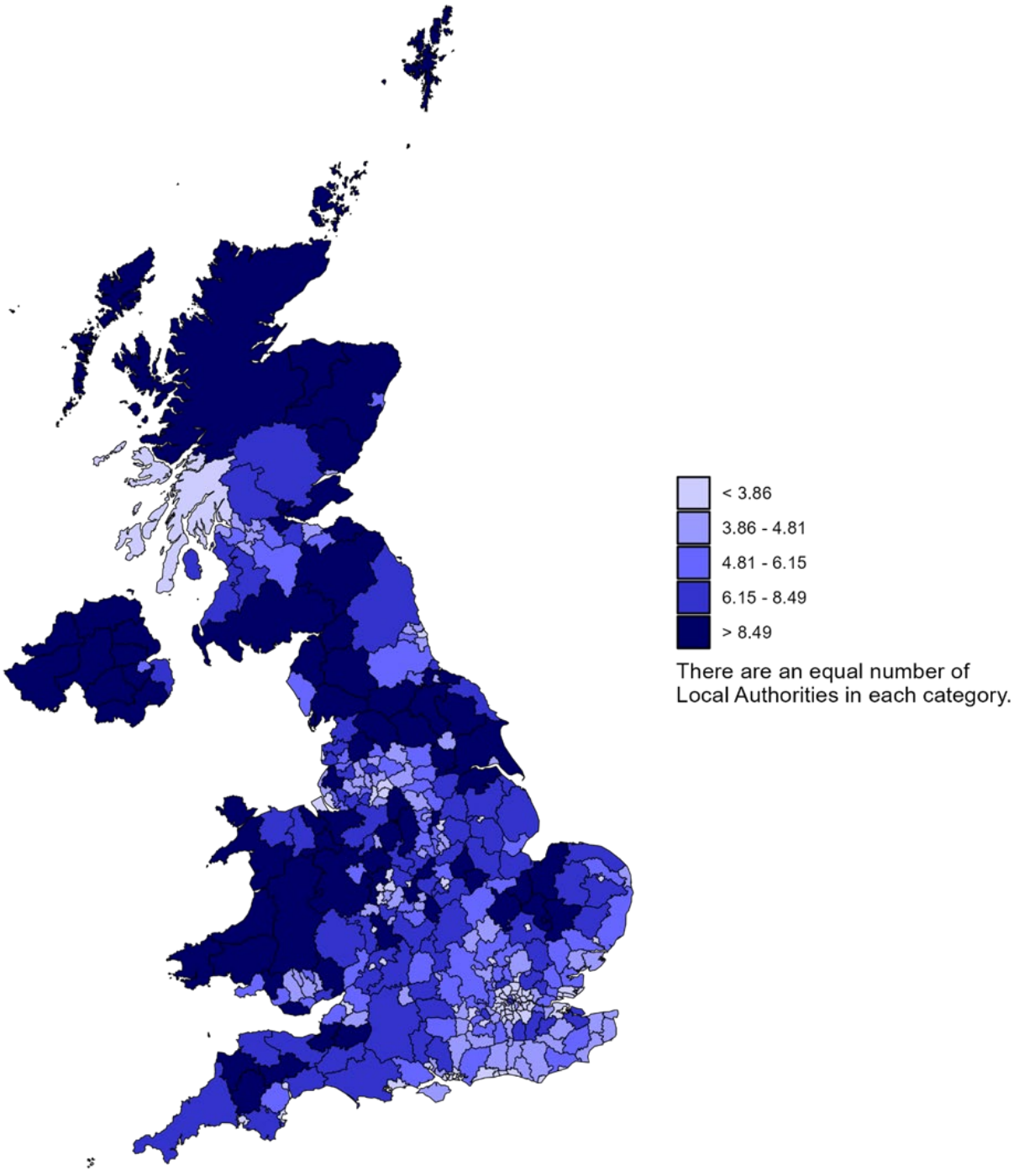
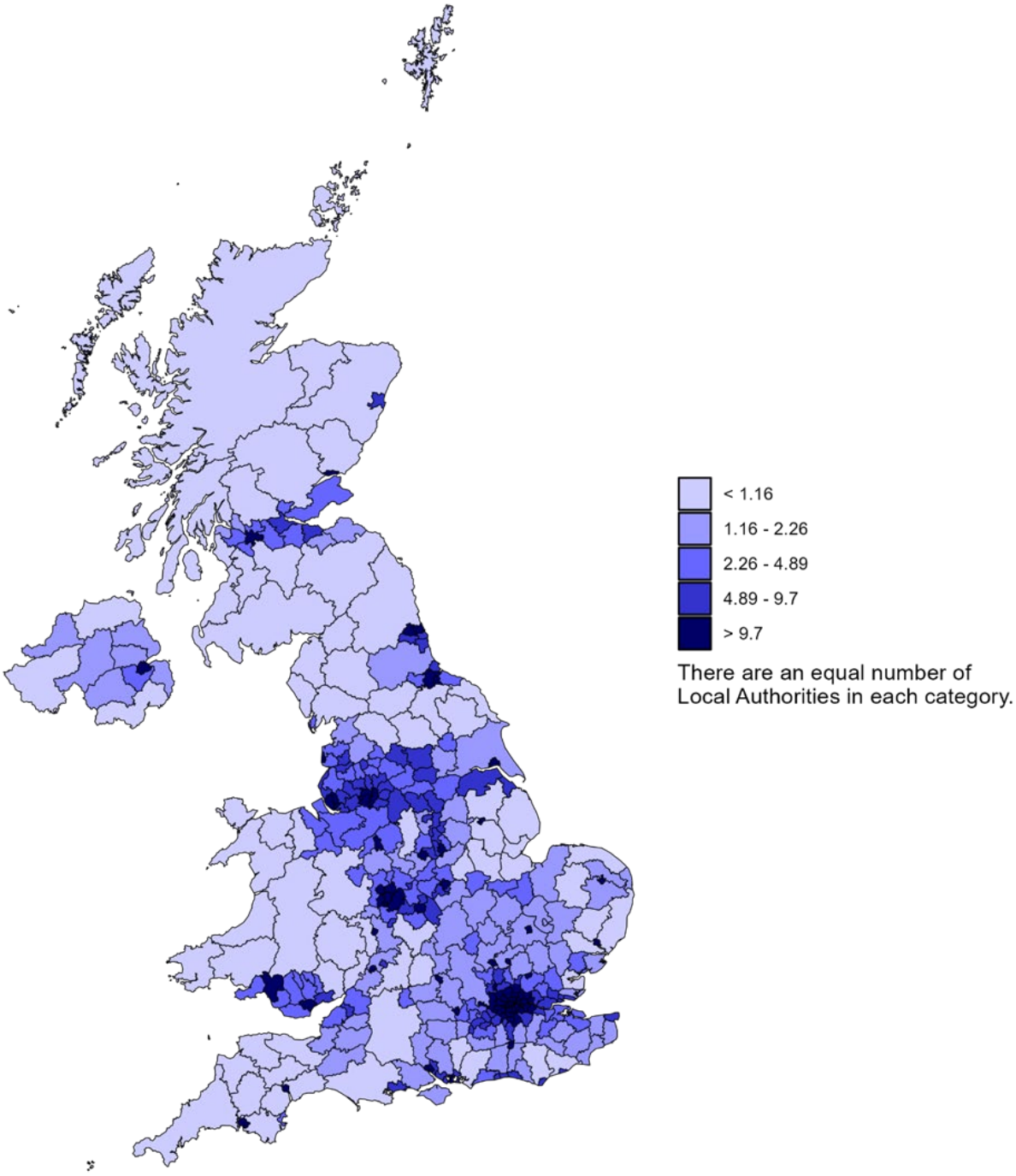


Figure 8: Net emissions of greenhouse gases per km^2 by local authority (tonnes CO_2e per km^2) in 2021



Domestic sector

In 2021, domestic sector greenhouse gas emissions increased in all 374 local authorities in the UK. The main driver of this increase is likely to be the colder temperatures in 2021 compared

to 2020[5] resulting in more energy being used to heat homes. In 2021, about 66% of domestic end-user emissions arose from gas use, 23% from electricity and 11% from consumption of other fuels.

Looking at longer term trends, national greenhouse gas emissions from the domestic sector have decreased since 2005 in all local authorities. The local authorities with the largest decreases in domestic sector end-user emissions since 2005 are Isles of Scilly (59%), Shetland Islands (54%) and Argyll and Bute (49%), having each reduced their emissions from domestic electricity by around two thirds. The larger falls in these areas are also partly because other local authorities have higher levels of domestic gas consumption, from which emissions have generally fallen more slowly than for electricity. Whereas the Isles of Scilly, Shetland Islands, and a high proportion of households in Argyll and Bute are not connected to the gas network.

Emissions per capita for the domestic sector have the least variation between local authorities and are dominated by gas and electricity consumption. DESNZ publishes sub-national metered domestic energy consumption data[6,7] which 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, but not activities by private individuals elsewhere, such as personal travel. Table 1 shows the range of greenhouse gas emissions per capita in this sector across local authorities. There are slightly fewer local authorities in the lower categories than in 2020, reflecting the overall rise in domestic emissions.

Table 1: Breakdown of UK local authorities by annual greenhouse gas emissions per capita in the domestic sector, 2020-2021

Number of local authorities, percentages

Tonnes of CO_2e per person	No. of LAs 2020	% of LAs 2020	No. of LAs 2021	% of LAs 2021
<1.0	7	2%	4	1%
1.0 to 1.5	235	63%	192	51%
1.5 to 2.0	126	34%	168	45%
2.0 to 2.5	6	2%	10	3%
Total	374	100%	374	100%

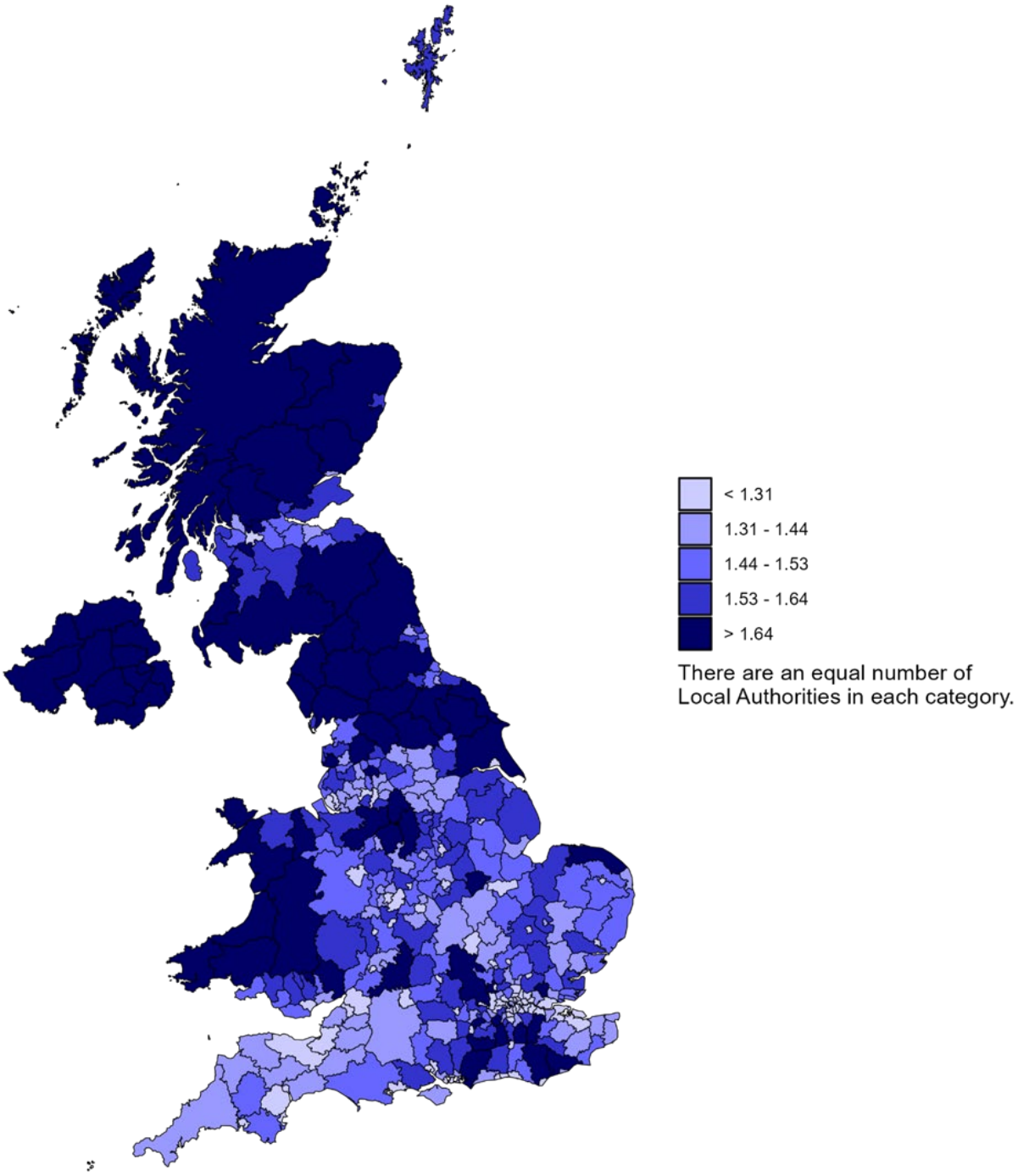
For 34% of local authorities (129 of 374) the domestic sector was the greatest contributor to end-use emissions in 2021. This sector can be influenced by the fuel types used, the type and condition of the housing (including its insulation), the average temperature (urban areas can be much warmer and therefore easier to heat than rural areas), average household size, type of household and the income and preferences of the occupiers.

As Figure 9 shows, in 2021, for the domestic sector, emissions per capita were higher in Scotland, Northern Ireland, and Wales than in England. Per capita emissions are high in Northern Ireland predominantly because there is limited availability of natural gas in this area; this results in the combustion of more carbon intensive fuels instead, such as coal, burning oil

[5] https://www.gov.uk/government/statistics/energy-trends-section-7-weather
[6] https://www.gov.uk/government/collections/total-final-energy-consumption-at-sub-national-level
[7] For gas and electricity consumption estimates are available for local authorities, regions, Lower and Middle Super Output Areas, and at a postcode level.
Gas: https://www.gov.uk/government/collections/sub-national-gas-consumption-data
Electricity: https://www.gov.uk/government/collections/sub-national-electricity-consumption-data

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 than Northern Ireland.

Figure 9: Domestic greenhouse gas emissions per capita by local authority (tonnes CO_2e per capita) in 2021



Transport sector

Transport emissions include freight and passenger transport, both for private and business purposes. The estimates are based on 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 this should be considered when looking at either totals or per capita estimates. The Technical Report shows how the road traffic estimates break down between major and minor roads, to help with consideration of this point. As the estimates are on an end-user basis, the transport emissions include a share of emissions from oil refineries.

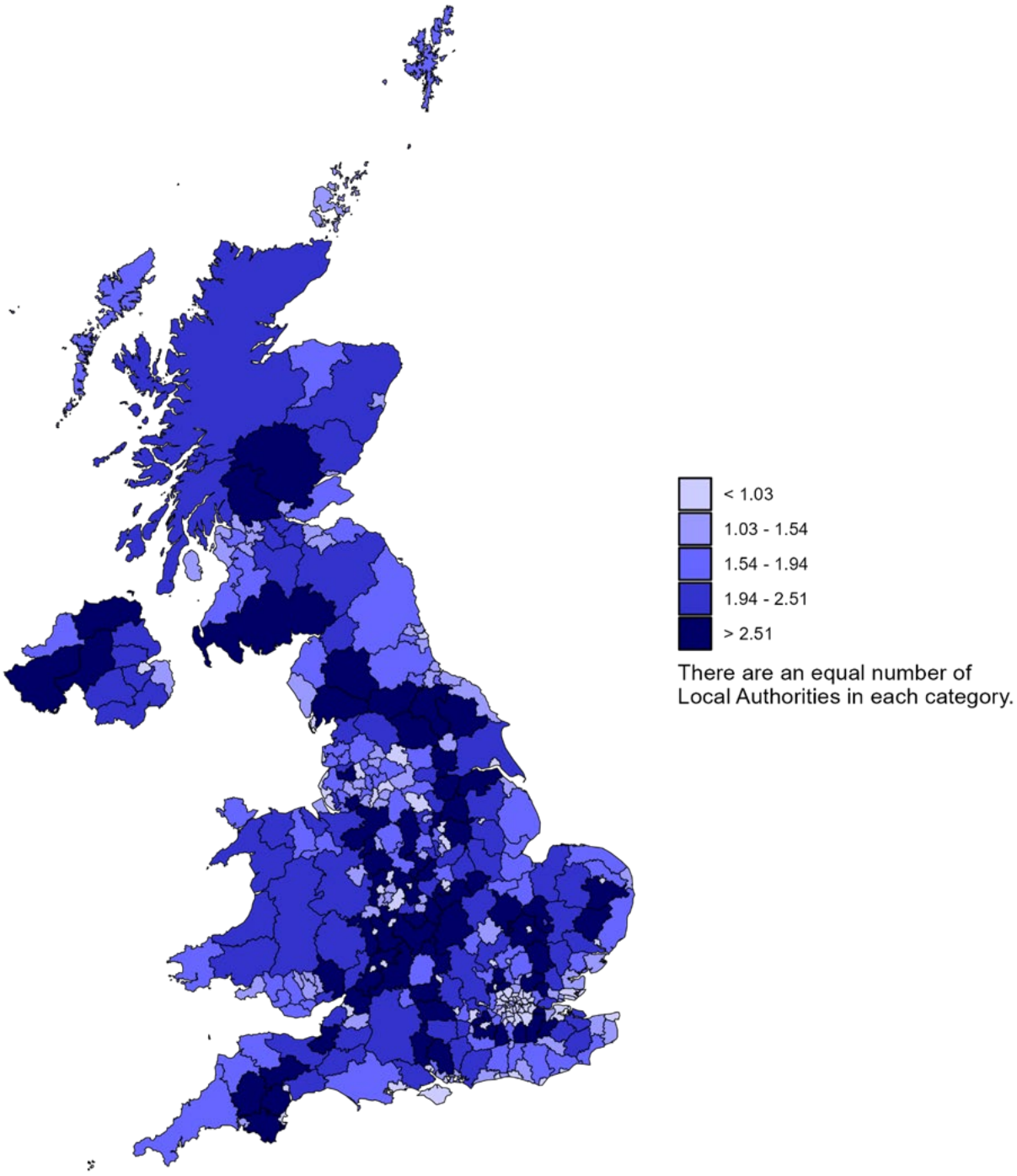
At a national level, transport greenhouse gas emissions saw an increase of 9.3% in 2021 compared to 2020. This was largely due to the easing of COVID-19 restrictions, allowing the public to travel more freely during 2021 compared to 2020 where they were instructed to stay at home as much as possible for large periods of time. During 2021, 94% of local authorities (350) saw an increase in transport emissions compared to 2020, although emissions were lower than in 2019 in 97% (361) of local authorities. Transport was the sector with the highest greenhouse gas emissions in 153 local authorities, 41% of the total.

Prior to the large fall in 2020 and rise in 2021, national transport emissions had decreased slightly since 2005, even though there had been an increase in both the number of passenger vehicles[8] and the vehicle kilometres travelled[9]. 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 cars[10]. In 2021, 368 out of 374 local authorities had lower greenhouse gas emissions from transport than in 2005, with the Isles of Scilly having the greatest decrease (52%) and Torridge having the greatest increase (12%).

Figure 10 shows how greenhouse gas emissions per capita from transport vary around the UK. There are a variety of factors that will affect the level of transport emissions in different areas such as the composition of the vehicle fleet and the level of road traffic for different vehicle types. Areas with higher emissions are more likely to be those with motorways and major roads carrying a lot of through traffic, while the areas with the lowest levels of emissions per capita are typically built-up highly populated areas with a high use of public transport.

[8] https://www.gov.uk/government/statistical-data-sets/tsgb09-vehicles
[9] https://www.gov.uk/government/statistical-data-sets/tsgb01-modal-comparisons
[10] https://www.gov.uk/government/statistical-data-sets/tsgb03

Figure 10: Transport greenhouse gas emissions per capita by local authority (tonnes CO_2e per capita) in 2021



Industrial sector

Industry accounted for 21% of greenhouse gas emissions in the UK in 2021 and in authorities with large industrial sites is a very significant source of emissions. In 2021, 85% of local authorities in the UK (319 out of 374) experienced an increase in greenhouse gas emissions from the industrial sector. Overall there was a 5.0% rise in greenhouse gas emissions from industry between 2020 and 2021, largely due to an increase in emissions from industrial gas and electricity use. Looking at longer term trends, 90% of local authorities (337 out of 374) have seen decreases in greenhouse gas emissions from this sector since 2005.

Emissions from fuel use in large industrial installations have been mapped using the National Atmospheric Emissions Inventory database of point sources, which combines data from the UK Emissions Trading Scheme and EU Emissions Trading System with data reported by operators that are held in regulators' pollution inventories. In the data tables accompanying this publication these data are included in the Large Industrial Installations category to ensure that no sensitive fuel consumption data for specific sites is disclosed. This means that in particular the industrial gas category does not include all industrial gas consumption, as some is included in the Large Industrial Installations category.

As seen in Figure 11, emissions per capita in the industrial sector are higher in Wales, Scotland and Northern Ireland than in England. Emissions from this sector are heavily dependent on whether there are large industrial sites situated in an area, and some of the lowest industrial emissions per capita are in authorities in London which has a higher population density and a greater proportion of residential areas meaning that industrial sites are less likely to be located there.

Commercial sector

Commercial emissions predominantly arise from the use of electricity and gas by businesses. They accounted for 4% of greenhouse gas emissions in the UK in 2021. They rose by 17.5% from 2020, when business activity reduced due to the pandemic, though were still lower than they were in 2019, the last full year before the pandemic. This rise from 2020 is reflected in the local authority figures, as 93% of local authorities (349 of 374) saw an increase in greenhouse gas emissions. Over the longer term, almost all local authorities (373 of 374) saw a decrease in greenhouse gas emissions since 2005. This long-term fall is largely driven by the reduction in emissions resulting from electricity use in this sector, largely due to a decrease in the use of coal for electricity generation and increased use of renewables.

Public sector

Most local authorities saw a rise in public sector greenhouse gas emissions between 2020 and 2021, with 88% (330 out of 374) seeing an increase. This is in line with the overall 12.6% increase in public sector emissions in the UK, which was predominantly due to a rise in emissions from public sector gas and electricity consumption. Almost all local authorities (94%, 352 of 374) saw a decrease in greenhouse gas emissions from the public sector since 2005, predominantly as a result of a reduction in emissions resulting from electricity use in this sector, due to the national decrease in the use of coal for electricity generation and increased use of renewables.

Figures 11, 12 and 13 show greenhouse gas emissions per capita for the industrial, commercial and public sectors respectively.

Figure 11: Industrial greenhouse gas emissions per capita by local authority (tonnes CO_2e per capita) in 2021

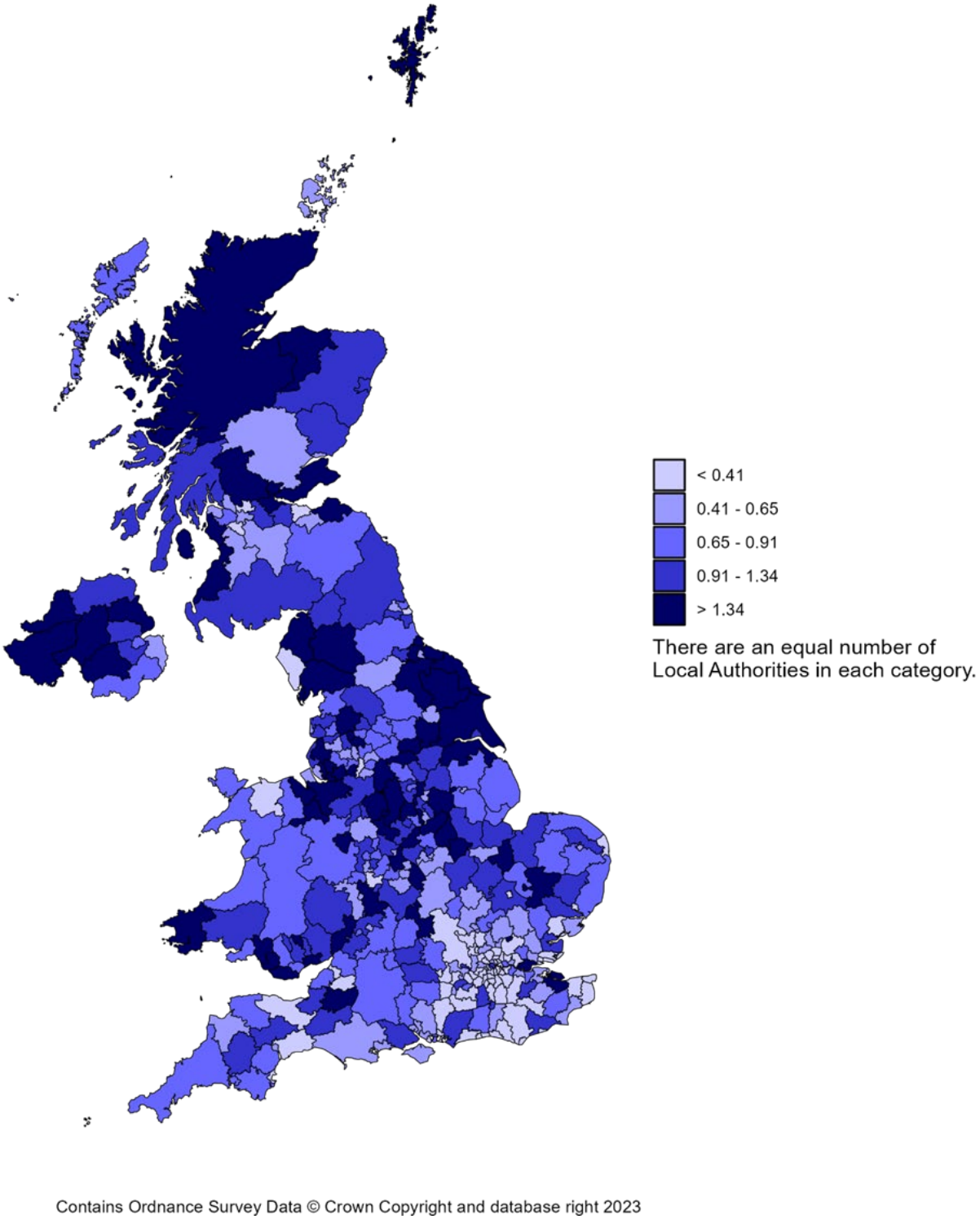


Figure 12: Commercial greenhouse gas emissions per capita by local authority (tonnes CO_2e per capita) in 2021

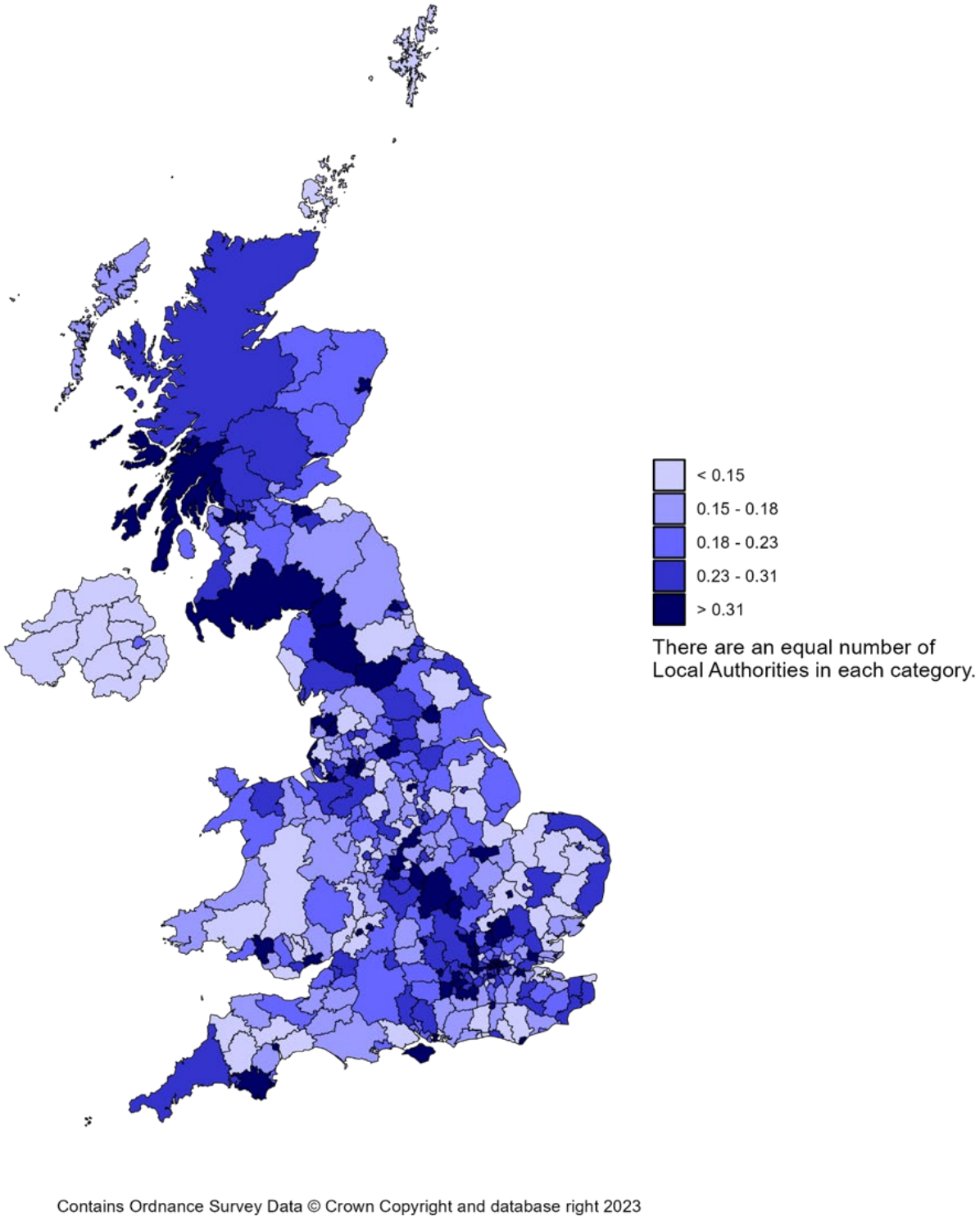
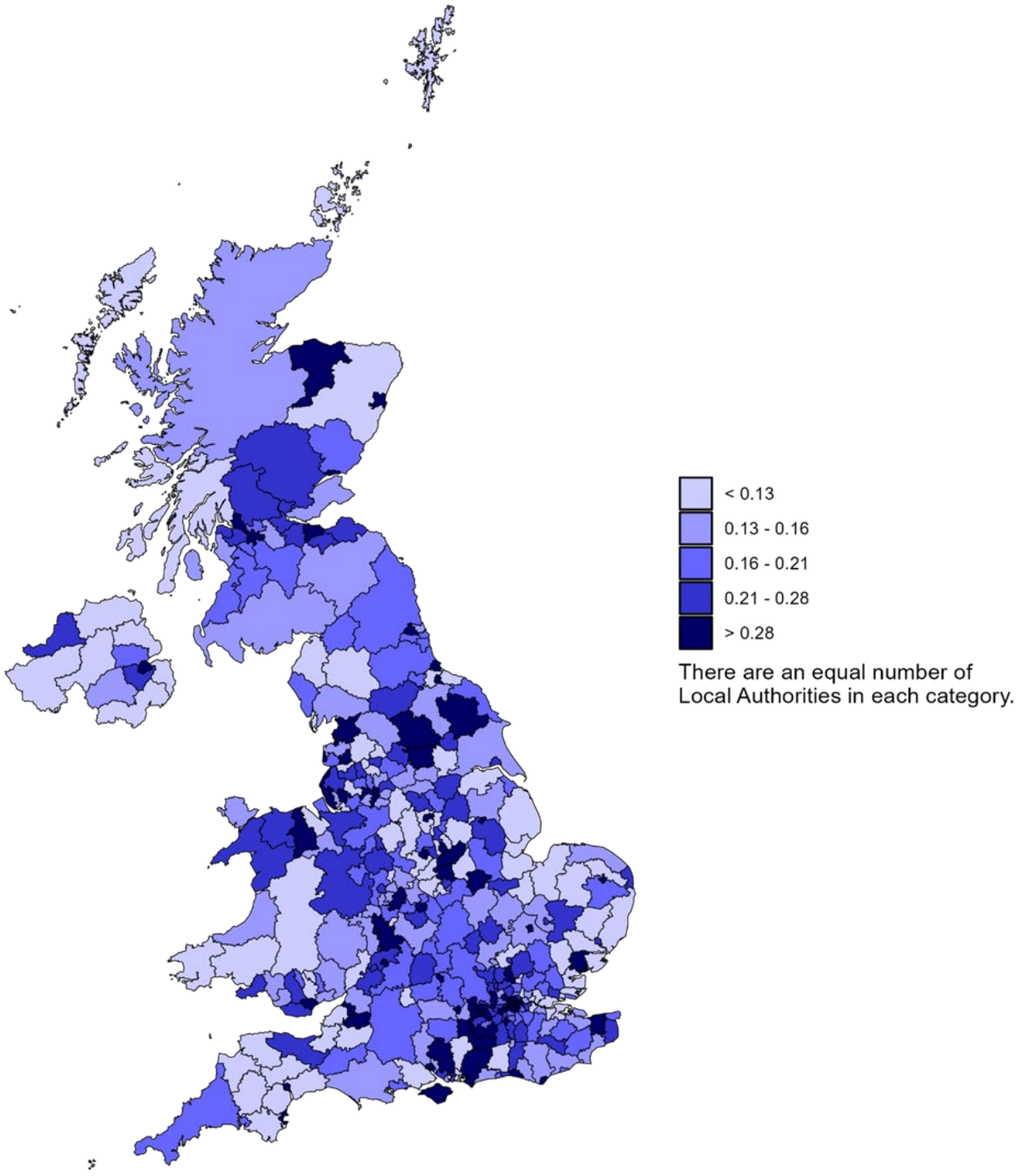


Figure 13: Public sector greenhouse gas emissions per capita by local authority (tonnes CO_2e per capita) in 2021



Agriculture

Methane and nitrous oxide emissions from livestock and agricultural soils have been included for the entire time series in these local authority estimates for the first time, having only been included in last year's estimates going back to 2018. Most emissions in the agriculture sector come from these gases, with 55% of the 2021 emissions total being methane and 27% nitrous oxide. The remaining 18% of emissions were carbon dioxide. Greenhouse gas emissions from agriculture made up 13% of emissions in the UK in 2021.

Agriculture is a significant source of emissions in a number of authorities and was the sector with the highest emissions in 55 local authorities in 2021, 15% of the total. Nationally, greenhouse gas emissions from agriculture rose by 3.0% between 2020 and 2021, with 76% of local authorities (284 out of 374) seeing an increase. These rises were largely due to an increase in emissions from agricultural machinery and an increase in both direct and indirect soil emissions of nitrous oxide, following a reduction in 2020 when less fertiliser was used due to wet weather reducing the planting of winter crops. Over the longer term, since 2005 agriculture emissions have fallen in 80% of local authorities (298 out of 374).

Waste management

Estimates of methane emissions from landfill have been included for the entire time series in these local authority estimates for the first time, having only been included in last year's estimates going back to 2018, although a significant proportion of landfill methane emissions in England in 2005-2009 could not be allocated to local authorities so the landfill emissions estimates shown will be underestimates for some local authorities in the early part of the time series.

Non-CO_2 gases make up the majority of waste management emissions, with methane emissions from landfill sites in particular making up 72% of waste management emissions across the UK. Greenhouse gas emissions from waste management made up 5% of emissions in the UK in 2021. Nationally, they fell by 2.1% between 2020 and 2021, with 57% (213 out of 374) of local authorities showing a decrease in emissions.

Rather than recording waste management emissions against the locations where the emissions occurred, in these statistics we have allocated emissions to local authorities based on the locations where the waste occurs. This is to enable local authorities to understand the emissions resulting from waste produced in their area, in a similar way to how emissions from energy supply are shown on an end-user basis in these statistics, so that emissions resulting from the production and supply of electricity and other energy are shown against the locations where the energy was used.

Figure 14: Agriculture net greenhouse gas emissions per capita by local authority (tonnes CO_2e per capita) in 2021

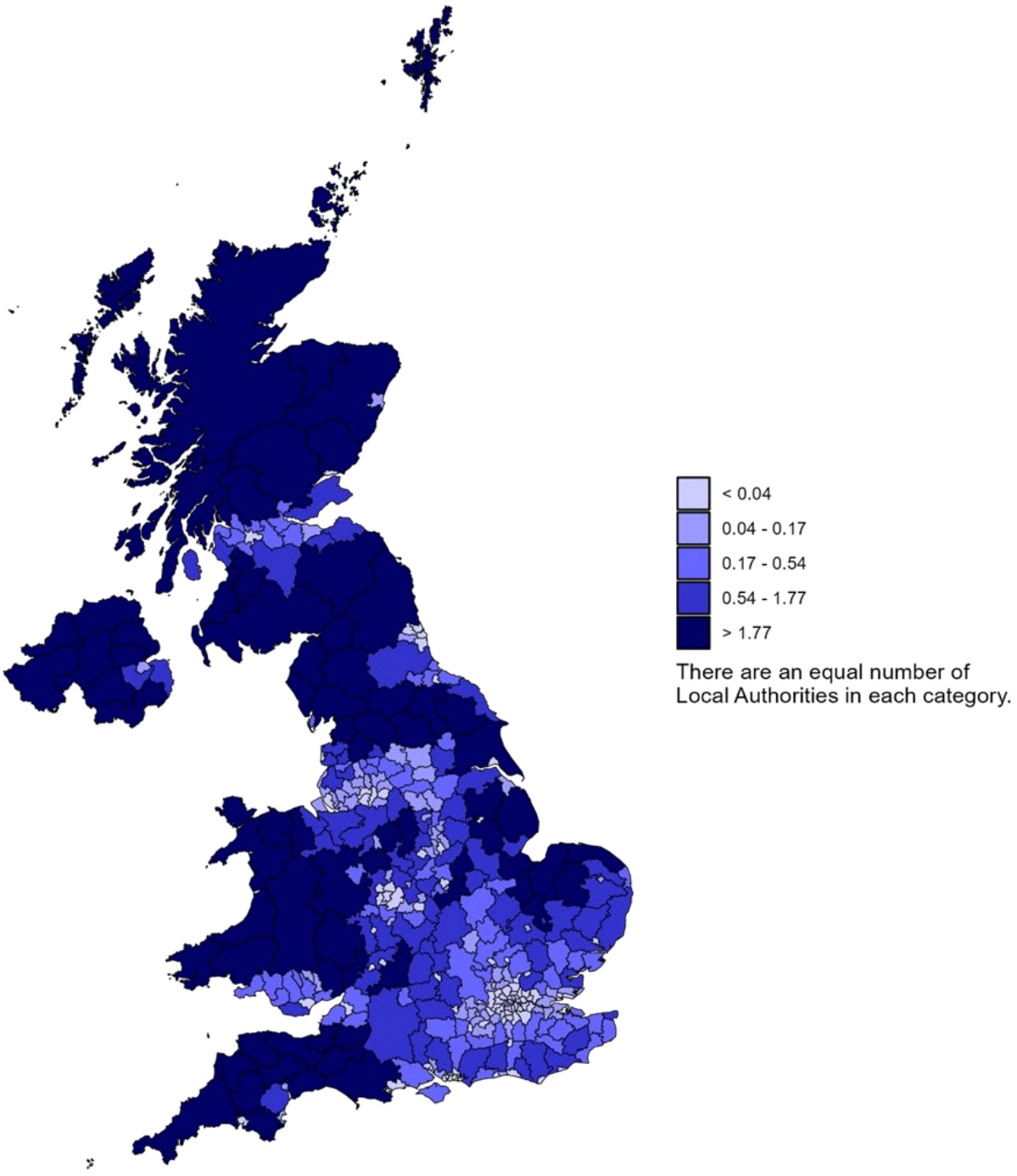
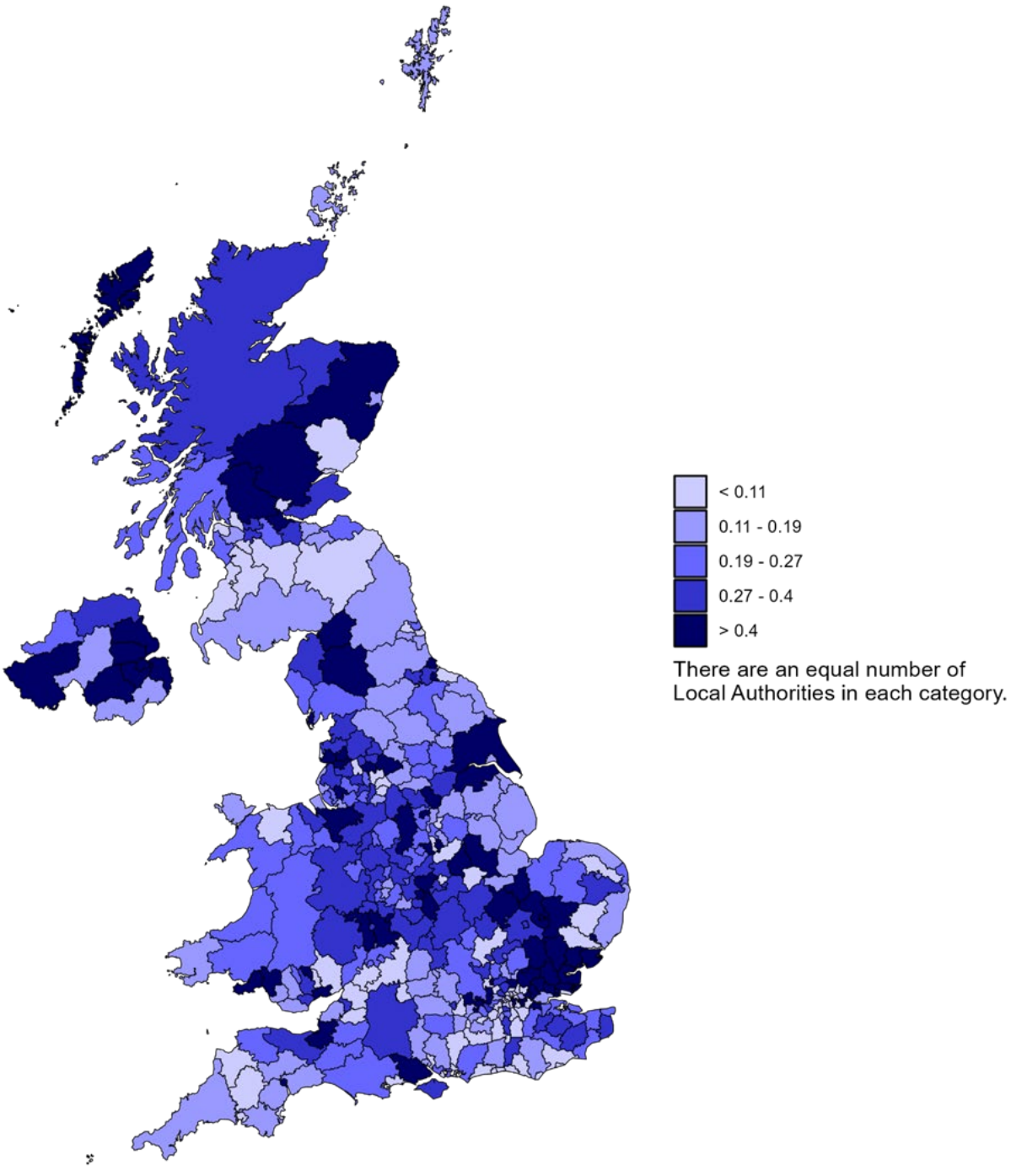


Figure 15: Waste management net greenhouse gas emissions per capita by local authority (tonnes CO_2e per capita) in 2021



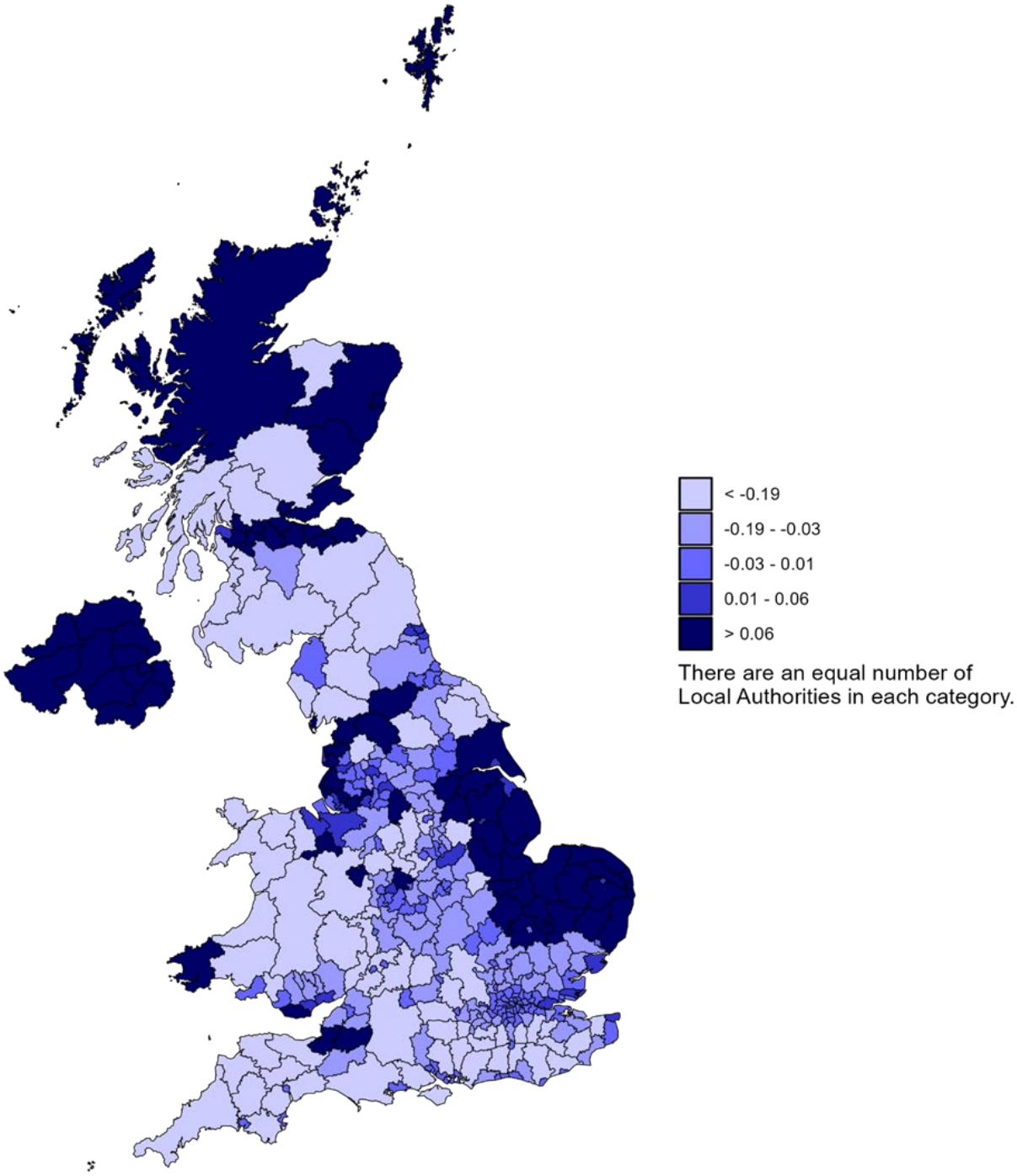
Land use, land use change and forestry (LULUCF)

The LULUCF sector consists of emissions and removals from forest land, cropland, grassland, settlements and harvested wood products. It is the only sector that includes emission removals, although we estimate the sector as a whole to be a net source of greenhouse gas emissions in each year from the start of the data series. In general, cropland is the largest sources of carbon dioxide emissions, while forest land is the dominant sink. Settlements, wetlands and grasslands are estimated to have been net sources of emissions throughout the data series. While the LULUCF sector was a net source of emissions across the UK as a whole in 2021, we estimate that it was a net sink in 54% of local authorities (201 of 374). This is because there are some local authorities where it is a large source of emissions, in Northern Ireland, Scotland and the East of England in particular.

While there was an overall decrease in net emissions from the LULUCF sector in 2021 compared to 2020, only 43% of local authorities (162 of 374) showed a decrease in net emissions from the LULUCF sector, with the other 57% (212 of 374) seeing an increase. This was because the overall decrease was driven by very large reductions in net emissions in a small number of local authorities compared to changes of much smaller magnitudes elsewhere. The majority of local authorities (89%, 334 of 374) saw a decrease in net greenhouse gas emissions from the LULUCF sector between 2005 and 2021.

In the LULUCF sector, there are clear regional trends in per capita emissions (Figure 16). In particular, in large parts of Wales, the North East, and the South East and South West there are large sinks of greenhouse gases. In other parts of the UK, such as in Northern Ireland, Scotland, and parts of the East of England, LULUCF is a large source of greenhouse gas 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 16: Land Use, Land Use Change and Forestry net greenhouse gas emissions per capita by local authority (tonnes CO_2e per capita) in 2021



Local authorities with large changes in emissions since 2020

Overall, greenhouse gas emissions increased in 358 out of 374 local authorities between 2020 and 2021, reflecting the 5.9% increase between 2020 and 2021 in the national emissions total allocated to local authorities. For most local authorities this was largely due to a large increase in road traffic as a result of the easing of restrictions related to the COVID-19 pandemic, as people were able to travel more freely for large periods of 2021 compared to 2020, and an increase in emissions from heating buildings due to colder temperatures in 2021. Many authorities also saw a significant increase in commercial emissions as business activity began to rebound, which was also largely due to the easing of COVID-19 pandemic restrictions. The exceptions to this are generally those local authorities that have shown changes in industrial emissions following closures or expansions of large industrial sites in those areas. The 16 authorities that saw a fall in emissions in 2021 mostly did so due to a decrease in industrial emissions. There are also authorities where the LULUCF sector provides a large emissions sink, giving them a small net emissions total that can be subject to large percentage changes when other sources of emissions change.

Table 2 shows some examples of local authorities that had particularly big increases or decreases in emissions and the sub-sector that made the largest contribution to this change in each case. The largest falls between 2020 and 2021 were seen in Redcar and Cleveland (26%), Stockton-on-Tees (15%) and Barrow-in-Furness (10%). The largest factors in the falls in Redcar and Cleveland and Stockton-on-Tees were reductions in large industrial installations. The reduction in Barrow-in-Furness was largely related to industry ‘other’.

Argyll and Bute (49%), Southwark (42%), and Greenwich (29%) saw the largest increases in emissions from 2020 to 2021. For Argyll and Bute this was due to net emissions: forest land, a sink for emissions, reducing and therefore causing net emissions to rise for the local authority. Both Southwark and Greenwich saw large increases in emissions mainly due to landfill emissions, which for both authorities accounted for more than two thirds of their increase.

Table 2: Local authorities that had the largest changes in greenhouse gas emissions between 2020 and 2021

Percentages

Local authority	Percentage change	Sub-sector most responsible for changes in that area
Redcar and Cleveland	-26%	Large Industrial Installations
Stockton-on-Tees	-15%	Large Industrial Installations
Barrow-in-Furness	-10%	Industry ‘Other’
Greenwich	29%	Landfill
Southwark	42%	Landfill
Argyll and Bute	49%	Net Emissions: Forest land

Greenhouse gas emissions trends since 2005

Because estimates of methane and nitrous oxide emissions are now available for all sources across the whole time series, this section presents trends in greenhouse gas emissions since 2005, rather than trends in carbon dioxide emissions, as it did last year.

When the local authority emissions are aggregated, estimated total greenhouse gas emissions decreased by around 39% since 2005 (the earliest year for which data are available at local authority level) – falling from 657 million tCO_2e to 399 million tCO_2e. 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), between 2011 and 2012 (largely due to variations in temperature) and between 2020 and 2021 (largely due to the easing of COVID-19 restrictions and variations in temperature). For information on the drivers of trends at national level, see the latest UK territorial greenhouse gas emission statistics.

Regional trends since 2005

Figures 17 and 18 show how total greenhouse gas emissions and annual greenhouse gas emissions per capita compare between 2005 and 2021 in each region and country in the UK. Emissions have decreased in all regions since 2005. The largest percentage decrease in emissions (63%) and the largest decrease in per capita terms of 10.2 tonnes per person were seen in the North East. The smallest decrease in percentage terms (23%) was seen in Northern Ireland and in per capita terms (3.6 tonnes per person) was seen in London and in the West Midlands.

Figure 17: End-user greenhouse emissions by region, 2005 and 2021

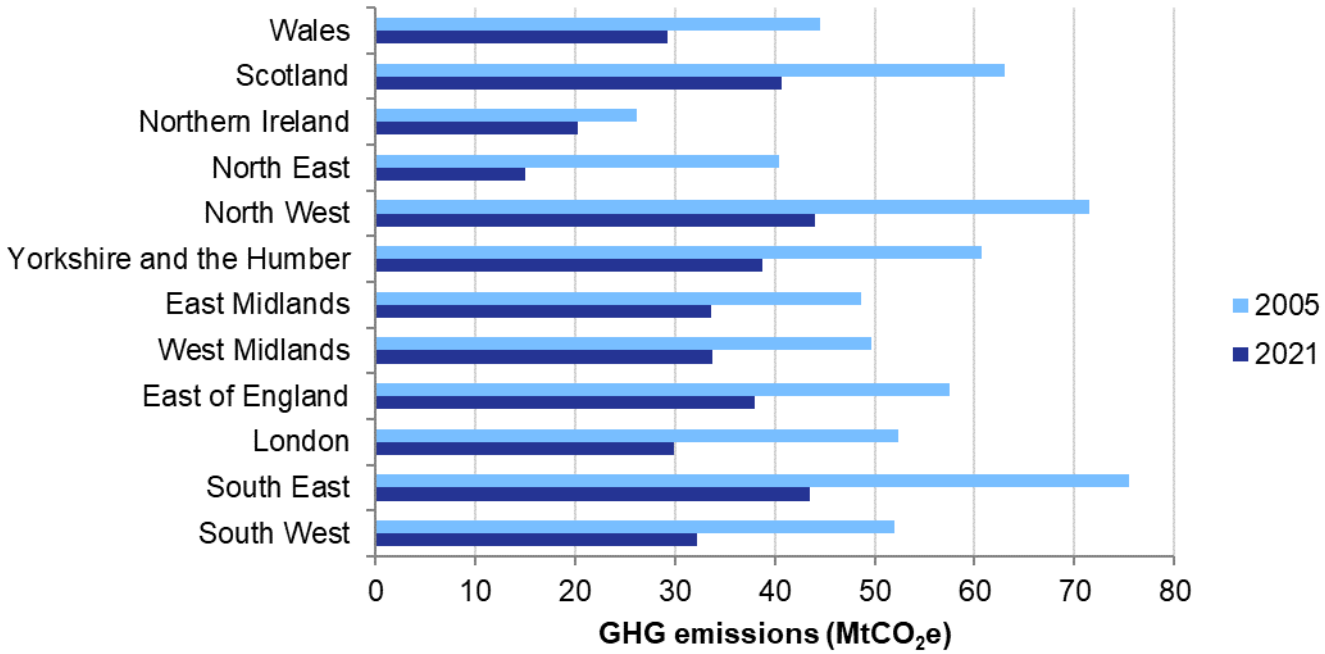


Figure 18: Annual end-user greenhouse emissions per capita by region, 2005 and 2021

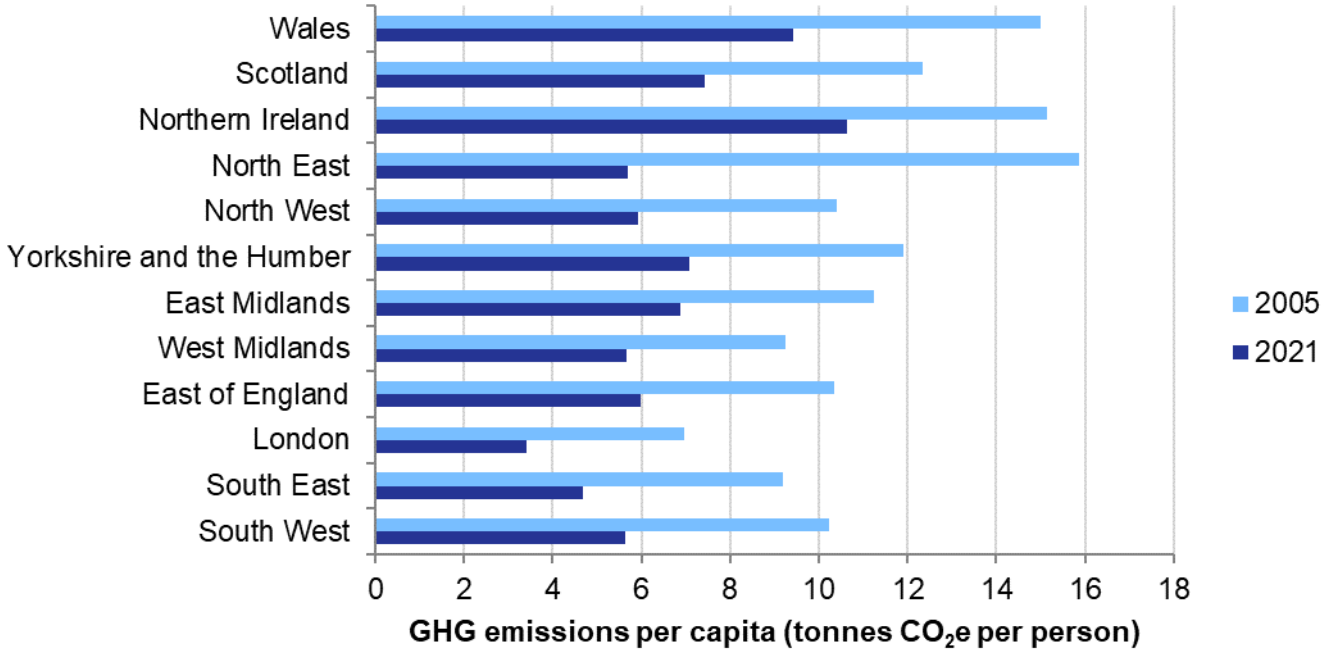


Table 3 shows how total greenhouse gas emissions and greenhouse gas emissions per km^2 compare between 2005 and 2021 in each region and country in the UK. The highest emissions per km^2 are generally in urban areas and areas with large industrial sites. At a regional level the largest emissions per km^2 are in London, at 18.8 tCO_2 per km^2 in 2021, due to London's high population density.

Table 3: End-user greenhouse gas emissions and greenhouse gas emissions per km^2 by region, 2005 and 2021

$MtCO_2e$, tCO_2e

Region / country	2005		2021		Difference between 2005 and 2021 per km^2 (tCO_2e)
	Total emissions ($MtCO_2e$)	Per km^2 (tCO_2e)	Total emissions ($MtCO_2e$)	Per km^2 (tCO_2e)	
UK	657	2.6	399	1.6	-1.0
Wales	45	2.1	29	1.4	-0.7
Scotland	63	0.8	41	0.5	-0.3
Northern Ireland	26	1.8	20	1.4	-0.4
England	508	3.8	309	2.3	-1.5
North East	40	4.7	15	1.7	-2.9
North West	72	4.8	44	3.0	-1.8
Yorkshire and the Humber	61	3.9	39	2.5	-1.4
East Midlands	49	3.1	34	2.1	-0.9
West Midlands	50	3.8	34	2.6	-1.2
East of England	58	2.9	38	1.9	-1.0
London	52	32.8	30	18.8	-14.1
South East	75	3.9	44	2.2	-1.6
South West	52	2.1	32	1.3	-0.8

Local authority trends since 2005

There is more variation in trends at local authority level than at regional level, as seen in Table 4. 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 374 local authorities have shown a decrease in total emissions between 2005 and 2021. This reflects the decrease in overall emissions for the UK during this period driven mainly by reductions in emissions from power stations and industrial combustion. The reduction from power stations is driven by change in the fuel mix used for electricity generation with a large reduction in the amount of coal, which is a carbon intensive fuel, and increasing use of renewables. The reduction in industrial combustion is largely driven by the closure or reduced activity of industrial plants, a notable portion of which occurred during 2009, likely due to economic factors.

From 2005 to 2021, the largest percentage decrease:

- in total emissions was in Redcar and Cleveland (down 90% since 2005), driven by the closure of some large industrial installations over this period.
- in emissions from the industrial sector was in Redcar and Cleveland (down 93%) due to the closure of a number of large industrial installations over this period.
- in emissions from the commercial sector was North Ayrshire (down 90%) due to reductions in emissions from electricity use and from gas consumption.
- in emissions from the public sector was Mid Ulster (90%) due to reductions in emissions from electricity use and other (non-gas) fuel consumption.
- in emissions from the domestic sector was in Isles of Scilly (down 59%) due to reductions in emissions from electricity consumption, although in absolute terms this reflects only a small decrease in emissions (3.3 kilotonnes (kt) of CO_2e).
- in emissions from transport was in Isles of Scilly (down 52%), due to a decrease in emissions from non-road transport, which again in absolute terms equates to a small decrease, of 1.0 ktCO_2e.
- in emissions from agriculture was in Runnymede (down 54%), due to a decrease in emissions from livestock.

From 2005 to 2021, the largest percentage increase:

- in emissions from the industrial sector was in Lambeth (up 125%), driven by a rise in emissions from industry ‘other’.
- in commercial emissions was in Slough (up 16%), due to increases in commercial electricity emissions.
- in emissions from the public sector was Rushcliffe (up 171%), driven by an increase in public sector gas consumption over this period.
- in the transport sector was Torridge (up 12%) due to an increase in road traffic emissions.
- in emissions from agriculture was in Brent (up 524%), due to an increase in emissions from agricultural electricity usage and gas consumption, although in absolute terms this equates to a small increase in emissions (2.7 ktCO_2e).

No local authorities showed an increase in total emissions or the domestic sector, and the largest changes in the waste management sector are not shown since a significant proportion of landfill emissions in 2005 could not be allocated to local authorities.

Table 4: Breakdown of size of decrease in greenhouse gas emissions between 2005 and 2021

Change in emissions since 2005	Number of local authorities
Decrease of more than 50%	25
Decrease of 45%-50%	46
Decrease of 40%-45%	66
Decrease of 35%-40%	88
Decrease of 30% to 35%	63
Decrease of 0-30%	86

Tables 5 below provides some information on the local authorities that have experienced the largest percentage decreases in emissions since 2005, and the sub-sector that made the largest contribution in each case.

All of the local authorities with the largest decreases in greenhouse gas emissions since 2005 were driven by closures in large industrial installations, except for City of London, where emissions reductions were mainly due to a decrease in emissions from commercial electricity use.

For some authorities a LULUCF sink is a factor in the trend in its emissions. A large sink can lead to the net emissions total in a local authority being much lower than its non-LULUCF emissions total, meaning that changes in emissions from other sectors lead to a larger percentage change in total emissions. This is the case for New Forest and Northumberland in this list, that both have notable LULUCF sinks meaning that their total emissions have fallen by a larger percentage than when only their non-LULUCF emissions are considered.

Table 5: Local authorities that had the largest decreases in greenhouse gas emissions since 2005

Percentage

Local authority	Percentage decrease	Sub-sector most responsible for decrease
Redcar and Cleveland	90%	Large Industrial Installations
Gravesham	75%	Large Industrial Installations
New Forest	69%	Large Industrial Installations
Northumberland	66%	Large Industrial Installations
City of London	63%	Commercial Electricity

Carbon dioxide emissions within the scope of influence of local authorities

Alongside the full dataset, we have also published a “subset dataset” which represents carbon dioxide emissions within the scope of influence of local authorities. This can be found in the tables accompanying this publication, available on the department’s statistics website. This

dataset was originally used to report progress against National Indicator 186 under the Department for Communities and Local Government's Local Area Agreements, and while the National Indicator Set was discontinued in 2011 we continue to publish this subset of the data since some local authorities use these statistics to monitor their progress in reducing emissions in their local area.

Unlike the full dataset, the dataset of emissions within the scope of local authorities excludes emissions that local authorities do not 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) and UK Emissions Trading Scheme (UK 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 and UK 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 significant impact on some local authorities compared to others, as some local authorities have a much bigger proportion of emissions from the above sources than others. Table 6 shows the local authorities with the largest decreases in emissions within the scope of influence of the local authority between 2005 and 2021. No authorities saw an increase over this period.

Only one of these, City of London, is amongst the top five local authorities for decreases in overall emissions (which are shown in Table 5 in the previous section). This is because the largest decreases in overall emissions were mostly driven by the large industrial installations sub-sector, large aspects of which are considered to be outside the scope of influence of local authorities, or occurred in areas with large LULUCF sinks, which are considered to be entirely outside the scope of influence of local authorities.

Table 6: Local authorities that had the largest increases or decreases in CO_2 emissions within the scope of influence of the local authority since 2005

Percentage

Local authority	Percentage change	Sub-sector most responsible for change
City of London	- 67%	Commercial Electricity
Isles of Scilly	- 59%	Commercial Electricity
Exeter	- 57%	Public Sector Gas
South Ribble	- 57%	Industry 'Other'
Westminster	- 54%	Commercial Electricity

Looking at changes in emissions within the scope of influence of local authorities between 2020 and 2021, 371 local authorities had increases in their emissions over this period. Table 7 shows the local authorities with the biggest percentage changes to the emissions within their scope of influence between 2020 and 2021. Several of these local authorities do not appear in Table 2, 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 7: Local authorities that had the largest increases or decreases in CO_2 emissions within the scope of influence of the local authority, 2020-2021

Percentage

Local authority	Percentage change	Sub-sector most responsible for change
Barrow-in-Furness	-6%	Industry 'Other'
West Suffolk	-4%	Industry Gas
Gravesham	-1%	Road Transport (A roads)
North Ayrshire	17%	Industry Gas
Rother	17%	Industry Gas
Selby	19%	Industry Gas

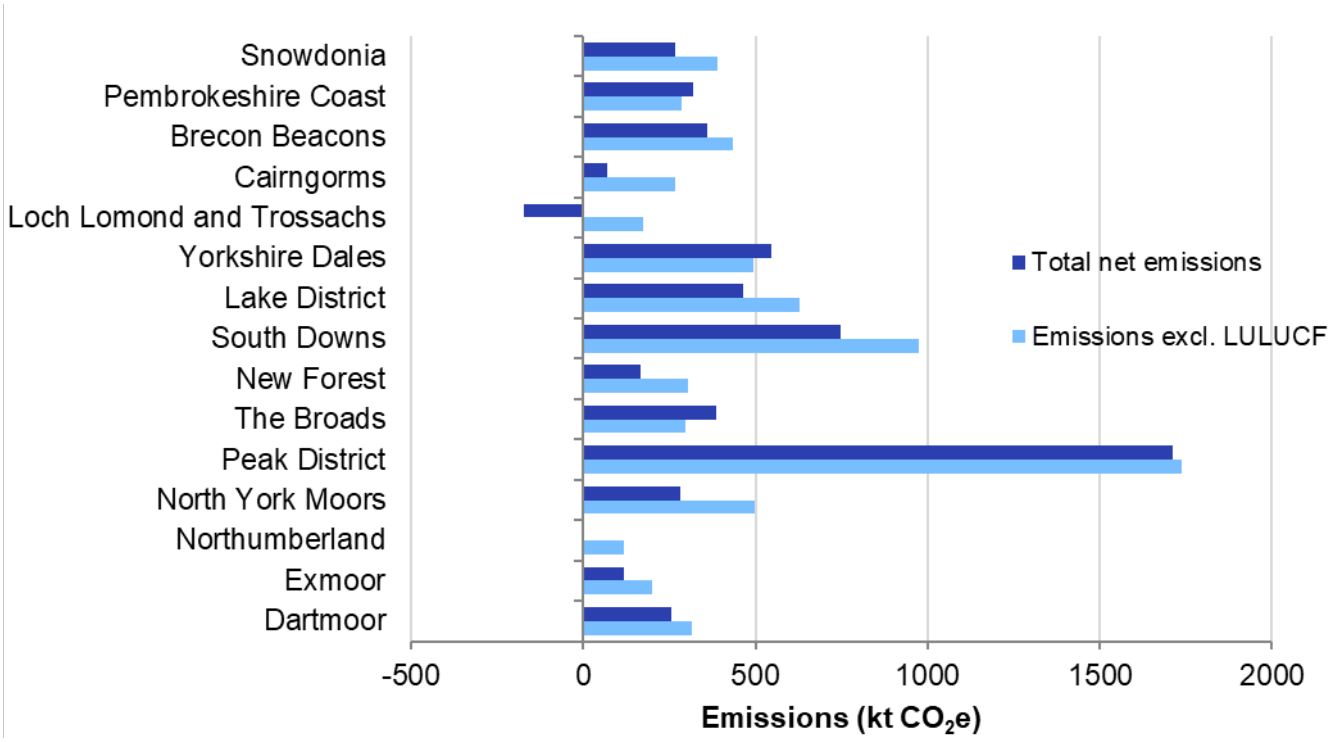
Emissions within National Park areas

Alongside the local authority estimates, as part of this publication we publish estimates of greenhouse gas emissions within the National Park areas. There are 15 National Parks in the UK, of which 10 are in England, 3 in Wales and 2 in Scotland. There are none in Northern Ireland. These estimates have been produced following the same methodologies as the local authority estimates as far as possible, and where there are differences these are given in the Technical Report that accompanies this publication.

National Parks are more rural than many other areas of the country so have quite different characteristics. Compared to their size they have lower levels of greenhouse gas emissions than more built up areas, averaging emissions of 0.2 $ktCO_2e$ per km^2 of area in 2021 compared to the UK average of 1.6 $ktCO_2e$ per km^2. However, they have higher emissions than average compared to the size of their populations, averaging 12.3 $ktCO_2e$ per capita in 2021 compared to the UK average of 6.0 $ktCO_2e$ per capita. The LULUCF sector is also more prominent in the emissions of National Park areas, both as a source and as an emissions sink in different areas.

Figure 19 shows how the net greenhouse gas emission totals in 2021 in the 15 National Parks compared including and excluding LULUCF. The Peak District has the largest total, 68% of which was industrial emissions. LULUCF acts as a net emissions sink in 12 of the 15 parks, and in Northumberland and in Loch Lomond and Trossachs results in the total net emissions being negative.

Figure 19: Net end-user greenhouse gas emissions in National Park areas including and excluding LULUCF, 2021



Reconciliation with the UK inventory

Local authority 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 authority estimates. 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 8 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, or in the case of fluorinated gases because data are not available to be able to estimate emissions at a local authority level.
- **"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 or incomplete address information for individual meters, some landfill emissions for which data are not available showing which local authorities the waste originated in, and harvested wood products.

- **"Methodological differences"** are the methodological differences that have caused discrepancies between the national inventories and the local authority greenhouse gas emissions dataset. These are explained after the UK reconciliation table.

Table 8: Reconciliation of 2021 local emission estimates with UK inventory

		$MtCO_2e$
	Details	**Totals**
End-user emissions allocated to local areas		**399.2**
Unallocated methodological differences:		
Large electricity users with unknown location	0.7	
Unallocated consumption	-0.8	
Total unallocated		-0.1
Total UK end-user emissions (local method)		**399.0**
Excluded from local allocation:		
Domestic shipping	4.9	
Domestic aviation	0.8	
Military transport	1.7	
Exports	6.1	
International aviation and shipping	2.0	
Fluorinated gases	10.9	
Total excluded		26.4
Methodological differences:		
Industrial sector	0.8	
Commercial sector	7.4	
Public sector	-5.0	
Agriculture sector	-1.5	
Domestic sector	-0.8	
Transport sector	0.0	
Waste management sector	0.1	
LULUCF sector	0.0	
Total methodological differences		1.1
UK total greenhouse gas emissions		**426.5**

Main differences between the local authority and 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 greenhouse gas 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 greenhouse gas dataset, the split is as defined by the

DESNZ sub-national energy consumption dataset which are not fully consistent with the national energy data presented in Digest of UK Energy Statistics (DUKES)[11]. The Devolved Administration greenhouse gas inventory, however, is based on DA-wide electricity consumption statistics which are available in the electricity generation and supply section of DESNZ's Energy Trends[12] 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 local authorities, 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 the national fuel use between the four countries.

In the local authority dataset, some electricity consumption data cannot be allocated to local authorities. This is due to both commercial confidentiality concerns for high-consuming sites, and where address information is incomplete. 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 greenhouse gas dataset, these emissions/removals are therefore assigned to the 'unallocated' category. These are the differences which can be 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 greenhouse gas 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 allocation methods differ between the two datasets due to the availability of data.

[11] For the definitions used in DUKES see DUKES 2022:
https://www.gov.uk/government/statistics/digest-of-uk-energy-statistics-dukes-2022
[12] https://www.gov.uk/government/collections/energy-trends

In the iron and steel sector, the methodology used for the local authority greenhouse gas emissions assumes that all emissions from the iron and steel sector from industrial processes, 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 greenhouse gas 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 solid fuel combustion, the DA inventory estimates use the energy modelling work based on the 2011 census and the 2019 Defra Solid Fuel Survey, which also underpins the local authority estimates. This results in more consistent reporting between local authority greenhouse gas 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 greenhouse gas 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.

Methodological improvements since last year and revisions to the data for 2005 to 2020

In the production of the 2021 estimates, new data were introduced, together with some improvements to the underlying methodology. To ensure that the data for 2005 to 2020 are consistent with the data now available for 2021, the estimates for these years have been revised to incorporate both the new data and the improvements in the underlying methodology. For some local authorities, 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.

Methane and nitrous oxide emissions

Emissions of methane and nitrous oxide were first included in these statistics last year, but only for the years 2018-2020 for emissions from landfill in the waste management sector and

from soils and livestock in the agriculture sector. Estimates of emissions from these sources have now been included for the entire time series back to 2005. Information about the methodologies used to produce the methane and nitrous oxide emissions estimates are given in the Technical Report.

Non-domestic

This year, new employment data from the updated Inter-Departmental Business Register (IDBR) database and new industrial fuel consumption data from the Energy Consumption in the UK (ECUK) publication were used in the production of non-domestic gas consumption and electricity usage figures. Furthermore, updated metered natural gas and electricity data at postcode level have been used. These changes have an impact on the emissions from non-gas/non-electricity activities as well. Details of the methodologies used to estimate non-domestic energy use emissions are outlined in the 'Employment based energy consumption in the UK' report that accompanies this publication.

Road transport

A revised version of minor roads data from DfT shows a substantial decreasing trend where previously emissions were estimated to have risen, likely due to some level of overestimating of minor road data previously. This change most significantly affects urban Local Authorities, where minor roads had previously been thought a major source of emissions in later years, an assessment which may be altered by the new data.

Land Use, Land Use Change and Forestry

A key improvement to the LULUCF methodology for disaggregating the DA LULUCF data to LA scale has been updated for the 2021 inventory cycle to utilise detailed spatial activity data where possible. The updated methodology spans two main workflows: Land Use Change Tracking (LUC-T) Maps and Organic Soil Maps. Details of the methodologies used to estimate the land use, land use change and forestry emissions are outlined in the 'Mapping Greenhouse Gas Emissions & Removals For The Land Use, Land-use Change & Forestry Sector' report that accompanies this publication.

Large Industrial Installations

There is a programme of continuous improvement and revisions have been made to the point source data for 2005-2020 in a few instances where additional data have become available, or where other changes (such as changes to the methodology of the UK greenhouse gas inventory) have an impact on the point source data. Most point source data, however, will be unchanged from the values used in the previous version of these statistics.

Global Warming Potentials

Figures for global warming potentials (GWPs) are set out in Intergovernmental Panel on Climate Change (IPCC) Assessment Reports (AR). In last year's publication, emissions estimates were based on GWPs from Working Group 1 of the IPCC Fourth Assessment Report: Climate Change 2007 (AR4), consistent with international reporting up to 2020. In November 2021 it was agreed by the international community at COP26 that greenhouse gas emissions shall be reported under the Paris Agreement transparency framework using GWPs (without climate-carbon feedback) from Working Group 1 of the IPCC Fifth Assessment Report: Climate Change 2013 (AR5). Therefore, this year's emissions estimates are based on 100-year AR5 GWPs.

As carbon dioxide emissions dominate the national emissions total and are not impacted by changes to GWPs this only has a limited impact on the national total, increasing it by around 1% each year. But it has a larger impact on the emission totals for sectors like agriculture and waste management that are predominantly other gases. The GWP for methane has increased from 25 to 28 (a 12% rise) while the GWP for nitrous oxide has decreased from 298 to 265 (an 11% fall).

Accompanying tables

The following tables are available in Excel and ODS format on the department's statistics website:

Local authority greenhouse gas emissions

Table 1.1	Local Authority territorial greenhouse gas emissions estimates 2005-2021
Table 1.2	Local Authority territorial carbon dioxide (CO_2) emissions estimates 2005-2021
Table 1.3	Local Authority territorial methane (CH_4) emissions estimates 2005-2021
Table 1.4	Local Authority territorial nitrous oxide (N_2O) emissions estimates 2005-2021

Emissions within the scope of influence of Local Authorities

Table 2.1	Local Authority territorial carbon dioxide (CO_2) emissions estimates within the scope of influence of Local Authorities 2005-2021 - Subset dataset (Excludes large industrial sites, railways, motorways and land-use)

Sector scope

Table 3.1	Scope of the local authority emission sectors used in these statistics
Table 3.2	Intergovernmental Panel on Climate Change (IPCC) sectors from the UK Greenhouse Gas Inventory which are covered by the local authority greenhouse gas emission statistics

Uncertainty of territorial emission estimates and past revisions

Table 4.1	Reconciliation of 2021 Local Authority territorial greenhouse gas emissions estimates with full end user UK Greenhouse Gas Inventory, by fuel and sector
Table 4.1 Notes	Notes on the methodological differences and differences in categorisation between Local Authority estimates and UK estimates in table 4.1
Table 4.2	Reconciliation of 2021 Local Authority territorial greenhouse gas emissions estimates with end user inventory for England, by fuel and sector
Table 4.3	Reconciliation of 2021 Local Authority territorial greenhouse gas emissions estimates with end user inventory for Scotland, by fuel and sector
Table 4.4	Reconciliation of 2021 Local Authority territorial greenhouse gas emissions estimates with end user inventory for Wales, by fuel and sector
Table 4.5	Reconciliation of 2021 Local Authority territorial greenhouse gas emissions estimates with end user inventory for Northern Ireland, by fuel and sector

Pollution inventory

Table 5.1	Pollution Inventory 'by source' emissions, not consistent with local authority emissions by end-user

National Park greenhouse gas emissions

Table 6.1	National Park territorial greenhouse gas emissions estimates 2005-2021
Table 6.2	National Park territorial carbon dioxide (CO_2) emissions estimates 2005-2021
Table 6.3	National Park territorial methane (CH_4) emissions estimates 2005-2021
Table 6.4	National Park territorial nitrous oxide (N_2O) emissions estimates 2005-2021

Technical information

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-greenhouse-gas-emissions-national-statistics

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:

- **Local and regional greenhouse gas emissions estimates for 2005-2021 for the UK: 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

Further information on UK greenhouse gas emissions statistics can be found at: https://www.gov.uk/government/collections/uk-greenhouse-gas-emissions-statistics

This statistical release and the related data tables are part of the National Atmospheric Emissions Inventory (NAEI) for 1970-2021, produced for the Department for Energy Security & Net Zero and the Devolved Administrations by Ricardo Energy and Environment. For further information on the UK Greenhouse Gas Inventory, see the NAEI website: https://naei.beis.gov.uk/

Given the number of local authorities, 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: GreenhouseGas.Statistics@beis.gov.uk

Further information

Future updates to these statistics

The next UK local authority greenhouse gas emissions estimates, covering the period 2005-2022, will be published in June 2024.

Final estimates of UK greenhouse gas emissions in 2022 will be published in February 2024.

In March 2024, the 1990-2022 UK greenhouse gas emissions estimates will be updated to include uncertainty estimates and estimates by end user, and provisional 2023 UK emissions estimates will be published.

In June 2024, the 1990-2022 UK greenhouse gas emissions estimates will be updated to include estimates by Standard Industrial Classification.

Related statistics

Devolved Administration Greenhouse Gas Inventories

Greenhouse gas emissions inventories are available for England, Scotland, Wales and Northern Ireland on the NAEI website: https://naei.beis.gov.uk/reports/reports?section_id=4

Final UK greenhouse gas emissions statistics

This publication provides the latest estimates of UK greenhouse gas emissions by source sector (published in February each year) and by end user (published in March): https://www.gov.uk/government/collections/uk-territorial-greenhouse-gas-emissions-national-statistics

Provisional UK greenhouse gas emissions statistics

Published in March each year, this publication provides initial estimates of the previous year's greenhouse gas emissions: https://www.gov.uk/government/collections/uk-territorial-greenhouse-gas-emissions-national-statistics

Sub-national energy consumption statistics

Several publications are produced by DESNZ estimating energy consumption by local authority, which are used in the production of the UK local authority greenhouse gas emissions estimates:

- Electricity consumption statistics for Great Britain and for Northern Ireland: https://www.gov.uk/government/collections/sub-national-electricity-consumption-data
- Gas consumption statistics for Great Britain and for Northern Ireland: https://www.gov.uk/government/collections/sub-national-gas-consumption-data
- Road transport fuel consumption statistics for the United Kingdom: https://www.gov.uk/government/collections/road-transport-consumption-at-regional-and-local-level

- Residual fuel (non-electricity, non-gas, non-road transport fuels) consumption for the United Kingdom: https://www.gov.uk/government/collections/sub-national-consumption-of-other-fuels
- Total final energy consumption statistics for the United Kingdom: https://www.gov.uk/government/collections/total-final-energy-consumption-at-sub-national-level

Revisions policy

The DESNZ statistical revisions policy sets out the revisions policy for these statistics, which has been developed in accordance with the UK Statistics Authority Code of Practice for Statistics.

User engagement

Users are encouraged to provide comments and feedback on how these statistics are used and how well they meet user needs. Comments on any issues relating to this statistical release are welcomed and should be sent to: GreenhouseGas.Statistics@beis.gov.uk

The DESNZ statement on statistical public engagement and data standards sets out the department's commitments on public engagement and data standards as outlined by the Code of Practice for Statistics.

National Statistics designation

National Statistics status means that our statistics meet the highest standards of trustworthiness, quality, and public value, and it is our responsibility to maintain compliance with these standards.

The continued designation of these statistics as National Statistics was confirmed in September 2018 following a compliance check by the Office for Statistics Regulation. The statistics last underwent a full assessment against the Code of Practice for Statistics in 2014.

Since the latest review by the Office for Statistics Regulation, we have continued to comply with the Code of Practice for Statistics, and have made the following improvements:

- Improved the accuracy of the historic emissions estimates by continuing to make methodological changes to the UK's Greenhouse Gas Inventory.
- Expanded the local authority emissions statistics to include estimates of methane and nitrous oxide emissions, and estimates of emissions in National Park areas.
- Included information about emissions per km^2 of land area in each authority and a more detailed breakdown of industrial, commercial, public sector and LULUCF emissions in the tables.

Pre-release access to statistics

Some ministers and officials receive access to these statistics up to 24 hours before release. Details of the arrangements for doing this and a list of the ministers and officials that receive pre-release access to these statistics can be found in the DESNZ statement of compliance with the Pre-Release Access to Official Statistics Order 2008.

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This publication is available from: https://www.gov.uk/government/statistics/uk-local-authority-and-regional-greenhouse-gas-emissions-national-statistics-2005-to-2021

If you need a version of this document in a more accessible format, please email GreenhouseGas.Statistics@beis.gov.uk. Please tell us what format you need. It will help us if you say what assistive technology you use.