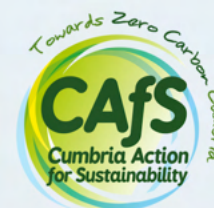


Working towards a zero carbon Cumbria by 2037

JULY 2023

# SUMMARY OF GREENHOUSE GAS EMISSIONS IN CUMBRIA AND TRAJECTORIES TOWARDS NET ZERO



# CONTENTS

Version 1.1 JULY 2023

## Foreword

1. Background and introduction .....	6
2. Methodology .....	7-10
3. Greenhouse gas emissions associated with Cumbria – key findings.....	11-21
4. Priority areas and trajectories to net zero .....	22-27
5. Renewables .....	28-29
6. Conclusions and recommendations .....	30-31

## Appendices

Appendix 1: Glossary of terms (to be added)

---

This summary has been prepared by Cumbria Action for Sustainability and Small World Consulting on behalf of the Zero Carbon Cumbria Partnership.

If you would like a large text version or have difficulties distinguishing between any of the colours in the graphs, please contact us.



# FOREWORD

JULY 2023



Cumbria well knows the devastation that can be wrought on lives and the environment by extreme weather events increasingly driven by climate change – floods and high winds have already left their mark on the region.



*Flooding in Cumbria*

The economic, environmental and social impacts caused by climate change are exacerbated in our rural county where remote communities already experience difficulty in accessing basic services.

We know what we need to do to fight climate change: as individuals, as communities, and as organisations we must reduce our emissions of greenhouse gases as quickly and as completely as possible.

There is simply no more time to waste. If we fail to keep climate heating below 1.5 degrees above pre-industrial levels, the world will experience catastrophic changes with profound effects on our lives. We are already dangerously close to missing this mark.

Thankfully, in Cumbria there is a great deal of awareness and understanding of the imperative to take action.

Community groups, businesses, the two unitary authorities and other organisations from across Cumbria have joined forces as the Zero Carbon Cumbria Partnership (ZCCP), supported by funding from the National Lottery Climate Action Fund. This partnership has adopted the ambition of reaching net zero carbon emissions by 2037.

To help with this critical task, in 2019 the partnership commissioned local consultancy Small World Consulting, led by Professor Mike Berners-Lee, to calculate Cumbria's carbon baseline.

Since then, some methodologies have been improved and new sources of data made available, which have now been incorporated into an updated carbon baseline presented here.

***There is simply no more time to waste***



The data in this summary does not claim to be, nor can it be, a 100% accurate assessment of the carbon and other greenhouse gas emissions that the people of Cumbria are contributing to the global issue of climate change.

The data is, however, an excellent indicator of the scale of the challenge and the key sources of emissions that are controlled or influenced by the behaviour and choices of people living in and visiting Cumbria.

By drawing on publicly available data and on both national and local assessments, this summary provides the best Cumbria-wide data to inform the ways and extent to which we can cut emissions from key sectors - transport, food and drink, buildings, energy use, land use - and sequester carbon through natural systems such as forests and restored peatbogs.

It uses these sources to illustrate how we might radically reduce our collective carbon emissions.

The data is an excellent indicator of the scale of the challenge and the key sources of emissions





The Zero Carbon Cumbria Partnership offers a unique opportunity to bring people together to tackle carbon emissions in Cumbria, working in innovative ways to find the right solutions.

Equipped with this information, ZCCP sector groups, each comprising around 10-12 participants with relevant sectoral skills and experience are convening to plan the pathway to net zero for Cumbria. This will not be a straightforward process because it is a complex challenge.

However, as we pick our way through the options, resources, actors, alliances and outcomes for reducing Cumbria's carbon emissions to net zero, we aim to ensure that the actions taken to reduce the county's emissions are fair for the people most affected.

This summary, and the more detailed reports accompanying it, will provide an excellent starting point for the sector groups and our partners to rise to this challenge, as well as for anyone interested in finding out more about Cumbria's carbon emissions. ZCCP offers a unique opportunity to bring together communities, the public sector and businesses to tackle carbon emissions in Cumbria, working in innovative ways to find the right solutions. Furthermore, by taking action, Cumbria will benefit from a wide range of economic and social benefits including green jobs, improved health and more resilient communities.

Karen Mitchell  
Chief Executive  
Cumbria Action for Sustainability  
and Co-Chair of ZCCP

Dr Stephen Curl  
Chair  
Strategic Oversight Board  
Zero Carbon Cumbria Partnership



# 1. BACKGROUND & INTRODUCTION

The analysis highlights the **scale of the challenge** and identifies **initial priority** areas for action.

The greenhouse gas (GHG) emissions associated with Cumbria need to be cut by as much, and as quickly, as possible whilst also building up the capacity of the natural environment to absorb carbon dioxide from the atmosphere. This summary provides an initial roadmap to help Cumbria take action on these critically important objectives.

It is based on an updated version of the report “A Carbon Baseline for Cumbria” by Small World Consulting (SWC), which was first published in 2020. We note that both versions of the SWC report use 2019 data, with the updated assessment using improved methodologies and introducing additional data.

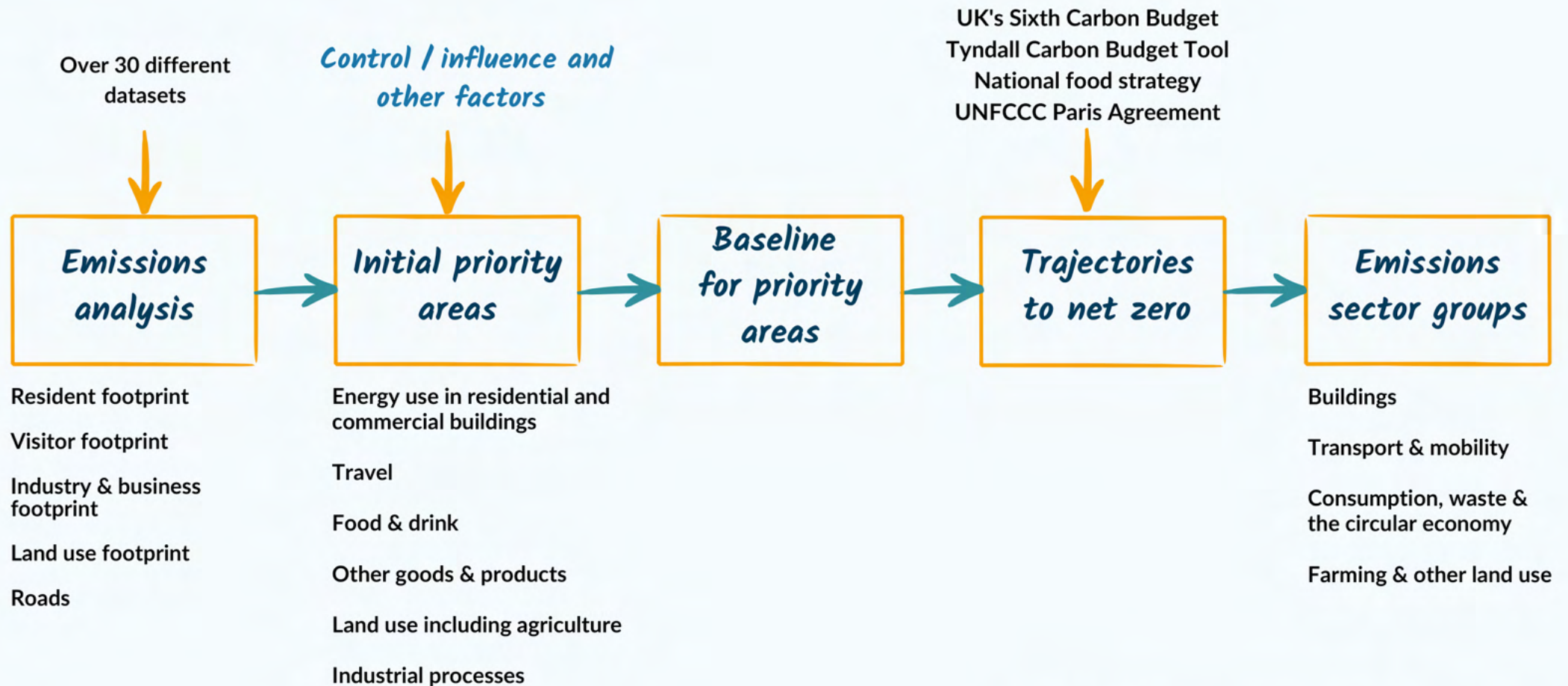
The analysis highlights the scale of the challenge and identifies initial priority areas for action. It also provides the baseline against which we will measure progress.



## 2. METHODOLOGY



Our approach to help plan the decarbonisation of Cumbria is illustrated in the following diagram and is described in the subsections below.



Note: GHG emissions associated with particular categories are sometimes referred to as carbon footprints, or GHG footprints.





*Installing insulation*

## 2.1 Emissions analysis

The GHG footprints of the county's residents, visitors, industries including businesses, and major roads have been calculated on a consumption basis, to take account of both the emissions produced in Cumbria and those associated with the upstream supply chains of the goods and services consumed in Cumbria. The land use footprints have been calculated on a territorial (aka production) basis.

The footprints take account of the six main greenhouse gases identified in the Kyoto Protocol, including carbon dioxide, methane and nitrous oxide.

## 2.2 Initial priority areas

From these emission figures, a number of **priority areas** for **action** have been identified, including the energy used in residential and non-residential buildings (heat and electrical power), travel, food and drink, other products bought by residents and visitors, land use, and industrial processes.

The initial priority areas cover everything of **significance** which is within the direct control or the indirect influence of **local policy-makers, businesses, organisations** and **individuals**. As examples, residents and businesses make choices regarding heating, travel, food, etc.

Businesses also make decisions on procurement, organisational policies and planning. These priority areas therefore reflect the links between individual lifestyles and business practices and the resulting GHG emissions.

When combined, initial priority emissions equate to a total of around **11.1 million tonnes of CO2 equivalent**

### 2.3 Baseline for priority areas

When combined, these initial priority emissions add-up to a total of around 11.1 million tonnes of CO2 equivalent over which we have control and influence.

These emissions are the focus of our efforts to decarbonise in line with our ambition of a zero carbon Cumbria by 2037 and are the baseline against which we will measure progress.

### 2.4 Trajectories

SWC has drawn on sources such as the UK's Sixth Carbon Budget, the recommended National Food Strategy and the Tyndall energy decarbonisation pathways to identify potential decarbonisation trajectories to net zero, and has recommended some key emission reduction actions.

These trajectories and the recommended actions will help inform the work of the ZCCP sector groups, which will lead to the implementation of, and further refinements of these trajectories over time.



#### They will also help inform:

- The climate-related strategies and plans for the two new unitary authorities, Cumberland Council and Westmorland and Furness Council.
- The ZCCP carbon monitoring framework, which will be used to track progress.



# 3. GREENHOUSE GAS EMISSIONS ASSOCIATED WITH CUMBRIA:

## KEY FINDINGS

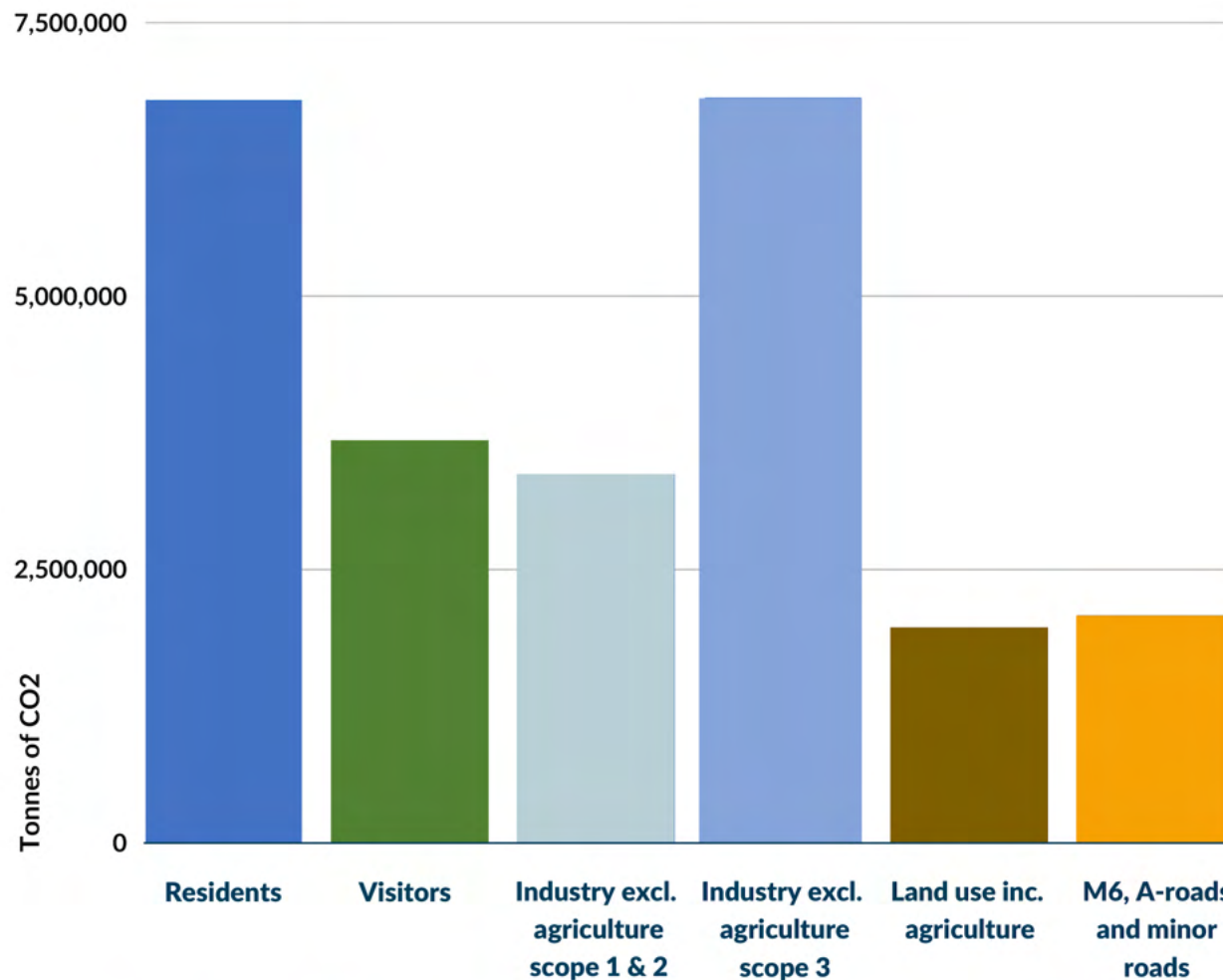
## GREENHOUSE GAS EMISSIONS ASSOCIATED WITH CUMBRIA

### Greenhouse gas emissions associated with Cumbria: key findings

The first graph shows the GHG emissions associated with Cumbria. (All figures are tonnes of CO2 equivalent).

Notes on the calculations:

- The emissions linked to residents, visitors and industry have been calculated on a consumption basis to take account of the emissions produced in Cumbria (scope 1 and 2) and those associated with the upstream supply chains (upstream scope 3). For more information on scopes please see p17.
- The emissions from land use including agriculture have been calculated on a territorial basis (aka production basis, or scope 1 and 2), with inclusion of emissions from the energy supply chains.
- The emissions associated with roads have been calculated on a consumption basis, and include the exhaust pipe emissions of vehicles travelling along these roads (including through traffic) and the associated fuel supply chains.



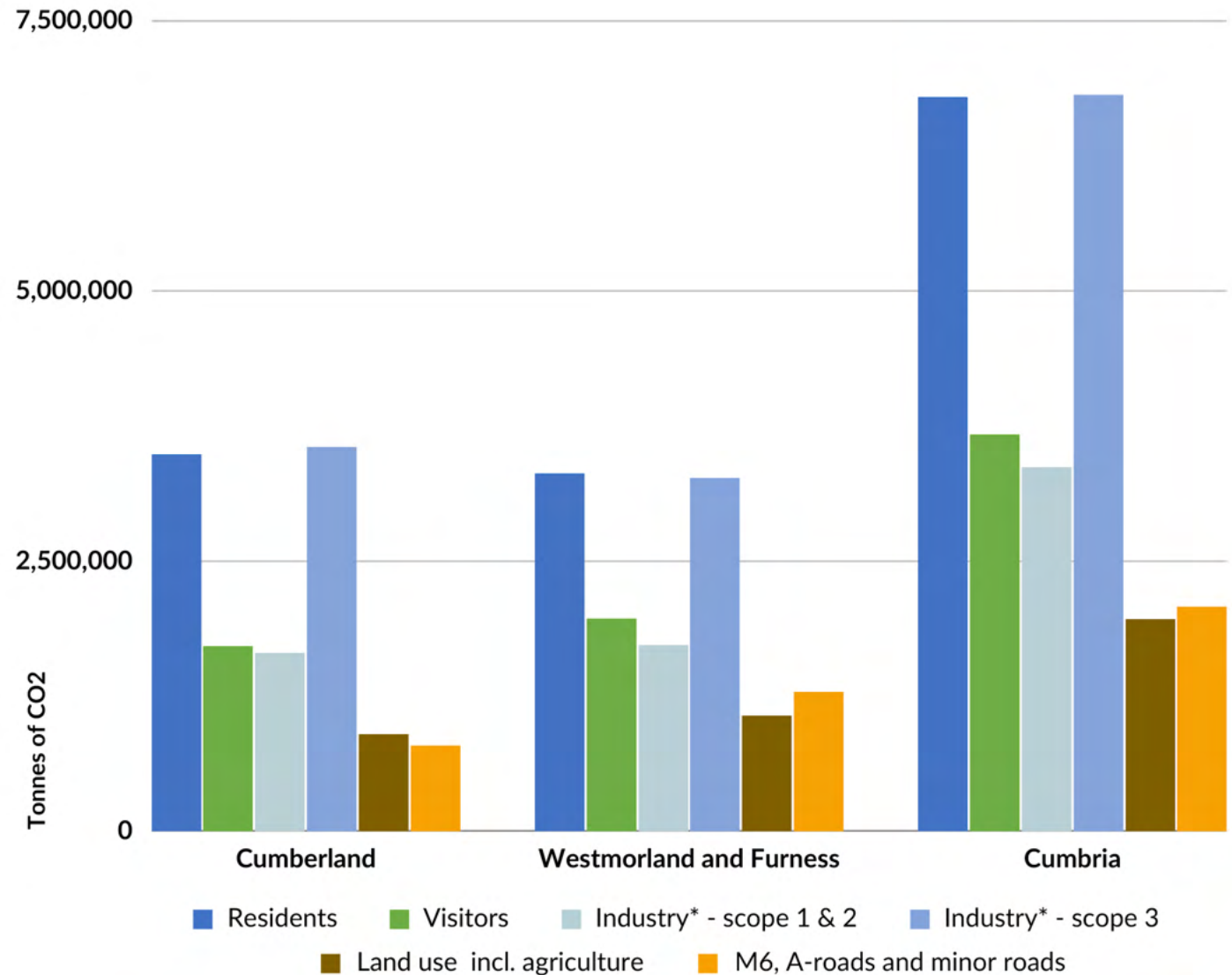
### Sources of Greenhouse Gas Emissions in Cumbria (2019)

It is also worth noting that some emissions occur in more than one category. As an example, if a resident bought a product which had been made in Cumbria, the emissions associated with the manufacture of the product would be included in both the residents' and industry footprints. Residents' travel whilst visiting other parts of Cumbria might also be included in the visitor footprint.

## GREENHOUSE GAS EMISSIONS ASSOCIATED WITH CUMBRIA

The next graph shows the GHG emissions associated with each of the two new unitary authority areas, as well as Cumbria as a whole.

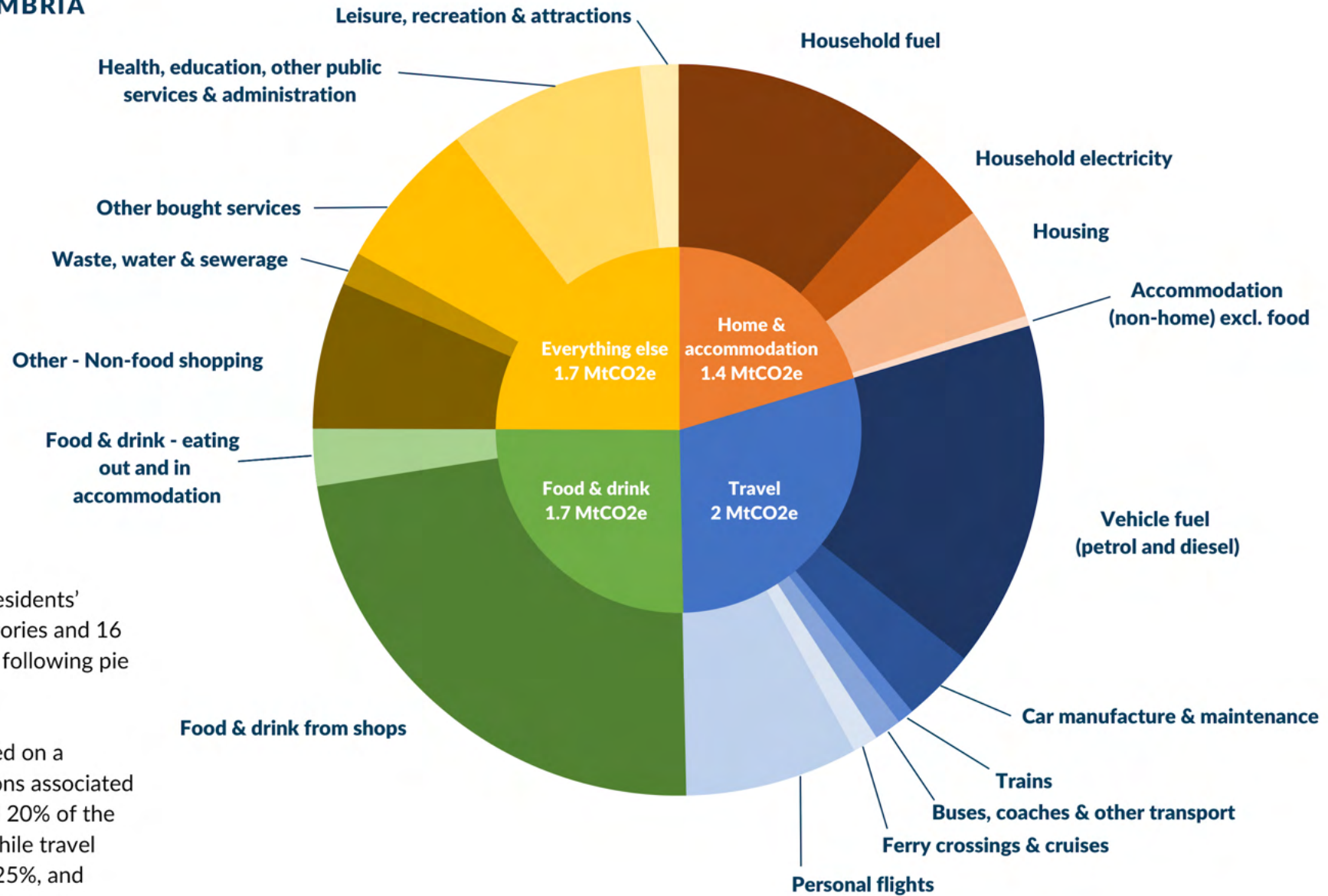
As can be seen, the emissions are similar for Cumberland and Westmorland and Furness (W&F), the main differences being a slightly higher visitor footprint in W&F and a higher footprint associated with the major roads in W&F. The latter is mainly because the section of the M6 that passes through W&F is longer than the one in Cumberland.



### Sources of Greenhouse Gas Emissions in Cumbria (2019)

Note: Industry\*: Industry, excluding agriculture

## GREENHOUSE GAS EMISSIONS ASSOCIATED WITH CUMBRIA



### 3.1 Residents

A detailed breakdown of the residents' footprint into four broad categories and 16 sub-categories is shown in the following pie chart.

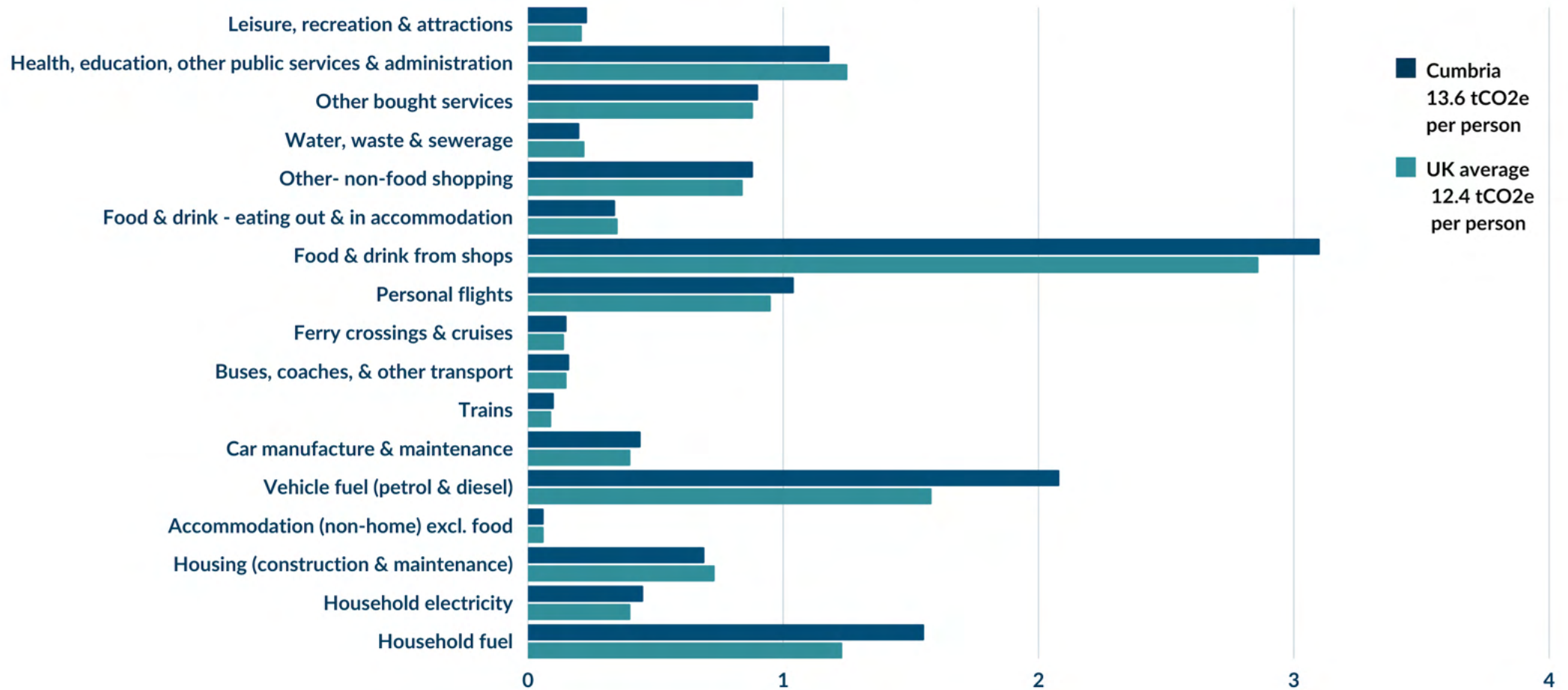
As can be seen, when calculated on a consumption basis, the emissions associated with housing represent around 20% of the average resident's footprint, while travel represents 30%, food & drink 25%, and everything else 25%.

*Cumbria residents' carbon footprint (2019) Total: 6.8 MtCO<sub>2e</sub>*

## GREENHOUSE GAS EMISSIONS ASSOCIATED WITH CUMBRIA

This graph shows the estimated per-capita footprint in 2019 for the "average" Cumbrian resident, compared to the UK average.

As can be seen, the estimates suggest that Cumbrian residents produced higher emissions from vehicle fuel use than the UK average, reflecting the rural nature of the area, and- also from household fuel use, reflecting the larger proportion of properties which are off-gas and/or harder to heat.



*Comparison of Cumbria's per capita resident footprint with UK average (2019)*

## GREENHOUSE GAS EMISSIONS ASSOCIATED WITH CUMBRIA

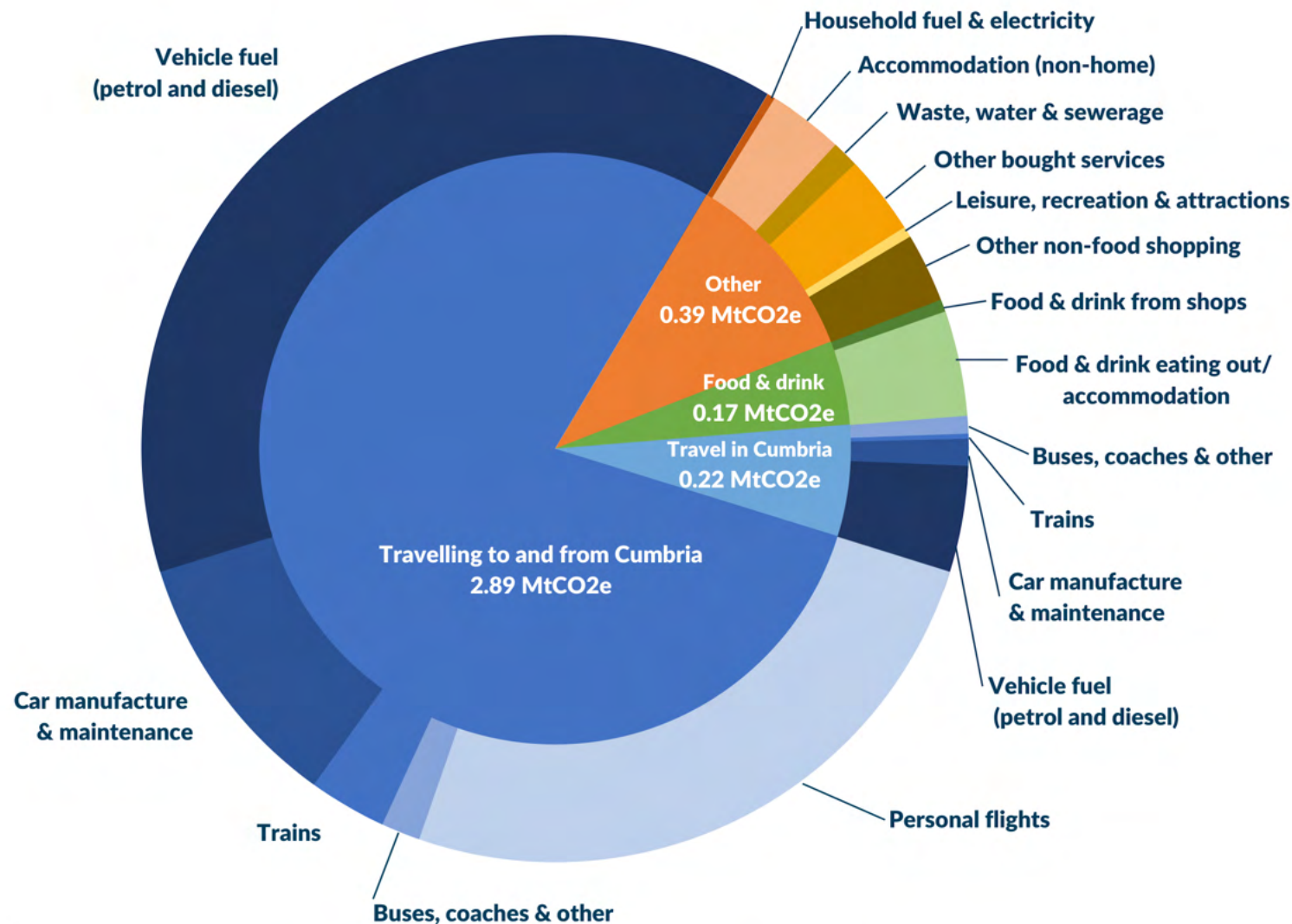
### 3.2 Visitors

This pie chart represents the breakdown of the visitors' footprint.

It clearly shows the significance of the emissions associated with visitor travel\*.

Whilst individuals and organisations in Cumbria do not control most of these emissions, they do have potential to influence them, for example through the provision and promotion of active travel and public transport options, and by establishing the infrastructure for electric vehicles.

It also shows the impact associated with the food consumed by visitors to Cumbria.



**Breakdown of visitors to Cumbria  
carbon footprint (2019) Total: 3.7 MtCO2e**

\*The estimate for the footprint due to visitor flights is based on empirical assumption that the overseas visitors spend 10% of their entire trip duration to the UK in Cumbria (e.g. coming to the Lake District from London for a weekend as part of a two-week trip to the UK), which serves as the Cumbria-apportioned fraction of the total footprint associated with the flights.





### *3.3 Industry and business*

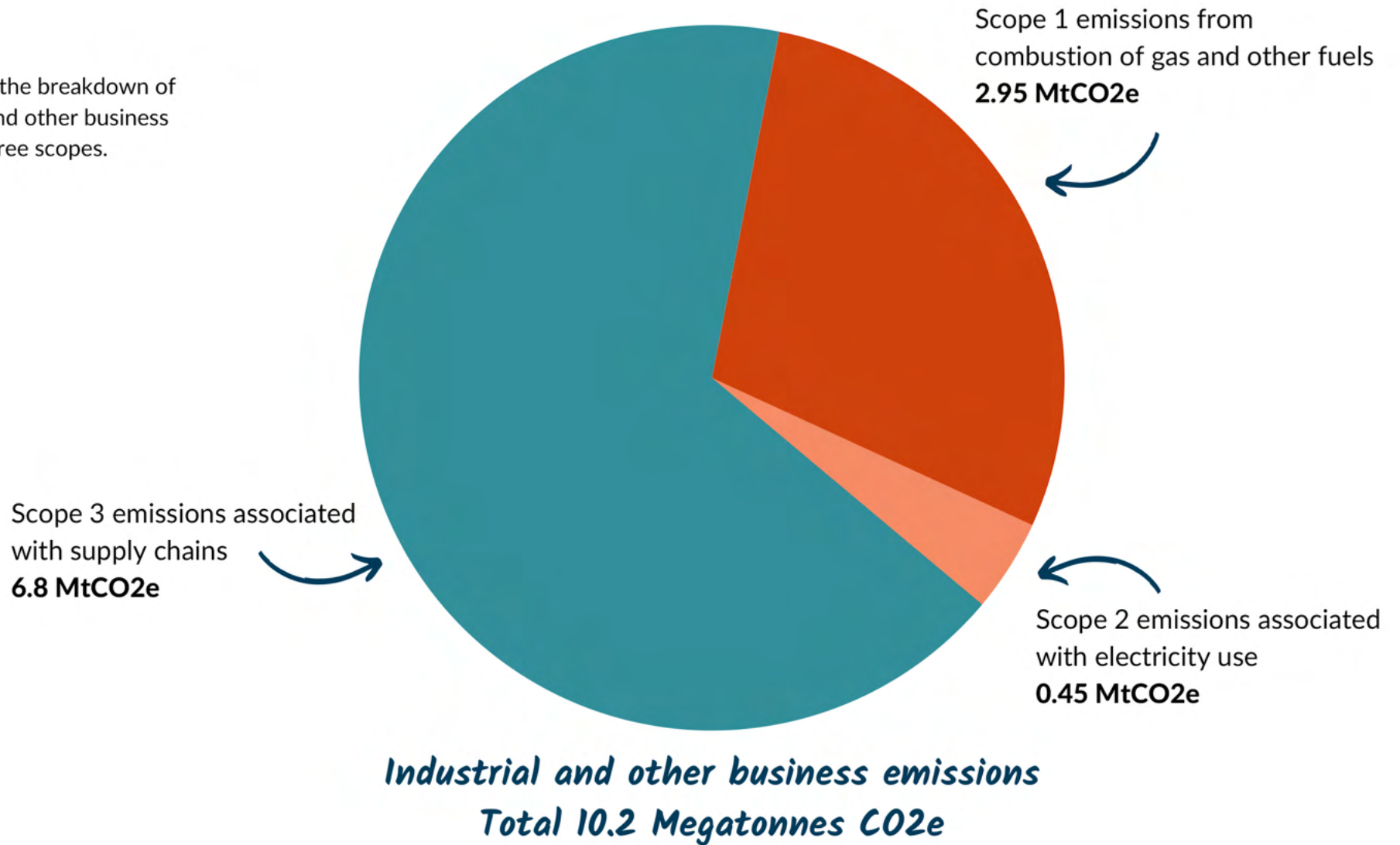
The emissions associated with industry and other businesses, are split into different scopes and different industry and business sectors.

*The three scopes  
are defined  
in this table*

<i>SCOPES</i>	<i>DESCRIPTION</i>
Scope 1	Emissions from the combustion of gas and other fuels and from chemical processes (where applicable)
Scope 2	Emissions from the use of electricity
Scope 3	Emissions associated with the upstream supply chains of businesses in Cumbria, including the supply chains for fuels and electricity generation

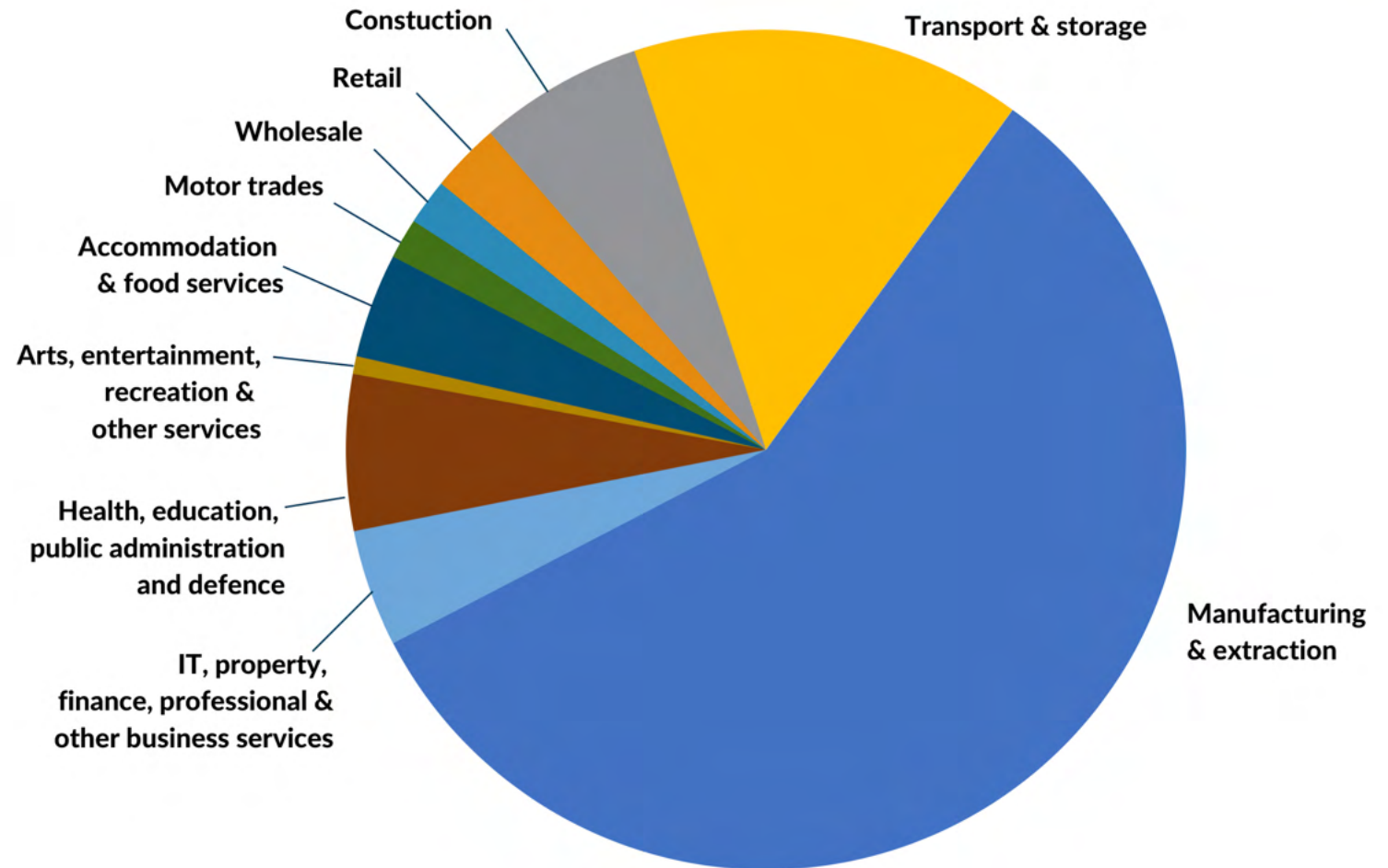


This pie chart shows the breakdown of Cumbria's industry and other business emissions into the three scopes.





This pie chart shows the breakdown of these emissions into various industry and other business sectors.



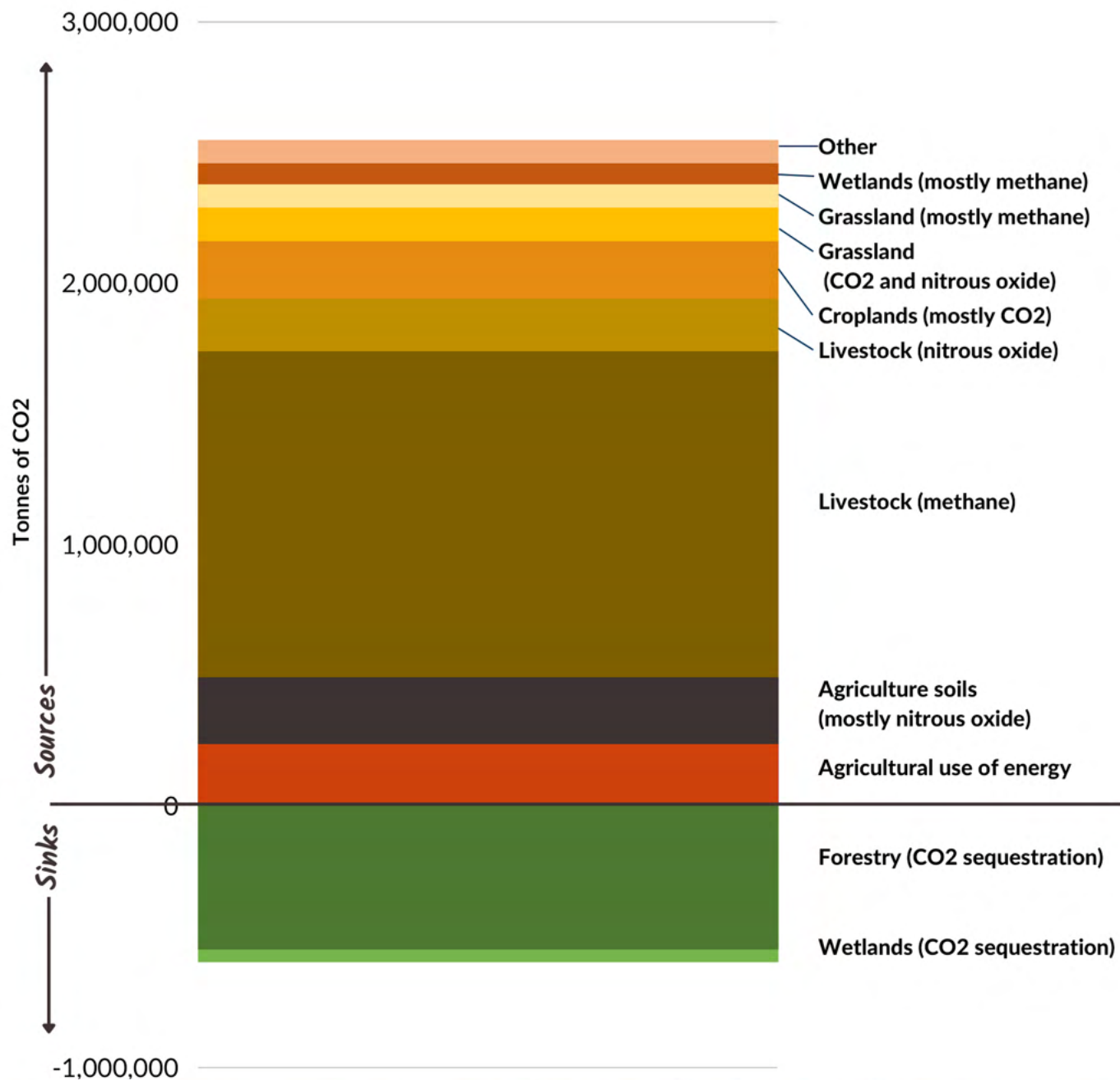
*Cumbria's emissions from industry and other businesses, excluding agriculture (2019) Total: 10.2 MtCO<sub>2</sub>e*

## GREENHOUSE GAS EMISSIONS ASSOCIATED WITH CUMBRIA

### 3.4 Land use

As some land use activities result in both negative emissions (i.e. carbon sinks such as those in woodland) and sources of emissions (CO<sub>2</sub>, methane and nitrous oxide from degrading peat, livestock, fertilisers, etc), it is not possible to show the breakdown of the land use footprints as pie-charts.

They can, however, be shown in bar chart format as in the graph opposite:



*Breakdown of emissions from agriculture and other land use in Cumbria*

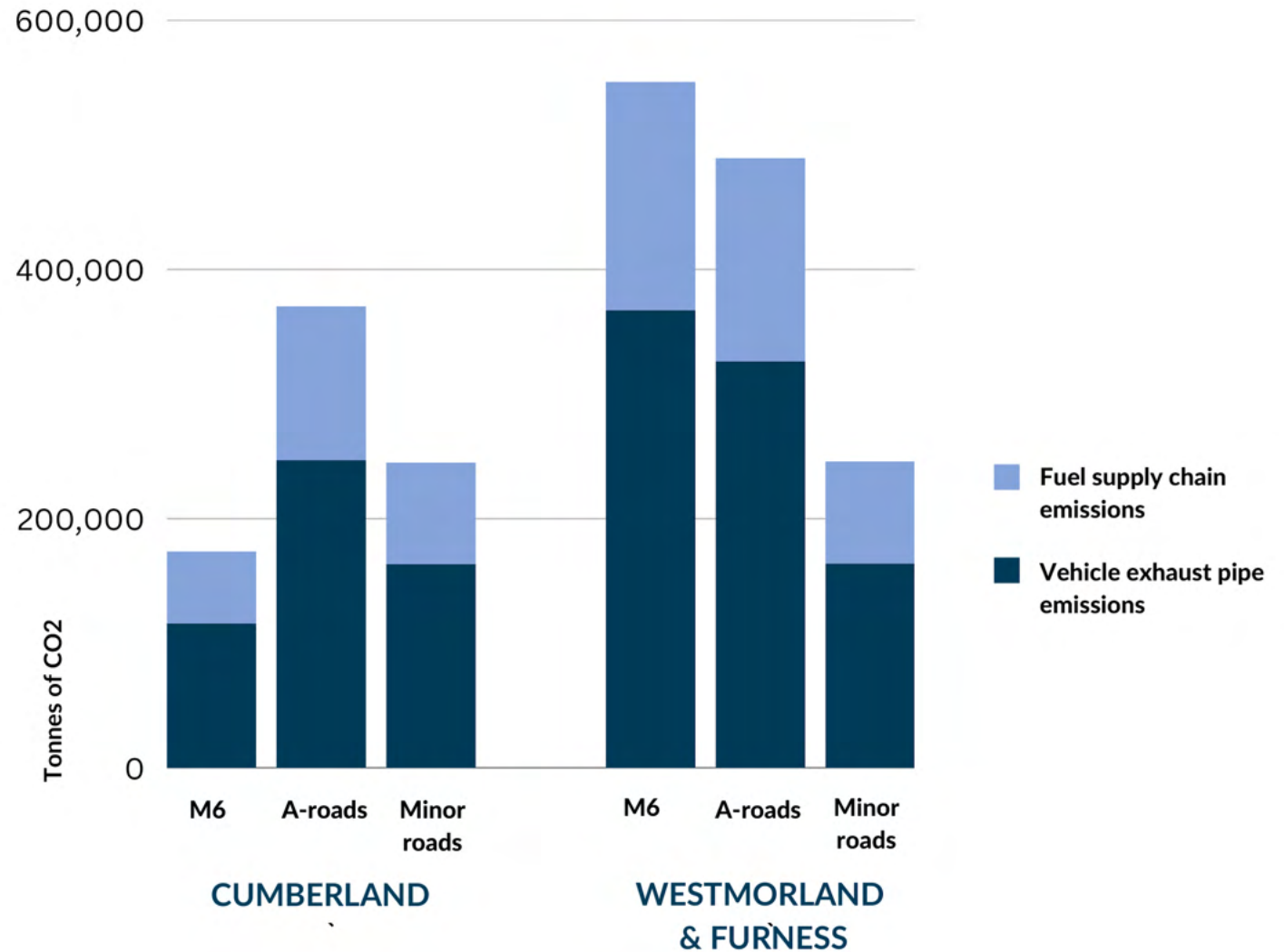
## GREENHOUSE GAS EMISSIONS ASSOCIATED WITH CUMBRIA

### 3.5 Roads

Significant consumption-based GHG emissions are also associated with the various roads in Cumbria as exhaust pipe emissions are produced when vehicles travel along these roads. There are also upstream emissions associated with production and supply of the vehicle fuels.

We note that there are additional emissions associated with construction and maintenance of roads, which have been captured as part of the industry footprint.

The consumption-based emissions relating to the use of roads are summarised in this graph.



*Emissions associated with roads in Cumbria*



# 4. PRIORITY AREAS AND TRAJECTORIES TO NET ZERO



Having analysed the emissions described, we have identified a number of initial priority areas for action where:

- Individuals or organisations in Cumbria either **control** the emissions or have a reasonable **level of influence** on them;
- The emissions are within the **influence** of local **policy makers**;
- There is reasonable **availability of data** to enable effective monitoring of progress.



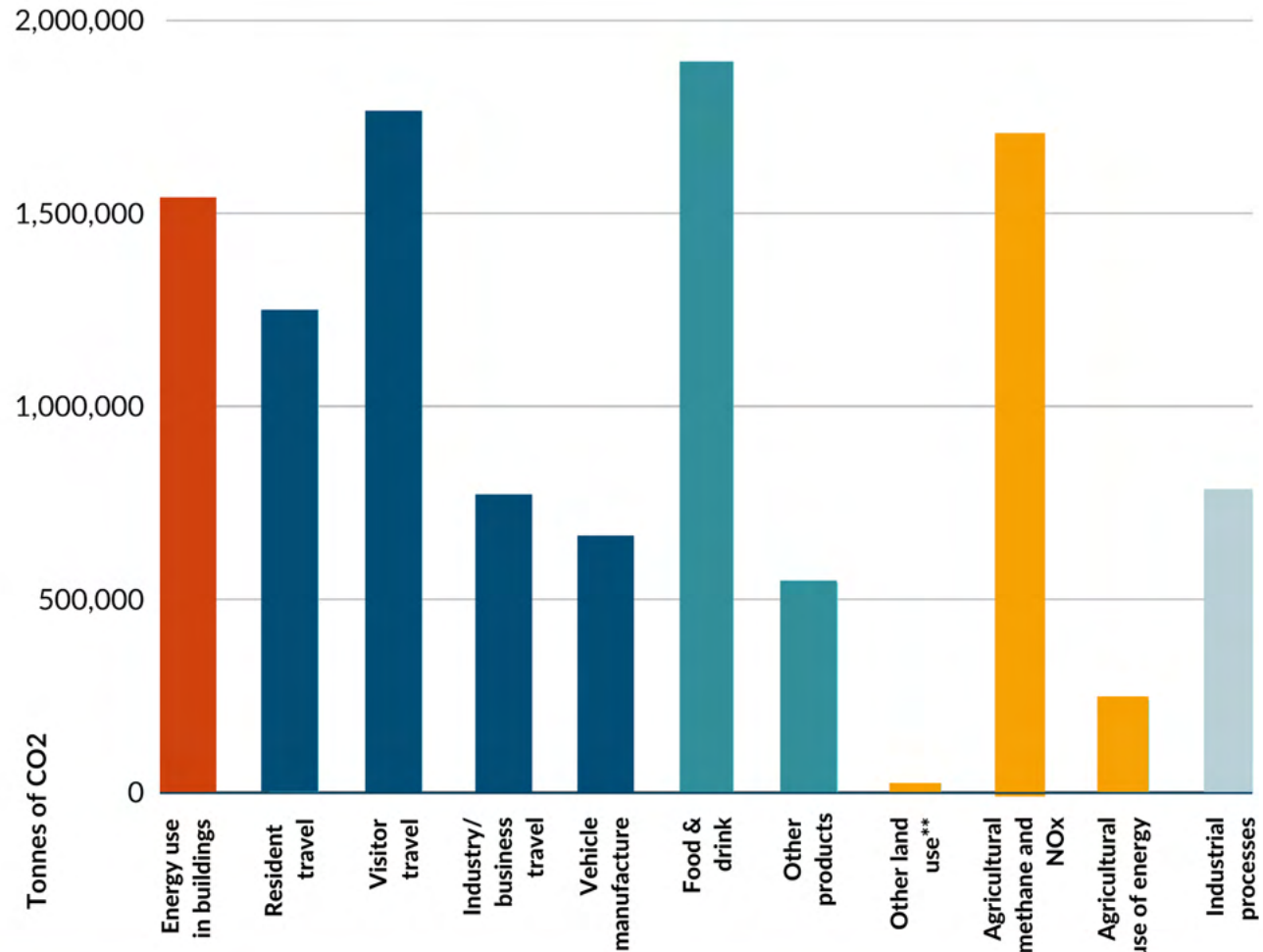
## PRIORITY AREAS AND TRAJECTORIES TO NET ZERO

### 4.1 Priority areas

This graph\* shows each of these initial priority areas and the ZCCP emission sector group that will address them.

\*The emissions associated with transport, car manufacture, food and drink and other products have been calculated on a consumption basis. The emissions from energy use in buildings, industrial processes and agriculture have been calculated on a territorial (production basis), with inclusion of emissions from energy supply chains. The non-energy emissions from agriculture and other land use have been calculated on a territorial basis.

\*\*Other land use: Land use excluding agricultural methane, NOx and agricultural use of energy.



ZCCP sector groups



Initial priority areas for emission reduction in Cumbria



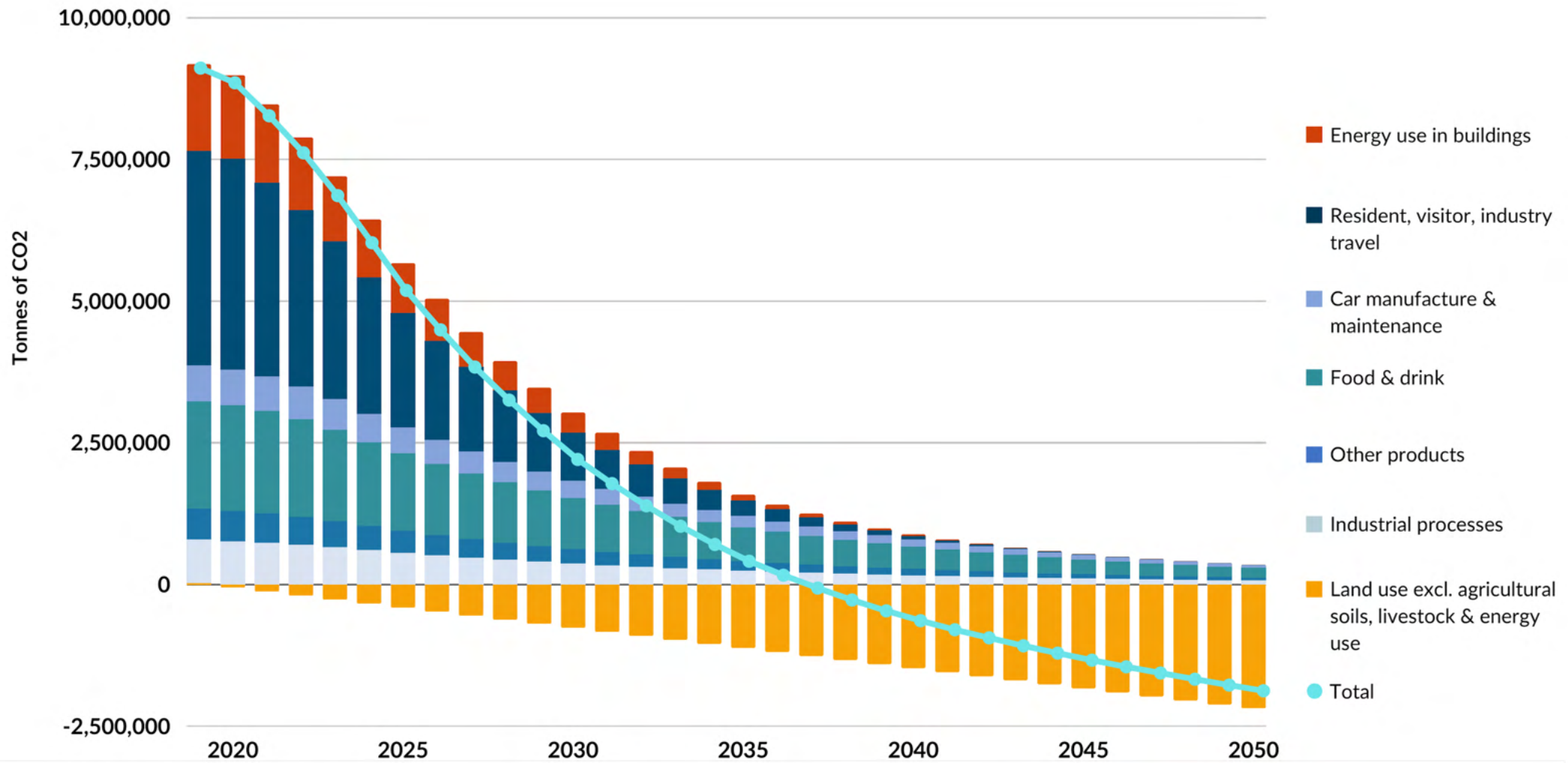
## *4.2 Trajectories to net zero*

In order to deliver Cumbria's share of the global efforts required to limit warming to the 1.5°C target from the Paris Agreement, we will need to achieve an overall trajectory to net zero emissions by 2037 in the following key areas: energy use in buildings; resident, visitor and industry travel; food and drink; other products, industrial processes; land use (excluding agriculture). These priority areas have a 2019 baseline of **9.2 MtCO<sub>2</sub>e**.

Neither agricultural emissions of methane and nitrous oxide emissions in Cumbria, nor the emissions from agricultural energy use are included in this baseline and the associated trajectory below to be consistent with the methodology used for the precursor 2020 report, "A Carbon Baseline for Cumbria", and to allow the best achievable decarbonisation pathway for these emissions in Cumbria to be established with the help of local farmers and land managers.

SWC recommends the following trajectory, starting from the 9.2 MtCO<sub>2</sub>e 2019 baseline and informed by the sources highlighted in section 2.4 (Trajectories).





*Trajectories to net zero by 2037 - Cumbria*

## PRIORITY AREAS AND TRAJECTORIES TO NET ZERO

This table shows the recommended percentage reductions [1] in annual emissions by 2030, 2037 and 2050 compared to the 2019 baseline, for the priority areas covered by three sector groups: buildings; transport and mobility; consumption, waste and the circular economy. It also shows the absolute change for annual land-based non-agricultural emissions [2] which is covered by the "farming and other land use" sector group.

These trajectories and the associated actions will be reviewed and refined as the planning and implementation of decarbonisation action progresses. The initial priority areas will also be reviewed over time. These initial trajectories, however, certainly make the magnitude of the challenge ahead very clear, particularly the importance of reducing emissions alongside building up sequestration capacity.

It should also be noted that although emissions decreased during COVID-19, they are likely to have re-bounded in 2022, particularly given the increase in UK-based visitors to the Lake District. The reductions associated with these trajectories by 2022 are therefore not likely to have been achieved, which will mean even more ambitious reductions will be required between now and 2030 / 2037 to ensure that the 1.5°C compatible decarbonisation goals are achieved.

PRIORITY AREA	2030	2037	2050
<b>Buildings</b>	-76%	-96%	-99.8%
<b>Travel including car manufacture and maintenance</b>	-74%	-93%	-99%
<b>Food and drink consumed by residents and visitors</b>	-53%	-74%	-91%
<b>Other products purchased by residents and visitors</b>	-53%	-74%	-91%
<b>Land use (excluding agricultural soils, livestock and energy use)</b>	On average 70,635 tCO <sub>2</sub> e per year added to land-based carbon removals and mitigated through restoring peat each year		

[1] Negative percentage = a reduction in emissions.

[2] Positive figure = increased land-based sequestration capacity/reduced land-based emissions



# 5. RENEWABLE ENERGY



*Installing solar panels*

Large-scale, community-scale and domestic renewables all have the potential to reduce emissions in so far as they displace the energy that would otherwise be generated using fossil fuels [1] even they do not remove carbon dioxide from the atmosphere.

Further development and uptake of **electricity generating renewables** in Cumbria (such as wind energy and solar PV) could also make a significant contribution to decarbonisation goals as follows:

- Where the electricity generated is used directly, it would help reduce the resident's or business's carbon footprint and therefore directly contribute to our net zero target.
- Where the electricity generated is fed into the national grid, it would help to decarbonise the grid and therefore indirectly contribute towards our net zero target by reducing the carbon intensity of the electricity consumed from the grid.

[1] Assuming no carbon capture.



# 5. CONCLUSION AND RECOMMENDATIONS



This analysis has shown both the scale and breakdown of emissions caused by decisions and actions which are taken by Cumbrian residents, visitors and businesses and organisations, reflecting their lifestyles and business practices.

It focuses on a number of priority areas which highlight both the extent of **emission reductions required** and the increases in **sequestration capacity needed** to meet Cumbria's obligations to limit global temperature rise to 1.5°C in line with the Paris Agreement.

The analysis also shows that there are many similarities between the carbon footprints associated with the two new unitary authorities, Cumberland Council and Westmorland and Furness Council, and that the priority areas for reducing greenhouse gas emissions and optimising carbon sequestration are essentially the same for both.

**It is therefore recommended that a collaborative approach is taken across Cumbria,** and that the ZCCP sector groups develop Cumbria-wide decarbonisation action plans focusing on agreed Priority Emission Reduction Actions (PERAs) for each sector.

Combining the various sector group plans will form the basis of a robust and ambitious decarbonisation plan for Cumbria.

Our goal is to produce this plan by March 2024, and the sector groups will have a key role to play in this process. In parallel, action to reduce emissions from every household and organisation, including businesses and public sector organisations, needs to accelerate rapidly from now onwards.

Combining the various sector group plans will form the basis of a **robust and ambitious** decarbonisation plan for Cumbria.