East Hampshire District – Green House Gas Emissions
Based on the DESNeZ 29 June 2023 data release

Purpose of this report

This report has been produced by Petersfield Climate Action Network and Alton Climate Action Network to stimulate and inform public debate, and to support decision-making by town and parish councils, East Hampshire District Council and Hampshire County Council.

PeCAN and ACAN would like to publicly record their enormous gratitude to WinACC (Winchester Action on the Climate Crisis) and in particular to Phil Gagg, for providing the initial spreadsheet and graphics on which this document is based. The spreadsheet and more detail is available on request from hello@petersfieldcan.org but has not been included in order to avoid the document becoming too long.

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Introduction and source of data

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

This report illustrates what the DESNeZ update tells us about the history and current state of greenhouse gas emissions (GHGs) in the East Hampshire District. It is intended to highlight the scale of the challenge in reducing GHGs, the trajectory, and the pace of change.

Some of the charts below contain considerable information in a small space, to fit into A4 size for printing. Readers wishing to see clearly all the labels should zoom in on the charts (control / mouse wheel, or view – zoom).

DESNeZ provide local authority data for 'territorial' emissions; in other words, emissions that occur within an authority's geographic boundaries. DESNeZ do not currently provide local authority data for 'consumption' emissions. Consumption data is available at a national level and from other sources but is not the focus for this report.

Territorial emissions are those produced within a geographical boundary – such as from heating buildings, transport, industry, and agriculture – regardless of whether the residents within the community are engaged in or demand those activities. For example, if a factory lies within the boundary of a local authority, then regardless of whether what is produced in the factory is consumed locally or exported to other parts of the country (or world), the factory's emissions would still be counted as part of that local authority's territorial footprint.

Consumption emissions are those produced as a result of the activities that the area's residents engage in, regardless of where geographically they occur. For example, emissions resulting from the food they eat, the clothes and household items they buy, the leisure activities they engage in, their travel behaviours, and the heating of their homes.

What's new in this 2023 DESNeZ data release?

Population data has been adjusted for more recent years to reflect the 2020 census.

The data is even more comprehensive than the data published in 2022. As well as carbon dioxide, methane, and nitrous oxide in East Hampshire, added last year, DESNeZ now provides historic data on emissions from all three gases since 2005.

How local is this data?

A detailed explanation of how this data is derived and allocated locally is available on the UK Government web-site, here and here. But in summary:

- Energy use is based on local consumption data for domestic and commercial energy use
- Soils & livestock is based on local data on crop types, livestock types and numbers
- Road transport is based on local traffic flow data
- Land use is based on land use classification maps at 100m x 100m resolution plus soil and forest type maps at similar scale.

Key points for East Hampshire

1. Territorial Emissions are dominated by Transport, Domestic Energy and Agriculture

83% of East Hampshire's territorial emissions come from Transport (almost entirely road transport), Domestic Energy consumption (mainly heating) and Agriculture (mainly livestock). The path to territorial net zero will require a focus on these three activities.

2. Transport is the biggest source of emissions

Transport is the biggest source of emissions and transport emissions are substantially greater than the national average. They account for 39% of East Hampshire's territorial emissions. 99% of those emissions are from road transport. There needs to be more investment in public transport, walking and cycling routes, so that people have the freedom to choose to leave their car at home, but there must also be support for electric vehicle charging.

3. Domestic Energy is the second biggest source of emissions and is increasing

Domestic Energy emissions are increasing, and it would be catastrophic if this continues. Homeowners should be encouraged to improve the energy efficiency of their homes through the combination of better insulation and the adoption of electric heating. New homes should be built with electric heating, and this should be enforced through the local plan.

4. Methane emissions from Livestock Farming cannot be ignored

For the first time DESNeZ have included historic data on emissions from Methane and Nitrous Oxide as well as Carbon Dioxide. This allows us to more accurately calculate the impact of emissions and shows that livestock are responsible for 12% of all territorial emissions in East Hampshire.

5. Territorial Net Zero is achievable

Territorial net zero is achievable with a focus on road transport, the way we keep our buildings warm and the way we farm locally. UK government policy is critical here.

UK government policy is currently that all new cars are electric (from 2030), all domestic heating installations are heat pumps (from 2035) and all electricity is green (from 2035). These commitments involve huge transitions but are the essential pathways to territorial net-zero.

Locally we can support this transition through active travel policy, charging infrastructure for cars, planning regulations including a revised local plan and the creation of a local area energy plan with the local network operator.

The hardest challenge will be understanding how to minimise agricultural emissions.

6. Total emissions attributable to East Hampshire's residents are larger than those produced within the territory

The data released by DESNeZ that is broken down by local authority only covers Territorial emissions. It does not cover the emissions that are attributable to East Hampshire residents' activities where the emissions occur outside of East Hampshire (either elsewhere in the UK or in the rest of the world). It is reasonable to assume that consumption emissions are at

least 82% greater than the territorial emissions covered here (See Trends in territorial and consumption emissions on Page 4).

Consumption emissions are driven by the goods and services that we buy, the leisure and social activities that we engage in, the food and drink we consume and the flights we take. While progress can be made through local businesses and services, achieving consumption net zero will require more informed personal choice and behaviour change.

7. The impact of COVID is fading

The Covid-19 lockdowns of 2020 had the effect of reducing greenhouse gas emissions. But as behaviour largely returned to what it was before lockdown, emissions are rebounding too. 2020 emissions reduced to 87% of the 2019 level but in 2021 emissions increased back to 96% of the 2019 level. Provisional 2022 data suggests that emissions will return to the same trajectory as from 2014 to 2019: an average reduction of under three per cent per annum.

8. The beneficial impact of our forests and grass lands are significant

We are fortunate to live in an area of natural beauty with forests and grasslands that help to remove Greenhouse Gas Emissions from our atmosphere. Today 9% of East Hampshire's annual emissions are removed by the natural environment around us. The quantity of the emissions captured in this way have stayed remarkably consistent over the period covered by this report. If we are to amplify the impact of the natural environment to remove GHGs by planting trees or by changing farming techniques, then we will need to do so on a scale that is many times greater than considered so far.

9. Public Sector emissions in East Hampshire are lower than the national average but eliminating them shows important leadership

It is great news that East Hampshire District Council has adopted a target to be carbon neutral by 2035 and are refreshing their strategy (to be published in early 2024). A clear plan to achieve public sector net zero would set a superb example for local residents to follow.

10. Most energy consumed in East Hampshire comes from burning fossil fuels

Most energy consumed in East Hampshire comes from burning fossil fuels. In 2019, energy use in East Hampshire showed very little use of low-carbon energy (about 16%) (Fig 17). Increasing the production of renewable energy locally and working with the local electricity grid operator to plan the expansion needed by East Hampshire residents will be essential.

Trends

The Impact of Covid is fading

The DESNeZ data showed a rapid reduction in total emissions in 2020, to 86.7% of the 2019 level. This is because of Covid-19 lockdown, which reduced transport CO_2 emissions particularly. In 2021 emissions returned to 92.6% of the 2019 level.

Figure 1

Trends in territorial and consumption emissions

DESNeZ provide local authority data only about 'territorial' emissions; in other words emissions that occur within an authority's geographic boundaries.

DESNeZ do not supply data on "consumption" emissions at a district level, though DEFRA do make this data available at a national level. National 'consumption emissions' include emissions that occur abroad to supply the needs and desires of people within the UK. This includes many emissions caused by growing and producing food, manufacturing goods, providing services, or generating wealth from investment.

In 2019, before normal patterns were interrupted by Covid, consumption emissions outside the UK associated with goods and services consumed within the country added about another 82% to the territorial emissions. In 2020, because territorial emissions reduced so much, consumption emissions added an even greater proportion, 87%. It is reasonable to assume, without other data, that in 2021 consumption emissions were close to the 2019 pattern and the total carbon footprint in East Hampshire was around 182% of the territorial

levels reported by DESNeZ. 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)](www.gov.uk).

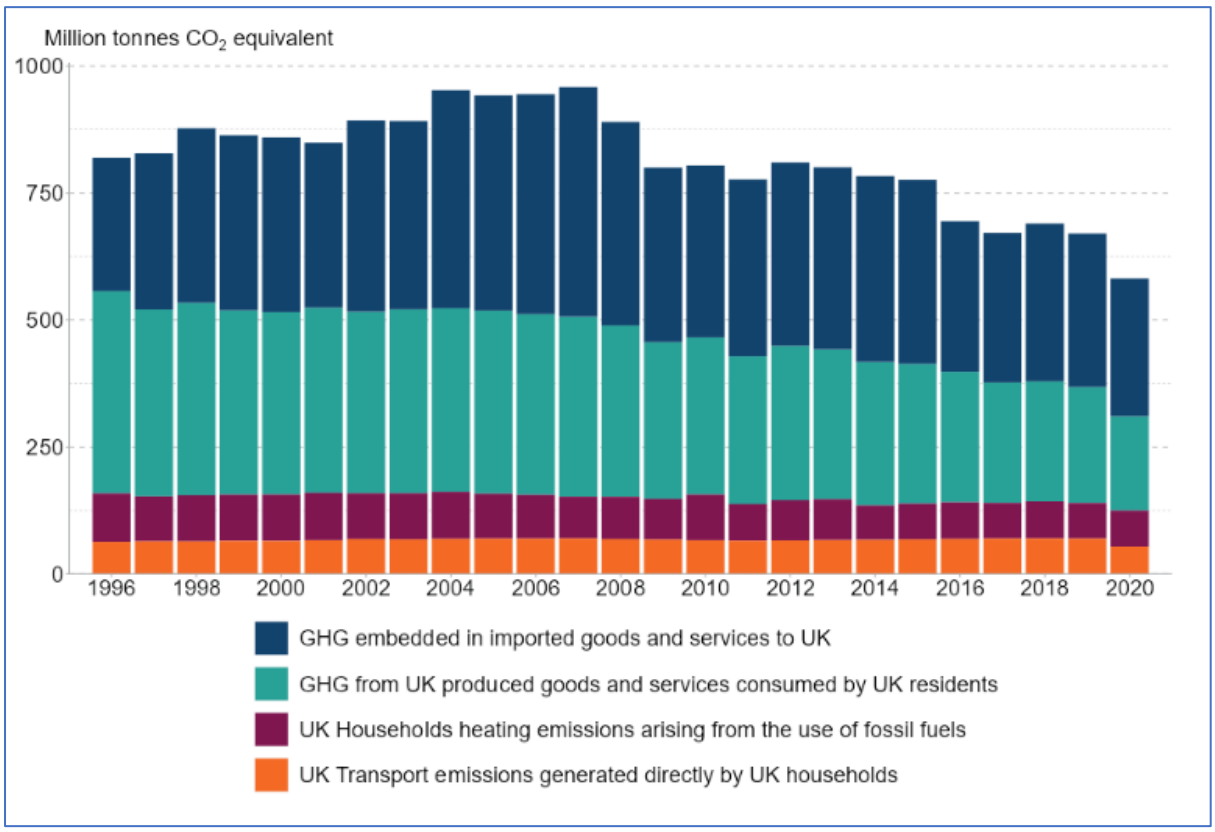


Figure 2 – UK wide consumption emissions

International transport and domestic air

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

Emissions for different greenhouse gases

The impact of methane

Weights of methane and nitrous oxide emissions are 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 (e = equivalent). This is the global warming potential (GWP) of each greenhouse gas.

In 2023, DESNeZ changed the formula they used to calculate global warming potentials. Previously they 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. This means that CO_2e data reported for earlier years have now been retrospectively adjusted upwards for methane, and downwards for nitrous oxide.

The formula to calculate GWP varies depending on the time horizon because different greenhouse gases cause global heating at different rates across their lifetime.

Greenhouse gas	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 3

The next twenty years are crucial in our attempts to prevent global heating becoming catastrophic. We need an accurate understanding of emissions in that period. DESNeZ adopts a time horizon of 100 years for converting the emissions that come from methane and nitrous oxide to CO2e. Methane emissions have three times more impact on global heating in their first 20 years (it makes little difference for nitrous oxide). This is a strong argument for a time horizon of 20 years. GWP for a 20-year horizon are given in Figure 3 in the blue-headed column (also based on the Fifth Assessments Report).

Given the critical importance of the next 20 years this report uses data based upon the 20-year time horizon where practical. This aligns better with the East Hampshire objective of achieving carbon neutrality for its own emissions by 2035.

The most significant difference between the 20-year horizon and the 100-year horizon is in agriculture which produces approximately 58% of the methane emissions in East Hampshire.

How do emissions compare by greenhouse gas?

The DESNeZ June 2023 data release updated estimates for East Hampshire' territorial carbon dioxide emissions and added estimates for methane and nitrous oxide emissions for every year from 2005. Figures 4 and 5 below are based on DESNeZ data, first over 20 years

and then over 100 years. Figure 4 shows that methane is significantly more important on a 20-year timescale. As a result, the 20-year timescale is used throughout the rest of the document.

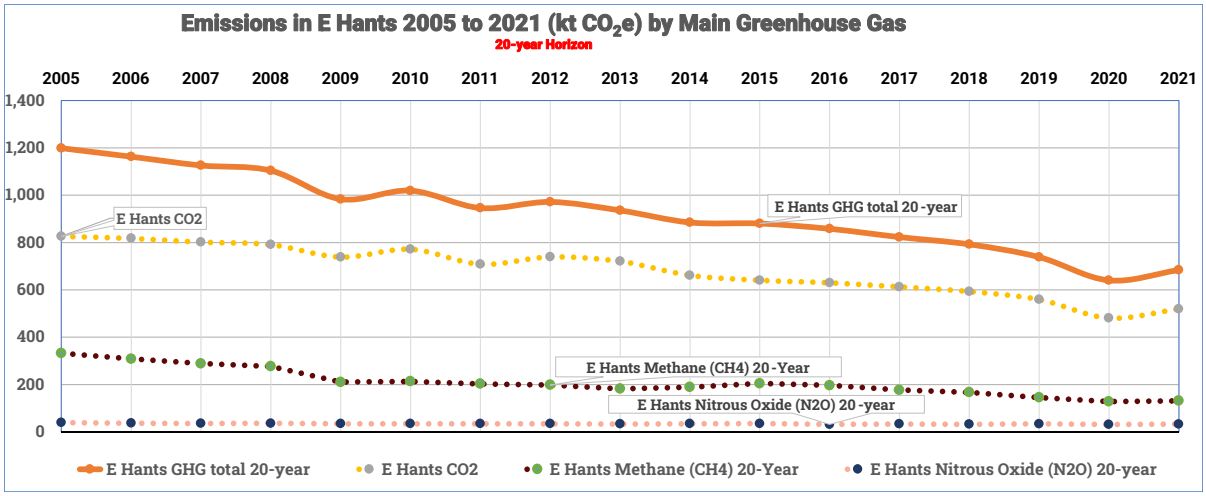


Figure 4

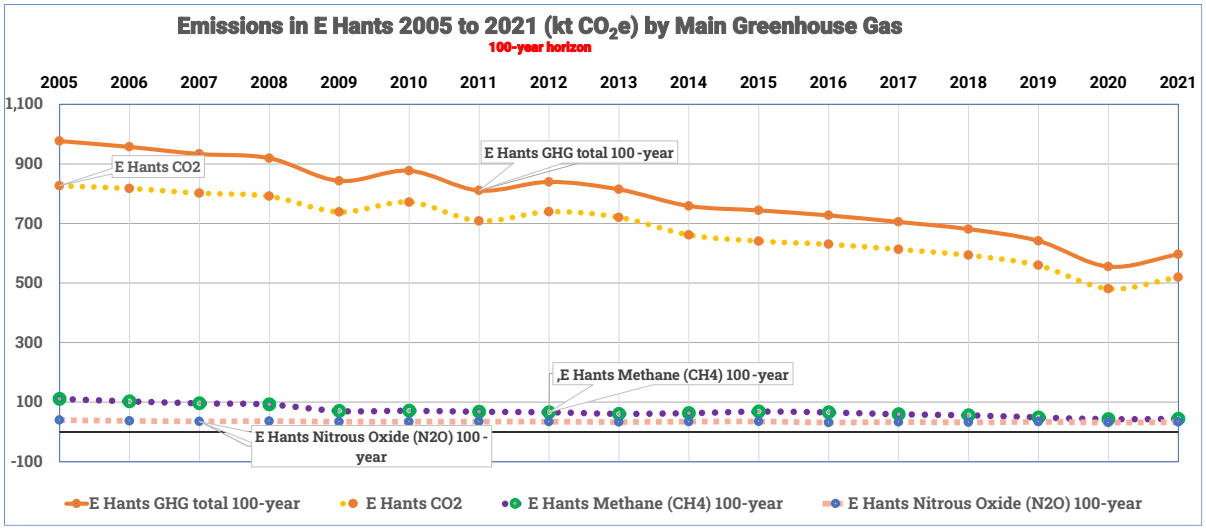
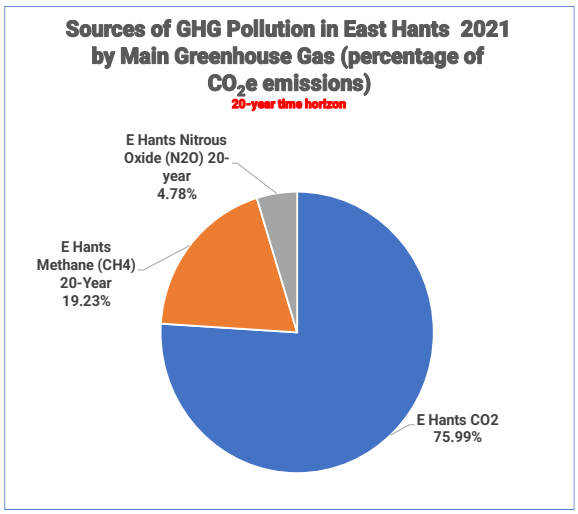


Figure 5

The gentle reduction in emissions 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 65.4kt reduction in road traffic (mostly CO_2) emissions during the Covid-19 lockdown.

In 2021 the breakdown was:



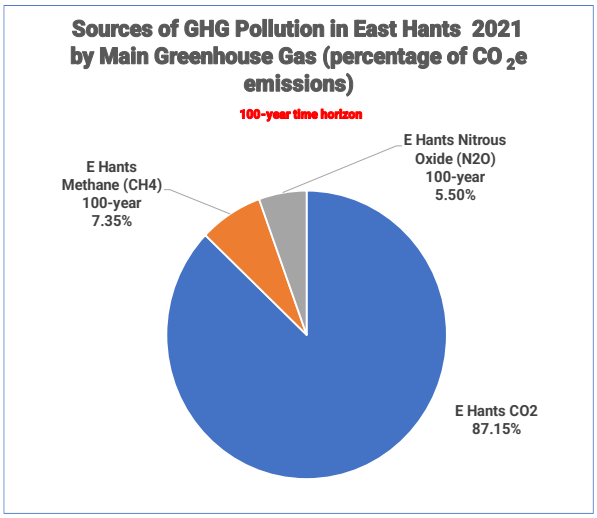


Figure 6

DESNeZ offers us a fairly detailed picture of the sources of greenhouse gas (Figure 7). Road transport, domestic energy, and livestock dominate:

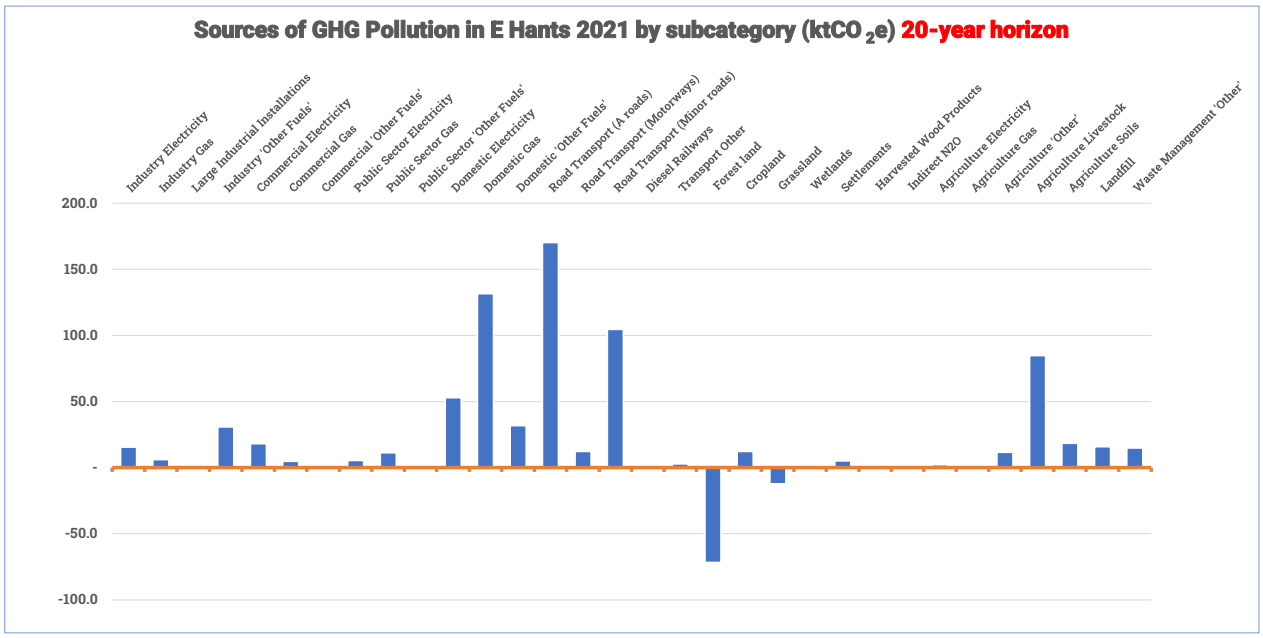


Figure 7

Figure 8 shows the sources of emissions of methane: they came mostly from livestock, landfill, and waste management. On a 20-year horizon, livestock is a serious source of methane, the DESNeZ 100-year horizon understates the short-term high level of impact of methane. Calculated in this way, livestock is responsible for 12.4% of all greenhouse gas emissions in the district. For the first time, we know how important it is to tackle this.

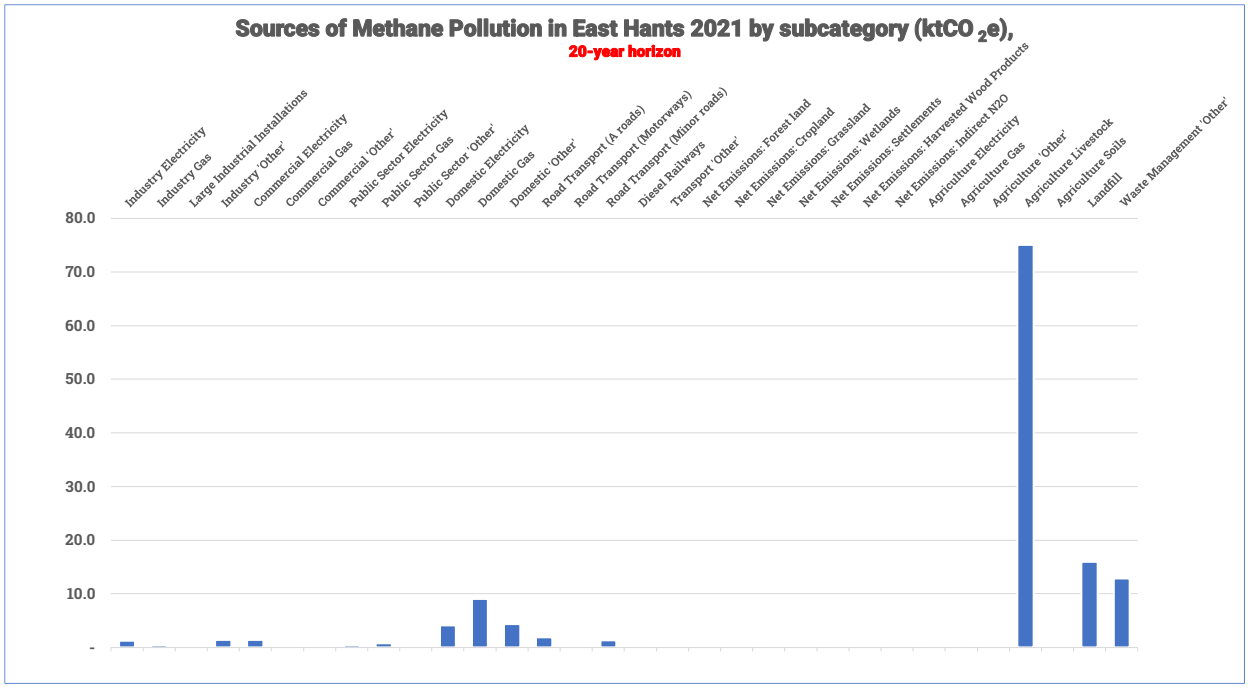

Sources of Methane Pollution in East Hants 2021 by subcategory (ktCO2e),
20-year horizon
Industry Electricity
Industry Gas
Large Industrial Installations
Industry 'Other'
Commercial Electricity
Commercial Gas
Commercial 'Other'
Public Sector Electricity
Public Sector Gas
Public Sector 'Other'
Domestic Electricity
Domestic Gas
Domestic 'Other'
Road Transport (A roads)
Road Transport (Motorways)
Road Transport (Minor roads)
Diesel Railways
Transport 'Other'
Net Emissions: Forest land
Net Emissions: Cropland
Net Emissions: Grassland
Net Emissions: Wetlands
Net Emissions: Settlements
Net Emissions: Harvested Wood Products
Net Emissions: Indirect N2O
Agriculture Electricity
Agriculture Gas
Agriculture 'Other'
Agriculture Livestock
Agriculture Soils
Landfill
Waste Management 'Other'
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
-

Figure 8

How do emissions compare by DESNeZ category?

Two categories of emissions have begun to grow relative to 2019 as we recover from Covid: domestic and industry. It will be catastrophic if this trend continues. Once again from the chart it is clear that Transport (mainly road transport), Domestic use (mainly heating) and Agriculture (mainly Livestock) dominate our territorial emissions. It is also important to note the beneficial effect of Land Use (due to forests and grasslands).

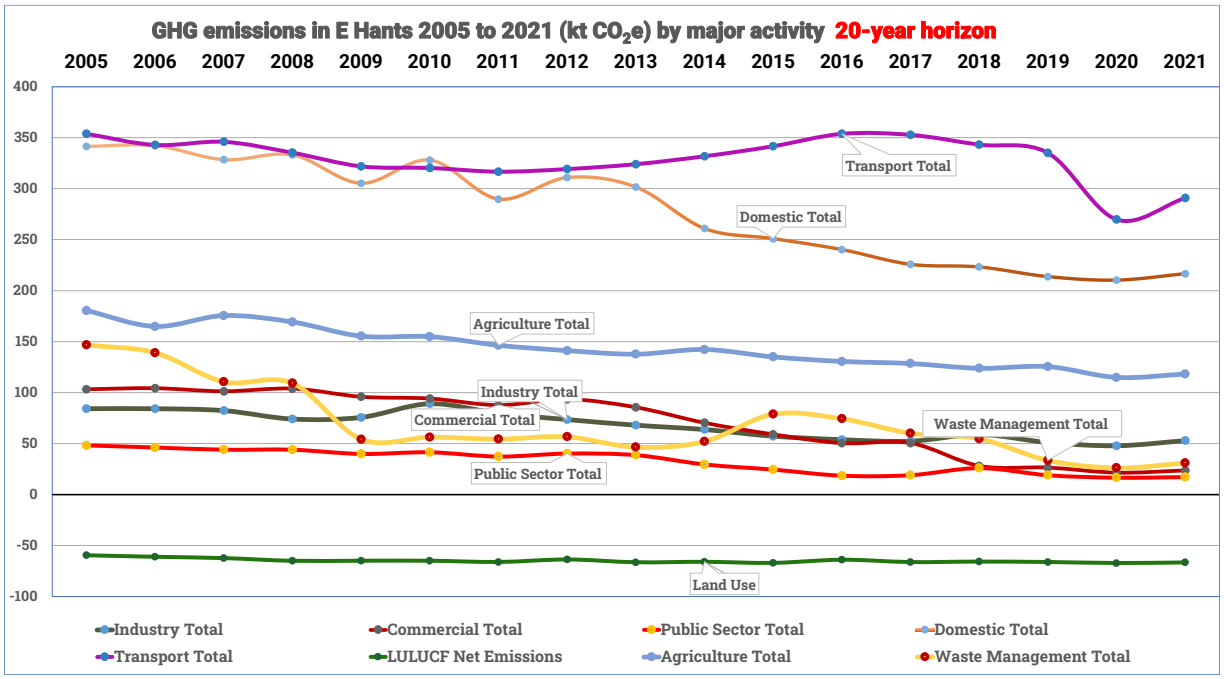


Figure 9

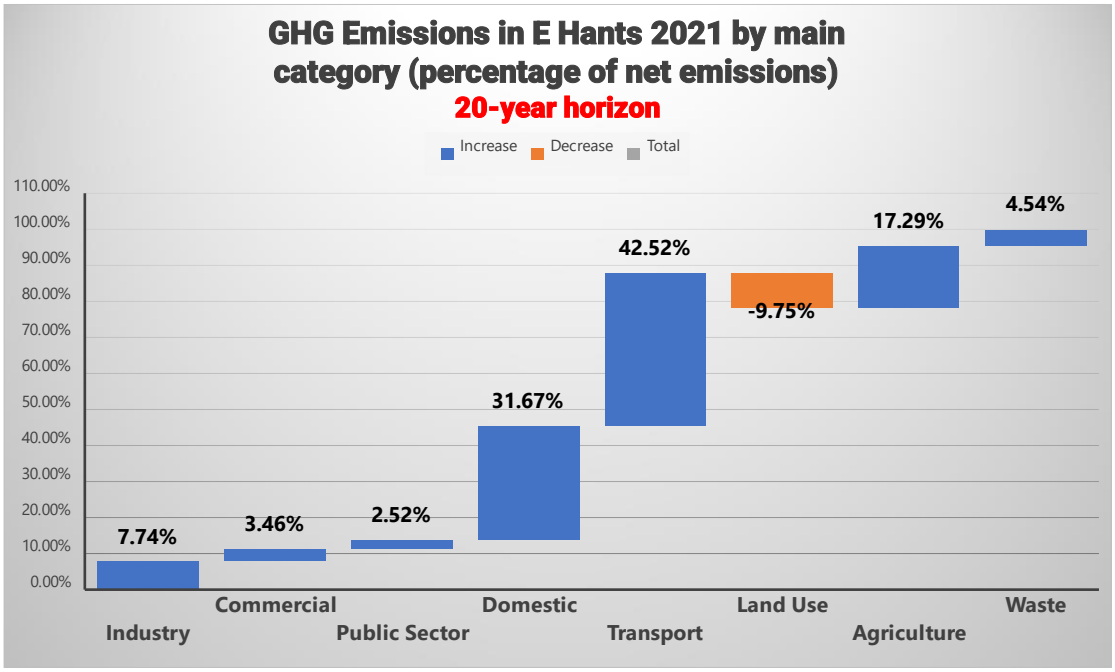


Figure 10 (Note that these percentages are net and therefore slightly larger than the gross emission percentages used elsewhere in this report)

DESNeZ provides detailed data for subdivisions of each major category. This means we can develop a strategic and targeted approach to tackle the major sources of GHG emissions. For example, here are charts for farming and land use, and transport:

Farming and land use:

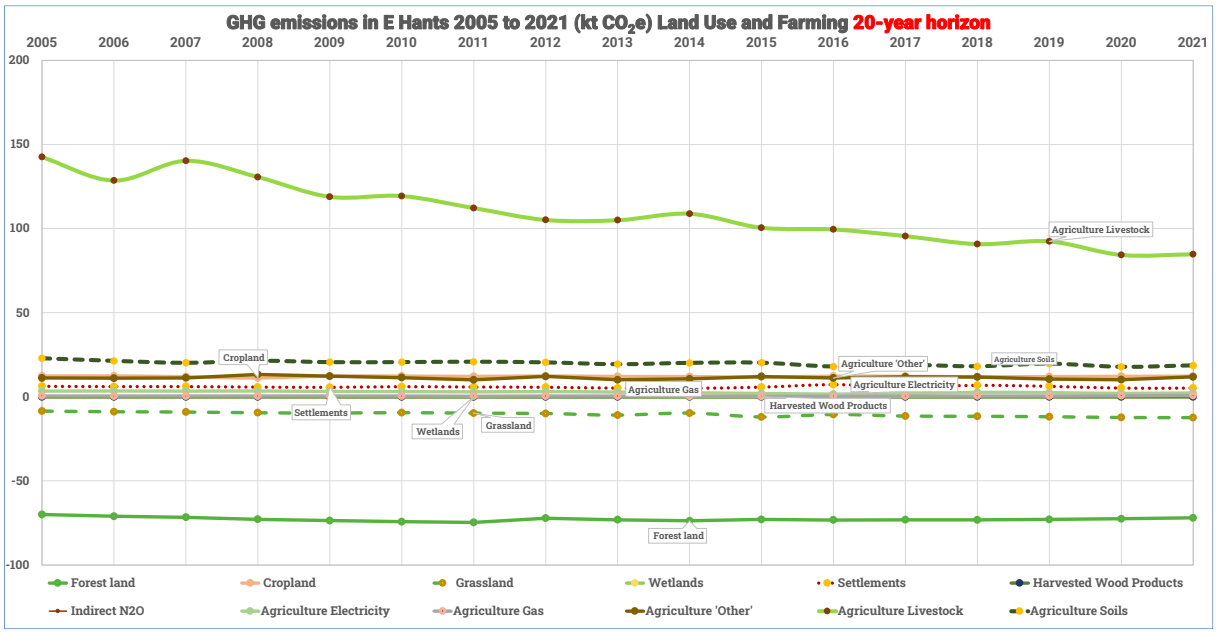


Figure 11

The key lessons from Figure 11 are that:

- livestock is by far the biggest source of emissions, 4.5 times that of the next largest source, soil used for agriculture.
- forest land has a strong beneficial effect.
- grassland has a minor beneficial effect but outweighed 6.5 times by the emissions produced by livestock, some of whom graze on it.

Transport:

Transport is the main source of greenhouse gases in East Hampshire. Transport, in particular road transport, remains key for emissions reduction. In all probability, transport emissions reported in 2022 will increase to resume the trajectory that was interrupted by Covid-19. To achieve carbon neutrality in East Hampshire by 2035, everything should be done to reduce road transport emissions.

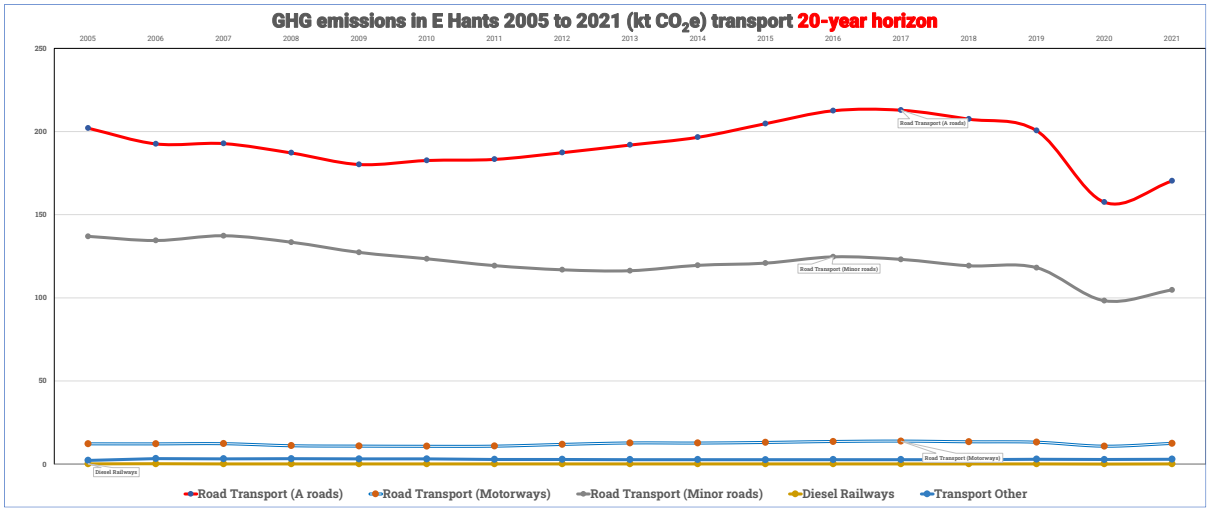

GHG emissions in E Hants 2005 to 2021 (kt CO_2e) transport 20-year horizon
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
250
200
150
100
50
0
Road Transport (A roads)
Road Transport (Minor roads)
Road Transport (Motorways)
Diesel Railways
Road Transport (A roads)
Road Transport (Motorways)
Road Transport (Minor roads)
Diesel Railways
Transport Other

Figure 12

How does East Hampshire compare with other local authority areas?

When comparing emissions in East Hampshire with other districts in Hampshire and the South East an emissions per-person figure is the best comparison and the DESNeZ 100-year horizon data is used for ease.

Within Hampshire the DESNeZ comparisons look like this:

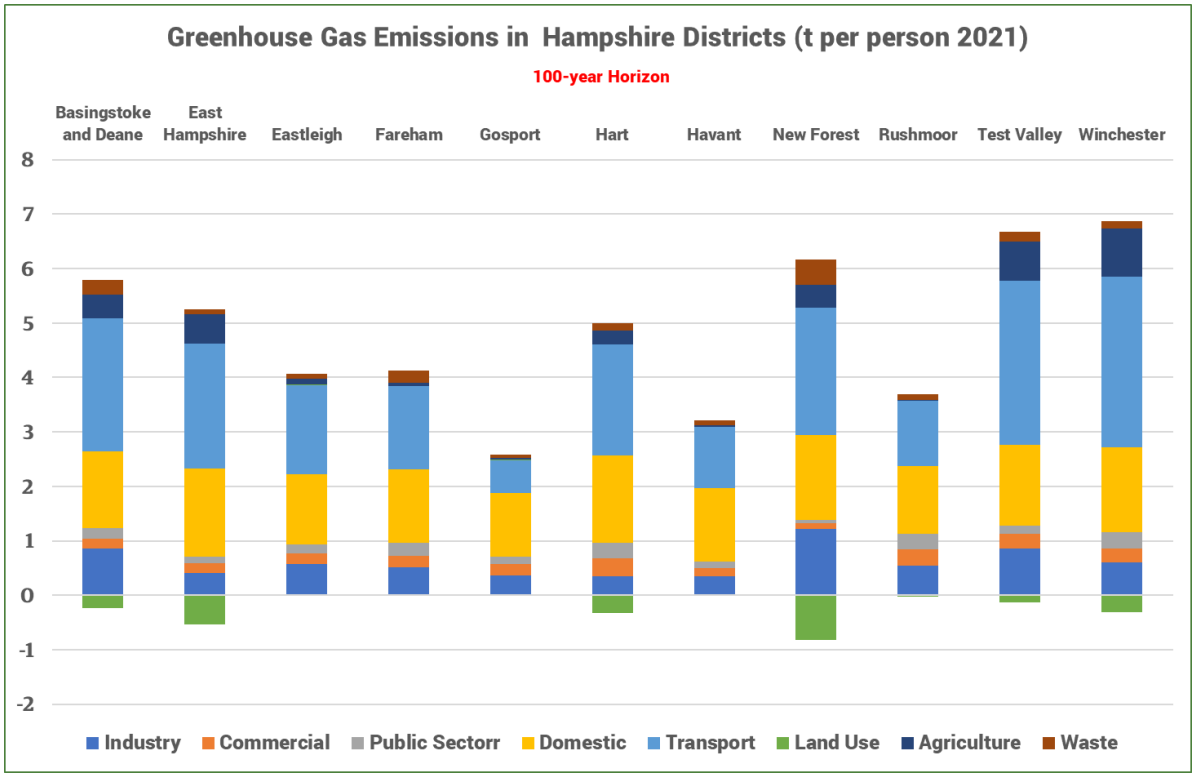


Figure 13

On a regional level, net emissions per person in East Hampshire in 2021 are broadly equivalent to the average across the South-East (excluding London). Net emissions per person across the South-East averaged 4.68 tonnes (t) CO_2e and East Hampshire had net emissions per person of 4.72t.

On a national level the East Hampshire emissions per person have been consistently lower than average emissions per person across the country, across all Green House Gases (Figure 14).

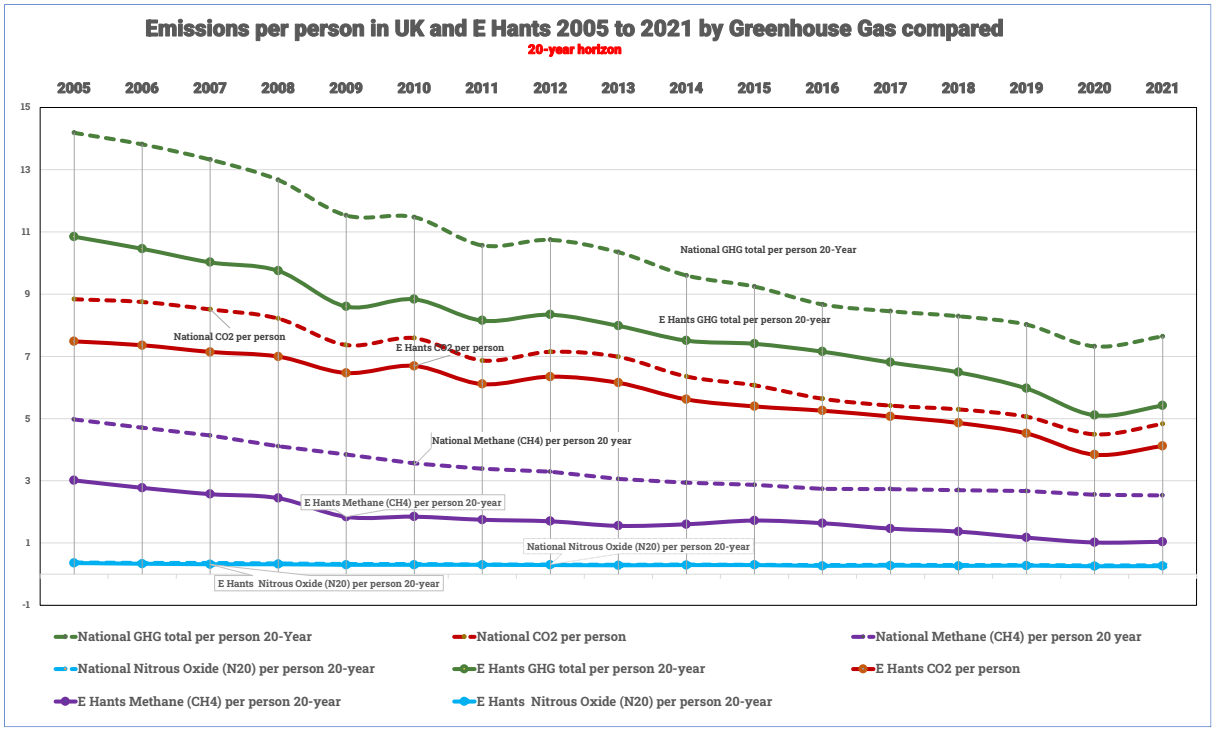


Figure 14

However, it is important to understand why East Hampshire's overall emissions are lower than the National average and this can be seen in Figure 15. We have substantially lower than average territorial emissions from industry, agriculture (mainly livestock) and waste management. We benefit from our surrounding natural environment (forests and grasslands). But we have worse than average emissions on transport and domestic energy.

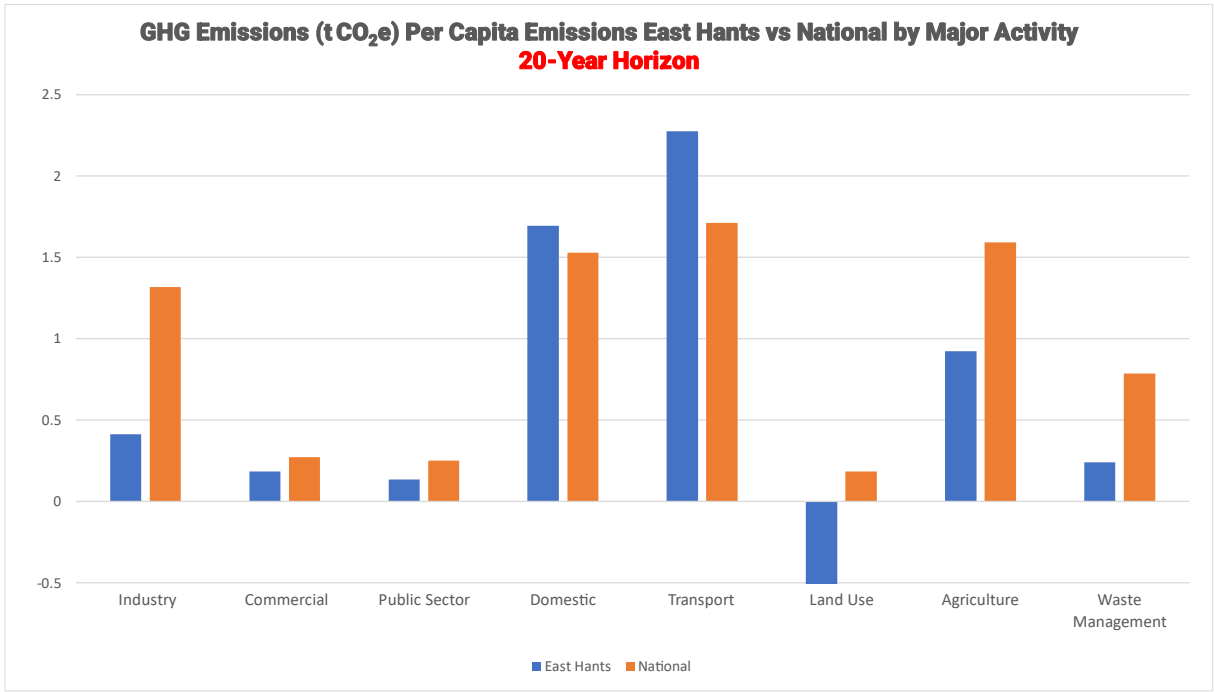


Figure 15

In particular, our transport emissions per person (dominated by road transport) are significantly higher than the national average (Figure 16).

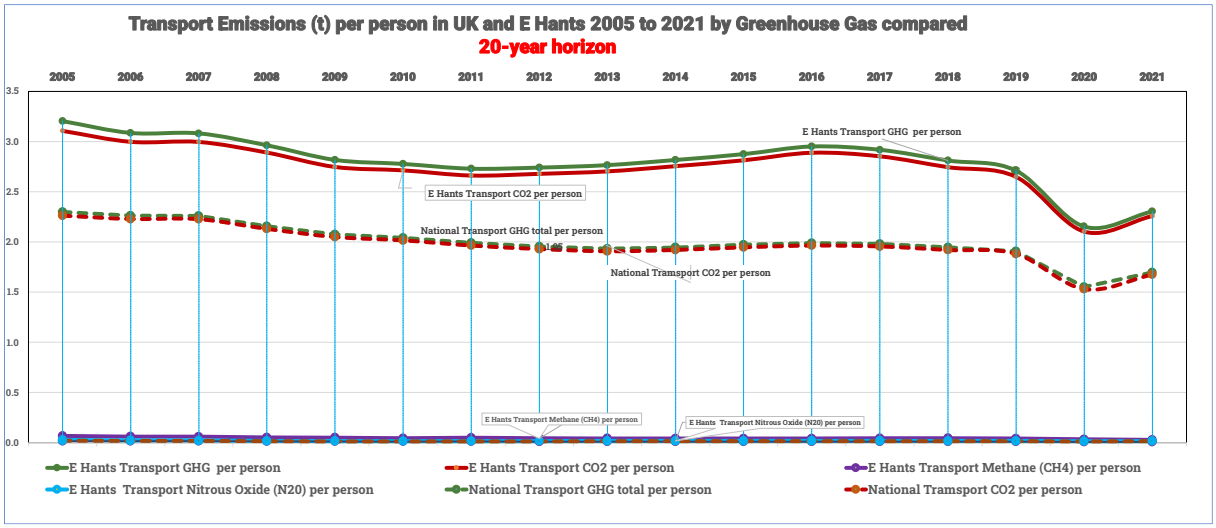


Figure 16

The COVID lockdown had a significant impact on these numbers but emissions appear to be returning to the pre-pandemic trajectory. That trajectory is driven by two things:

- Volume of Road traffic use
    - Road traffic estimates can be found at [Provisional road traffic estimates, Great Britain: October 2021 to September 2022 - GOV.UK (www.gov.uk)]
    - A detailed analysis is beyond the scope of this report, but pre-pandemic road traffic volumes grew on average at 1.4% per annum from 2016 to 2019
    - It remains to be seen whether volumes will return to this pre-pandemic trend
    - But we cannot rely on significant behaviour change to eliminate road transport emissions
- Vehicle efficiency (emissions per mile travelled)
    - Despite the fact that road traffic use grew from 2016 to 2019, emissions fell
    - This is likely to be the result of improvements in vehicle efficiency and adoption of hybrid vehicles and electric vehicles.

East Hampshire's Path to Territorial Net Zero

So where should East Hampshire focus its efforts? Transport, Domestic Energy and Agriculture emissions account for 83% of East Hampshire territorial emissions. They have to be the local focus!

1. Transport must be the top priority. Minimising vehicle use as much as possible, through the use of public transport (buses and trains) and active travel (walking and cycling) should be high on the agenda, but the only way to eliminate transport emissions is to support the transition to electric vehicles. The UK governments commitment to end the sale of new petrol and diesel cars by 2030 is critical, but locally we must ensure that the charging infrastructure is there to support this switch.
2. Domestic Energy must be a high priority. Homeowners should be encouraged to improve the energy efficiency of their homes through the combination of better insulation and the adoption of electric heating. The installation of oil and gas heating in new homes should be avoided (every gas boiler installed in a new home today will result in costly retrofit work in the future). The UK government's commitment to electric heating in all new homes as soon as possible and a commitment to end the sale of replacement oil and gas boilers by 2035 is critical.
3. Agriculture warrants attention, but livestock emissions are clearly difficult to abate, and the solution probably requires a significant shift away from meat and dairy towards plant based alternatives. We need to encourage that behaviour change.
4. We are fortunate to have the benefit of significant forestry and grassland assets which help in removing GHGs from the atmosphere. It is important that we preserve these. However, it is clear from the charts that increasing the beneficial effect of trees in East Hampshire would require tree planting on a completely different scale to anything that has been achieved so far.
5. Public Sector emissions while not huge are straightforward for HCC and EHDC to eliminate. A clear plan to achieve public sector net zero would set a superb example for local residents to follow. This is a chance for EHDC to show real leadership in East Hampshire and it is great news that they have adopted a target to be carbon neutral by 2035.

Figure 17 looks at the rate of greenhouse gas emissions reduction between 2005 and 2021 and extrapolates out to suggest possible routes to achieve net zero.

- It assumes that emissions in East Hampshire will broadly reflect the pattern of UK emissions in the provisional data for 2022 (i.e. the 'provisional national data trend' applied to East Hampshire 2019 total emissions)
- It assumes that emissions for 2024 will be a return to 'business as usual', basing an arithmetical projection on the historic trajectory 2005 to 2022, and then
- It charts pathways that will be necessary to reduce emissions in the district to zero by 2035, in line with the date adopted by the District Council's recent motion for their internal emissions. Two pathways are shown: a straight line pathway, and an example of a front-loaded pathway to guarantee a net-zero result.

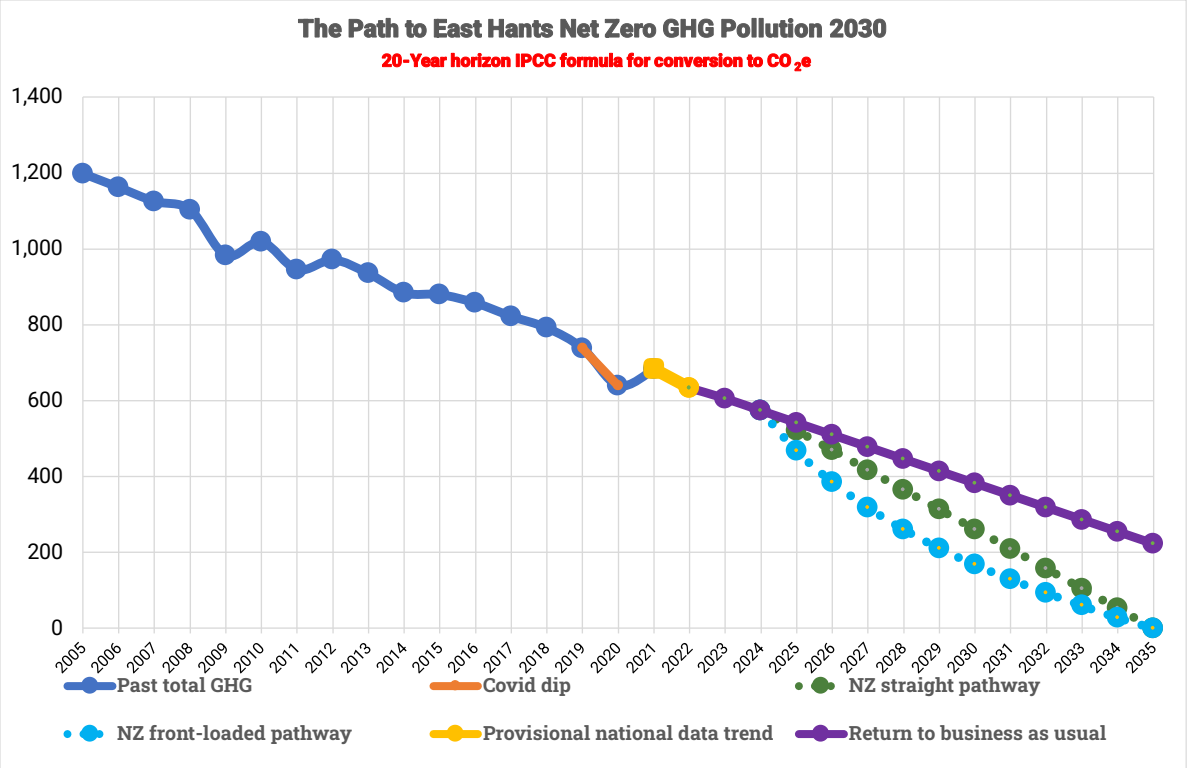


Figure 17

As this shows, a significant emissions reduction will be necessary, and it is unlikely this will be possible without considerable support from the district electorate and concerted action by local and national government.

- If reductions were to continue in line with the "business as usual" trajectory then net zero would be achieved in 2042. However it is likely that the harder to abate emissions will dominate as we approach net zero and so a straight line is unlikely (purple).
- If 2035 is assumed as a target then the straight-line pathway is a useful indication of the overall rate of reduction necessary (green).
- It would however be wiser to adopt a front-loaded pathway to leave time later for resolving the harder to abate emissions and to allow for reduction fatigue. Initially, this pathway will require a rate of reduction that is similar to that which occurred during Covid-19 (light blue).

East Hampshire District Council declared a climate emergency in July 2019 and adopted a climate and environment strategy in August 2020. This plan was assessed, along with other similar plans by local authorities, by Climate Emergency UK see Council Climate Plan Scorecards | Climate Emergency UK (councilclimatescorecards.uk) . At the end of 2021 East Hampshire were given a score for the quality of their plan of 24% out of 100 and were ranked 120th equal out of 180 district authorities.

It is great news that East Hampshire District Council has now adopted a target to be carbon neutral by 2035 and are refreshing their strategy (to be published in early 2024). Hopefully lessons will be learned from other district councils and a more comprehensive plan adopted.

East Hampshire's Path to Net Zero Consumption Emissions

The DESNeZ statistics that this document focuses on are territorial emissions (see the definitions at the beginning of this document).

While the DESNeZ statistics do not allow us to go into detail on East Hampshire's residents' consumption emissions there are tools available that can give us a broad outline.

The Impact | Community carbon calculator (impact-tool.org.uk) is a commonly used tool and although the information is increasingly out of date it highlights that significant emissions are generated from the following activities by local residents:

- The goods and services that we purchase and the leisure and social activities we engage in (approximately 34% of our consumption emissions)
- The food and drink we consume (approximately 21% of our consumption emissions)
- The flights we take (approximately 8% of our consumption emissions)

All of the manufacturers and providers of these goods and services will increasingly be focused on reducing their carbon emissions over the next 2 – 3 decades, but some of the emissions will be very hard to abate. Earlier reductions and the elimination of hard to abate emissions are possible through informed personal choice and changes of behaviour. An environmental labelling scheme that provided simple transparency for everything that we buy would help.

Further conclusions on consumption emissions are beyond the scope of this report, but it is important to recognise that they are an important contributor to the Net Zero challenge and focusing on Territorial emissions is not enough.

Energy sources in East Hampshire

The focus of this report so far has been on the emissions produced in East Hampshire and the activities that produce them. This section focuses on the energy sources that we use that are the causes of those emissions.

Most energy consumed in East Hampshire comes from fossil fuels. Data can be downloaded from: Total final energy consumption at regional and local authority level: 2005 to 2019 - GOV.UK (www.gov.uk) and supplemented with the annual electricity generation mix from Energy Trends: UK electricity - GOV.UK (www.gov.uk).

The latest energy use data available is for 2020, but we have referred to 2019 because there was an abnormal reduction of energy use in 2020 as a result of the Covid shutdown.

Emissions will reduce if we switch to using low-carbon sources of energy. In 2019 energy use in East Hampshire showed limited use of low-carbon energy (about 16%) – Figure 18. The supply of low-carbon energy will have to increase manyfold to meet everybody's current energy needs.

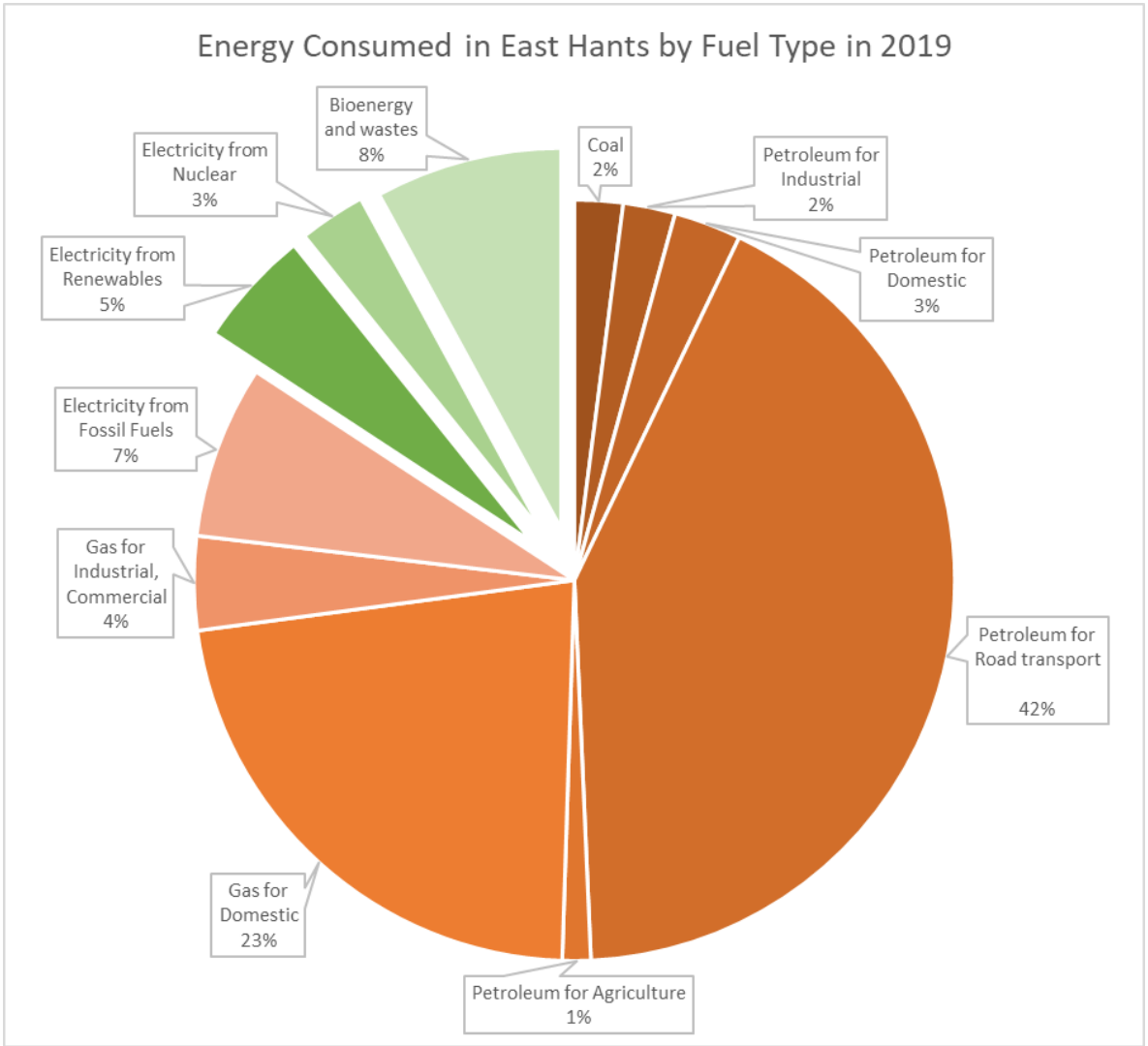


Figure 18: Data from DESNeZ energy consumption at regional and local authority level (2005 to 2020 29 September 2022) with electricity split by mix for England

There is no doubt that the UK National Government are the key drivers of change in our journey to achieve net zero emissions and it is definitely achievable if current government policy is maintained:

- all new cars are electric (by 2030)
- all electricity on our national grid is green (by 2035)
- and all domestic heating installations (new and replacement) are heat pumps (2035)

It is critical that we encourage the national government to stick with these commitments and support people through the transition.

It is clear from Figure 18 that the energy transition will involve a significant increase in the amount of (low-carbon) electricity required both locally and nationally as gas and petroleum are replaced largely by low-carbon electricity.

We need to do everything we can to support the transition to low-carbon energy. This includes local planning support for:

- Renewable energy projects at a domestic and community level and by electricity generators.
- Changes to the national grid and local electricity network, including additions in transmission lines and storage to help balance the network.
- Demand management initiatives to help grid operators and generators to balance the network and minimise the need for new sources of generation.

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