Hampshire:

The DESNZ 29 June 2023 data release on climate crisis greenhouse gas pollution from 2005 to 2021

Introduction

On 29 June 2023 the government Department for Energy Security and Net Zero (DESNZ) issued their update on greenhouse gas (GHG) pollution to 2021 at sub-national level. Versions can be downloaded from UK local authority and regional greenhouse gas pollution national statistics, 2005 to 2021 - GOV.UK (www.gov.uk).

This paper focuses on illustrating what the DESNZ data tell us about the history and current state of climate crisis greenhouse gas pollution in Hampshire, about their patterns and shape, and about the scale of the problem. The paper touches on the broad implications of this. We hope it will be a useful reference point for further work on how Hampshire can reduce GHG pollution, but detail on the solutions is beyond the scope of this paper.

Some of the charts below contain considerable information in a small space because of the constraints of an A4 document. Readers wishing to see clearly all the labels may wish to zoom in on the charts (control / mouse wheel, or view - zoom).

What's new in this year's DESNZ data release?

The data included is even more comprehensive than the data published in 2022.

Like last year, it now includes carbon dioxide, methane, and nitrous oxide pollution within Hampshire , but it now provides **historic data on pollution from all three gases since 2005**. Population data has been adjusted for more recent years to reflect the results of the 2021 census, reducing per person pollution data slightly for some years.

Reflecting differences in the Life Cycles of Pollutants

Weights of methane and nitrous oxide pollution have been converted by DESNeZ into the weight of CO_2 that would have an equivalent impact on global heating; this is referred to as CO_2e. The conversion factor is referred to as the **global warming potential (GWP) of each greenhouse gas**. For the 2023 data release DESNZ changed the conversion factors they used: previously they had followed the recommendations of the United Nations Intergovernmental Panel on Climate Change Fourth Assessment Report in 2007 (IPCC AR4); now they have adopted the recommendations of the Fifth Assessment report in 2013 (AR5).

Pollutant	NAEI Name	Lifetime (years)	100-years GWP (AR4)	100-years GWP (AR5)	20-years GWP (AR5)
Carbon dioxide	CO2	50-200	1	1	1
Methane	CH4	12	25	28	84
Nitrous oxide	N2O	114	298	265	264

Figure 1

This means that CO_2e data reported for earlier years have now been retrospectively adjusted upwards for methane, and downwards for nitrous oxide.

DESNZ adopts **a time horizon of 100 years** for converting the pollution that comes from methane and nitrous oxide to CO_2e. The GWP conversion factor will vary according to the time horizon adopted because greenhouse gases cause global heating at different rates across their lifetime.

There are strong arguments, however, to adopt **a time horizon of 20 years** because methane pollution particularly has **three times more impact** on global heating in the first 20 years than across a period of 100 years. It makes little difference for nitrous oxide. The next twenty years will be pivotal in our attempts to tackle the climate crisis so it is crucial we have an accurate understanding of how the pollution behaves in that period. The Fifth Assessments Report's GWP conversion factors for a **20-year horizon** are given in Figure 1 in the dark-blue-headed column.

In what follows we have used conversion factors for both 20-year and 100-year time horizons:

- 100-year factors to maintain compatibility with DESNZ data
- 20-year factors to register accurately the impact of methane pollution on Winchester City Council's ability to achieve its climate crisis targets

The most significant difference is that with the 20-year horizon **agriculture becomes the second major category** of GHG pollution.

Trends

The DESNZ 100-year horizon data showed a rapid reduction in total GHG pollution in 2020; they dropped to 88% of the 2019 level. This was clearly a reflection of Covid-19, which reduced transport CO_2 pollutants particularly. In 2021 pollutants had already returned to 94% of the 2019 level. The indications in provisional 2022 *national* data (which will only be available for local authority level in June 2024) suggest that for 2022 data will show district GHG pollution returning to the pre-2019 trajectory from 2014 with an average yearly reduction of 3.11%.

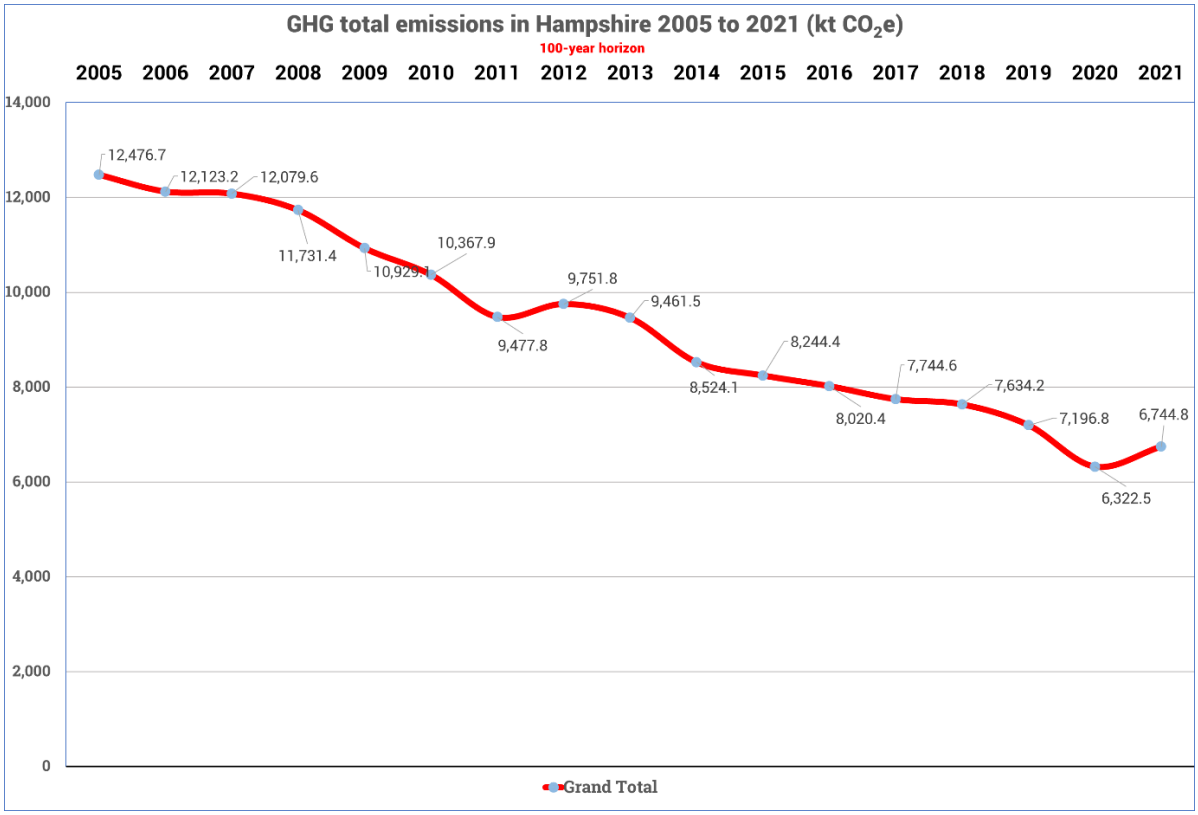


Figure 2

The difference between territorial and consumption GHG pollution

DESNZ provide local authority data only about 'territorial' GHG pollution; in other words pollution that occurs within the authorities' geographic boundaries.

DESNZ do not supply data on "consumption" pollution at a district level, though DEFRA do make this data available at a national level. National 'consumption GHG pollution' includes GHG pollution that occurs abroad in supplying the needs and desires of people within the UK. This includes much GHG pollution caused through growing and producing food, manufacturing goods, providing services, or generating wealth from investment.

In 2019, before normal patterns were interrupted by Covid, GHG consumption pollution outside UK associated with goods and services consumed within the country added about another 82% to the territorial GHG pollution. In 2020, because there was so much reduction in total internal 'territorial' GHG pollution, external consumption GHG pollution was proportionately greater, at 87% of the territorial pollution. It is reasonable to assume, without other data, that in 2021 consumption pollution was close to the 2019 pattern and the total carbon footprint of consumption in Hampshire was around 84% above the territorial levels reported by DESNZ. Data for the chart below is taken from Figure 1 of Carbon footprint for the UK and England to 2020 - GOV.UK (www.gov.uk).

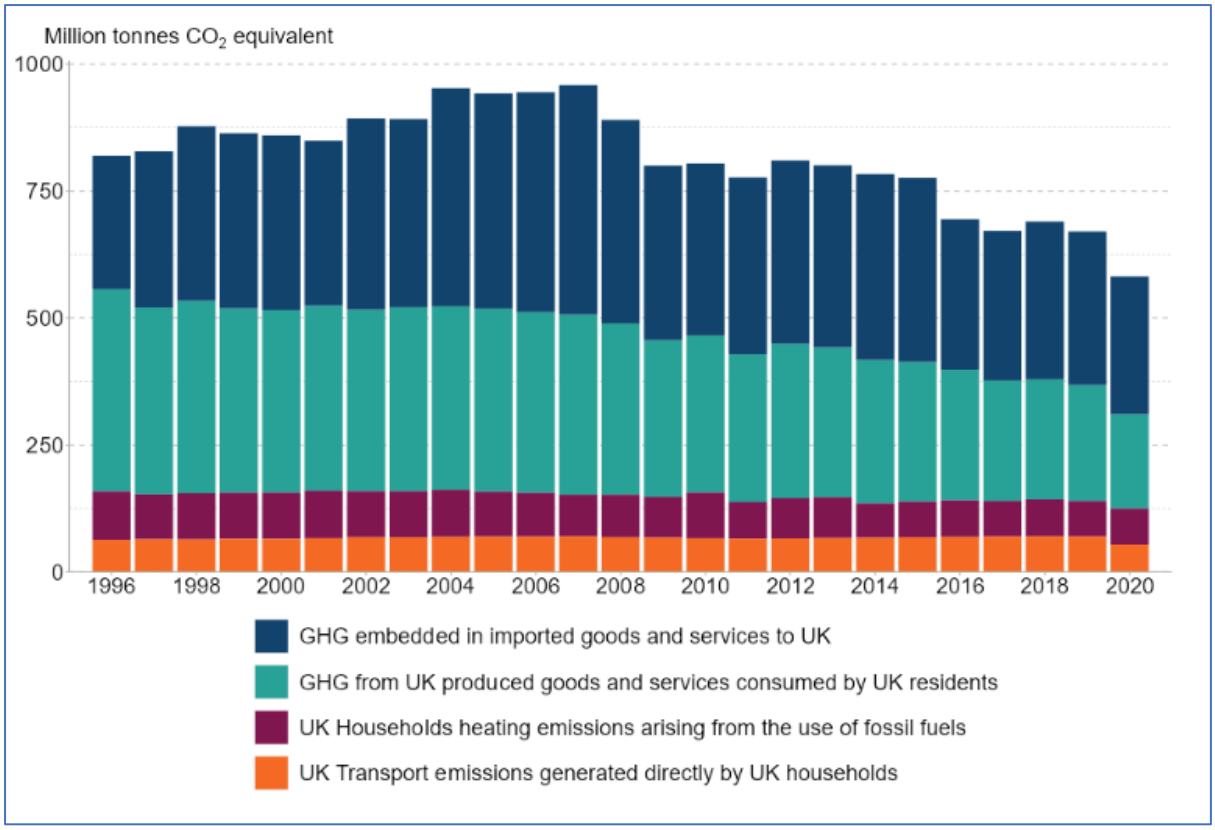


Figure 3

International transport and domestic air

DESNZ territorial data for sub-national areas do not yet include relevant GHG pollution from air transport or shipping either for commerce, personal or leisure purposes. Hopefully, it will be assigned to local government areas in future data releases, and we will then be able to add them to the GHG pollution listed here.

The story so far

How does GHG pollution compare by greenhouse gas?

The data release updated estimates for Hampshire's territorial carbon dioxide pollution, and added estimates for methane and nitrous oxide pollution for every year from 2005. Both Figures 4 and 5 below are based on DESNZ data. Figure 4 recalculates DESNZ data using IPCC 20-year horizon conversion factors for methane and nitrogen. Methane is significantly more important on this timescale.

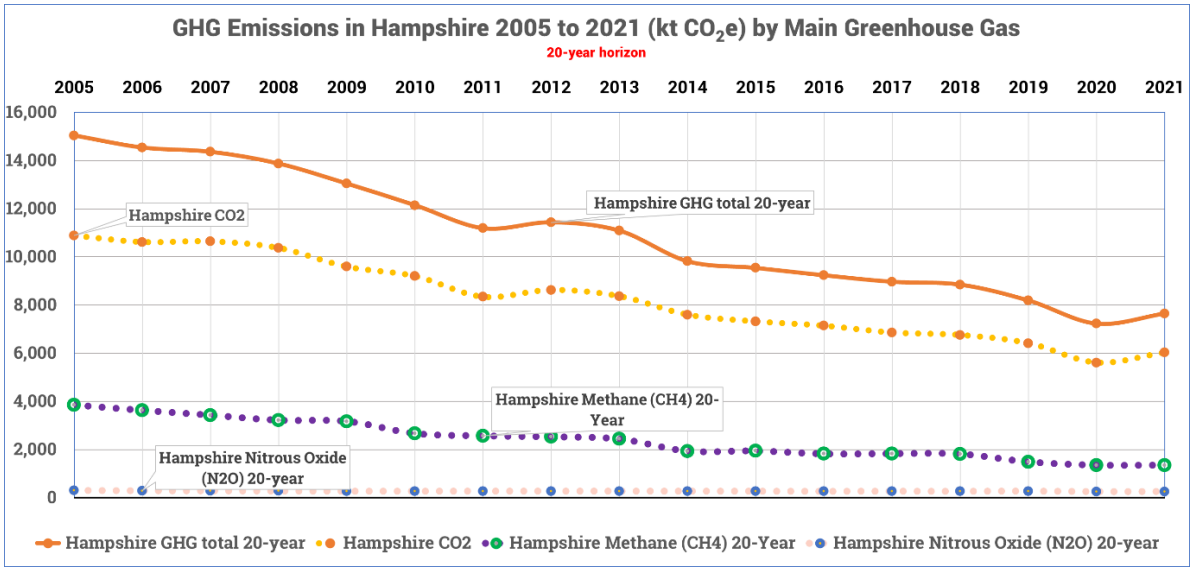


Figure 4

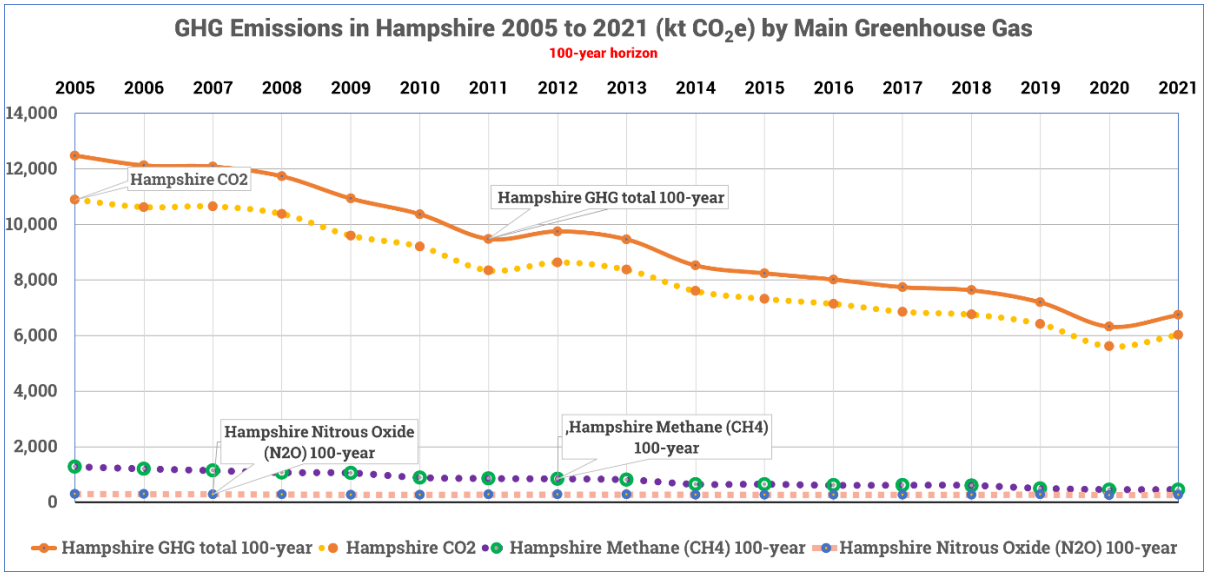


Figure 5

The gentle reduction in GHG pollution between 2014 and 2018 was mostly attributable to action at a national level to decarbonise electricity. The 'dip' between 2019 and 2021 was mostly because of the 663 kt reduction in road traffic (mostly CO_2) pollution during the Covid-19 lockdown.

In 2021 the breakdown of GHG pollution in Hampshire was:

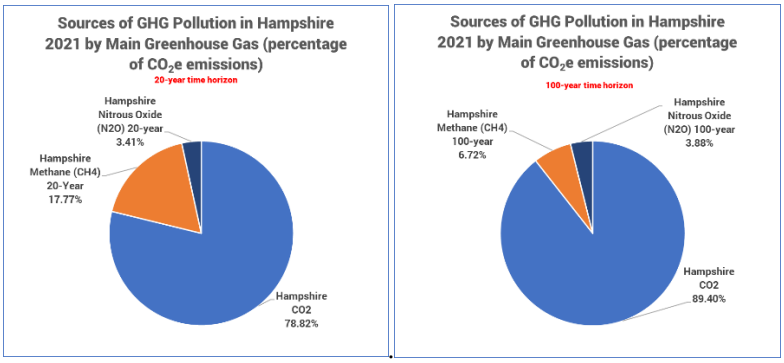


Figure 6

DESNZ offers us a fairly detailed picture of the sources of GHGs: **transport, livestock, and domestic dominate:**

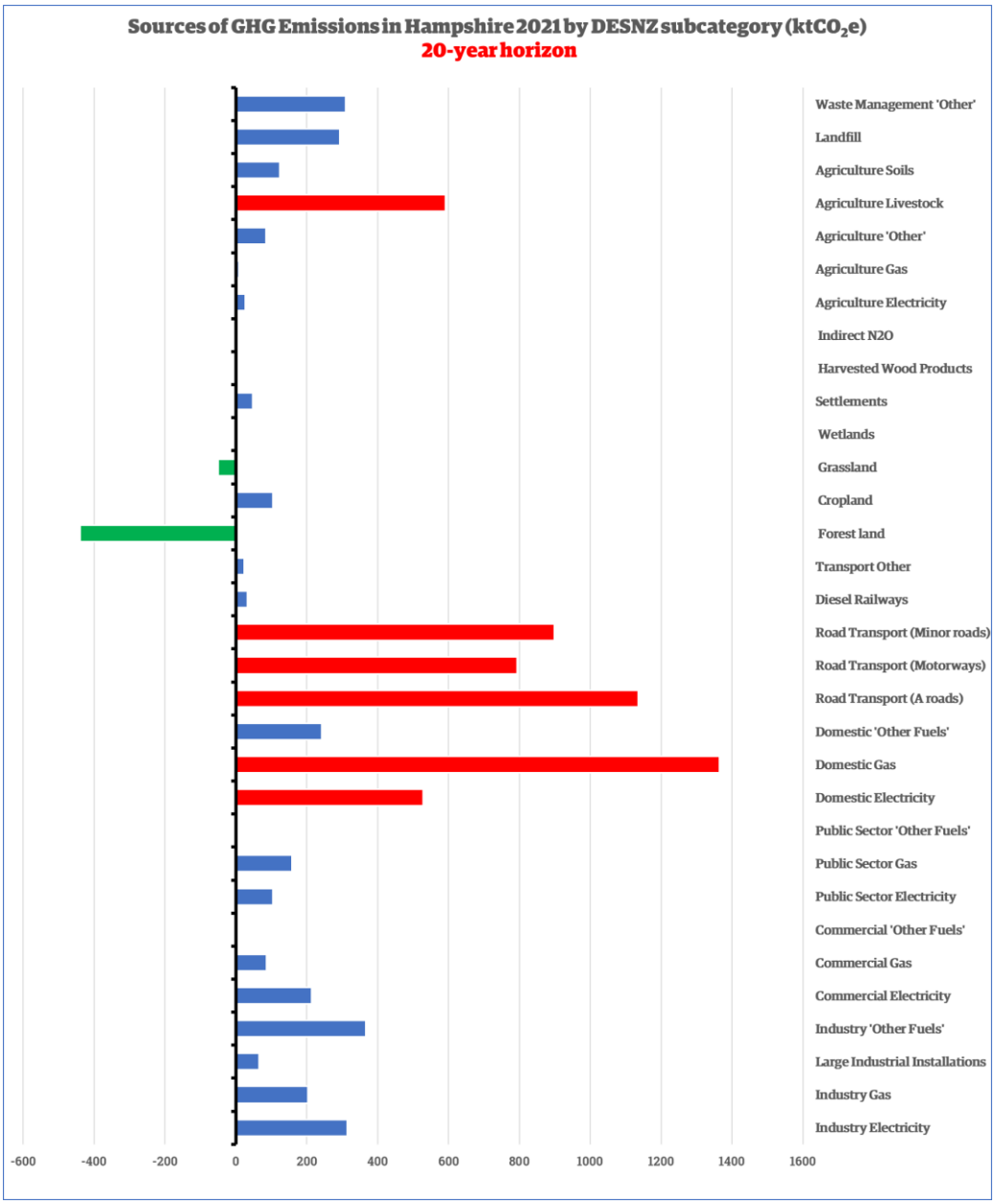


Figure 7

Now that we know the sources, we have the knowledge to tackle pollution by methane and nitrous oxide: it comes mostly from livestock, soils, landfill, and waste management. On a 20-year horizon livestock is a serious source of methane, the DESNZ 100-year horizon data methodology understating the short-term high level of impact of methane. **Calculated using a 20-year horizon, livestock is responsible for 11% of net GHG pollution in the county**.

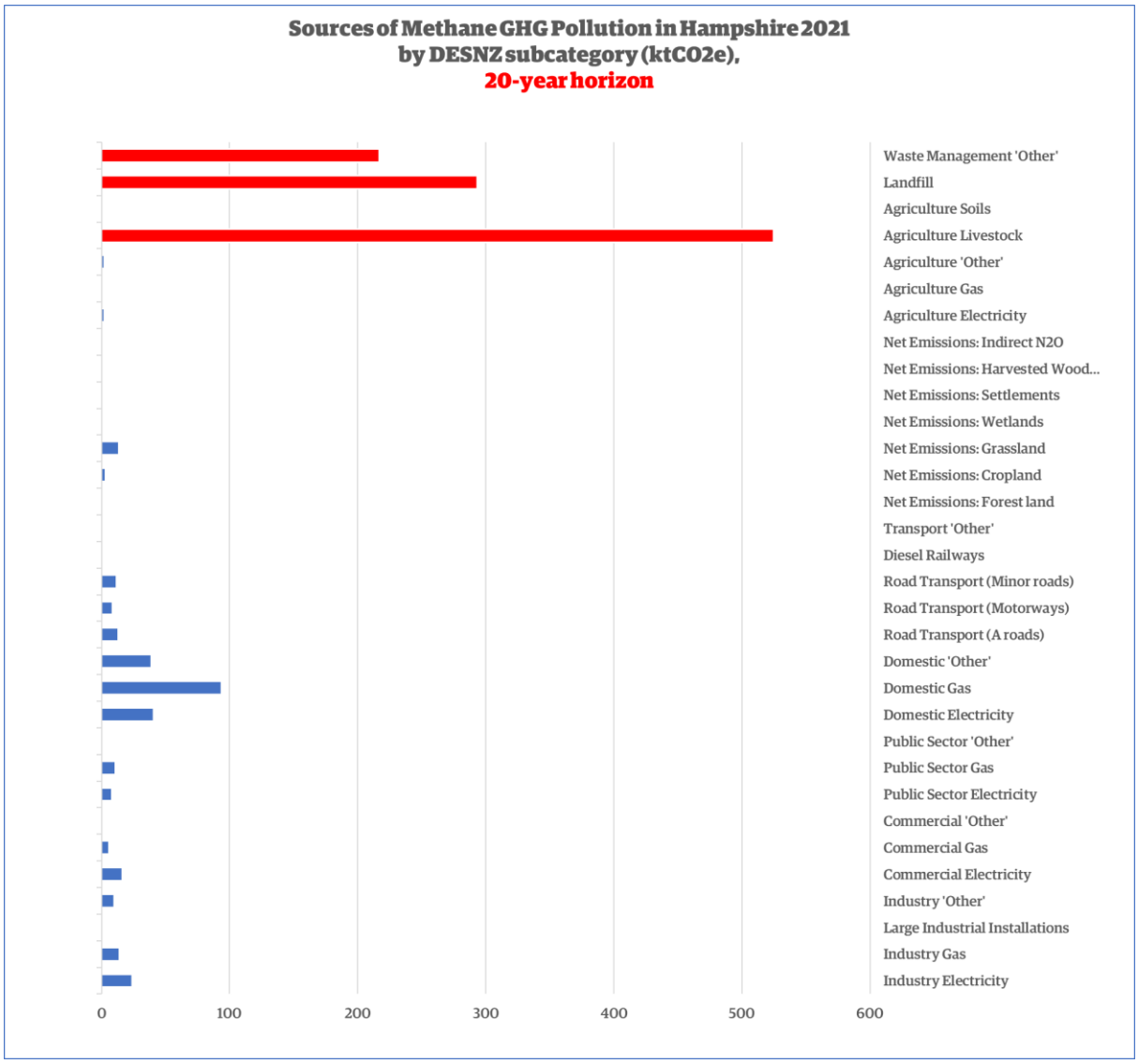


Figure 8

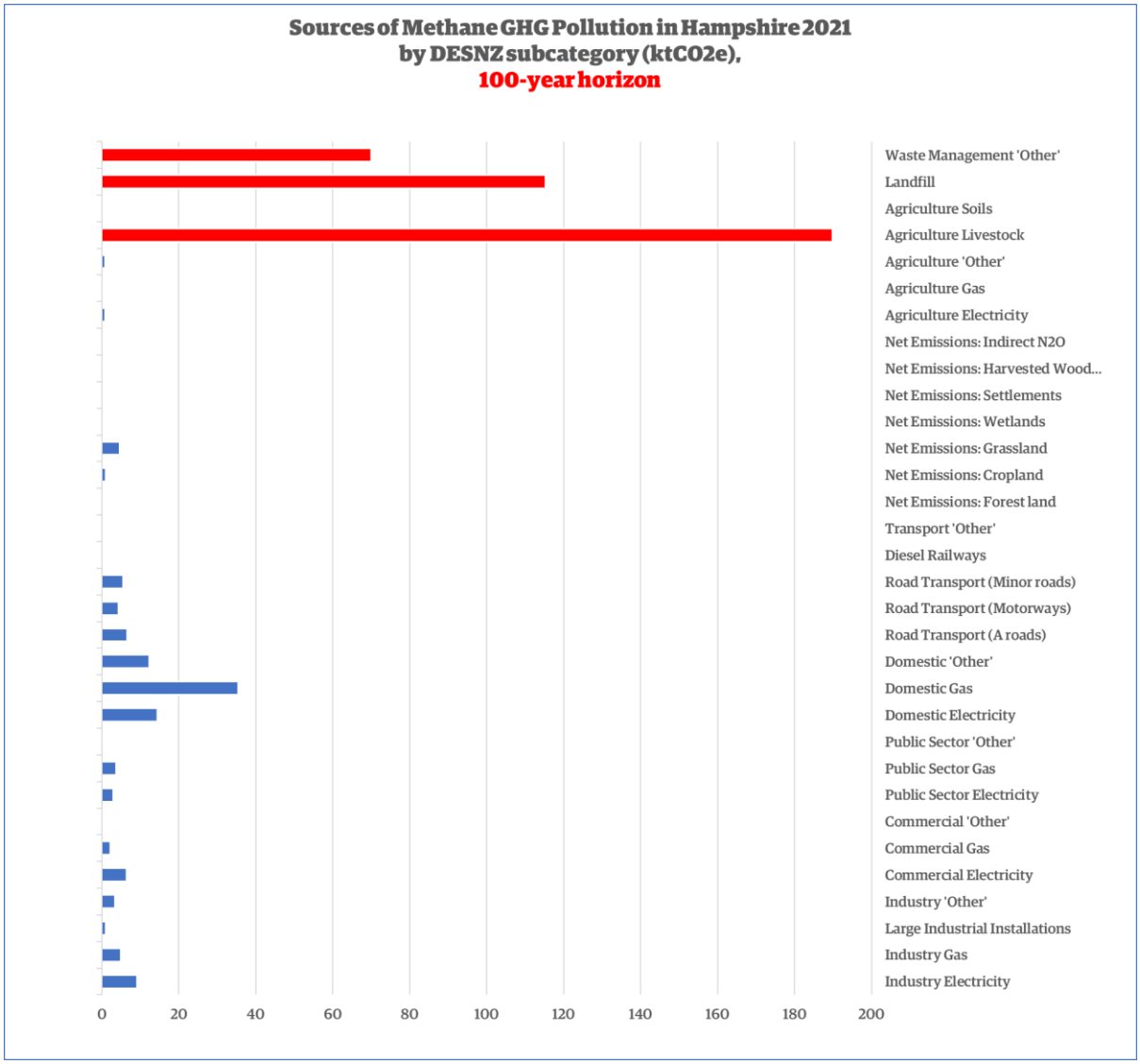


Figure 9

How does GHG pollution compare by DESNZ category?

After the Covid-19-related reduction in many types of emission some categories have increased for 2021: transport, domestic, industry, commercial, public sector. It will be catastrophic if this trend continues. Using 20-year horizon conversion ratios for methane makes agriculture relatively more significant with an impact similar to industry.

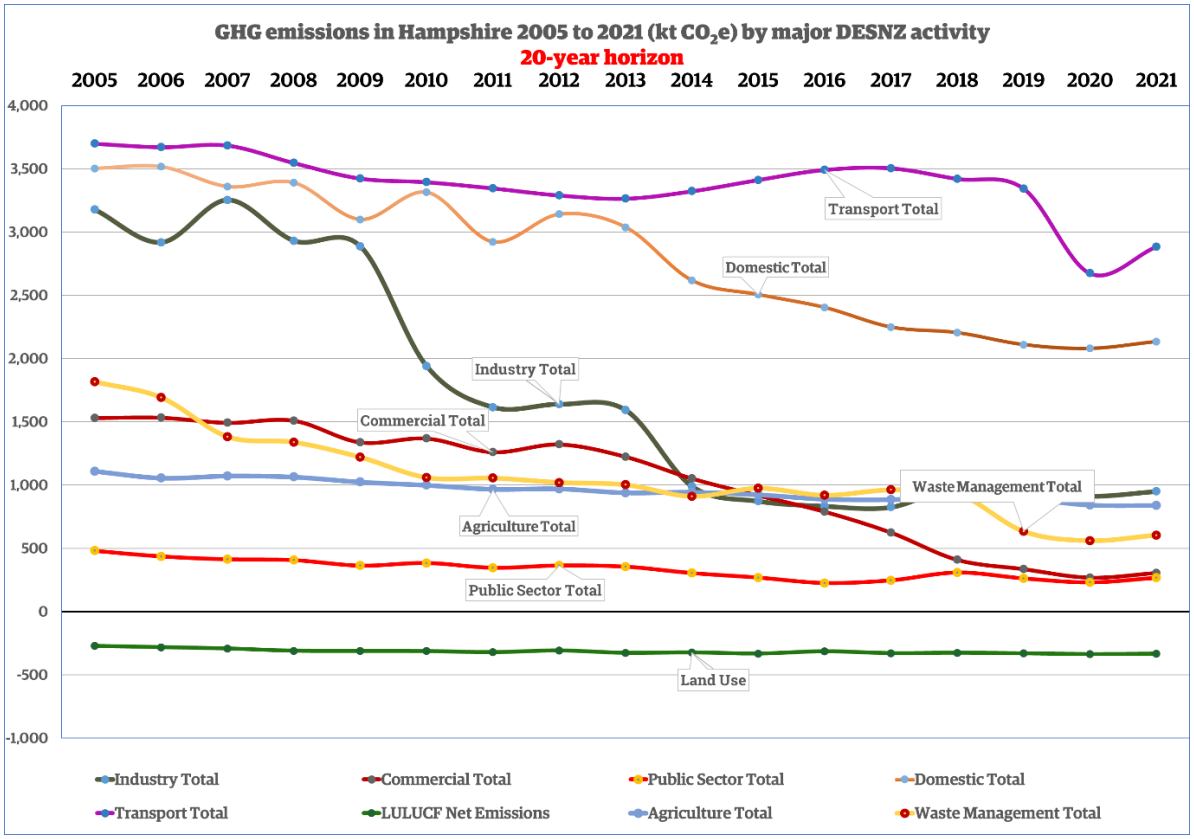


Figure 10

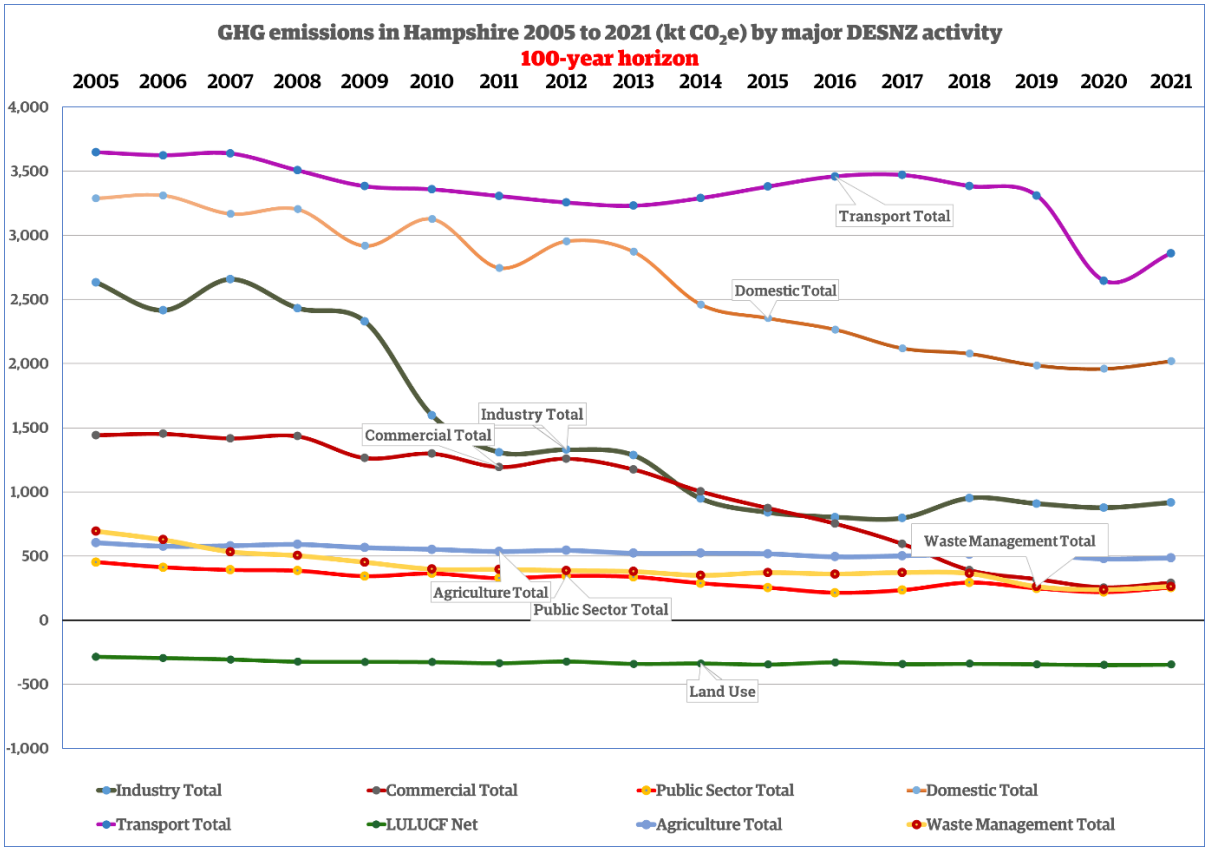


Figure 11

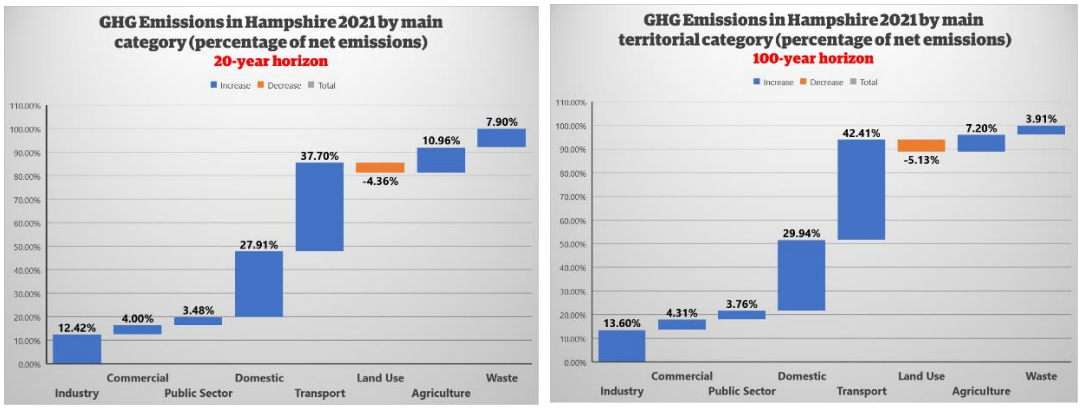


Figure 12

DESNZ provide detailed data for subdivisions of each major category. This can help us develop a strategic approach, for example, to farming and land use:

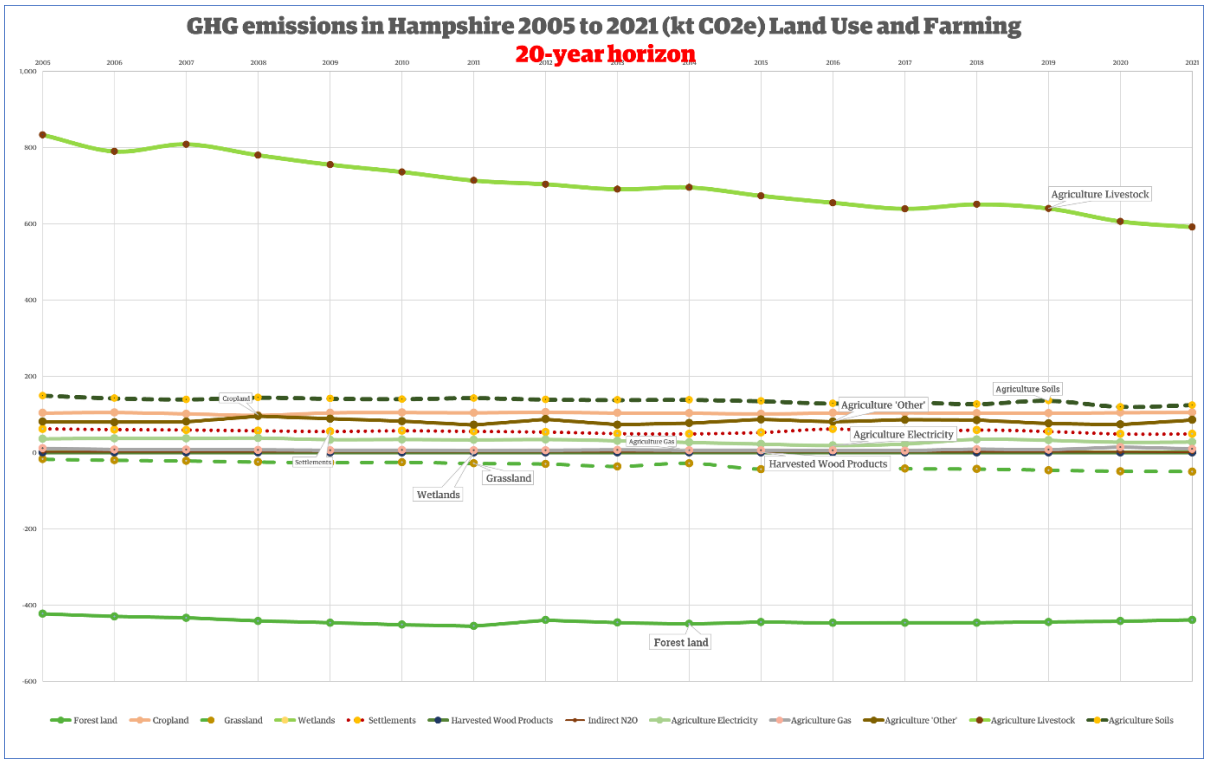


Figure 13

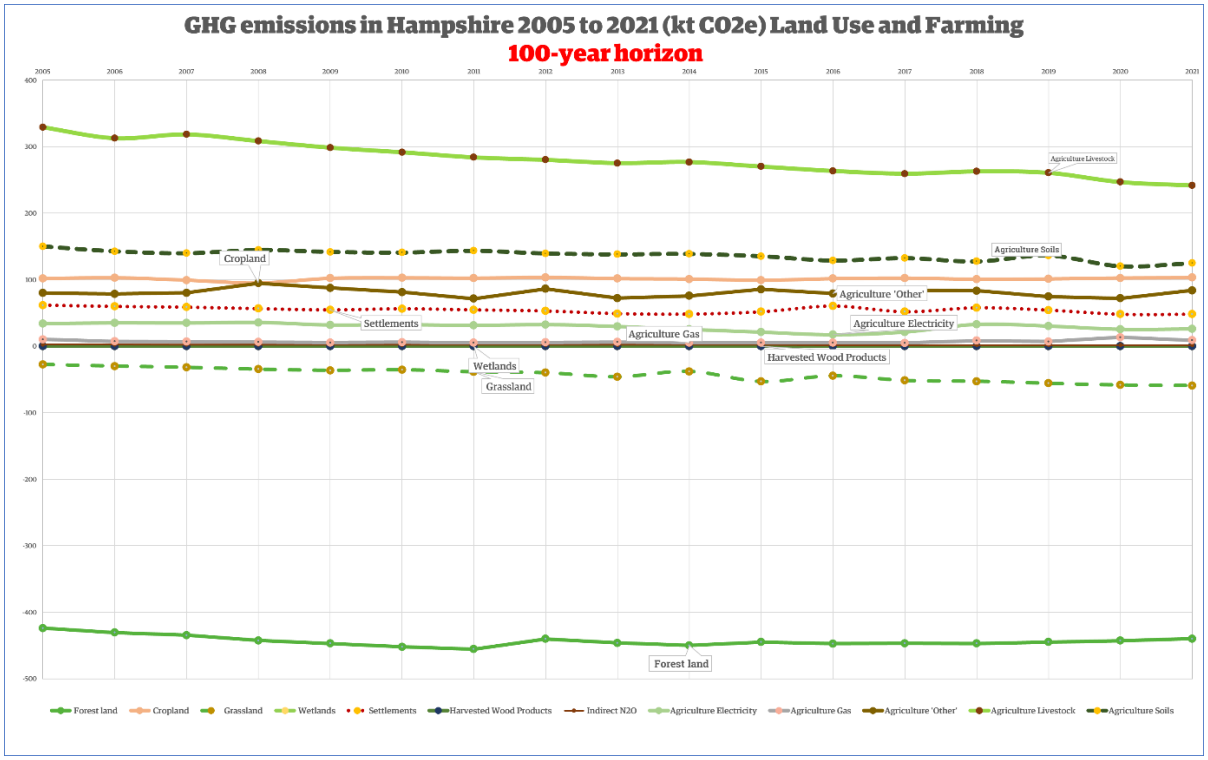


Figure 14

Forest land has a strong beneficial effect. Grassland also has a minor beneficial effect, but this is outweighed 12 times (20-year horizon) by the GHG pollution produced by livestock, some of whom graze on it.

These data can now be used to ensure that a Hampshire Biodiversity Strategy along with an enhanced Biodiversity Action Plan will help ensure a Nature-based Solutions or biodiversity approach that can play a much greater part in pollution reduction.

The DESNZ data clearly show 'negative pollution' has flat-lined, and this points to the need to accelerate negative pollution (greenhouse gas removal) to support the inadequate UK and local active GHG pollution mitigation measures. Local offsetting schemes appear to have had no impact so far. National and international reports emphasise the importance of increasing the scale of this 'negative pollution.'

Transport is the main source of greenhouse gases in Hampshire. Transport, in particular road transport, remains a key area for work on GHG pollution reduction. Without radical action transport on minor roads could well return to the growth in pollution that took place between 2012 and 2019. In all probability transport GHG pollution reported in 2022 will increase to resume the trajectory that was interrupted by Covid-19. To achieve net zero emissions in Hampshire by 2050 everything should be done to prevent these post-Covid increases, in particular LTP4 must focus closely on reducing transport emissions.

Because GHG transport pollution is mostly CO_2 there is little difference between the 20-year horizon and 100-year horizon CO_2e conversions, but the former reports slightly higher levels of GHG pollution.

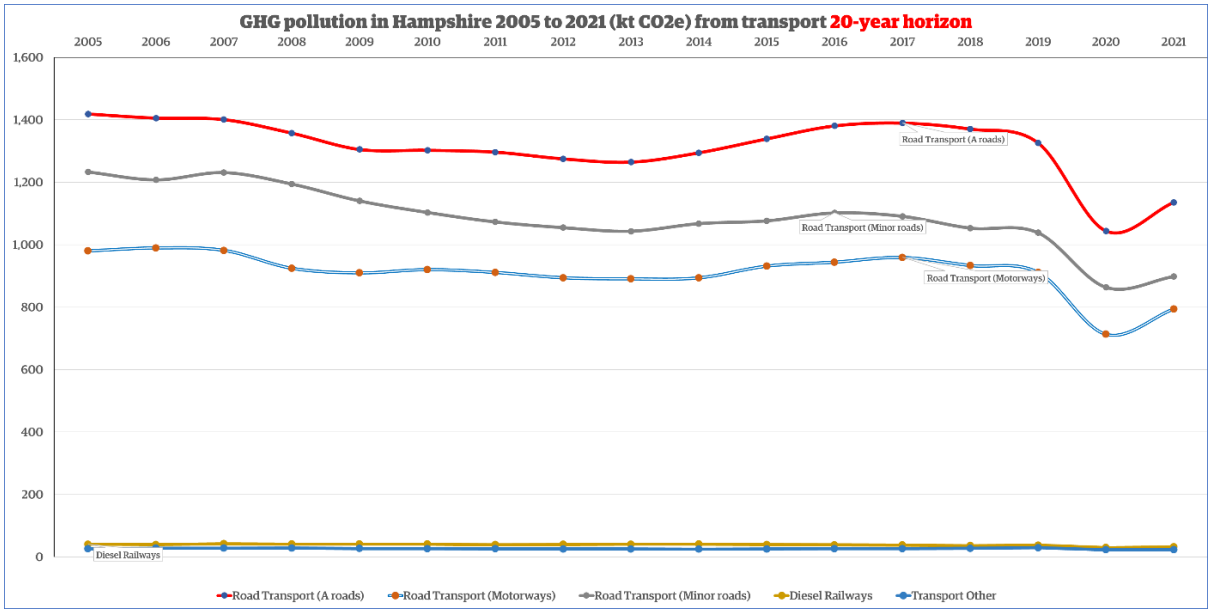


Figure 15

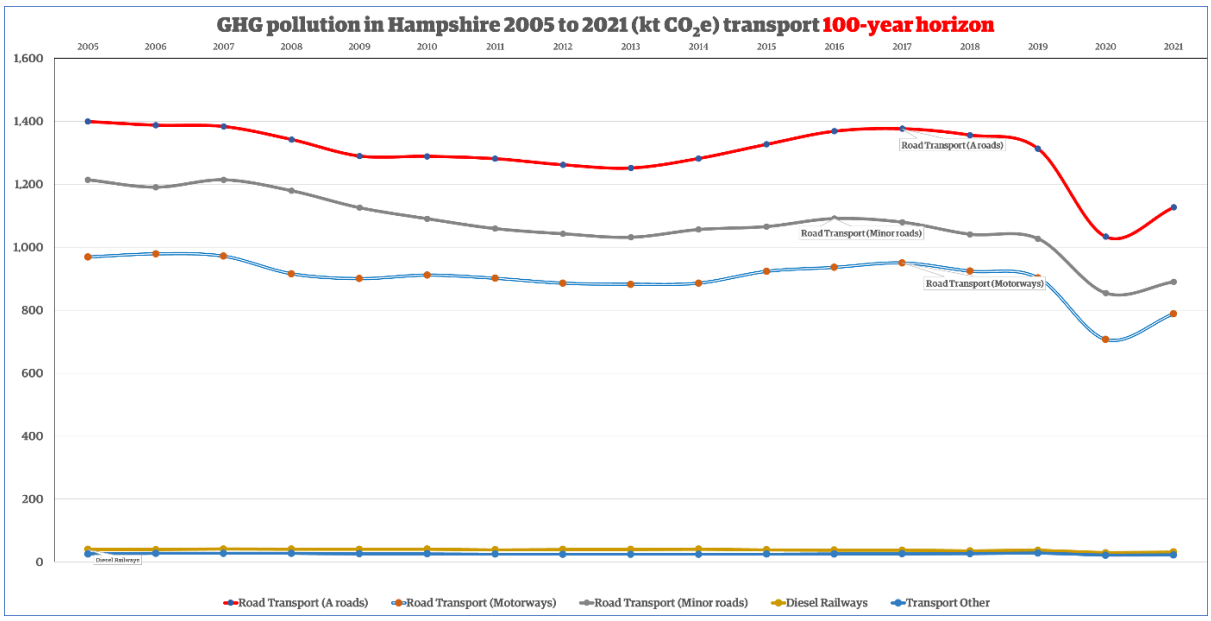


Figure 16

How does Hampshire's progress compare with other local authority areas?

It is good news that Hampshire County Council continues to work with its Climate Action Plan. This plan was assessed, along with other similar plans by local authorities, by Climate Emergency UK see [Council Climate Action Scorecards | Climate Emergency UK (councilclimatescorecards.uk)](). In October 2023 HCC were given a score for the quality of their 'action' of 35% and were ranked 125th equal with 9 other councils out of 382 local authorities (or 11th out of 21 County Councils).

The DESNZ data enables us to compare progress in reducing pollution per person in Hampshire against progress elsewhere. Pollution per person in Hampshire is generally a little below emissions per person nationally. In 2021 Hampshire had net pollution per

person of 4.80 tCO_2e, and ranked 29th highest out of 70 South East local authorities (County, District, Unitary, Combined). This compares with emissions per person across the South East of 4.68 tCO_2e.

Within Hampshire

the DESNZ comparisons look like this:

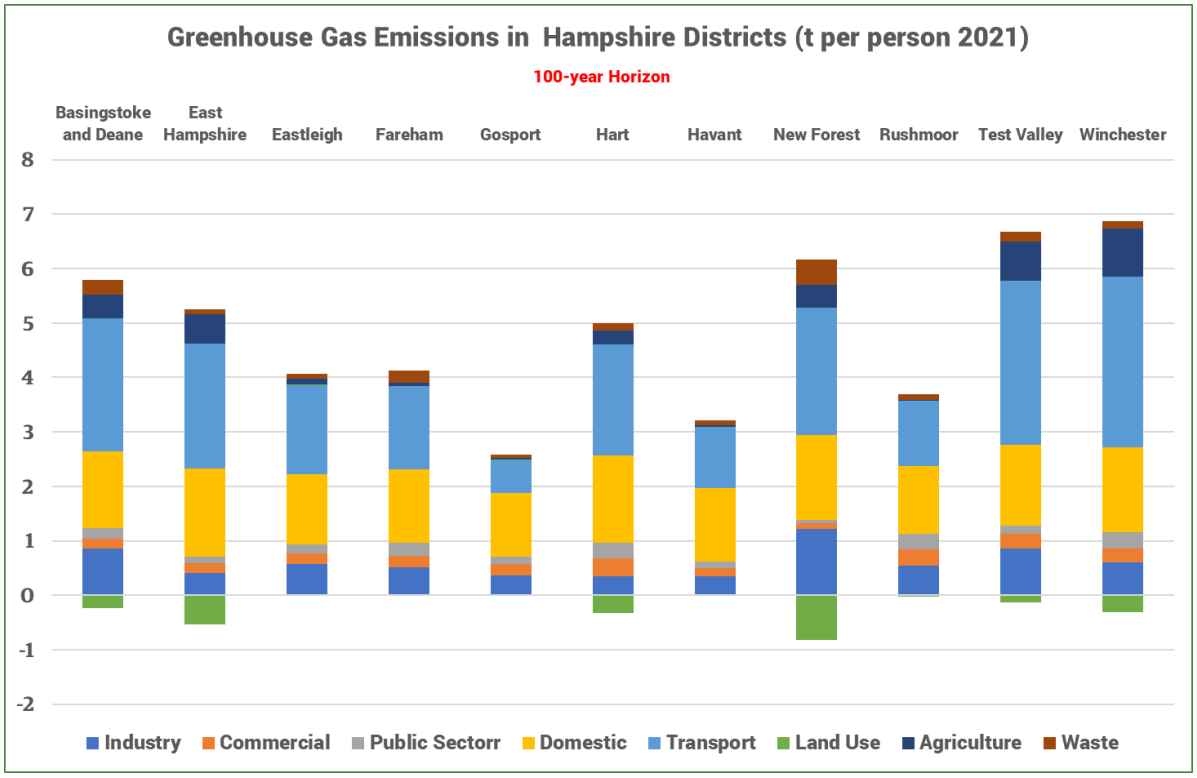


Figure 17

The differences are so great that differentiating in the approach to each district would seem appropriate when supporting district authority initiatives, strategically focussing on the greatest emissions in each district.

GHG pollution per person in Hampshire is a little lower than pollution per person across the country. This is especially the case when converting methane using the 20-year time horizon suggesting that high levels of methane elsewhere are a factor.

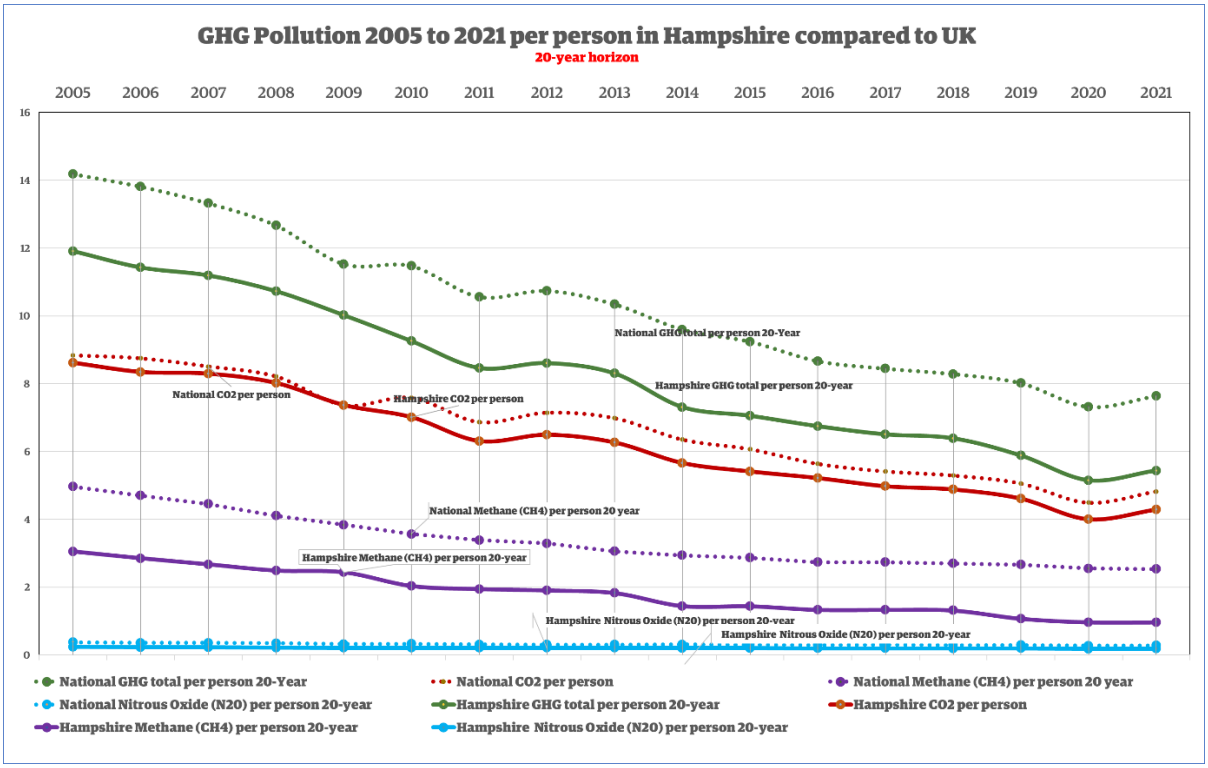


Figure 18

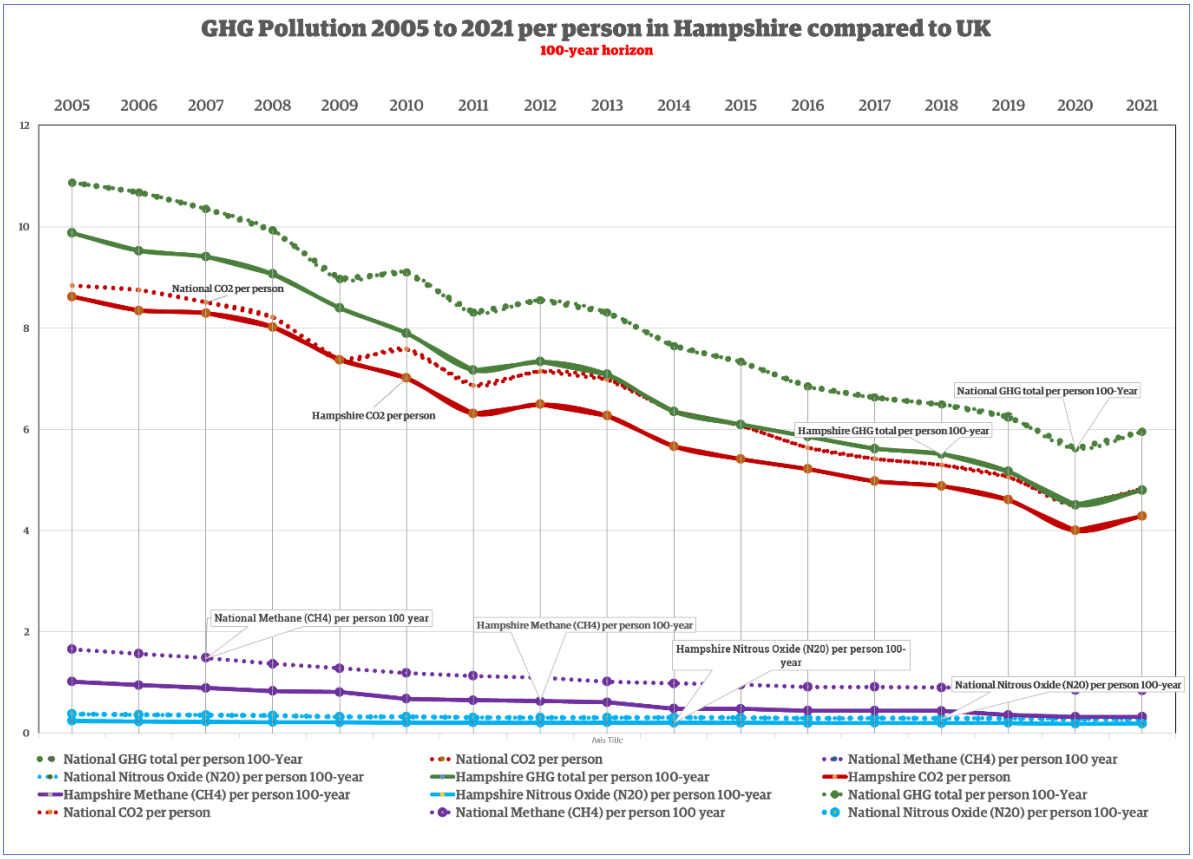


Figure 19

Transport GHG pollution per person is 20% higher than it is nationally:

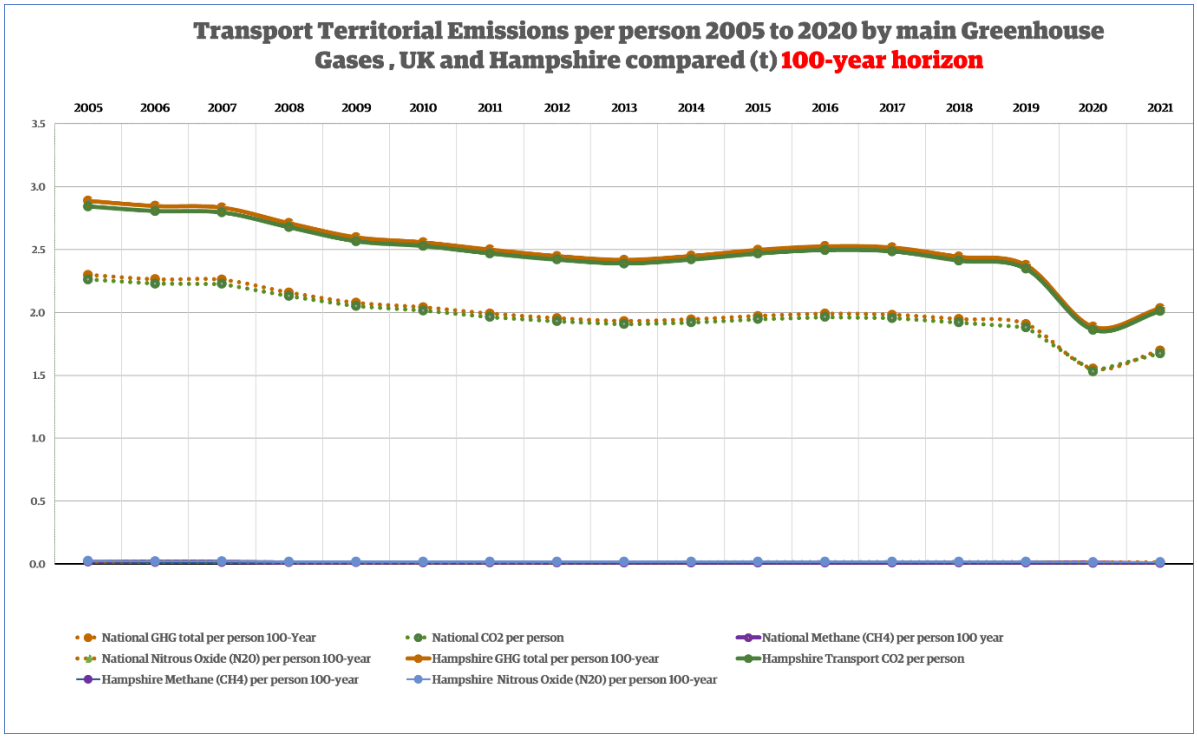


Figure 20

Figure 21:

- looks at the rate of GHG pollution reduction in Hampshire between 2005 and 2021,
- Shows how emissions will have to reduce up until 2037 if they are to align with the government's June 2023 revised Net Zero Growth Plan figure 6 at [Powering up Britain - GOV.UK (www.gov.uk)](),
- adds the subsequent range of pathways that will be necessary to reduce GHG pollution in the county to net zero by 2050, in line with the Hampshire County Council Declaration of Climate Emergency.

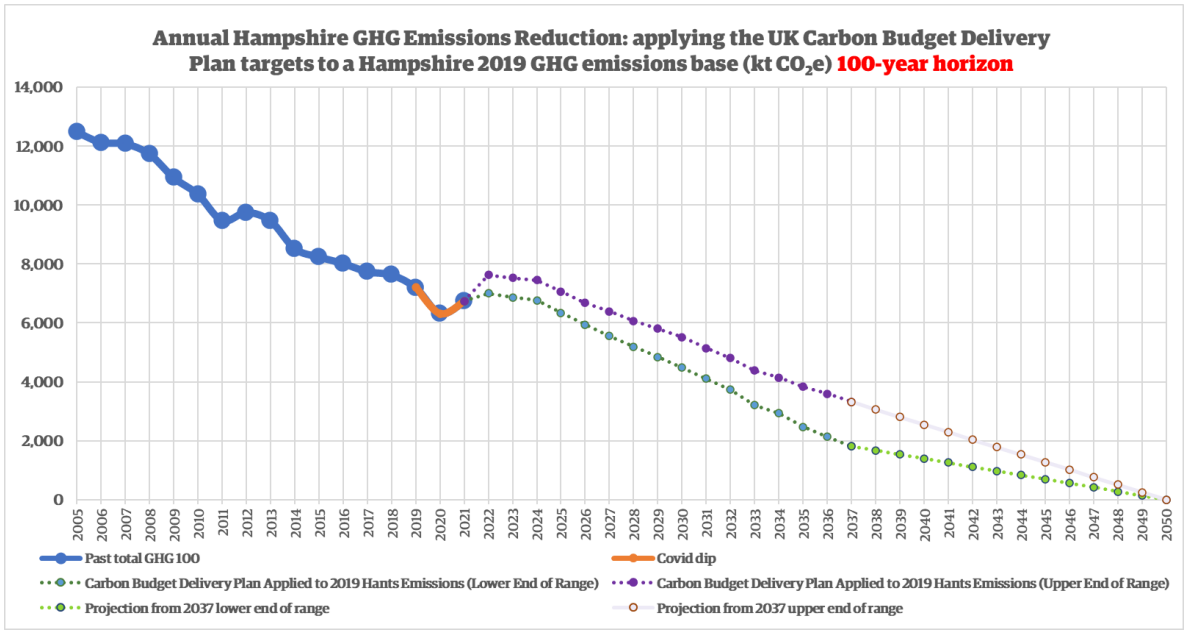


Figure 21

To ensure that Hampshire will succeed in achieving its net zero target, the annual targets implied here, or more ambitious targets, will need to be discussed and adopted. This would open the way for a programme of initiatives that will deliver these targets. It would be useful if Hampshire could develop such a programme soon. There is currently a High Court challenge arguing that the government's Net Zero Growth Plan is not sufficient to ensure the country will achieve net zero by 2050.

In the past many initiatives have been identified, but it is now urgent to demonstrate how these initiatives, and more, will be co-ordinated to reduce emissions to the levels necessary shown in the chart above.

Energy sources

Most energy consumed in Hampshire comes from fossil fuels. GHG pollution will reduce if we switch to using zero-carbon sources of energy. In 2021 energy use in Hampshire showed very little use of zero-carbon energy (about 8%):

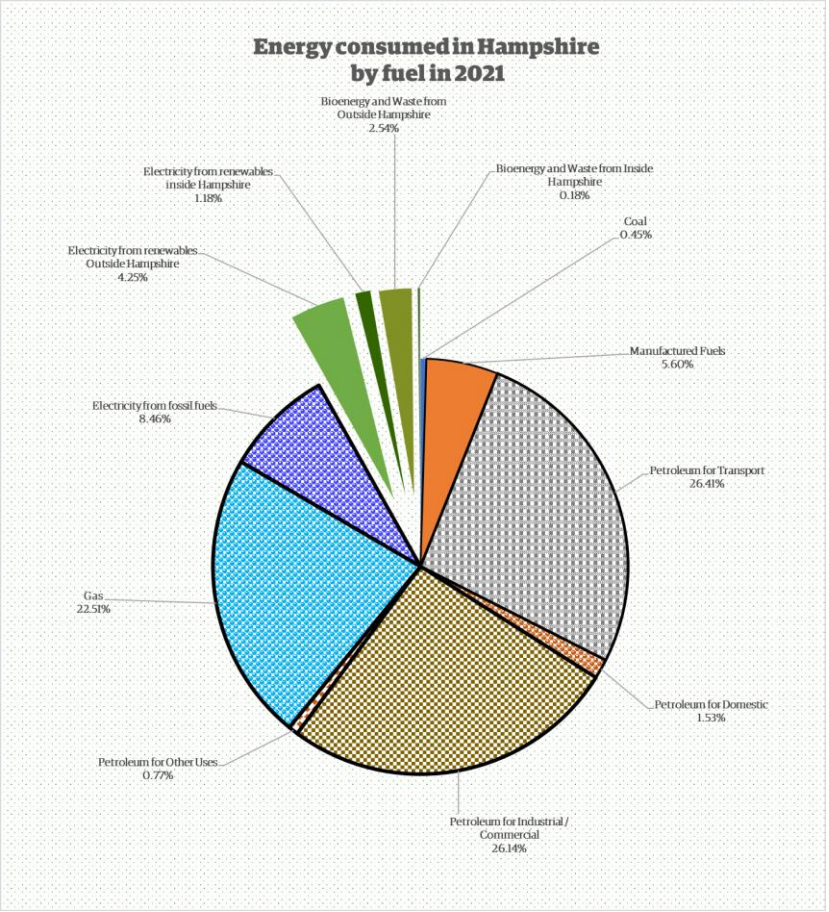
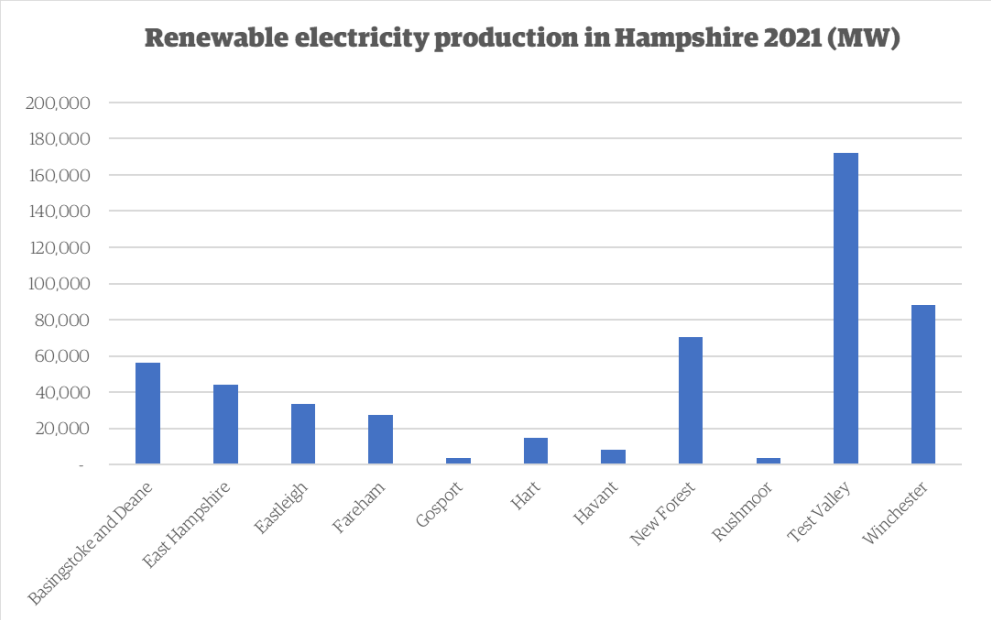


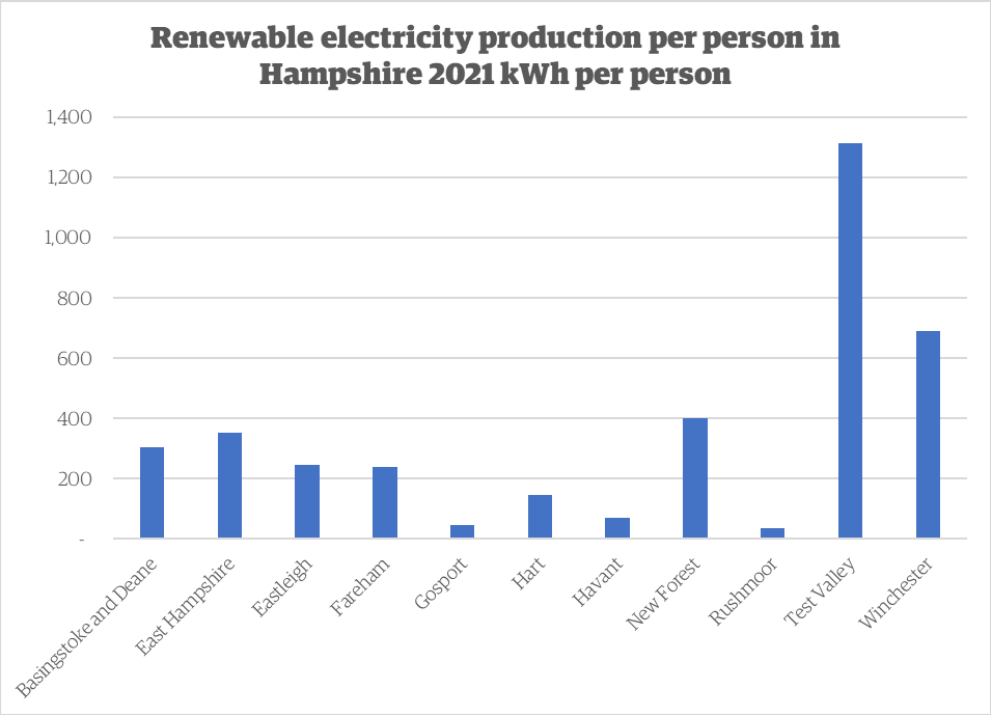
Figure 22

Data from Total final energy consumption at regional and local authority level: 2005 to 2021 - GOV.UK (www.gov.uk) 29 September 2022. National share of energy consumed from renewables taken from Digest of UK Energy Statistics (DUKES): renewable sources of energy - GOV.UK (www.gov.uk)

The programme for emissions reduction in Hampshire will benefit from a complementary programme for maximising the production of zero carbon energy in Hampshire.

Levels of renewable energy production vary considerably by district:





Phil Gagg 23 October 2023