

Appendix A Baseline Emissions Report 2022
County-wide carbon dioxide emissions estimates

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1.0 Executive summary

Hampshire County Council's climate change mitigation target is for the Hampshire area to be carbon neutral by 2050¹. To gauge progress towards this target, carbon emissions will be tracked and reported annually. Understanding the sources of carbon emissions helps the Council formulate its [strategic priorities for climate change mitigation](#).

From 2022 the Council will use aggregated Local Authority level emissions data from the Department for Business, Energy, and Industrial Strategy (BEIS). This will replace the methodology developed by the Carbon Trust in producing Hampshire's first baseline data in 2020 and simplify the process, aligning the Council with other local authorities and central government.

Due to a two-year lag between collection and publication by BEIS, the data in this report is from 2019 and covers only carbon dioxide emissions. The data is organised by sector and includes transport, household (domestic), industrial, commercial, public sector and land use.

Going forwards, BEIS' expanded Local Authority level emissions data will be used to report emissions for 2020 onwards. This data includes methane and nitrous oxide emissions as well as carbon dioxide. This data has currently only become available for 2020 and has not been used in the production of this report.

The change in approach was made in consultation with the Expert Stakeholder Forum on Climate Change, who have endorsed the methodology and advised on future considerations and next steps.

Overall, the net county-wide carbon emissions estimates for Hampshire in 2019 were **6,482.93 ktCO₂**. This includes -377.14 ktCO₂ accorded to sequestration through land use and represents a reduction of 40.88% since 2005 and 5.13% since 2017.

¹ Carbon neutrality refers to the balance between emitting carbon into the atmosphere and absorbing carbon in carbon sinks. A carbon sink is a system that absorbs (sequesters) more carbon than is emitted. Natural carbon sinks include oceans, soils, and forests. To be carbon neutral by 2050, Hampshire must be permanently sequestering the same amount of carbon in sinks, as is being emitted.

2.0 Context

Hampshire's area-wide emissions baseline was initially developed with the Carbon Trust in 2020. Two reduction pathways were created to develop a Hampshire-wide carbon budget to 2050 (figure 1), showing the permissible emissions within each scenario. These pathways were: emissions reductions aligned with a 1.5°C world, and reductions aligned with the UK Government and Hampshire County Council target of carbon neutrality by 2050.

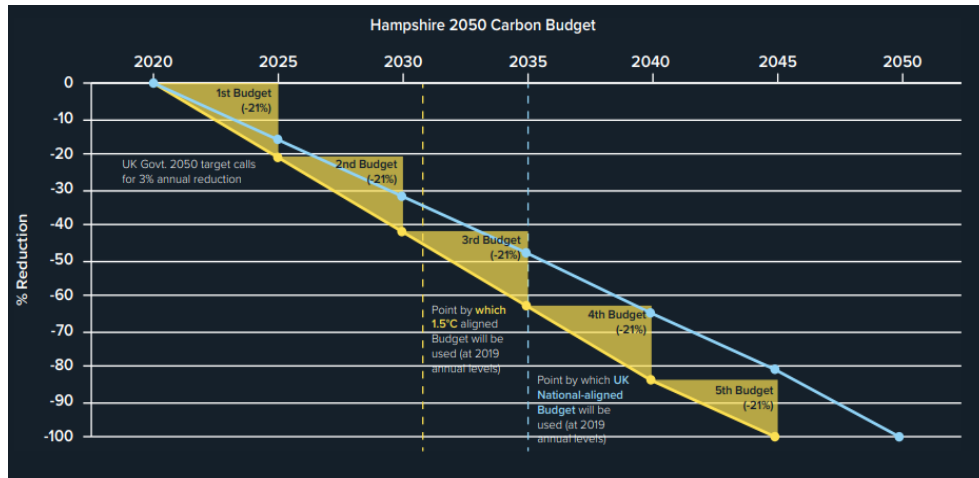


Figure 1: The Hampshire carbon budget for achieving carbon neutrality is by 2050. The blue line represents the proposed carbon budget reduction within Hampshire by 2050, in alignment with national government. The yellow line represents the required carbon budget when aligned with a 1.5°C warming

The Carbon Trust methodology helped to identify the key sources of carbon dioxide emissions in Hampshire, which informed the development of the [Climate Change Strategy in 2020²](#). However, due to the complexity of the methodology, and the resources associated with maintaining it, a simpler approach of using the BEIS Local Authority carbon dioxide emissions dataset, has been adopted. Using this dataset also ensures consistency with other local authorities and central government.

² An overview of Hampshire County Council's carbon reduction and resilience projects can be found on the [climate change website](#).

3.0 Why carbon emission estimates are recorded

The emissions estimates from BEIS act as a baseline to monitor against and assess trends. Changes in carbon dioxide emissions will be tracked annually to monitor progression towards carbon neutrality by 2050. In future, this will include methane and nitrous oxide emissions as they are now included within the BEIS database. Every five years the progress made against the five-year carbon budgets will be reported. The annual emissions estimates will continue to help inform the Council's strategic priorities in carbon mitigation.

4.0 Emissions datasets

For the purposes of this report, the statistics for the county-wide carbon dioxide emissions estimates have been sourced from the latest [local authority and regional CO2 emissions national statistics 2005-2019 dataset compiled by BEIS](#). This provides local authority estimates and delivers a nationally consistent and transparent evidence base³. Data for 2019 was chosen as a 'pre-covid' baseline and updates using 2020 and subsequently released data will be produced in due course.

The data is organised into six sectors (industrial, commercial, transport, domestic, public sector, and land use) with further separation into sub-sectors. [The Office of National Statistics UK SIC codes](#) are used to classify different economic activities into the different sectors.

The districts included are Basingstoke and Deane, East Hampshire, Eastleigh, Fareham, Gosport, Hart, Havant, New Forest, Rushmoor, Test Valley, and Winchester. This excludes the unitary authorities of Southampton and Portsmouth.

The data covers territorial carbon dioxide emissions only. This means carbon dioxide emissions that occur within the relevant area's borders or that can be assigned to them – in this case the districts listed above. Carbon dioxide is the main greenhouse gas produced by human activity, accounting for 80% of UK emissions in 2019 and approximately 66% of warming. The climate change team acknowledges that a focus on carbon dioxide excludes other greenhouse gases, such as methane, which also have significant warming effects. However, at the time of writing the BEIS 2019 emissions was limited to carbon dioxide. Hampshire County Council will align with any data changes BEIS release in the future and further information about next steps, including the use of BEIS' expanded emissions data can be found in [Section 8.0](#).

The BEIS data show 'end-user' emissions, where emissions are distributed according to the point of energy consumption (or point of emission if not energy related). Emissions from the production of goods are assigned to where the production takes place. Therefore, goods that are produced in Hampshire and exported will be included, but emissions from imported goods are excluded. Further details can be found within the [technical note \(from page 8\)](#).

³ BEIS has also produced a [technical note](#) summarising what is included within the national data.

4.1 Local Authority scope of influence

BEIS recognises that not all emissions fall within the scope of influence of local authorities. Table 1 outlines the different sub sectors that are used within the carbon dioxide emissions calculations, and whether Local Authorities have influence, according to BEIS.

Table 1: The sectors and sub sectors that are included within the carbon dioxide emissions estimates. The table outlines whether Local Authorities have scope of influence to reduce carbon dioxide emissions, according to BEIS⁴.

Sector	Sub sector	Do Local Authorities have scope of influence?
Industry	Industry Electricity	Yes
Industry	Industry Gas	Yes
Industry	Large Industrial Installations	No
Industry	Industry 'Other Fuels'	Yes
Industry	Agriculture	Yes
Commercial	Commercial Electricity	Yes
Commercial	Commercial Gas	Yes
Commercial	Commercial 'Other Fuels'	Yes
Domestic	Domestic Electricity	Yes
Domestic	Domestic Gas	Yes
Domestic	Domestic 'Other Fuels'	Yes
Transport	Road Transport (A roads)	Yes
Transport	Road Transport (Motorways)	No
Transport	Road Transport (Minor roads)	Yes
Transport	Diesel Railways	No
Transport	Transport Other	Yes
Public Sector	Public Sector Electricity	Yes
Public Sector	Public Sector Gas	Yes
Public Sector	Public Sector 'Other Fuels'	Yes
Land Use	Net Emissions: Forest land	No
Land Use	Net Emissions: Cropland	No
Land Use	Net Emissions: Grassland	No
Land Use	Net Emissions: Wetlands	No
Land Use	Net Emissions: Settlements	No

⁴ This table was produced by BEIS in 2021.

5.0 Caveats about the data

It is important to note some caveats to the data. There is a two-year lag between collection and publication of emissions estimates from BEIS. As the dataset is released around June of each year, and time is required to update the Hampshire emissions spreadsheet, this report is based on the 2021 dataset, which reflects 2019 figures.

As the climate change team was established in 2020, the emissions estimates reported here (2019 data) do not reflect any impact that the climate change strategy and action plan may have made.

The BEIS dataset is subject to continuous improvement to increase confidence in the estimates, which influences the figures, including the alteration of figures from previous years. There are also some recognised limitations on the national carbon dioxide emissions estimates. [These limitations can be viewed on page 4 and page 31 of the BEIS technical note, respectively.](#)

As mentioned above, it is important to be aware that Local Authorities have relatively little influence over some types of emissions. Areas where Hampshire County Council does have influence is described in the following sections, and within the [Climate Change Strategy](#).

Furthermore, whilst the BEIS data allows trends to be tracked, it is challenging to make direct links between the projects that are delivered in Hampshire and the BEIS figures. In some cases, the emissions figures are national estimates extrapolated to the Local Authority level. For instance, the BEIS data uses a national grid average for the carbon intensity of electricity, meaning the emissions figures for electricity use in Hampshire reflect the national 'average', rather than any emissions reduction effect of local renewable sources.

6.0 Analysis of the BEIS 2019 emissions estimates

6.1 Overall trends

Overall, the county-wide carbon dioxide emissions estimates for Hampshire in 2019 were 6,482.94 kt CO₂. This represents a decrease of 40% from 2005 levels and is equal to 1.88% of national carbon dioxide emissions (0.1 percentage points lower than in 2017).

Total carbon emissions (in ktCO₂) are made up of five sectors: transport, household (domestic), industrial and commercial, public sector, and land use. Figure 2 shows the fall in carbon dioxide emissions from 2005 to 2019 across these sectors. The carbon dioxide emissions from the transport sector have remained stable over the recorded period. The household (domestic) carbon dioxide emissions remained stable until 2014, when a gradual decline began to occur. The industrial and commercial sector has seen the greatest decline in carbon dioxide emissions from 2005 to 2019. The public sector has also seen a decline in emissions, with the greatest decline occurring from 2017 onwards. The land use sequestration has seen a gradual increase from 2005 to 2019. The reasoning behind these changes over time can be found in sections [6.2](#), [6.3](#), [6.4](#), [6.5](#) and [6.6](#), respectively.

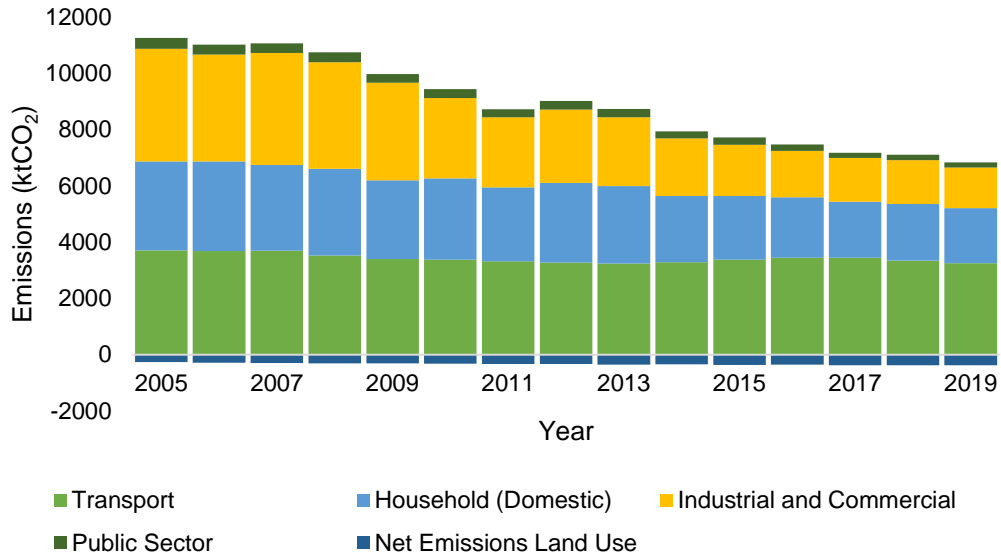


Figure 2: The breakdown of the fall in emissions across the different sectors, within Hampshire, from 2005 to 2019.

In 2019, the transport sector was responsible for the biggest share of carbon dioxide emissions (50.37%). The household (domestic) was the second highest emitter of carbon dioxide at 30%, followed by the industrial and commercial sector at 22%. The public sector emitted the smallest share. (2.26%, Figure 3⁵).

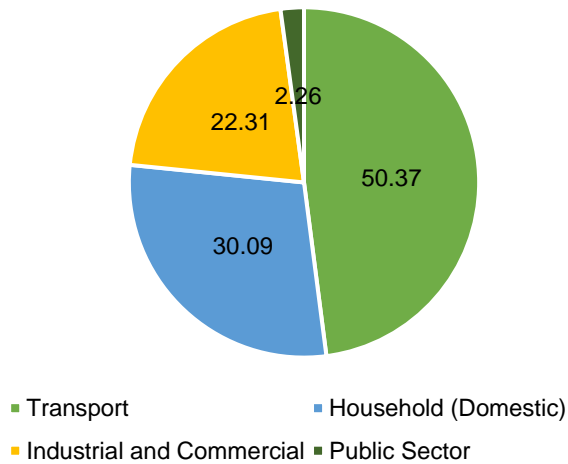


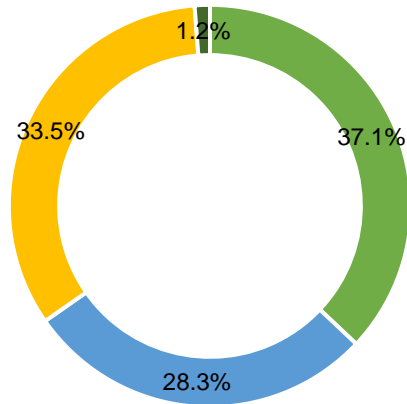
Figure 3: The share of carbon emissions (ktCO₂) produced by each sector across Hampshire. These figures do not add up to 100% because this pie chart does not include the 5% reduction in emissions through land use sequestration.

⁵ The figure does not include land use emissions as this sector produces a negative figure due to carbon sequestration.

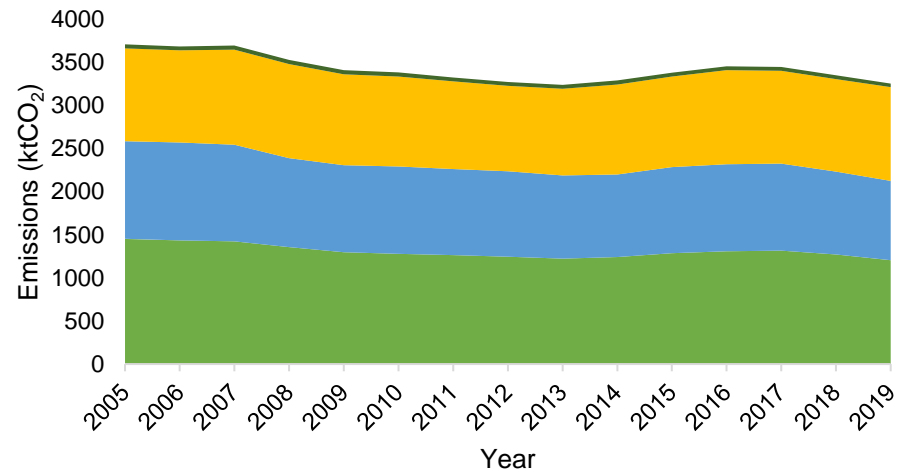
6.2 Transport

Within the transport sector, petroleum products are the primary source of emissions. Over a third of carbon dioxide emissions in 2019 were produced on A roads and minor roads (figure 4a). Whilst there were fluctuations in transport emissions between 2005 and 2019, the overall trend shows a slight decline over time (figure 4b). Between 2005 and 2019, there was a fall of 454.68 ktCO₂ (12.26%) produced by the transport sector within Hampshire.

Local authorities have scope of influence over A roads and minor roads ([Table 1](#)). These two road types produced the greatest percentage of emissions in 2019 (figure 4a). Hampshire County Council has a dedicated transport department who are working on improving the transport sector within the County. This will contribute to a fall in emissions on A and minor roads. Further information about how emissions from transport are being addressed as part of Hampshire County Council's Local Transport Plan 4 can be viewed on the [LTP4 webpage](#).



■ A roads ■ Motorway ■ Minor roads ■ Diesel railways



■ A roads ■ Motorways ■ Minor roads ■ Diesel railways

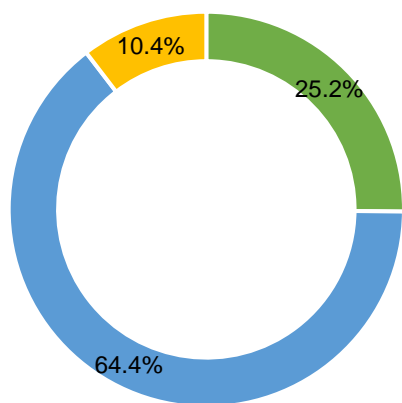
Figure 4a: 2019 transport emissions by source.

Figure 4b: Transport emissions, 2005 and 2019 in ktCO₂.

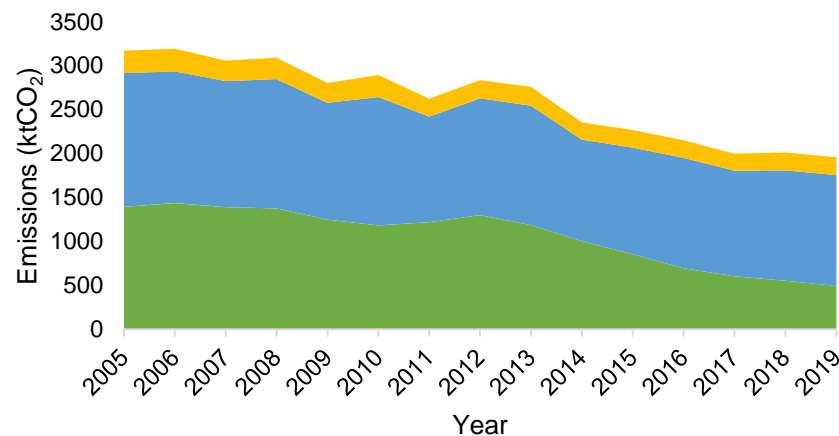
6.3 Household (Domestic)

In 2019, domestic gas produced the highest share of household carbon dioxide emissions (64%, figure 5a) and consequently 19% of all emissions. This suggests that to meet the Hampshire climate target of carbon neutrality by 2050, the way homes are heated will need to change. Between 2005 and 2019, household (domestic) carbon dioxide emissions fell by 1212.28 ktCO₂ (38.24%). Electricity has seen the greatest fall in this sector (figure 5b), due to the decreasing carbon intensity of the grid whilst emissions from domestic gas use have stayed relatively constant.

The decarbonisation of the national grid has clearly had a major effect on electricity emissions⁶. Therefore, while local authorities have scope of influence over both local demand and supply within the sector (Table 1), the recorded carbon dioxide emissions estimates are currently mostly driven by electricity grid changes that are occurring at a national level. Details about the more local work that is being carried out to reduce household emissions, including work on retrofit and community energy, can be found in the climate change annual report 2022.



■ Electricity ■ Gas ■ Coal



■ Electricity ■ Gas ■ Coal

Figure 5a: Household (domestic) emissions by fuel type, 2019.

Figure 5b: Household (domestic) emissions, 2005 to 2019.

⁶ Analysis conducted for Hampshire County Council by the University of Southampton suggests domestic electricity use only fell by 7% in the period 2010-2019, compared to the halving of domestic electricity emissions shown in the figure.

6.4 Industrial and Commercial

Fossil fuels are still the main fuel type used by the industrial and commercial sectors. Gas and manufactured fuels produced the highest combined share of carbon dioxide emissions in 2019 (figure 6a). However, the industrial and commercial sectors saw a decline of 2570.59 ktCO₂ (64.21%) between 2005 and 2019 (figure 6b) largely due to the reduction in coal use and the reduction in grid electricity carbon intensity mentioned above.

Local authorities have limited influence on the fuel types that are used in large industrial installations ([Table 1](#)). However, Hampshire County Council are working with businesses to reach carbon neutrality within the County. For example, during COP26, an event was held involving 50 businesses sharing their ideas and innovations for solutions to achieve sustainable carbon neutral targets.

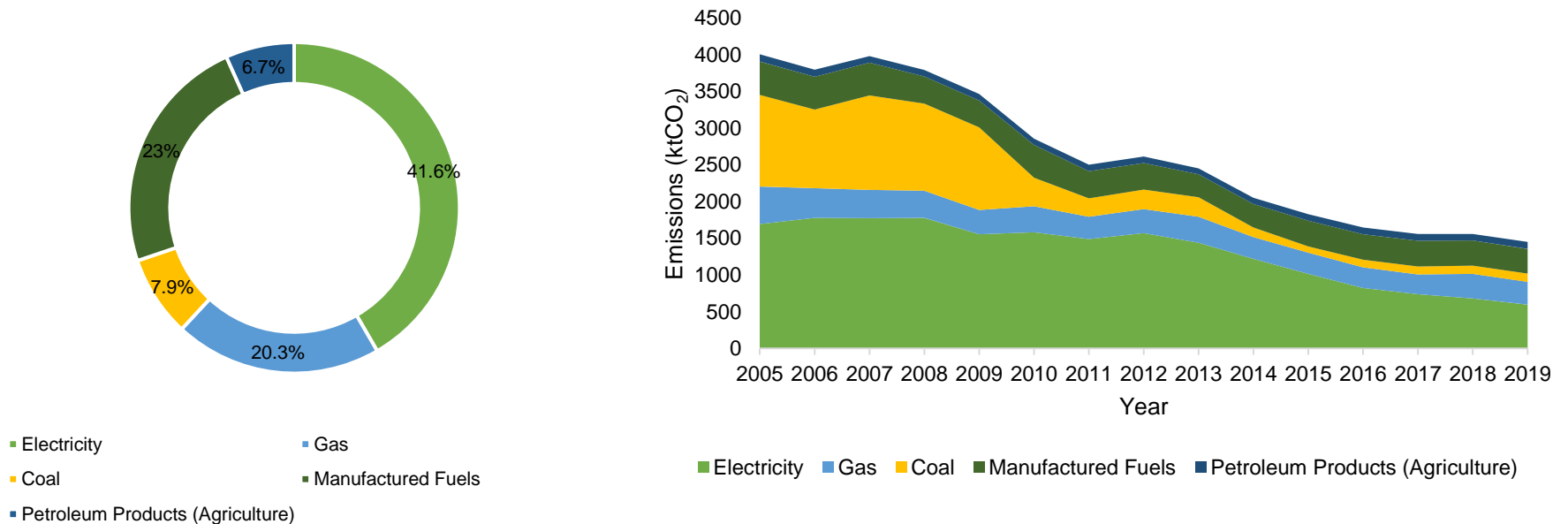


Figure 6a: Industrial and commercial sector emissions by fuel type, 2019.

Figure 6b: Industrial and commercial emissions, 2005 to 2019.

6.5 Public Sector

The Public Sector carbon dioxide emissions are made up of emissions from public administration and defence, compulsory social security, education, human health and social work activities, and residential care activities. In 2019, gas was the main source of carbon emissions in the public sector (57%) largely from heating buildings. Electricity was the other main source of carbon dioxide emissions in 2019 (figure 7a).

Between 2005 and 2019, carbon dioxide emissions declined by 207.49 ktCO₂ (54.34%) (figure 7b). As above, this appears to be driven by reductions in other fuels and the decreasing carbon intensity of the grid. Emissions from gas use have stayed largely constant. Local authorities have a scope of influence within the public sector ([Table 1](#)). Within Hampshire County Council's own estates, behavioural change programmes and energy efficiency initiatives such as boiler efficiency upgrades, along with large scale upgrades to LED lighting since 2005 have seen a reduction in carbon emissions. For more details about the Hampshire County Council estate emissions, [see here](#).

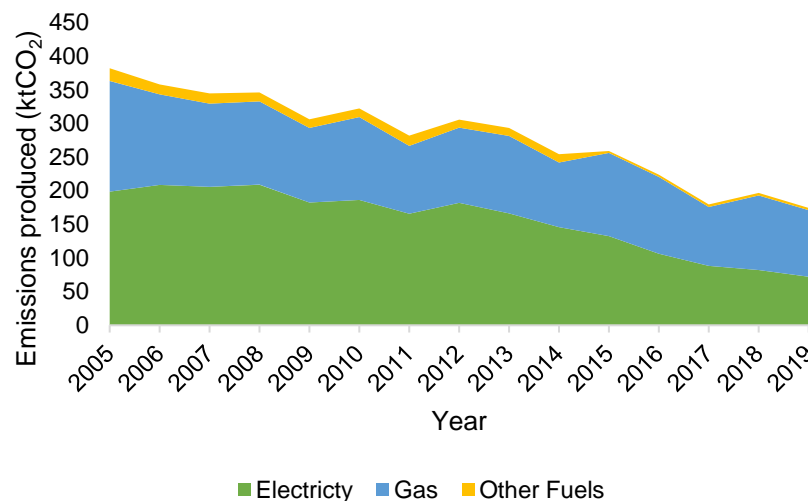
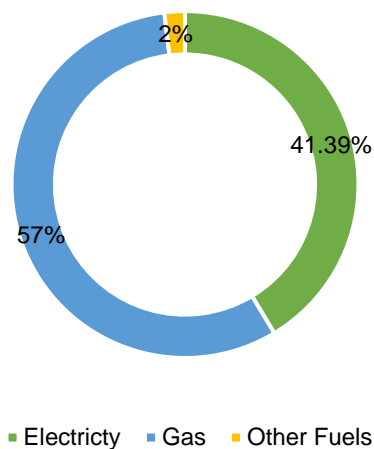


Figure 7a: Public sector the carbon emissions by fuel type, 2019.

Figure 7b: Public Sector emissions, 2005 to 2019.

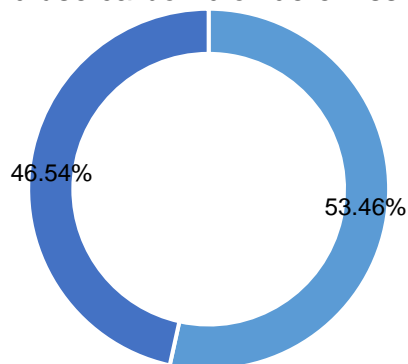
6.6 Land Use Emissions

Carbon sequestration in the land use sector means net carbon dioxide emissions from this sector are negative. In 2019, Hampshire's land had a net sequestration of 377.14 ktCO₂, equivalent to 5.04% of carbon dioxide emissions ([figure 3](#)).

Depending on usage, land can have positive or negative net carbon emissions. Settlements and croplands are net emitters while forests and grassland are carbon sinks. Within the land use carbon dioxide emitters, settlements released 53.46% of land use carbon dioxide emissions, whilst cropland contributed 46.54% (figure 8a). Forestland had the greatest influence, accounting for 71.22% of land use sequestration (figure 8b). In 2005, net emissions for land use were 266.46 ktCO₂. Therefore, between 2005 and 2019, land use net emissions sequestration increased by 110.68 ktCO₂ (41.54%) (figure 8c). Therefore, in 2005 the land use sector was releasing more carbon dioxide than in 2019.

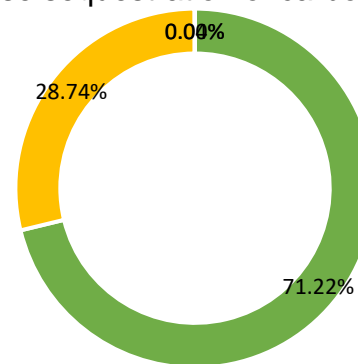
Hampshire County Council is able to influence wider land use sequestration through the [Hampshire Spatial Framework](#) for environment and infrastructure projects, as well as through its own estate such as the county-owned farms policy, tree planting and management of country parks. Since 2019, 28,573 trees have been planted by the County Council. The County Council has also been appointed as provisional Responsible Authority for the preparation of the Local Nature Recovery Strategy for Hampshire.

Land use carbon dioxide emissions



■ Cropland ■ Settlements

Land use sequestration of carbon dioxide



■ Forest Land ■ Grassland ■ Wetlands ■ Harvested Wood Products

Figure 8a: Carbon dioxide emissions in the land use sector, 2019.

Figure 8b: Sequestration in the land use sector, 2019.

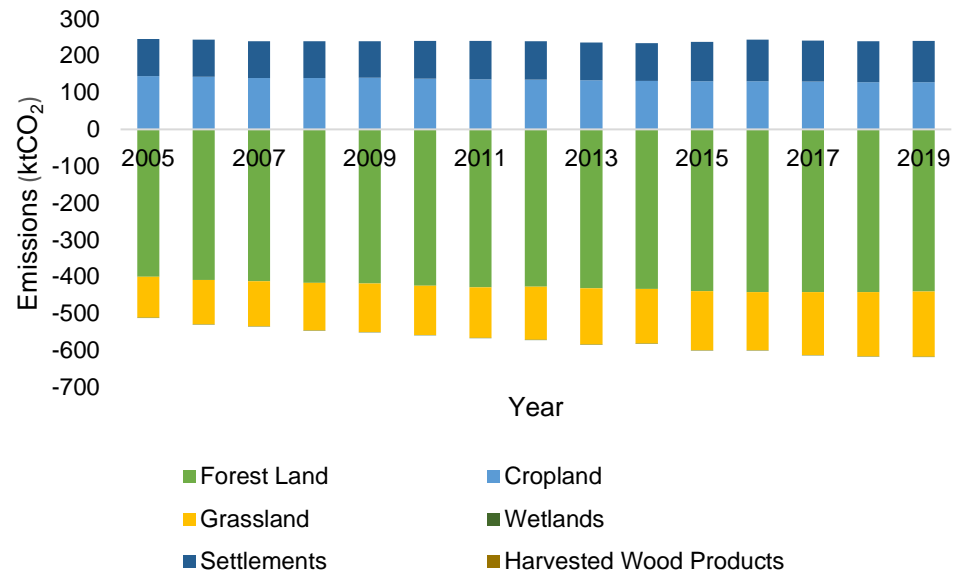


Figure 8c: Carbon dioxide emissions and sequestration in the land use sector, 2005-2019

6.7 Comparison between 2017 and 2019

The figures from 2017 and 2019 are compared because the initial baseline that was produced by Hampshire County Council in 2020 used figures from 2017. Between 2017 and 2019, there was an overall reduction of 434.97 ktCO₂ (6.29%) emitted from the area across all recorded sectors. Table 2 shows that the public sector had the greatest fall in emissions (33.96%) from the smallest base, whilst household (domestic) emissions saw the smallest change.

It can also be seen that sequestration through land-use increased slightly.

Table 2: Carbon dioxide emissions (ktCO₂), 2017 and 2019

Hampshire (ktCO₂)	2017	2019	<u>Difference in emissions</u>	<u>Percentage change</u>
Transport	3471.34	3276.60	194.74	-5.61%
Household (Domestic)	1999.26	1957.61	41.65	-2.08%
Industrial and Commercial	1555.92	1433.03	122.88	-7.90%
Public Sector	264.00	174.33	89.66	-33.96%
Land Use	-372.61	-377.14	4.53	-1.20%
Total	6917.90	6464.44	434.97	-6.29%

7.0 Why is there a difference between the data produced by the Carbon Trust in 2020 and the BEIS data used within this report?

The methodology used by the Carbon Trust in the development of the first baseline report in 2020 differed from the BEIS methodology in some significant ways. The primary difference was the inclusion of certain heavy industries (such as the Fawley power station in the New Forest), alongside emissions from manufactured fuels in the domestic sector. Emissions from bioenergy and waste in the industrial/commercial sector was also a difference. In contrast, the BEIS data “show (energy) emissions allocated on an “end-user” basis where emissions related to energy use are distributed according to the point of emission, other than emissions from waste management which are distributed based on where the waste was produced” (BEIS, 2021).

8.0 Next steps and recommendations

One of the roles of the [Climate Change Expert Forum](#) is to advise the County Council on its progress in delivering against its targets and commitments within the Climate Change Strategic Framework. A member of this forum, from the University of Southampton, is acting in an advisory role, and has recommended:

- The council should establish how to model policy impact and assess change, particularly regarding the relationship between the climate change framework of strategic programmes and major emissions sources. Every five years when the strategic framework needs to be renewed, the baseline emissions will be examined to determine the progress against the five-year carbon budgets (in addition to the annual update on emissions).
- Working with the District and Borough Councils will continue to establish how data can be shared to promote consistency and how partnership working can better address major sources of emissions.
- BEIS has now included methane and nitrous oxide emissions within their local and regional dataset. Therefore, these greenhouses gases will be included.
- Hampshire County Council has been nominated to sit on BEIS' Local Net Zero Forum's Task and Finish group on Data and Reporting. This group will explore issues around local government data, reporting and metrics on net zero activity, and to make recommendations on next steps. This task and finish group aims to look at the data that is available, how it can be improved, how to develop more consistency and transparency in reporting, and the role of digital developments to support place-based net zero planning, (understanding that different places will have distinct data needs). The aim is not to duplicate existing data and reporting but to discuss where improvements can be made.

9.0 Impact of COVID-19 on future reporting of emissions

Due to the uncommon circumstances of the coronavirus pandemic, the data that is being analysed this year (from 2019 datasets) will be the last data set for several years that will not be influenced by the implemented lockdowns. The BEIS data that will be recorded over the next few years will be data that was collected during the coronavirus pandemic. The coronavirus pandemic has had large social and economic impacts which will have resulted in changes to the greenhouse gas emissions produced. There is likely to have been an increase in household (domestic) emissions due to a larger percentage of the population working from home and consequently lower transport emissions.

Consequently, gaining a consistent picture of the carbon emissions produced will be more challenging and factors beyond the control of Hampshire County Council will have influenced the data. This will mean that understanding the impact of current mitigation actions will be a greater challenge.

As noted above, the 2020 carbon emissions data was released in July 2022. The decision was made to analyse the 2019 dataset as it reflects pre-coronavirus business as usual. A separate update on the 2020 greenhouse gas emissions figures will be given later in the year.

10.0 Conclusions

From 2022 the Council will use greenhouse gas emissions data from BEIS, replacing the methodology developed with the Carbon Trust in 2020. This simplifies the process and aligns the Council with other local authorities and central government. However, given the close alignment of major emissions sources between the two methods, the strategic priorities for carbon mitigation and climate change resilience remain unchanged.

The change in approach was made in consultation with the Expert Stakeholder Forum on Climate Change which has endorsed the methodology and advised on future considerations and next steps.

Overall, the net county-wide carbon emissions estimates for Hampshire in 2019 were **6,482.93 ktCO₂**. This includes -377.14 ktCO₂ accorded to sequestration through land use and represents a reduction of 40.88% since 2005 and 5.13% since 2017.

The climate change team will continue to update the figures and include methane and nitrous oxide emissions in future reports, using the latest data that is available from BEIS.