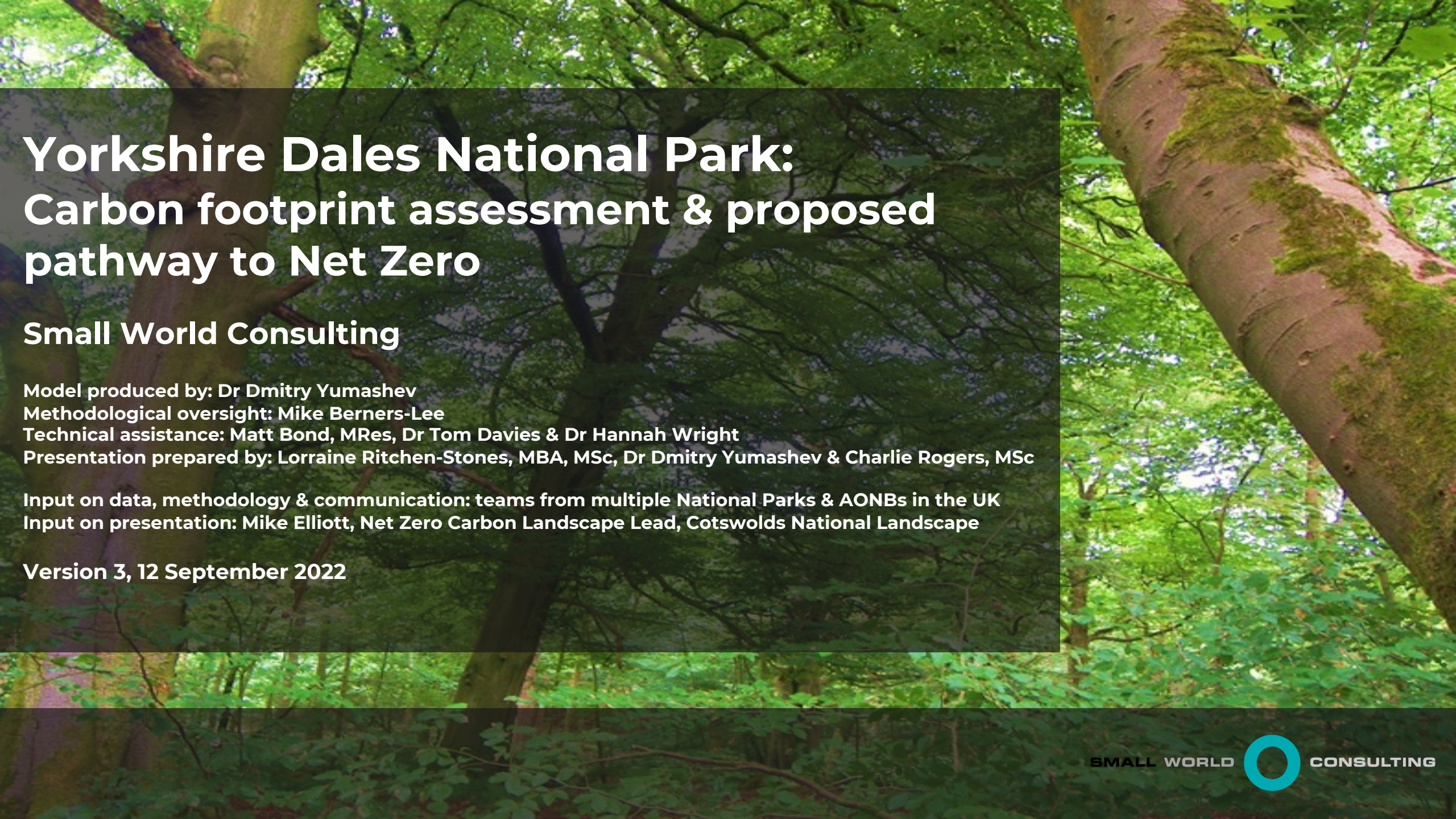

Yorkshire Dales National Park: Carbon footprint assessment & proposed pathway to Net Zero

Small World Consulting

Model produced by: Dr Dmitry Yumashev
Methodological oversight: Mike Berners-Lee
Technical assistance: Matt Bond, MRes, Dr Tom Davies & Dr Hannah Wright
Presentation prepared by: Lorraine Ritchen-Stones, MBA, MSc, Dr Dmitry Yumashev & Charlie Rogers, MSc

Input on data, methodology & communication: teams from multiple National Parks & AONBs in the UK
Input on presentation: Mike Elliott, Net Zero Carbon Landscape Lead, Cotswolds National Landscape

Version 3, 12 September 2022

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Part 1:
Context

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Climate & ecological emergency

Extreme weather events

Droughts, storms, wildfires
Uninsurable property losses
Multi-breadbasket failure

Rising sea levels

Flooding, soil contamination
Loss of agricultural land/habitats

Natural resource depletion

Loss of groundwater and topsoil due to changing rainfall patterns

Spreading pests & diseases

Supported by shifting climate
Rising CO_2 levels weaken crop defenses

Loss of nutrition

Rising CO_2 levels decrease nutritional value of staple crops

Biodiversity loss

Shrinking habitats & mass extinction
Mis-timed spring emergence
Greater risk of disease

Wild food depletion

Ocean acidification
Loss of freshwater/land habitats

Reduced access to food

Trade disruption & increased conflict
Rising food prices
Risk of displacement on unprecedented scale

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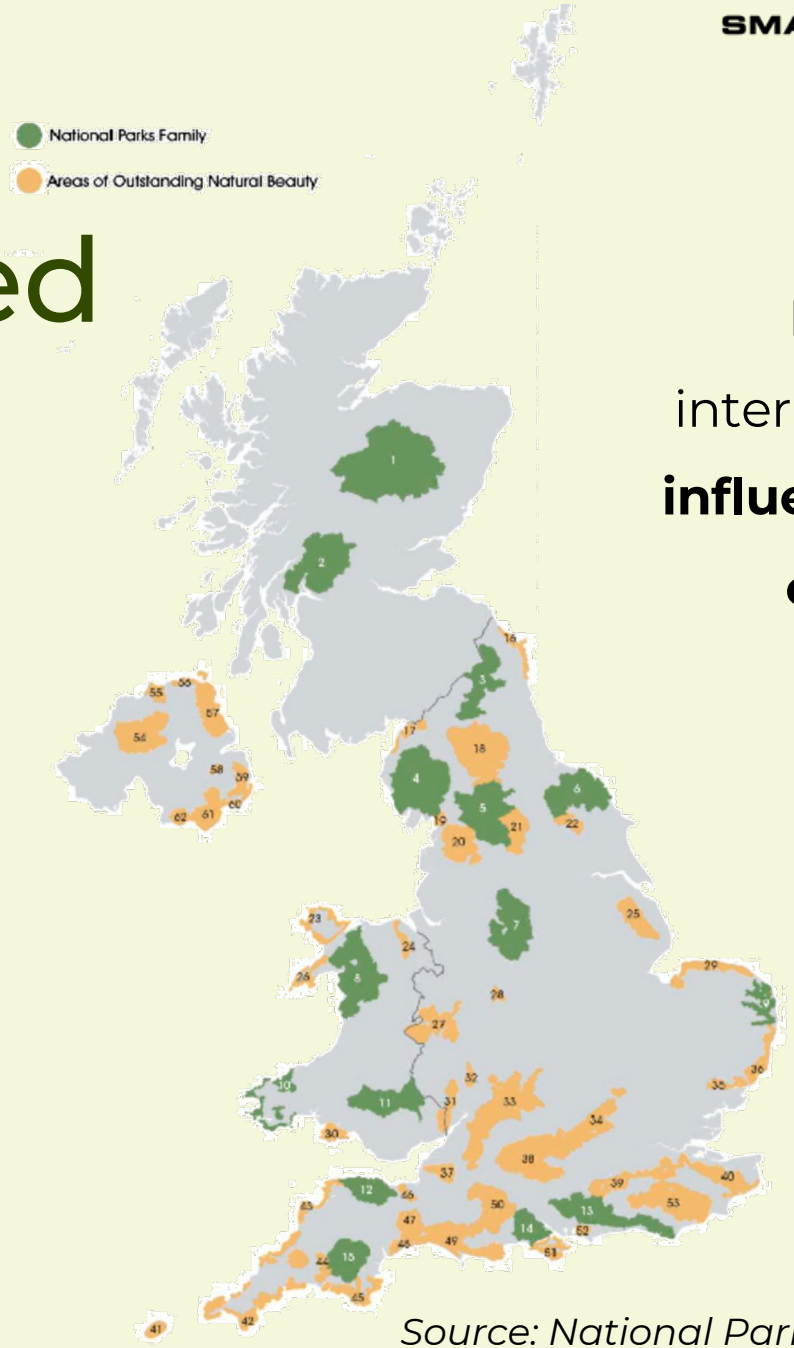
Role of protected landscapes

- 15 National Parks and 46 AONBs
  - 18% of UK land area
  - 1.5 million residents
  - 250 million visitors/year



Source: National Parks website

High national and international profiles mean **influence can exceed scale of own emissions**

Major challenges and opportunities for protected landscapes

Cutting emissions in line with cutting-edge research

Being land stewards and planning authority leaders

Creating better places to live, work and visit

Adopting and scaling up land use measures

- Woodland creation
- Peatland restoration
- Renewable energy production
- Regenerative agriculture

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Part 2:
Approach

Assessment boundaries

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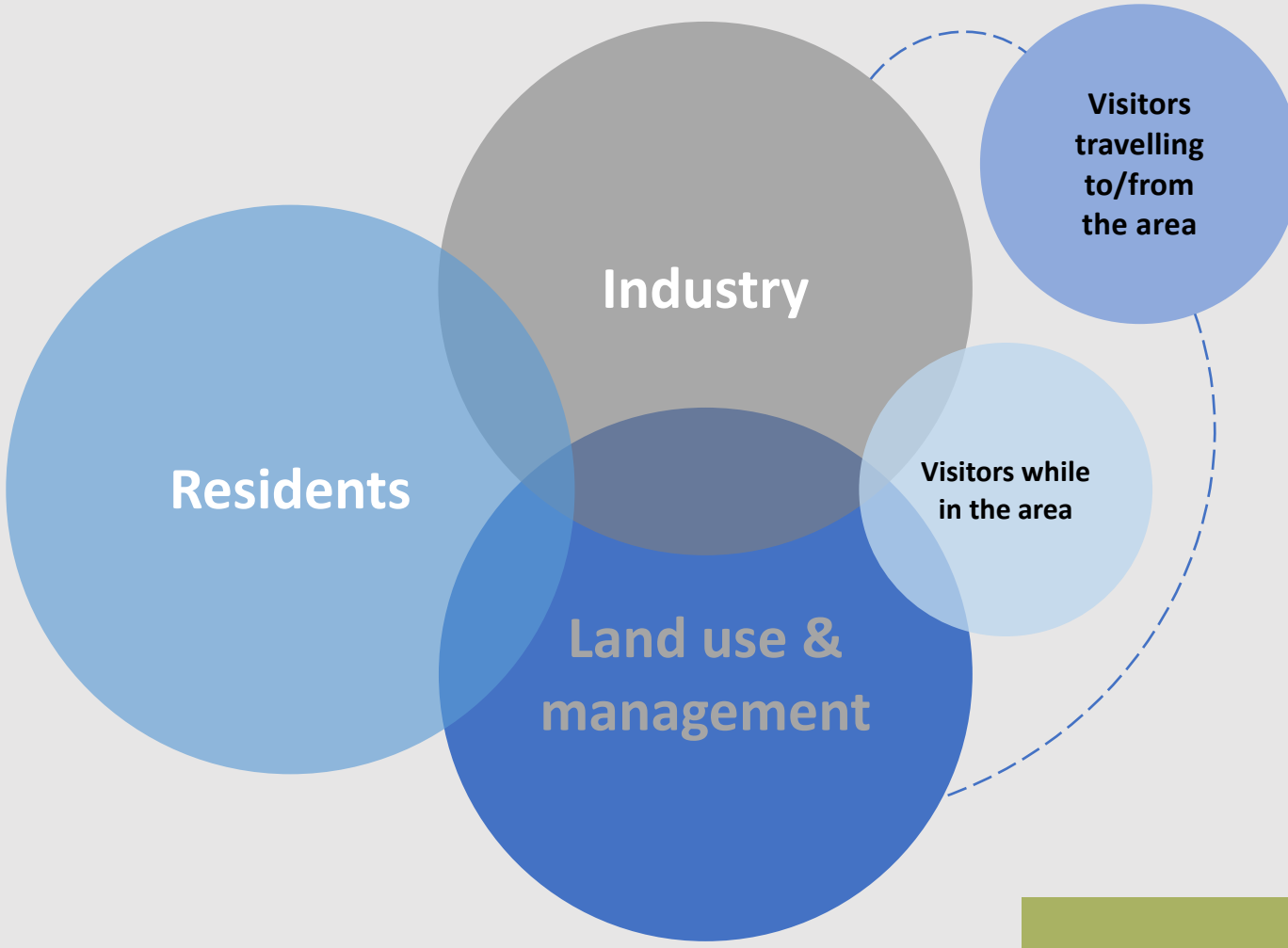
- **Consumption-based approach**: full footprint of lifestyles, goods & services
- Approach taken by **leaders** to accelerate low-carbon transition
- All estimates are subject to uncertainties, particularly industry
- Industry / business overlaps with
  - Land use and management
  - Residents' lifestyles
  - Visitors while in the area
  - Visitors travelling to/from the area
- Carbon baseline assessment year: **2019**



Part 3:
Results

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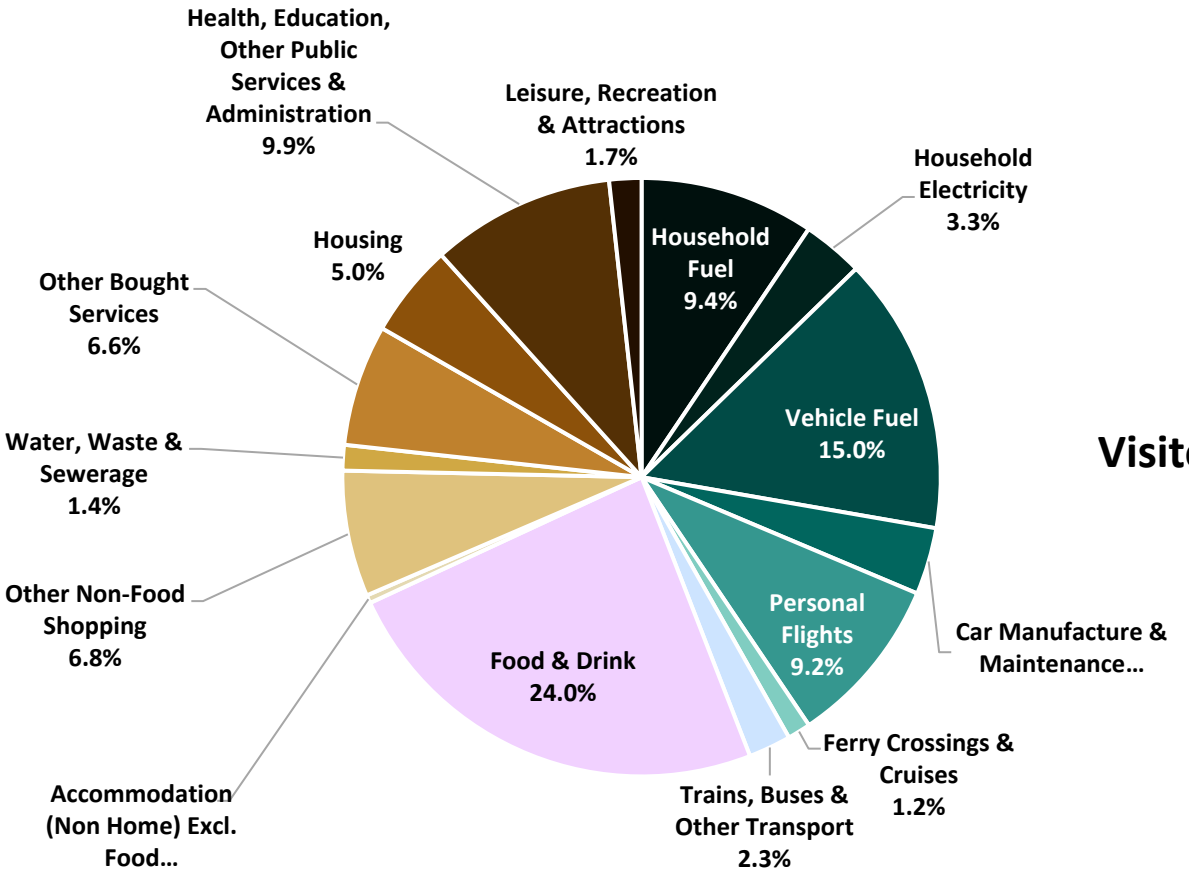
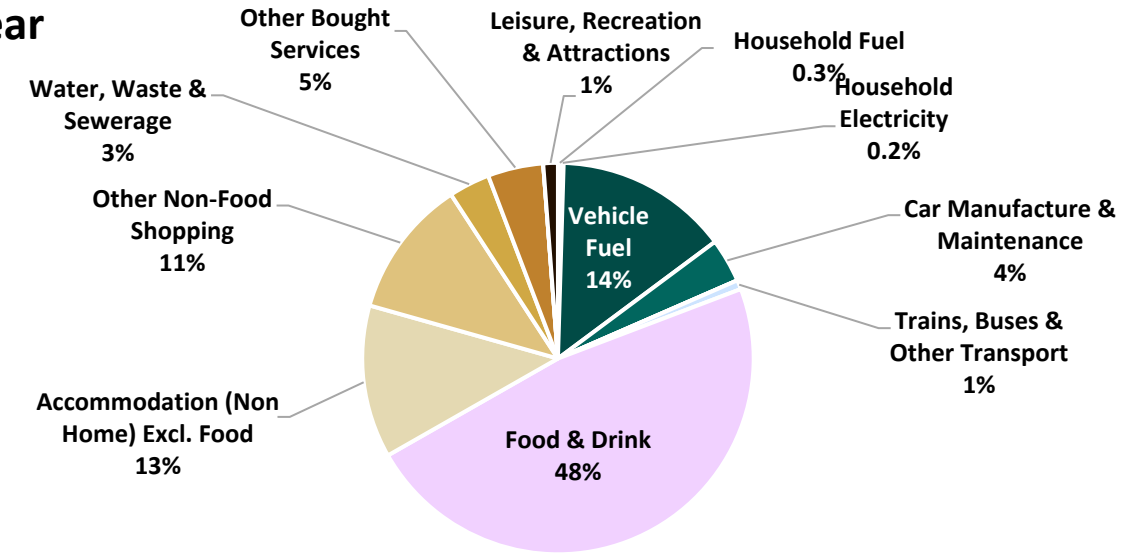
Residents: 337,127 tCO_2e/year

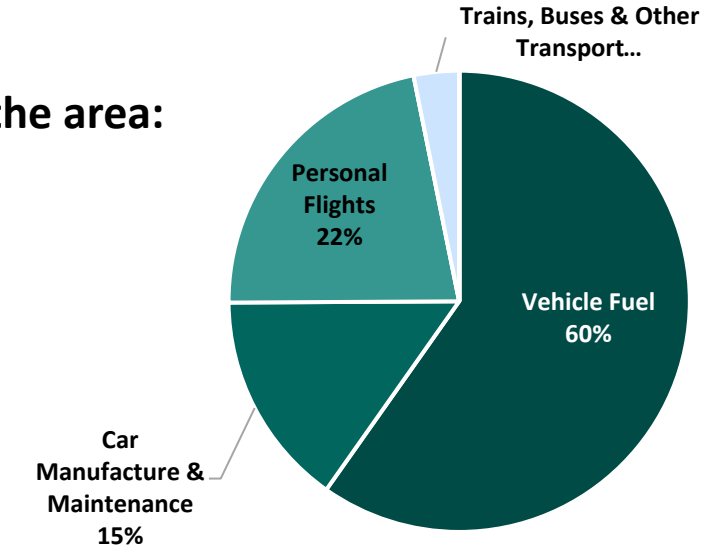


➢ Residents' GHG emissions, by percentage

Visitors while in the area: 121,060 tCO_2e/year



Visitors travelling to & from the area: 213,285 tCO_2e/year



➢ Visitors' GHG emissions while in (top) and on the way to & from (bottom) the area, by percentage

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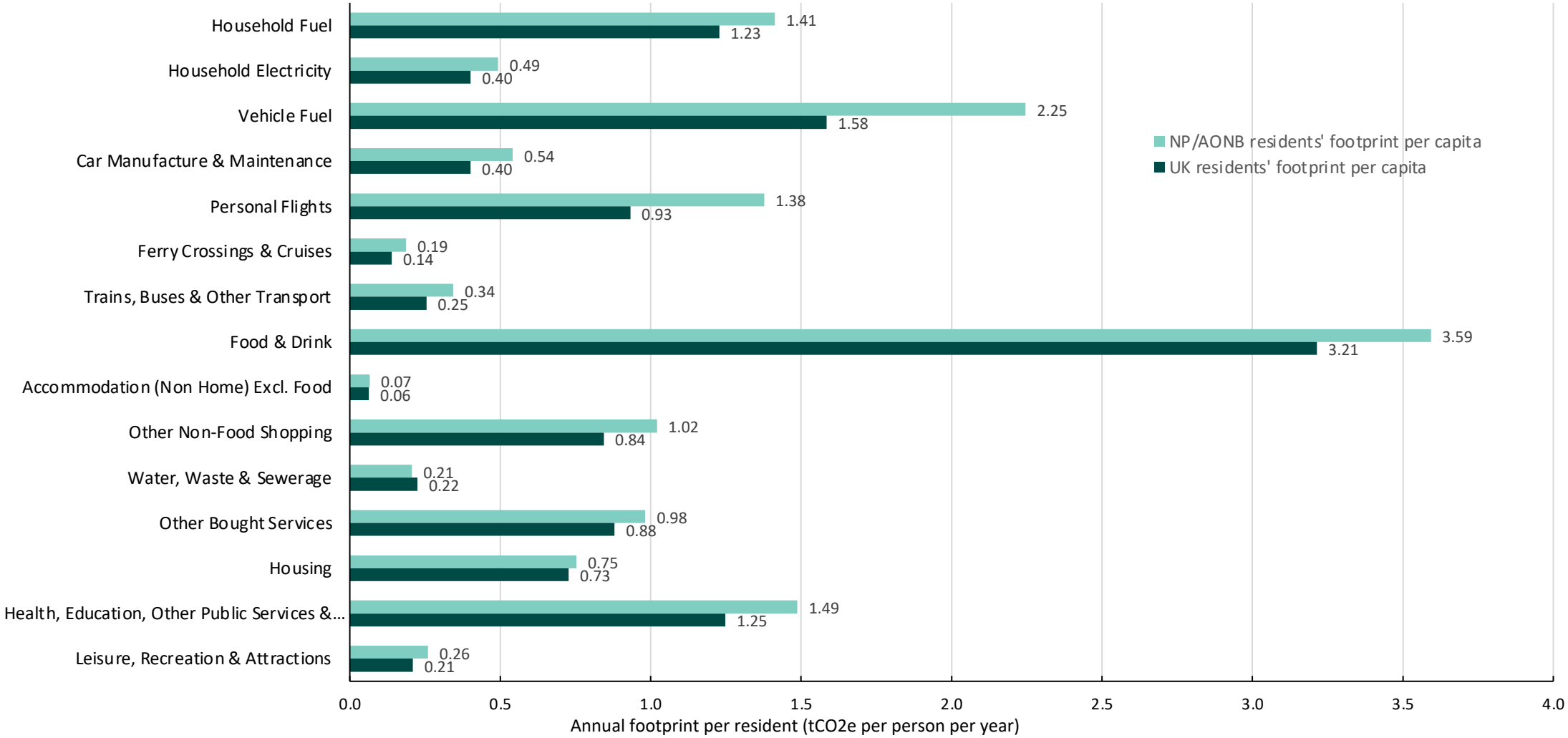
Residents' Total
15.0 tCO_2e/year
per capita

UK Total
12.4 tCO_2e/year
per capita



➢ **Residents' GHG emissions compared with UK national average per capita, by category**

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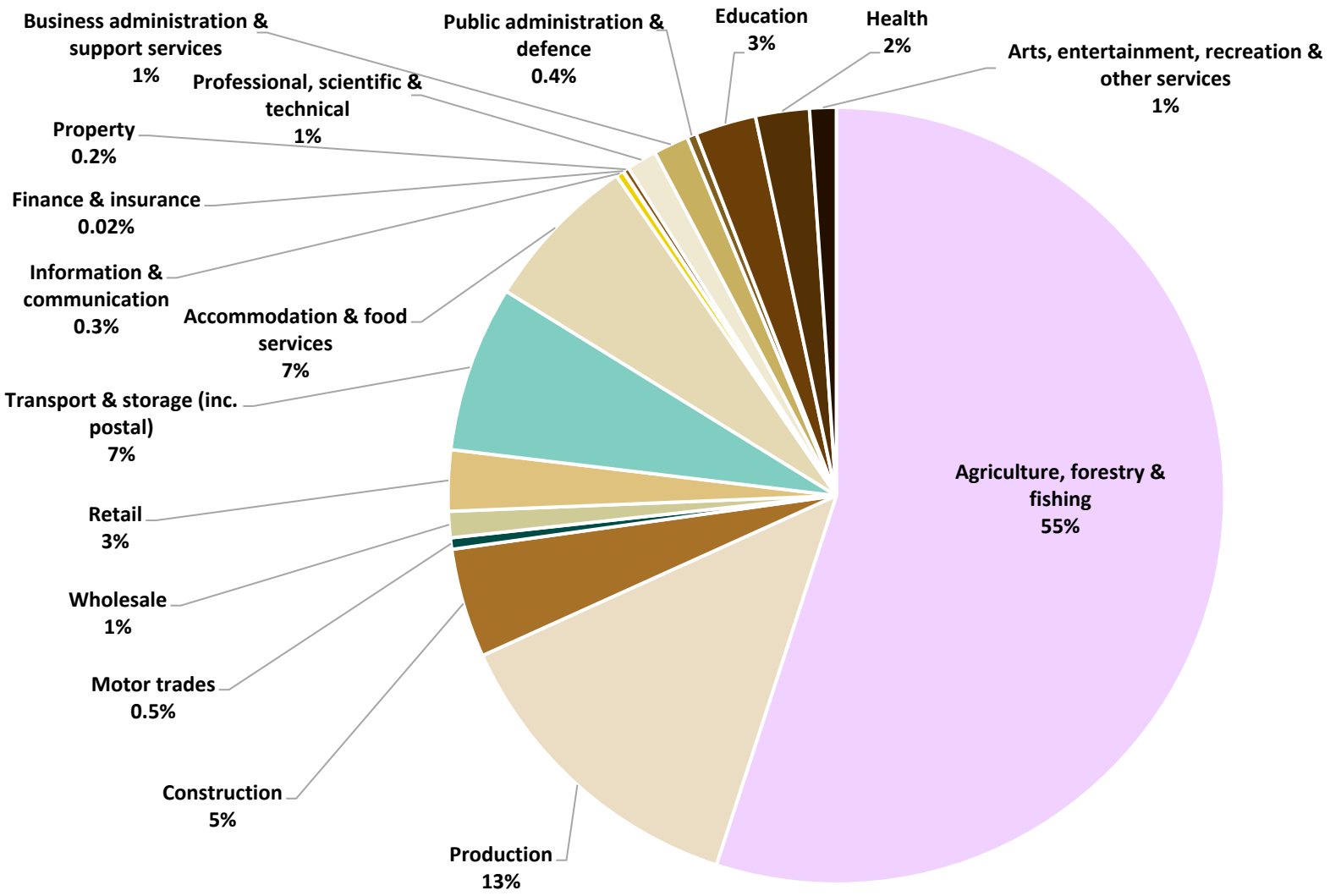
Industry (IDBR data): 191,574 tCO_2e/year



This breakdown mostly excludes:

- **Land use CO_2 12,751 tCO_2e/year**

The "Agriculture & Forestry" IDBR sector* partially includes:

- **Land use non-CO_2 322,517 tCO_2e/year**

** IDBR turnover data for agriculture & forestry used here is closely matched to the landscape boundary, but the corresponding footprint estimate is based on UK-average carbon intensity of these sectors*

- **Industry GHG emissions, by sector**

Part 4: Pathway to Net Zero

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Six categories for emission reduction targets

Energy-only GHG
Residents, visitors, industry (incl. supply chain)

Travel to/from the area
Visitors (excl. flights, incl. car manufacturing)

Food & drink
Residents, visitors

Land-based non-CO_2
(e.g. livestock, fertiliser use)

Non-food shopping
Residents + visitors (incl. car purchases)

Land-based CO_2
(e.g. sequestration, soil degradation)

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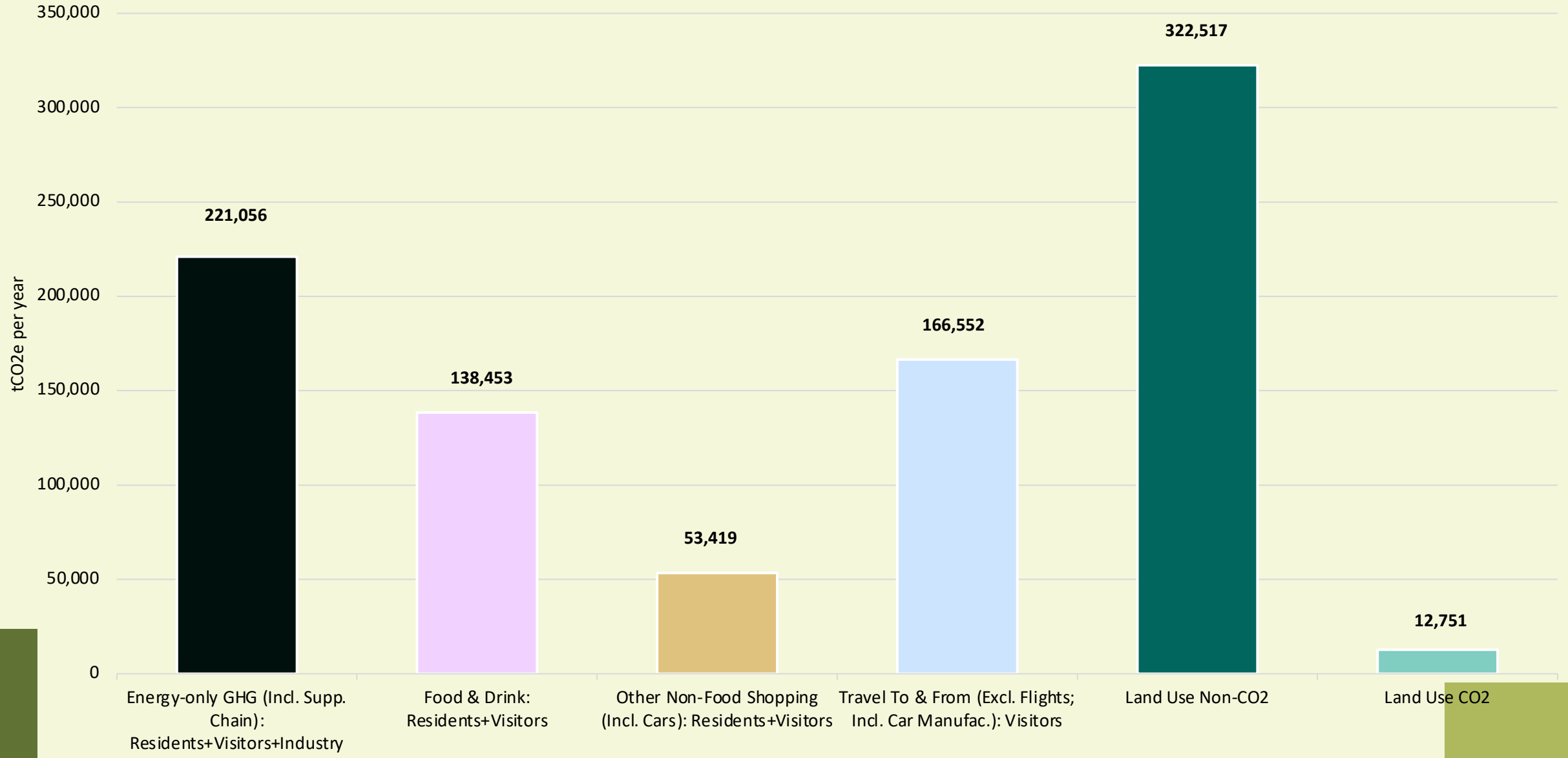
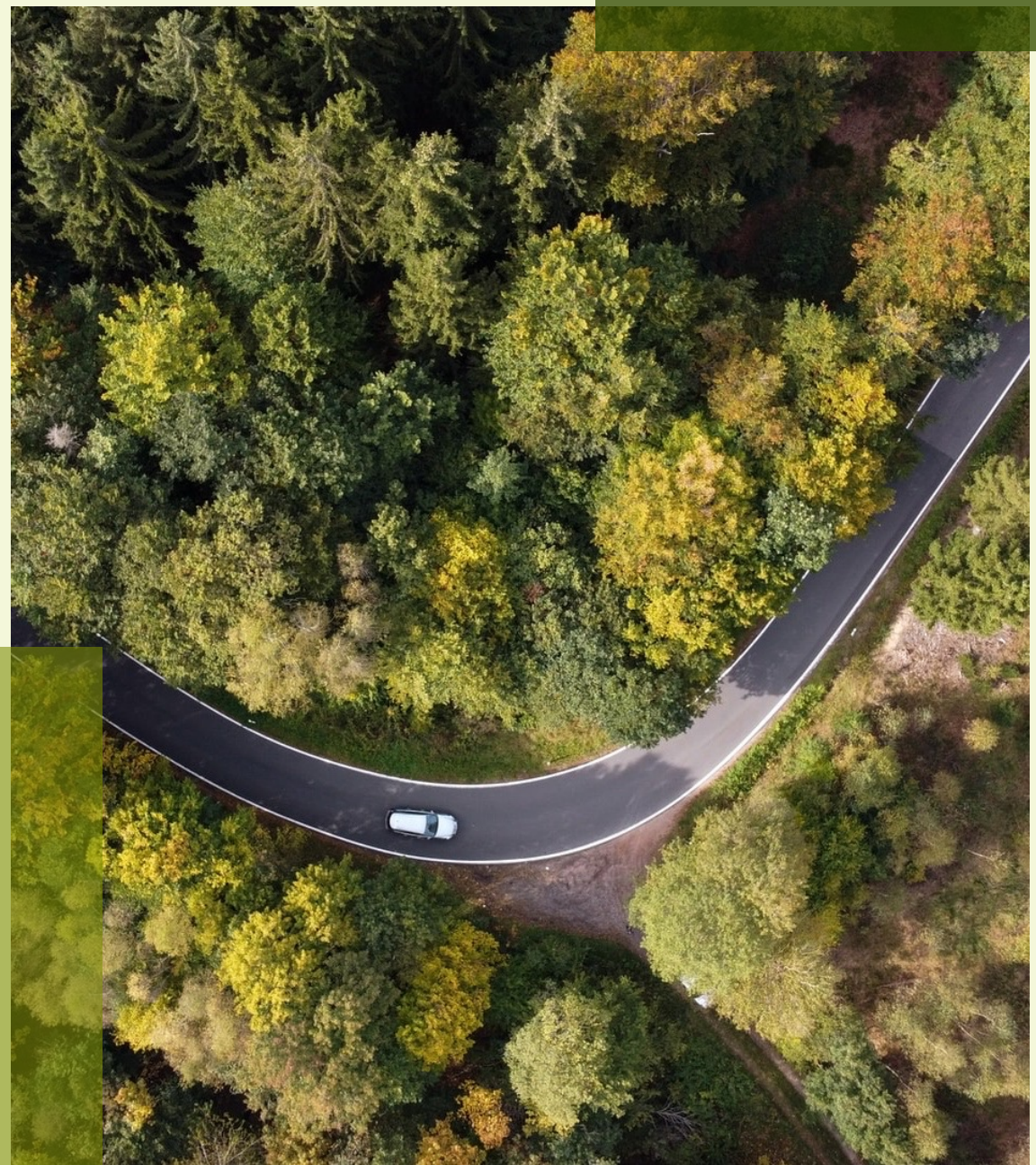
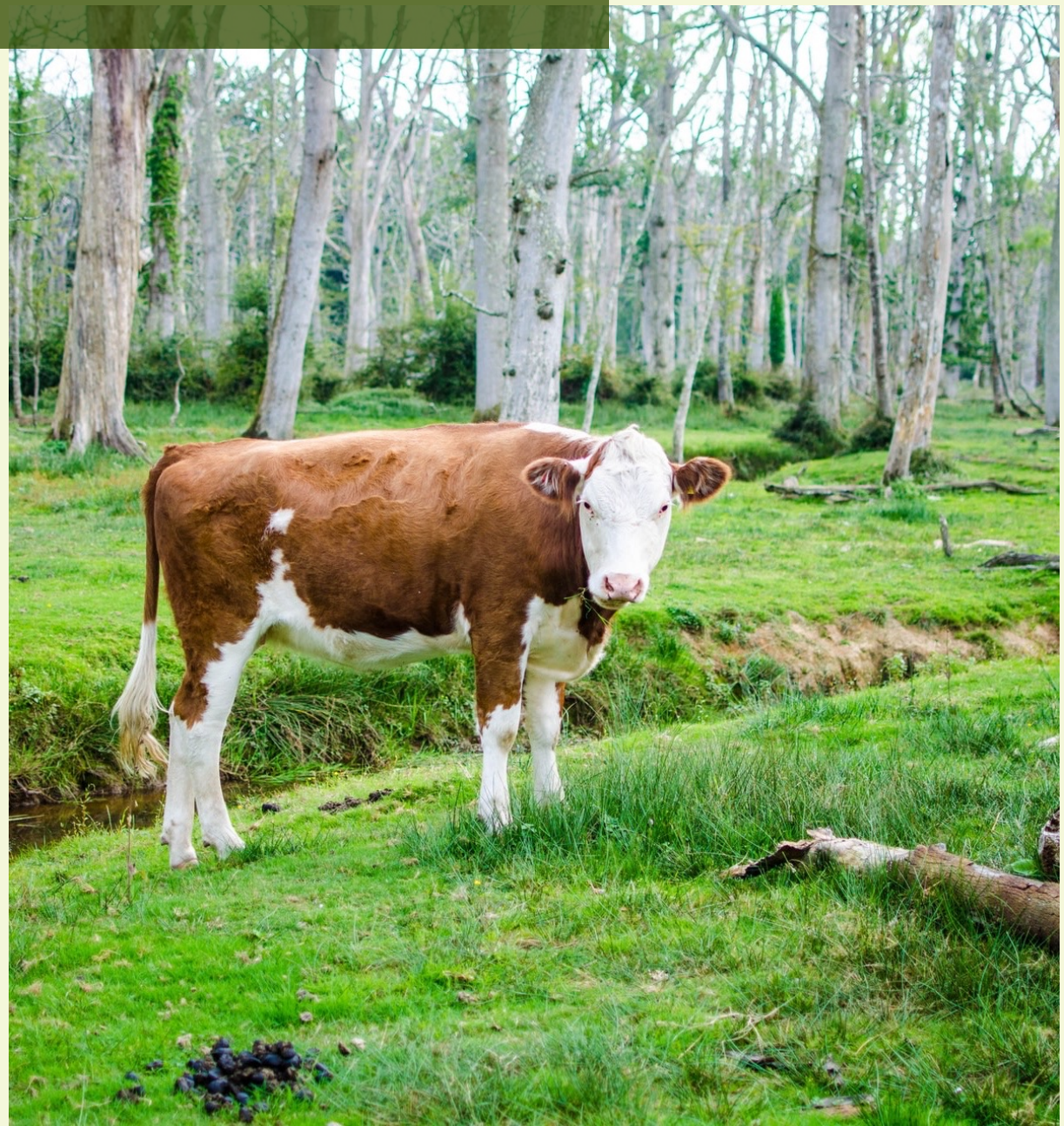
2019 baseline emissions



Emission reduction & carbon sequestration targets

- Derived from science-based assessments, including:
  - UK's Sixth Carbon Budget
  - Tyndall Carbon Budget Tool
  - UK's National Food Strategy
  - UNFCCC Paris Agreement
- Proposed emissions reductions / carbon sequestration targets require **immediate, ambitious action** to be taken across ALL six emission categories





Land use change / management options

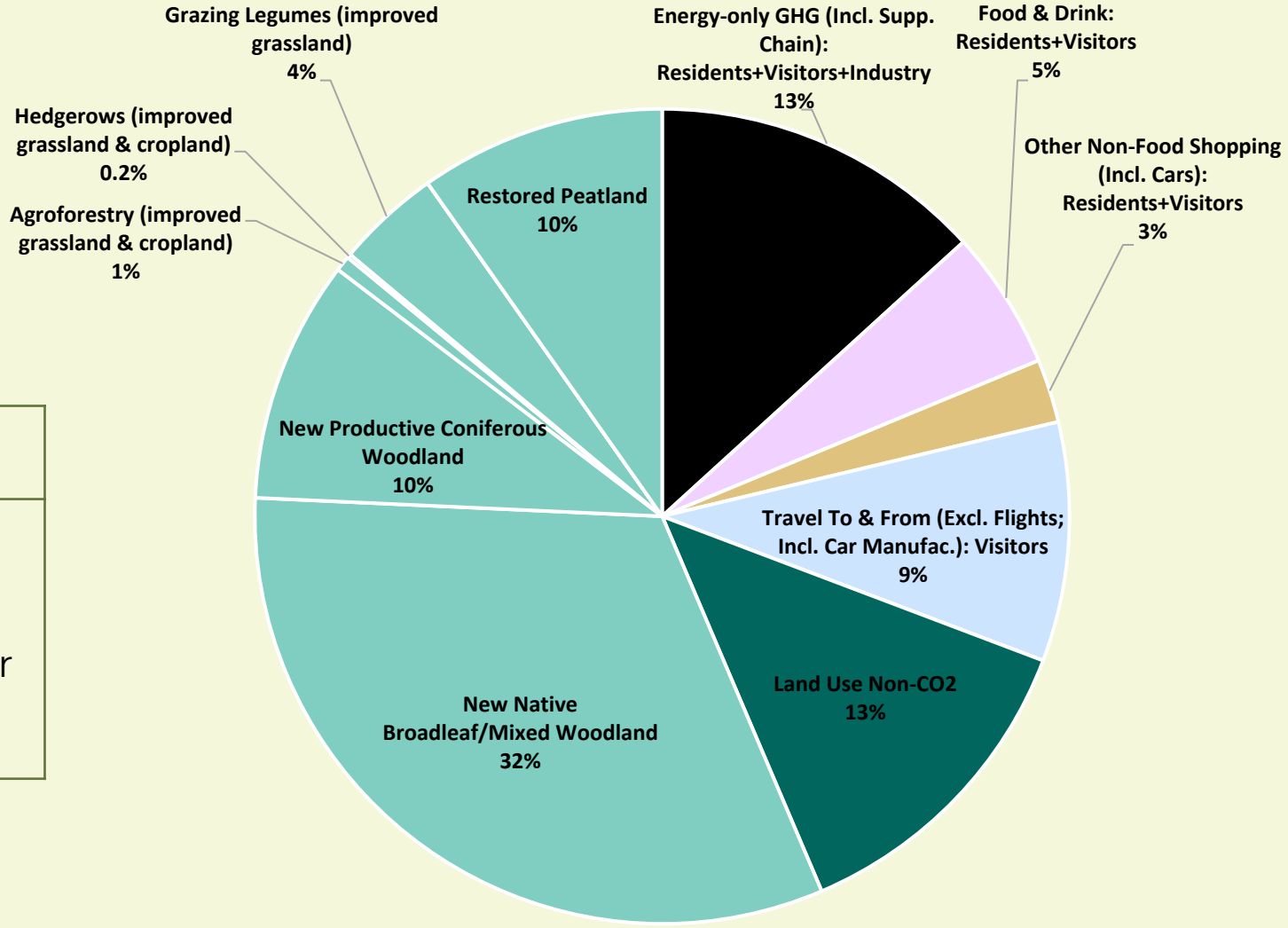
- New native broadleaf/mixed woodland
- New productive coniferous woodland
- Peatland restoration
- Agroforestry (improved grassland + cropland)
- Hedgerows (improved grassland + cropland)
- Introducing legume species (improved grassland)
- Introducing cover crops (cropland)

Emission reduction & carbon sequestration targets

- New woodland: **1100** ha / year
- Share of native broadleaf/mixed woodland: **80%** of the target

Year	**2019**	**2050**	Units
GHG emissions	914,749	218,863	tCO_2e per year
Carbon sequestration	0	-871,123	
Net GHG emissions	914,749	-652,261	

% breakdown of total proposed reduction in net annual GHG emissions from 2019 to 2050 (1,567,010 tCO_2e / year), by category:



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A possible Net Zero pathway