## Annex A

# York Climate Change Strategy: A City Fit for the Future: Technical Annex

## About this Document

This Technical Annex supplements York Climate Change Strategy: A City Fit for the Future and aims to provide further detail on the content, analysis, policy context and objectives within the strategy. This technical annex should be used to provide a more in-depth understanding of the strategy and the assumptions behind pathways modelling.

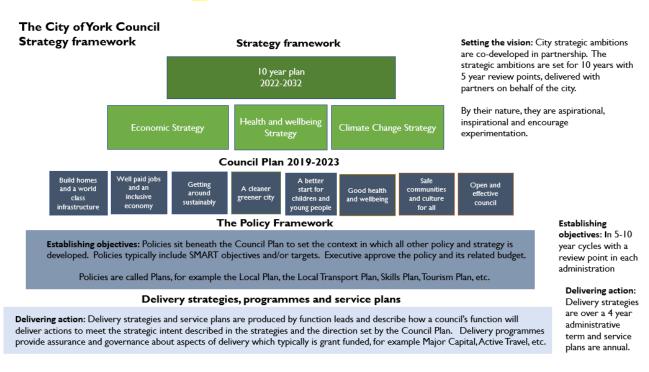
# Strategic Framework

The council and city partners are co-designing a 10 year plan that will be informed by three strategies covering climate change, economic growth and health and wellbeing. The council is following a sustainable approach to developing the city's ambitions for the decade ahead.

The goal of sustainability is to, "create and maintain conditions, under which humans and nature can exist in productive harmony, that permit fulfilling the social, economic, and other requirements of present and future generations." or put simply - 'Enough, for all, forever'.

This means that sustainable approaches need to consider the interdependencies between actions that might affect the environment, society, and the economy. To this end, the council is developing three strategies to inform city-wide direction over the next decade.

The Strategy and Policy framework sets out how strategies and policies fit together to achieve overarching ambitions (Figure XY).



# **Working Together**

The Climate Change Strategy is for the whole of York. Achieving the ambition will be the responsibility of everyone living, working and visiting our city. We will need to work with existing and develop new networks and partnerships that can bring together organisations from the city's public, private, community, faith, education and academic sectors to achieve the ambitious objectives and targets.

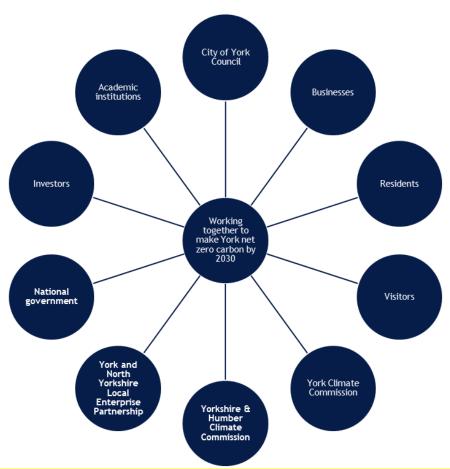


Figure xy: The stakeholders and partnerships involved in supporting and delivering the Climate Change Strategy

## In Focus: York Climate Commission

The York Climate Commission was formed in December 2020 with the approval of City of York Council. Recognising that no single organisation has the power, authority, resources or ability to achieve the citylevel change needed to deliver York's ambition, the Commission was created.

### The role of the York Climate Commission

• Promote leadership in the city on climate change, encouraging stakeholders to take effective action now, while maintaining a long-term perspective.

- Provide authoritative independent advice on the most effective steps required to meet the city's carbon reduction target to inform policies and actions of local stakeholders and decision makers.
- Monitor and report on progress towards meeting the city's carbon targets and recommend actions to keep on track.
- Make the economic case for project development, implementation and investment in low carbon and climate resilient projects in the city; and promote best practice in public engagement on climate change and its impacts in order to support robust decision-making.
- Bring together major organisations and key groups in York to collaborate on projects that result in measurable contributions towards meeting the city's climate reduction target.
- Act as a forum where organisations can exchange ideas, research findings, information and best practice on carbon reduction and climate resilience.

# **Engagement & Consultation**

Our Big Conversation Phase 1

Stakeholder roundtables

Our Big Conversation Phase 2

# **Policy Context**

The York Climate Change Strategy exists within a complex policy context at the local, regional and national scale. The integration of Strategic objectives across policy areas is key requirement for delivering on our climate change ambition, with existing and emerging policy acting as levers and critical enablers for action.

National	Regional	Local
The Clean Growth Strategy set targets to upgrade as many houses to EPC band C by 2035 (2030 for all fuel-poor households). The Government's preferred target is that non-domestic property owners in the private sector achieve EPC band B ratings by 2030. Alongside the strategy, BEIS published joint industrial decarbonisation and energy efficiency action plans with seven of the most energy intensive industrial sectors, including the food and drink sector.	The Yorkshire and Humber Climate Commission is an independent advisory body set up to bring actors from the public, private and third sectors together to support and guide ambitious climate actions across the region.	The COVID-19 Economic Recovery  Transport and Place Strategy was produced to secure the active travel benefits that have been realised during the pandemic. The strategy proposes to invest and create new networks of park and cycle hubs, priority cycle routes, cycle hire and parking to prioritise active travel as the preferred from of commuting.
The <u>Future Homes Standard</u> provides an update to Part L of the building	<u>The Yorkshire and Humber Plan – The</u> <u>Regional Spatial Strategy</u> to 2026 aims	The <u>City of York Local Transport Plan</u> <u>2011-2031 (LPT3)</u> aims to reduce

regulations and will include the future	to guide development in the next 15 to	emissions across York by providing
ban on gas boilers by 2025 (which may be brought forward to 2023 under the recent 10-Point Plan).	20 years. Relevant policies picked out below.	quality walking, cycling and public transport networks. The Local Transport Plan 4 is under development and will reflect the objectives within
		the Climate Change Strategy
Energy White Paper outlines the latest plans on decarbonising the UK's energy	Policy YH2: Climate change and resource use encourages better	In 2020, York launched a <u>Clean Air</u> <u>Zone</u> across the city which regulated
system consistent with the 2050 net	energy, resource and water efficient	buses. Funding from DEFRA and the
zero target.	buildings and minimise resource demands from developments, as well as exploiting the continued supply of brown field opportunities.	Department for Transport was used to upgrade or replace existing buses using fossil fuels
The <u>UK Green Building Council</u> was set	Policy Y1: York sub area policy	York's <u>Public EV Charging Strategy</u> sets
up in 2013 to investigate and recommend new ways forward to	encourages strategic patterns of development on the Sub Regional City	out their approach to accelerating the transition to EV through a public
reach zero-carbon buildings.	of York, whilst safeguarding its historic and environmental capacity.	charging network.
Ten Point Plan for a Green Industrial Revolution includes ending the sale of	Policy T1: Personal travel reduction and modal shift highlights the need to	CYC Asset Management Strategy 2017- 2022 sets out how the council will
new petrol and diesel cars and vans by	reduce travel demand and congestion	manage its built assets. This will be
2030.	and encourage a shift to sustainable travel methods	supplemented with the emerging  Housing Retrofit Action Plan
Moving Forward Together strategy	Policy T3: Public transport sets out the	Private sector housing strategy 2016-
commits bus operators to only purchase ultra-low or zero carbon	need for improving public transport infrastructure and services to address	2021 covers the private housing stock in the city
buses from 2025.	problems of congestion and accessibility	in the city
Well Managed Highway Infrastructure	Policy ENV12: Regional Waste	<u>Cultural strategy 2019-2025</u> is designed
<ul> <li>A Code of Practice - advocates</li> <li>sustainability through sustainable</li> </ul>	Management Objectives advises that all plans, strategies, investment	to make a measurable, positive difference to the people of York
consumption and production; climate	decisions and programmes should aim	
change and energy; natural resource protection and environmental	to reduce, reuse, recycle and recover as much waste as possible.	
enhancement; and sustainable communities.		
The Road to Zero Strategy 2018 sets	Policy ENV12: Encourages local	The Low Emissions Strategy is targeted
out new measures to establish the UK as a world leader in development,	authorities to support waste facilities and management initiatives by moving	at reducing airborne emissions and has a direct positive impact on reducing
manufacture and use of zero emission	it ravel the management of waste	carbon and other ghg emissions
road vehicles.	streams up the hierarchy, achieving waste management performance	
	targets, and managing waste at the nearest appropriate location	
Waste and Recycling: Making Recycling	Policy YH1 of the <u>Yorkshire Humber</u>	"Let's talk rubbish" outlines York's Joint
Collections Consistent in England (2019) The government are working	Plan – Regional Spatial Strategy to 2026 states that growth and change in	Municipal Waste Management strategy with North Yorkshire County Council.
with local authorities and waste	the region will be managed to achieve	The report highlights an increased
management businesses to implement a more consistent recycling system in	sustainable development	need for reducing, reusing and recycling.
England. The measures are expected to		-
come into effect in 2023.  Our Waste, Our Resources: A Strategy	Policy ENV5 of the <u>Yorkshire and</u>	The City of York's Council Plan 2019-
for England (2018) sets out how the	<u>Humber Plan</u> states the regions plan to	2023 outlines that the Council will
country will preserve resources by minimising waste, promoting resource	maximise improvements to energy efficiency and increase renewable	review waste collection to identify options to provide green bins to more
efficiency and moving to a circular	energy capacity.	houses, curbside food waste collection
economy.		and the range of plastics currently recycled.
Waste Prevention Programme for England aims to supporting a resource	The Yorkshire and Humber Waste Position Statement was produced to	York are currently developing a <u>Green</u> <u>Infrastructure Strategy</u> which will
efficient economy, reducing the	ensure appropriate coordination in	establish a long-term vision for the
quantity and impact of waste produced	planning for waste	planning and management of Green

whilst promoting sustainable economic growth  In the UK's Industrial Strategy, one of the grand challenges set is clean growth, which refers to driving economic growth whilst reducing carbon emissions, and maximising the	The Yorkshire and Humber Waste Technical Advisory Body ensures effective collaboration between Waste Planning Authorities in Y&H.	Infrastructure across York, identifying where the protection and enhancement of green spaces and natural elements can be achieved.  The City of York Local Biodiversity Action Plan 2017 provides information about the wildlife in York, the sites that are of value, its importance both for York and nationally, the current threats
advantages for UK industry.  The Ten Point Plan for a Green Industrial Revolution includes plans to invest in carbon capture for industries that are particularly difficult to decarbonise.	The Yorkshire and Humber Regional Biodiversity Strategy highlights how the region can contribute to local, regional and international biodiversity obligations and identifies the key mechanisms and actions required of difference partners and sectors	and what is being done to conserve it.  Section 14 of the City of York Local Plan promotes sustainable connectivity through ensuring new development has access to high quality public transport, cycling and walking networks.
The 25 Year Environment Plan includes commitments to create new forests/woodlands, incentivise tree planting, explore innovative finance; and increase protection of existing trees.	The Humber Clean Growth Local White Paper sets out for the Humber region to be a net zero carbon economy by 2040.	York set an ambition to increase tree canopy cover in line with national average in the Tree Canopy Expansion Target
Land use: Policies for a Net Zero UK (2020) includes converting 22% of agricultural land (mostly from livestock) to forestry.	One of North Yorkshire and York Local Nature Partnership Strategy objectives is to conserve and enhance natural habitats and species. The LNP also sets out to strengthen natural corridors for species movement and aims to have a 75% coverage of green infrastructure corridors in LNP priority areas.	Joint Health and Wellbeing Strategy 2017-2022: considerable co-benefits to health and wellbeing from reducing carbon emissions and minimising the impact of climate change
Woodland Trust Emergency Tree Plan recommends Local Authorities write an Emergency Tree Plan and set targets for tree planting.	The Humber Local Energy Strategy sets out two key objectives: To ensure decarbonization in Humber in the electricity, heat and transport sectors and; To foster clean growth by supporting low carbon technologies and taking advantage of opportunities of a low carbon economy.	
The UK's National Planning Policy Framework (2019) states as a core planning principle that planning should support the transition to a low carbon future	The York, North Yorkshire & East Riding's Local Energy Strategy provides a clear pathway towards a low economy by implementing high-impact low carbon energy technologies such as energy efficient vehicles, renewable heat pumps, anaerobic digestion and biomass for heat.	
UK <u>National Energy and Climate Plan</u> sets out integrated climate and energy objectives, targets, policies and measures for the period 2021-2030.		

In Focus: Tourism

## **Tourism in York**

In 2018, York received <u>8.4 million visitors</u>, a figure which has increased 11.8% since 2014.

With York's permanent population estimated to be 209,900, several key challenges arise when aiming to sustainably cater for both residents and tourists, such as:

- Tourism congestion, relating to the density and seasonality of visitors to the city
- Supporting businesses in the tourism sector to reduce emissions
- Ensuring the city remains livable for residents

We are in the process of updating our Tourism Strategy, which will include our approach to promoting sustainable tourism and how the sector can support our climate change ambition. Following the COVID-19 pandemic, the entertainment, tourism and hospitality sectors have been significantly impacted. Opportunities to influence behaviour change as the industries recover and as tourists return should will considered as part of the strategy.

"Sustainable tourism has the potential to advance urban infrastructure and universal accessibility, promote regeneration of areas in decay and preserve cultural and natural heritage... Greater investment in green infrastructure should result in smarter and greener cities, from which not only residents, but also tourists, can benefit." (United Nations World Tourism Organisation, 2015)

## **Emissions Profile**

The current emissions profile for the area administered by City of York Council is shown in figure XY, based on the SCATTER tool calculations. This covers scope 1 and 2 emissions for the city-wide area of York. This covers 3 greenhouse gases: carbon dioxide, nitrous oxide and methane and relates to the 2018 reporting year. While the embodied carbon associated with creating products used in York is an important consideration, this emissions profile only covers emissions generated within the city, as this follows the same boundaries set out by UK Government.

Not all subsectors can be neatly summarised as a "slice" of this chart. Emissions from land use act as a carbon sink for the region, sequestering carbon from the atmosphere. An illustration of this has been included in the chart.

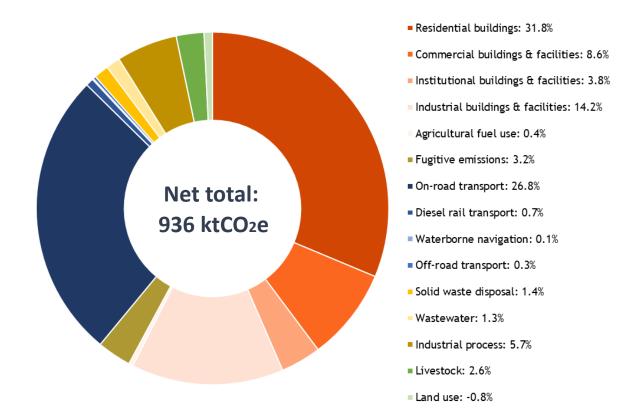


Figure XY: SCATTER emissions inventory for York, 2018

City-wide emissions data (sometimes referred to as "community" or "geographic") encompasses all emissions within a specific geopolitical boundary over which local governments can exercise a degree of influence through the policies and regulations they implement.

The Global Covenant of Mayors (GCoM) requires committed cities to report their inventories in the format of the Common Reporting Framework, to encourage standard reporting of emissions data. The GCoM Common Reporting Framework is built upon the Emissions Inventory Guidance, used by the European Covenant of Mayors and the Global Protocol for Community-Scale Greenhouse Gas Emission Inventories (GPC), used by the Compact of Mayors. Both refer to the 2006 Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories.

The main greenhouse gases defined by the United Nations Framework Convention on Climate Change (UNFCCC) are carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), perfluorocarbons (PFCs), hydrofluorocarbons (HFCs) and sulphur hexafluoride (SF6), as well as nitrogen trifluoride (NF3). GCoM cities are required to report at least CO2, CH4 and N2O gases.

An emissions inventory uses activity data which is a quantitative measure of a level of activity that results in GHG emissions taking place during a given period of time e.g volume of gas used, tonnes of solid waste sent to landfill. Emission factors are then applied to this activity data. An emissions factor is a measure of the mass of GHG emissions relative to a unit of activity. Government conversion factors for greenhouse gas reporting are used. Global Warming Potentials (GWP) use a factor describing the degree of harm to the atmosphere of one unit of a given greenhouse gas relative to one unit of CO<sub>2</sub>.

### York Emissions Subsectors

The following tables demonstrate the profile of each emissions sector and explain the sources of Scope 1 and 2 emissions included in each<sup>1</sup>:

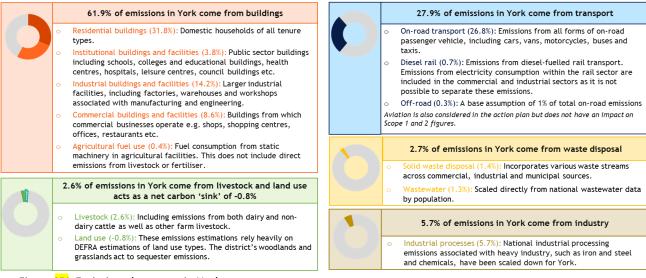


Figure XY: Emissions by sector in York

## Link data tables to appendix

# In Focus: City of York Council Corporate Emissions

In 2021, City of York Council reported on emissions associated from its corporate activity for the first time. In total, its buildings, corporate waste, business travel and fleet were responsible for 3,635tCO₂e for the financial year 2020/21.

The council is committed to achieving net zero for its own operations by 2030 and has produced the following recommendations to achieve this:

- Produce a decarbonisation plan for our largest emitting sites to identify improvements in heat generation, building fabric and energy efficiency and renewable generation
- Adopt a policy to consider low carbon heating solutions for all system replacements
- Develop and promote a behaviour change campaign to reduce emissions associated with staff activity
- Explore opportunities to replace mains water with grey water
- Implement vehicle route planning and driver training across our corporate fleet
- Promote remote event attendance where possible
- Adopt a policy that prioritises train travel over flights, wherever possible
- Increase the proportion of hybrid and electric vehicles in the car club fleet and encourage staff to use electric and hybrid vehicles
- Review the corporate waste contract and undertake a waste audit

<sup>&</sup>lt;sup>1</sup> Emissions sectors may not add up to exactly 100% due to rounding.

- Incorporate sustainable procurement and circular economy principles into our purchasing decisions
- Develop a methodology to calculate Scope 3 emissions associated with council activity

# **Emissions Reduction Pathway for York**

The current emissions profile offers the baseline from which to measure progress towards net zero by 2030.

Also important is the fact that once emitted, greenhouse gases such as  $CO_2$  and  $N_2O$  can remain in the atmosphere for extended periods of time – up to hundreds of years. This means it is crucial to consider York's *cumulative* year-on-year emissions.

The Paris Agreement aims of remaining "...well below 2°C" of warming dictate an upper limit of greenhouse gas emissions that are allowed.

We can join these ideas together in the form of a *carbon budget, which* guides a trajectory for emissions reduction.

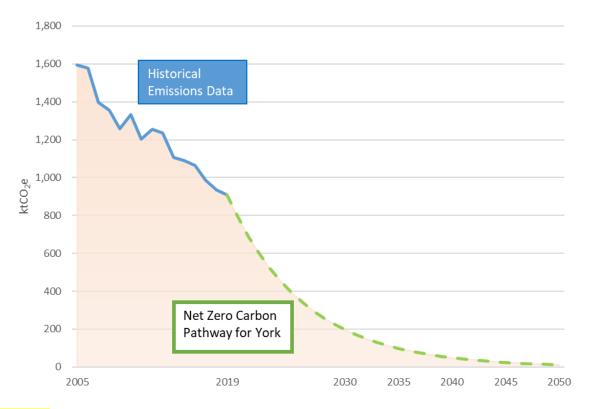


Figure XY: Science based emissions reduction pathway for York that is consist with the IPCC 1.5oc scenario

The Tyndall Centre for Climate Change Research, based at the University of Manchester, have produced advisory climate change targets for York to make its fair contribution to meeting the objectives of the United Nations Paris Agreement on Climate Change. The latest scientific consensus on climate change in the Intergovernmental Panel on Climate Change Special Report on 1.5°C is used as the starting point for

setting sub-national carbon budgets that quantify the maximum carbon dioxide emissions in York to meet this commitment.

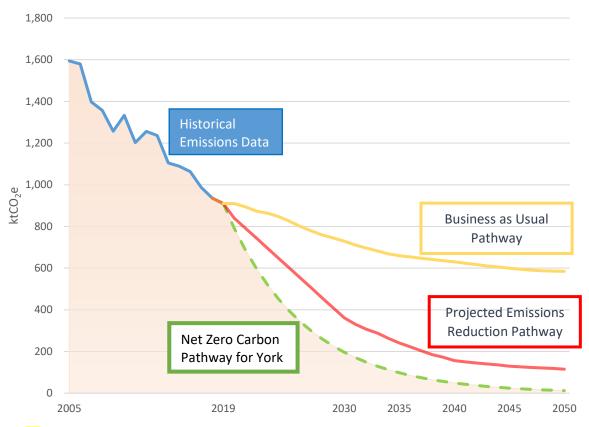


Figure XY: Projected Emissions Reduction Pathway and Business as Usual Pathway for York

### In Focus: SCATTER Tool

SCATTER is a local authority focussed emissions measurement and modelling tool, built to help create low-carbon local authorities. SCATTER provides local authorities and city regions with the opportunity to standardise their greenhouse gas reporting and align to international frameworks, including the setting of targets in line with the Paris Climate Agreement. Its use is free of charge to all local authorities in the UK.

## The SCATTER tool:

- Generates a greenhouse gas emissions inventory following the Global Protocol for City-wide Greenhouse Gas emissions for your local authority area
- Helps the understanding and development of a credible decarbonisation pathway in line with emissions reduction targets
- Provides outputs that can be used for engagement to create a collaborative carbon reduction approach for local authorities

# **Objectives Analysis**

## **Understanding carbon impact potential**

Figure XY provides a visual overview of the estimated carbon savings that would result if the objectives detailed in the Projected Emissions Pathway were achieved. Savings provided are cumulative, for the period 2020-2030.

- The diagram illustrates the high variance between the impact potential of the objective areas
- Mirroring the trend observed in the emissions inventory, the largest savings potential is found within the buildings and transportation sectors
- Specifically, actions associated with on-road transportation and building energy efficiency offer the biggest potential carbon savings

In seeking to achieve your net zero target, it is recommend prioritising action with the largest carbon saving potential.

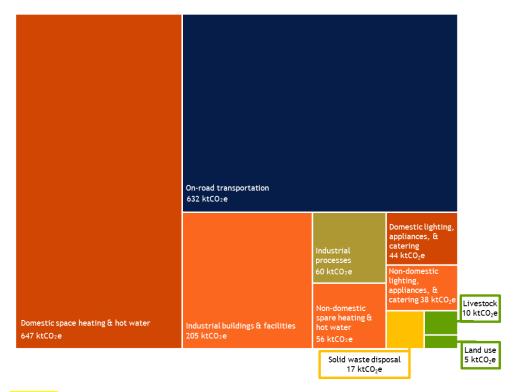


Figure xy: Cumulative carbon savings for York, 2020-2030, in line with the Projected Emissions Reduction Pathway

### **Cost Implications**

There are different types of cost to consider when evaluating carbon reduction actions, which can be helpful to define:

- <u>Capital expenditure</u> (capex) represents funds used to acquire, replace or upgrade a fixed asset e.g., the showroom price of an electric vehicle
- Operational expenditure (opex) represents funds spent or earned in the use and maintenance
  of that asset throughout its life e.g., the price of charging point electricity used to power the
  electric vehicle

- Marginal cost represents additional expenditure incurred as a result of choosing a low-carbon option over a higher-carbon alternative e.g., the difference between the showroom price of an electric vehicle versus a diesel equivalent
- Annualised costs represent a combined yearly capex and opex cost associated with a given initiative. The upfront capex is averaged over the lifetime of the project/asset (equivalent to a depreciation charge) and combined with any in-year operational cost/savings to provide a single number to compare assets like for like.

Each of these financial metrics represents an important consideration for the business case for different actions and are not always directly comparable. Estimates provided here reflect this, with an attempt made to clearly define the type and specific nature of each cost.

It should be noted that costs given are high-level estimates only and that forward-looking cost models are inherently limited in accuracy. Estimates are not intended to act as definitive costings and are instead better used as a means of appreciating the scale and nature of the financial implications of different activities.

### Methodology

Estimates are based on a comparison between the cost of a baseline case (the "BAU") and Projected Emissions Reduction Pathway equivalent within SCATTER for each sector. Estimates have been made in isolation for different objectives based on specific research and data contexts. Where possible, an attempt has been made to enable like-for-like comparison between estimates made for different activities within the same sector. Cost assumptions are themselves based on government datasets and underlying research papers, most notably the CCC's Sixth Carbon Budget.

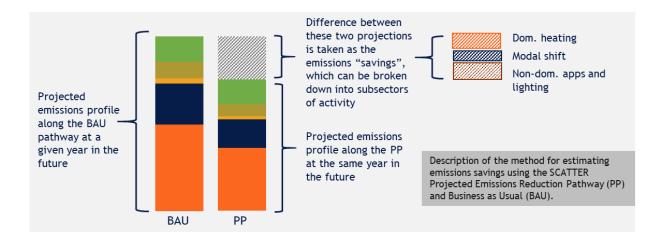
### **Carbon savings**

Understanding the activities which offer the highest potential carbon savings is another way York can prioritise action towards net zero. Understanding which activities contribute most to reducing both District's emissions also links into the hierarchy of actions for project development and sets out the "heavy hitting" objectives defined by SCATTER.

### **Estimating emissions savings**

Using the Projected Emissions Reduction Pathway and "Business as Usual" scenarios we can estimate emissions savings, broken down into different categories. This is done by comparing the projected emissions along each pathway from different subsectors (e.g. domestic lighting or commercial heating) for each year, and defining the difference between them.

A visual representation of this method is given below.



### Which areas of activity have been estimated?

The categories of emissions savings are broken down slightly differently to the SCATTER objectives, meaning that the savings are grouped slightly differently. This is because of the interdependency of the SCATTER objectives, where more than one objective contributes to the same savings subcategory.

Since one action can contribute to more than one SCATTER objective target, the savings from multiple separate objectives may be combined into one subcategory. This is illustrated below:



### **Estimated Cumulative Savings**

Sector	SCATTER Objective	Subsector	Cumulative Savings from 2020	
			2030	2050
Domestic	Improved building efficiency	Domestic space heating and hot water	647 ktCO₂e	2,405 ktCO₂e
Domestic	Improved lighting and appliance efficiency	Domestic lighting, appliances, and cooking	44 ktCO₂e	117 ktCO₂e
Non- Domestic	Improved building efficiency	Industrial buildings and facilities	205 ktCO₂e	694 ktCO₂e
Non- Domestic	Improved heating efficiency	Commercial space heating, cooling,	. E( I+CO -	242 1460 -
Non- Domestic	Shifting off gas heaters	and hot water	56 ktCO₂e	262 ktCO₂e
Non- Domestic	Improved lighting and appliance efficiency	Commercial lighting, appliances, equipment, and catering	38 ktCO₂e	101 ktCO₂e

Sector	SCATTER Objective	Subsector	Cumulative Savings from 2020 (ktCO2e)	
			2030	2050
Waste	Reducing the quantity of waste	Solid waste disposal	17 ktCO₂e	54 ktCO-0
Waste	Increased recycling rates	Solid waste disposat	17 KtCO2e	54 ktCO₂e
Transport	Switching to electric vehicles	On-road		1,582 ktCO₂e
Transport	Travelling shorter distances		632 ktCO₂e	
Transport	Driving less			
Transport	Improving freight emissions			
Industry	Shifting from fossil fuels	Industrial processes	21 ktCO₂e	87 ktCO₂e
Energy Supply	Local technologies	Chatiana Farancia da sa	1,050 ktCO₂e	3,744 ktCO₂e
Energy Supply	Large scale technologies	Stationary Energy sectors	1,030 KtCO2e	
The Natural Environment	Increase tree coverage and planting		51,00	24.1.62
The Natural Environment	Land use management	Land use	5 ktCO₂e	21 ktCO₂e
The Natural Environment	Livestock management	Livestock	10 ktCO₂e	57 ktCO₂e

# Buildings

# Stakeholder Perspective

As part of the Climate Change Strategy & Action Plan development, three workshops were held, and a public attitude survey published to gain stakeholder views on how York could respond to the climate emergency. A summary of the key stakeholder views relating to buildings are detailed below.

	Challenge areas	
	Technical	<ul> <li>Technologies that have reached maturity are now trusted and widely accepted (e.g. PVs), newer technologies still treated with scepticism and suffer from high cost. Heat pumps need financial subsidy to stimulate market until economies of scale drive down price.</li> <li>Complicated systems that underperform can generate negative reactions. Only appropriate solutions should be specified with local demonstrators/pilots to showcase new technology.</li> </ul>
	Policy	<ul> <li>Approach to decarbonisation of conservation/heritage assets is insufficient and inconsistent. National policy (NPPF) needs to reflect climate emergency priorities, local policy (The Local Plan) needs to provide standards and guidance for heritage retrofit and planning practice needs a consistent, joined up approach.</li> <li>Need to balance decarbonisation with reducing fuel poverty and recognise the role of demand reduction.</li> </ul>
£	Financial	<ul> <li>Government subsidies for low carbon heating solutions have not been effective. Gas is too cheap and so a greater financial incentive is needed switch to electricity.</li> <li>Financial offers can be complicated and initial capital outlay may be prohibitive for some organisations/households. Role for specialist independent advice.</li> </ul>
	Community	<ul> <li>Broad awareness of need for change has increased significantly, but there is an evident behavioral gap when it comes to uptake.</li> <li>Inconvenience, lack of simple independent information, complicated list of suppliers and pricing all add hassle factors to retrofit. There is a need for an independent and trusted brokerage service and local pilot/demonstrators.</li> </ul>
<b>9</b>	Delivery	O Limited availability of specialist consultants (particularly for heritage buildings). Highly skilled project co-ordinators/managers also needed in construction sector. Potential for area-based skill sharing schemes for Clerk of Works/Building Inspectors. O Need to provide suitable training, skills and market development but high level of inertia in trainers/education. National curriculum change will be slow so need to promote local apprenticeships and integrate into purchasing policy of local organisations.

# **Cost Estimates**

SCATTER activity	Assessed cost (£m)
Switch to electric cookers	<b>6.1</b> (marginal opex as a result of switching to all-electric cooking systems)
New build standards are Passivhaus	<ul><li>23 (marginal capex of building to Passivhaus standard during construction)</li><li>119 (marginal capex of retrofitting new-build Part L in the future)</li></ul>
Reduced household energy demand	700 (capex required for retrofit on existing homes)
Switching away from gas heating	<ul><li>144 (marginal capex for domestic electric heating systems)</li><li>-155 (marginal opex as a result of switching to electrified heating)</li></ul>

# Notes & Caveats

## Switch to electric cookers

o No additional capex assumed with the cost of installation for new electric cooking systems.

- Main cost here represents the potential added cost of fuel each year if the borough switches over time to electric systems, based on a marginal cost over a gas equivalent.
- Projected Emissions Reduction Pathway assumes a linear transition to electric cookers ending in 2035 modelled as a retirement rate of 1/15<sup>th</sup> of gas systems replaced each year.
- The cost for a household that switches from a full gas to a full electric system may incur higher energy bills as a result of the higher cost of electricity. Long-run energy prices taken from the CCC Sixth Carbon Budget.
- This analysis does not consider government subsidies for energy prices which may have a significant role to play in lowering the cost to consumers.

### New build standards are to Passivhaus

- These figures are taken from a <u>Currie & Brown and AECOM</u> report which defines the marginal cost between building Part-L or Passivhaus standard both during construction and retrofit phases at a later date. This also accounts for heating systems (assumes air-source heat pump in a semi-detached house).
- The cost of retrofitting runs very high because retrofitting newly-built Part L to higher standards in future can cost between 3-5 times more than building to Passivhaus during construction.
- Number of new builds taken from SCATTER newbuild projections between 2020-40.

#### Reduced energy demand in homes

- This represents the capex required to complete inner/external wall retrofit on the numbers of households described by the HA pathway.
- Point capital costs for insulation and all other costs come from this <u>BEIS study</u> into the cost of domestic retrofitting. This also accounts for economies of scale, other fixed project costs and local geographical weighting, as well as a hurdle rate.
- Assumes a linear transition of completed retrofit from 2020 household numbers.

### Switching away from gas heating

- <u>CCC Sixth Carbon Budget</u> has data on capex and opex of a variety of domestic heating systems. An
  average of these systems was used to determine the cost estimate opposite.
- Number of households taken from SCATTER (2020) and split between gas/non-gas according to aggregated government estimates at LSOA level. A flat 5% assumption was made on households already served by an electric system. All other off-gas properties assumed to be oil boilers.
- All systems assumed replaced at some point (retirement rate 1/15), so replacement costs are calculated for all systems including fossil.
- Opex assumption assumes energy bills are reduced over time as a result of efficiency improvements of electric over gas.

Building archetype	Improved building efficiency		Switching away from gas heating	
	Capex (£m)	Annual opex (£m)	Capex (£m)	Annual opex (£m)
Arts, community and leisure	5.1	-0.007	1.1	0.1
Education	4.8	-0.009	1.8	0.15
Emergency services	1.4	-0.003	0.6	0.05
Factories	18.1	-0.018	2.7	0.25
Health	3.9	-0.010	1.7	0.15
Hospitality	4.1	-0.007	0.8	0.05
Offices	14.2	-0.018	1.6	0.15
Shops	13.3	-0.018	1.1	0.1
Warehouses	5.8	-0.008	1.1	0.1
Total	70.560.6	-0.098	12.2	1.1

#### Improved building efficiency

- o Non-domestic buildings in any area make up a very broad stock of diverse properties.
- The Non-Domestic National Energy Efficiency Database (<u>ND-NEED</u>) was used to find the number of rateable properties in York.
- Costings from Building Energy Efficiency Survey (<u>BEES</u>), which outlines the cost of a package of retrofit measures across different non-domestic archetypes. These were mapped onto the ND-NEED rateable properties register at the local level according to a nationally representative mix of archetypes.
- Costs represent one round of retrofit. Annualised costs relate to the annual marginal expenditure across all sectors over the lifetime of a 15-year cycle of retrofit.

#### Switching away from gas heating

- Average load demand for heating across different archetypes calculated based on a combination of BEES consumption data and CCC statistics on heating systems.
- CCC publish £/kW values for capex and opex which have been applied to a scaled figure of average load demand for space heating and hot water.
- Figures represent the capex of a new heating system, whilst opex covers routine maintenance but not fuel costs. Fuel costs are only projected to constitute significant additional bills in the retail and office sectors, offering cost savings to many archetypes due to more efficient systems.
- $\circ$  Heating systems assumed to be replaced at a rate of  $1/15^{th}$  each year.
- Costs expressed represent the annualised, marginal cost between a business-as-usual gas case and a Projected Emissions Reduction Pathway transition to electrified systems. They represent the annual additional cost of electric systems versus replacement like for like with gas.

### **Transport**

As part of the Climate Change Strategy & Action Plan development, three workshops were held, and a public attitude survey published to gain stakeholder views on how York could respond to the climate emergency. A summary of the key stakeholder views relating to transport are detailed below.

	Challenge areas	
	Technical	<ul> <li>There are many concerns regarding the lack of infrastructure surrounding the support of the transitions to EVs from a technical perspective; such as the lack of charging infrastructure and a gap in the data to help estimate the required change need to meet the growing demand.</li> <li>Central hub is needed to connect more than one mode of transport e.g., one app connecting all journeys with different modes and influence decision making with costs per mode and carbon cost.</li> </ul>
	Policy	<ul> <li>Long term security of policy is impossible due to change in political parties' agendas.</li> <li>Clarification on policy on EV charging demand.</li> <li>Historic nature of the city - how to accommodate infrastructure that is compliant with guidance.</li> <li>Members of the Council may not live in the inner-city areas - who they represent may limit York's activities.</li> </ul>
£	Financial	O Funding schemes are short term - no finance in the medium/long term e.g., in 7-8 years. Umited finance to pay for new bus networks/improvements. Need funding to encourage residents to switch and enact that behaviour change and ensure offers are affordable. How to make roads safer to increase cyclist confidence, speed reduction, large vehicle restriction - limited space. 73% of survey respondents listed that an efficient and affordable public transport system should be a key objective of York's Climate Change Strategy.
	Community	Lack of education on cost of an EV - Council should encourage people to think about switching to EV through more educational opportunities.     Encourage co-creation - discuss solutions with members of the community.     Engagement with community when encouraging shorter distances.     Ethical considerations are important - fair and just transition to consider all communities.     Direct engagement with communities to challenge conceptions and drive change.
אפע	Delivery	<ul> <li>Facilitating behavior change by introducing earlier bus schedule.</li> <li>Number of residents put pressure on transport and infrastructure - puts more pressure on the NHS.</li> <li>Council to develop cycling routes through the city centre which connect to outer areas.</li> <li>People don't want to leave the safety of their vehicles, especially with the pandemic and weather is changeable.</li> </ul>

Tuno of cost	Overall investment (£m)		
Type of cost	Сарех	Opex	
Infrastructure: cars/ vans/ motorcycles	74.5	-	

Infrastructure: HGVs/ buses	38.3	-
Infrastructure: rail	3.7	_
Total infrastructure	116.5	-
New vehicles: cars/ vans/ motorcycles	433.5	-1,441.1
New vehicles: HGVs/ buses	108.4	-23.8
New vehicles: rail	30.9	-129.5
Total new vehicles	572.8	-1594.4
Efficiency measures	-	-284.7

#### **Notes & caveats**

- <u>CCC Sixth Carbon Budget</u> costings for capital expenditure and operational savings in the surface transport sector have been recast under SCATTER objectives to 2050 to give an estimate for the implications of the Projected Emissions Reduction Pathway.
- Costs represent a scaled down portion of national expenditure in each area as set out in the Sixth Carbon Budget, based on vehicle registrations in York.
- Demand reduction and modal shift objectives have been mapped from the Projected Emissions Reduction Pathway onto the expenditure, assuming all costs rise proportionally.
- The vast majority of expenditure and savings related to transport is made in the purchase and operation of new electric vehicles.
- Additional costs have also been given as part of this analysis, shown below in Table X. These are sourced from <u>DfT</u> and <u>CCC Sixth Carbon Budget</u>.
- Scaled costings have also been included for the "efficiency measures" objective from CCC modelling. It should be noted that whilst the costings are representative of similar changes within SCATTER, the details of this measure do differ and this figure should be taken with an added caveat.

### Waste

As part of the Climate Change Strategy & Action Plan development, three workshops were held, and a public attitude survey published to gain stakeholder views on how York could respond to the climate emergency. A summary of the key stakeholder views relating to waste are detailed below.

	Challenge areas	
	Technical	<ul> <li>Need to consider whether there is potential for a waste recovery plant and if it is a long-term solution, as waste is diverted from landfill and is instead generating energy. Potential to utilise existing technology but with additional infrastructure or technology should be explored - e.g. the conversion of the anaerobic digestion site.</li> <li>Ongoing technical projects to find single use plastic alternatives through University of York.</li> <li>Mycelium packaging assessing technical viability.</li> </ul>
	Policy	<ul> <li>Having consistency between households and businesses, as businesses are mandated to do recycling and sort more waste as a result.</li> <li>There's a need to be consistent in policy in infrastructure for waste, packaging and producer responsibility alongside any ongoing cost and management of waste.</li> <li>Potential policy change could include food waste.</li> </ul>
£	Financial	<ul> <li>Uptake of Re-biz programme is not as high in certain areas due to a lack of audits and grants.</li> <li>55% of respondents to the Our Big Conversation Residents survey listed cost as a key reason preventing them from reducing their carbon footprint in areas including waste.</li> </ul>
	Community	<ul> <li>Need to increase community awareness and business incentives to discourage single use plastic.</li> <li>Need for community champions who provide encouragement and education for the smallest businesses.</li> </ul>
P	Delivery	<ul> <li>The biggest issue with microplastics is their depository in natural areas, their life cycle needs to be managed.</li> <li>Time and effort into recycling different plastics and determine what can and can't be recycled.</li> <li>Greater emphasis on larger businesses, need to consider whether different language and a different approach is needed.</li> </ul>

Reduce overall volume of	
waste & increased	-56.9 (opex savings in gate fees)
recycling	

#### **Notes & caveats**

### Waste disposal

- This is based on simple modelling of future gate fees for recycling, landfill and incineration based on statistics in the 2019/20 WRAP gate fees report.
- SCATTER estimates for the volume and stream of waste are applied to current figures cast forwards to 2040.
- Gate fees represent the charge levied per tonne to dispose of waste by a given means e.g. landfill site or material recovery facility.
- Estimates do not cover the cost of collection and transport of waste. We have assumed there is no marginal cost between the two scenarios – lifetime cost of electric refuse collection vehicles (RCVs) is comparable to that of diesel RCV (see table opposite from DfT data).
- Not all payments for waste are handled purely through gate fees but this represents a useful proxy for comparative costs of increased recycling and reducing waste volumes versus the counterfactual.

### Commercial & Industrial

As part of the Climate Change Strategy & Action Plan development, three workshops were held, and a public attitude survey published to gain stakeholder views on how York could respond to the climate emergency. A summary of the key stakeholder views relating to industry are detailed below.

	Challenge areas	
	Technical	<ul> <li>Although technology already exists to capture carbon emissions, such as carbon capture storage (CCS), it is not readily available.</li> <li>Consistent demand for energy in industry provides an opportunity for a Power Purchase Agreement.</li> <li>Consistent demand for energy in industry may limit the ability to rely on renewable energy without sufficient energy storage.</li> </ul>
	Policy	<ul> <li>There is an existing Clean Growth Strategy for the UK, which should be referenced and considered.</li> <li>Most policy focused on industry is at larger geographical scales than a local authority, so the influence of CYC may be limited.</li> </ul>
£	Financial	COVID Recovery Loan Scheme from government is set to help industries hit particularly hard by the pandemic and provides an opportunity for building back better and driving low-carbon growth and low-carbon infrastructure.     Development of low-carbon infrastructure can have high associated costs.     Businesses may not have significant available funds due to COVID-19, and therefore would need financial support to implement changes.     Funding needs to be made available to businesses of all sizes.     CCS has high associate costs.
	Community	o Jobs may be created in CCS trials and low-carbon infrastructure. o May face resistance from industry without support. o There may be a skills shortage in the local workforce to install low-carbon infrastructure.
<b>9</b>	Delivery	O External reporting mechanisms provide guidance and structure to reporting. O External reporting mechanisms have high credibility and reflect well on the business. O Knowledge of low-carbon infrastructure and energy efficiency measures to be included in new builds may be limited. O Heritage and historical importance of York's landscape may limit infrastructure improvements.

SCATTER activity	Assessed cost (£m)
Industrial processes	<b>5.6</b> (capex)

### Notes & Caveats

- Cost represents the marginal capex of a low-carbon pathway for industry, scaled to Slough based on their share of national industrial fuel consumption.
- o Government pathways can be found in the <u>industrial pathways to decarbonisation</u> summary report.

# Natural Environment

	Challenge areas	
	Technical	<ul> <li>Tree planting can be used to mitigate the risk of flooding which doesn't have to be within York's boundary and can be tied into local York initiatives.</li> <li>Trees offer a nature-based solution to the warming of urban areas by providing shade.</li> </ul>
	Policy	O Under the UK's exit from the European Union, policy can move away from the Common Agricultural Policy and a provide a change in funding requirements for landowners. The requirements could focus on the public good and there could be more funding options for decarbonisation/afforestation.  The temporal period is a barrier to tree planting and tree cover reducing carbon emissions. Policy should consider that more mature trees have more significant impact but may not tie into the 2030 timeline.
£	Financial	<ul> <li>There are existing funding streams available for urban planting.</li> <li>There is an associated cost to the maintenance of trees and green space which needs to be demonstrated.</li> <li>The return on investment in the form of carbon sequestration will be more in the long-term.</li> </ul>
	Community	<ul> <li>Need to address the public view of the value of trees and how they benefit the city.</li> <li>Community engagement is very important and should be viewed as a positive upfront investment.</li> <li>Involving the community with green infrastructure initiatives engages people with nature.</li> <li>There may be disagreement and resistance to local changes, also known as "Not In My Back Yard"-ism (NIMBYSM), over the location of new trees.</li> </ul>
P	Delivery	<ul> <li>There are opportunities for rewilding and tree planting in the outer areas of York.</li> <li>Tree planting in urban areas can also look at levels of deprivation when deciding on locations to improve local areas.</li> <li>Land use availability - land under local authority ownership covers a small percentage of the district, which means that the impact tree planting can be dependent on the engagement and willingness of local landowners.</li> </ul>

SCATTER activity	Assessed cost (£m)
coverage	<b>3.9-0.77</b> (capex range depending on availability of government grant support)

#### **Notes & Caveats**

- Tree coverage and land area change under SCATTER objectives were modelled to 2030 in terms of increase in hectares of woodland.
- <u>Woodland Creation & Management Grant</u> gives costs for capex and opex per hectare of new woodland, which have been applied to the new hectares.
- Further funding opportunities for woodland creation, maintenance, management and tree health can be found <a href="here">here</a>.
- Figures represent a marginal case for Projected Emissions Reduction Pathway over BAU; the range represents the impact government grant funding may have.

## Energy

As part of the Climate Change Strategy & Action Plan development, three workshops were held, and a public attitude survey published to gain stakeholder views on how York could respond to the climate emergency. A summary of the key stakeholder views relating to energy supply are detailed below.

	Challenge areas	
	Technical	<ul> <li>Assessments from the Council should look at all renewable energy options e.g., a heat pump strategy, wind strategy.</li> <li>The use of technology should be maximised, e.g., apps that show the amount of money and carbon saved from renewable energy.</li> <li>Technology should also be used to amplify good practice e.g., apps to share case studies and tips.</li> </ul>
	Policy	<ul> <li>There is a gap in policy for new-build properties between the Local Plan and the requirements of Passivhaus. There is a need to balance Passivhaus and offering retrofitting such as loft insulation across the city, existing stock should also be focused on.</li> <li>Historic and heritage-based policy may conflict with renewable energy installation.</li> </ul>
£	Financial	<ul> <li>Energy Service Companies (ESCOs) can benefit SMEs through free or cheap audits, the development of a plan and help accessing finance to invest in upgrades. The payment then comes out of saving made from energy bills. This method is working well in Oxford but does require some initial capital investment. The ability of ESCOs to benefit small businesses may be limited.</li> <li>Funding opportunities are predominantly for larger businesses and need to be made available to small businesses.</li> <li>Need to provide a financial incentive for people/businesses.</li> </ul>
	Community	<ul> <li>Need to ensure all groups are accounted for and get a say in any transition/conversation.</li> <li>Negative view of putting in a planning application for wind turbines to the council due to negative past experiences.</li> <li>Opportunity for tying the COVID-19 recovery to initiatives.</li> <li>Role of the creative sector to reshape the heritage view of the city to now include renewable options e.g., wind turbines.</li> </ul>
P	Delivery	O Solar tiles may be more beneficial than solar panels. Implement smart grid technologies e.g., demand-side response to manage renewable energy supply/demand. Allocate small portion of new renewables to be community-owned. Carbon literacy may help with the missing conversation to promote renewable energy.

	Overall inves	Overall investment (£m)											
Renewable energy source	Сарех	Орех	Сарех	Орех									
	to 2030	to 2030	to 2050	to 2050									
Offshore wind	32.6	47.5	127.2	227.9									
Onshore wind	47.2	29	21.9	15.2									
Large-scale PV (>10kW)	3.5	2.4	8.3	6									
Small-scale PV (<10kW)	136.3	27.9	398	76									
Hydroelectric	8	4.8	8.4	5.1									
Total	227	111	563.7	330.2									

### **Notes & Caveats**

- The Projected Emissions Reduction Pathway for installed capacity across different renewable energy types
  has been cost modelled according to a <u>BEIS report</u> on the development of new installations.
- Costs of installation and maintenance are in constant flux; two benchmark constructing years (2030 & 2050) have been chosen from BEIS data and compared against capacities within the Projected Emissions Reduction Pathway
- It is important to acknowledge that not all costs are incurred by a single stakeholder, since larger installations are government funded and smaller scale PV installations are paid for by households and businesses.
- o Figures below indicate the scale of investment in renewable energy each year in order to meet the capacity targets set out by the Projected Emissions Reduction Pathway.

# Date Tables

Local Authority territoria	al CO <sub>2</sub> emissions estimates	2005-2019 (kt CO <sub>2</sub> ) - Full d	dataset																											
Region/Country	Second Tier Authority  Vork	Local Authority  York	Code	Year Indus	itry Industry Ga	Coner Polits	Large Industrial Agric Installations	alture Industry Total	Commercial (Electricity	Commercial Comm Gas 'Other!	Fuels' Total	Public Sector Se Electricity	Public Public Sector Gas Other F	olic Public tor Sector Fuels' Total	Domestic Electricity	Domestic Dor Gas 'Othe 259.7	messic or Fuels, Domestic	Road Total Transport (A roads) (	Road Ro Transport (Mi Motonways) roa	ad sport Diesel nor Railways ds)	Transport T Other	ransport N Total Foresi	et Net itons: Emissions: I land Cropland	Net I Emissions: Emis Grassland We	Net Net ssions: Emissions: stlands Settlements	Net Emissions: LULUC Harvested Net Wood Emission Products	Grand Total	Population (000s, mid- year estimate) •	0	Emissions per km² (kt)
	York York	York York	E06000014 E06000014		52.4 49. 49.1 33.	8 27.4	2.6 2.6	6.5 138 5.9 117		110.0	0.5 287.3 0.5 239.3	51.3	55.7 37.0	1.1 108.1		251.5 236.0		458.1 198.1 438.5 196.9		104.9 7.8 108.6 8.0		314.5 316.1	-7.6 9.2 -7.6 8.8	-11.0 -11.2	0.0 5.5	0.0	-4.0 1,302.8 -4.7 1,193.2	189.0	6.9 27	
				2008	48.7 32		0.1	6.0 100	.5 164.4	71.2	0.5 236.1	47.7	36.1	0.8 84.6		244.3		439.1 182.8	0.0	107.2 8.1	3.7	301.8	-7.7 8.8	-11.4	0.0 5.2		-5.1 1,166.1	190.8	6.1 27	
			E06000014	2009	44.8 27.	3 19.1	0.3	5.8 97	2 151.3	60.2	0.4 211.9	43.9	30.5	0.6 74.9		223.0	13.8	402.0 177.1 435.0 174.4	0.0	103.6 8.2	3.7	292.6	-7.7 8.9	-11.5	0.0 5.0	0.0	-5.2 1,073.5	192.4	5.6 27	
			E06000014	2010	48.5 31. 43.3 26.	8 18.0	0.0	5.9 94	.1 163.6	55.6	0.4 232.5	42.8	28.9	0.4 <b>82.6</b> 0.8 <b>72.4</b>		249.2 206.6	15.1	435.0 174.4 382.3 170.5	0.0	103.9 8.1	3.8	290.3	-7.7 8.7 -7.8 8.6	-11.8	0.0 5.0	0.0	-5.7 1,140.7 -6.1 1,034.7	195.1	5.8 27 5.2 27	2.0 4.
		York	E06000014	2012	43.6 17.	0 19.9	0.3	5.8 86	6 148.2	65.5	0.3 214.1	44.6	42.5	0.5 87.6	6 172.9	226.8	12.7	412.4 172.1	0.0	102.7 8.1	3.7	286.5	-7.6 8.5	-12.0	0.0 4.9	0.0	-6.3 1,080.9	199.6	5.4 27	2.0 4
	York	York	E06000014	2013	40.6 30.	8 17.7	0.1	5.3 94	.4 139.8 .6 124.9	74.3	0.3 214.4	40.9	35.4 29.3	0.3 <b>76.6</b> 0.4 <b>66.4</b>		229.5 193.6	13.7	399.4 168.8 338.7 169.0	0.0	105.3 8.0	3.8	285.9	-7.6 8.3 -7.7 8.0	-12.3	0.0 4.7		-6.9 1,063.8 -7.2 966.0	202.1	5.3 27 4.7 27	
		York	E06000014	2015	29.1 50.	0 20.2	0.1	5.7 105	.0 97.0	46.7	0.6 144.3	28.9	30.4	0.2 59.5	5 112.5	204.0	12.7	329.2 174.7	0.0	112.9 8.2	4.0	292.4	-7.8 8.0	-12.6	0.0 4.7	0.0	-7.7 930.2	205.8	4.5 27	
	York	York	E06000014		22.3 51.		0.2	5.8 100		46.9	0.5 125.3	22.7	29.7	0.2 52.6		209.9		314.4 175.5	0.0	120.1 8.2		307.9	-7.8 7.9	-12.6	0.0 4.8		-7.7 892.8			2.0 3
	York		E06000014	2017	22.2 34	5 20.4	0.1	5.8 83	6 68.7	51.7	0.2 118.5 0.6 114.8	19.3	24.7	0.3 44.2 0.3 47.6		203.2	12.5	294.5 178.4 293.6 170.0	0.0	121.8 8.1	4.2	312.6 312.4	-7.8 7.9 -7.8 7.7		0.0 4.6		-8.2 844.7 -8.6 839.4	208.2		2.0 3
Yorkshire and the Humber	York	York	E06000014		17.2 33	1 19.8	0.1	6.3 76	.5 58.3	47.7	0.5 104.5	16.8	24.3	0.2 41.3		208.5		284.1 165.8	0.0	132.6 7.1		309.8	-7.8 7.8	-13.2	0.0 4.5	0.0	-8.6 807.6			2.0 3.
Region/Country	Second Tier Authority	Local Authority	Code	Year	industr Electricit	y Industry (	Sas Industry C	ther Large Indu Installati	strial ns Agriculti	re Industry To	otal Commercia	l Commerci Gas	al Commercia 'Other Fuel	al Commercia is' Total	al Public Sect Electricity		ctor Public Se 'Other Fu	ctor Public Secto els' Total	r Domestic Electricity	Domestic Gas	Domestic 'Other Fuels'	Domestic R Total	oad Transport Roe (A roads) (M	ad Transport Ti linor roads)	ransport Tran Other To	sport Grand Tot	Population al ('000s, mid- year estimate	Per Capita Emissions (t)	Area (km²)	Emissions pe km² (kt)
		-	74		×	E .	v	×	·	v	E		v			v	E .	v			V	E		×	E	v	*		E	F
	York	York	E06000					27.9	0.0		34.7 174 33.6 171			0.7 <b>287</b> 0.5 <b>287</b>			56.8 55.7	1.6 109.			15.6		198.0	104.5	3.5	306.1 1,25 306.7 1,25				4.1
	York		Energy					27.2	0.0		13.2 16			0.5 239			37.0	0.9 86.	.1 188.8		13.8		198.1	104.9	3.6	308.7 1,25				4.
	York		E06000					22.5	0.0		07.1 16			0.5 236				0.8 84			14.6		182.8	107.2	3.7	293.7 1,16				4.
							27.3	19.1	0.0		94.8 15			0.4 211				0.6 74			13.8		177.1	103.6	3.7	284.4 1,06				3.
				014 2	1010	48.5	31.0	20.9	0.0	3.7 10	04.1 163	3.6 6	8.5	0.4 232	2.5 4	7.5	34.7	0.4 82	6 170.8	3 249.2	15.1	435.0	174.4	103.9	3.8	282.0 1,13	16.2 195.	1 5.8	272.0	4.
	York		E06000	014 2	1011	43.3	26.8	18.0	0.0	3.8 1	91.8 15	0.3 5	5.6	0.4 206	6.2 4	2.8	28.9	0.8 72	4 162.8	206.6	12.9	382.3	170.5	103.4	3.8	277.6 1,03	10.4 197.	8 5.2	272.0	3.
	York	York	E06000	014 2			17.0	19.9	0.0	3.9	84.4 14	3.2 €	5.5	0.3 214		4.6	42.5	0.5 87	6 172.9	226.8	12.7	412.4	172.1	102.7	3.7	278.4 1,07	<b>16.9</b> 199.	6 5.4	272.0	4.
	York		E06000				30.8	17.7	0.0					0.3 214				0.3 76.			13.7		168.8	105.3	3.8	277.9 1,06				3.
	York	York	E06000				50.0	19.1	0.0		87.8 124 03.3 9			0.4 186				0.4 66			12.7	338.7 329.2	169.0	111.2	3.9		3.2 203. 8.1 205.		2.2.0	3.
	York		E06000					20.0	0.0					0.5 125				0.2 52			12.6	314.4	175.5	120.1	4.0		0.6 206.			3.
				014 2	1017	22.2	34.5	20.4	0.0	4.2	81.3 66	5.7 5	1.7	0.2 118	8.5 1	9.3	24.7	0.3 44	2 78.8	203.2	12.5	294.5	178.4	121.8	4.2	304.5 84	3.1 208.	2 4.1	272.0	3.
	York		E06000	014 2	1018	20.8	32.4	20.6	0.0	4.2	78.0 6:	3.5 5	0.7	0.6 114	4.8 1	8.0	29.3	0.3 47	.6 71.5	209.4	12.7	293.6	170.0	130.5	4.2	304.7 83	18.7 209.	9 4.0	272.0	3.
Yorkshire and the Humber	York	York	E06000	014 2	1019	17.2	33.1	19.8	0.0	4.2	74.3 5	5.3 4	7.7	0.5 104	4.5 1	6.8	24.3	0.2 41.	3 63.5	208.5	12.2	284.1	165.8	132.6	4.3	302.7 80	210.			3.1
Pollution Inv	ity	Operator			Site		Postco	de_ Ref	erence	Subsi	tance Nam	e _											_		_				CO <sub>2</sub> emiss	
Distract Nam York	British Sugar	<u> </u>	York			,		F AA25	٧	Carbon diox			59.31		20	07	2008	2009	2010	20	1	2012	2013	2014	2015	2016	201	7 💌 20	018 💌	2019
York	British Sugar	Plc	York				YO26 6X	F BW92	39IF (	Carbon diox	xide - 'therm	al'		57.	.29	80.64														
York	Nestle UK Ltd	ı	York				YO91 1X	Y BO92	98IQ (	Carbon diox	xide							30.1	9 32	2.70	30.95	26.67	26.78	30.5	58 29	.55 25	.67 2	24.80	31.68	32.3
York	Nestle UK Ltd	ı	York				YO91 1X	Y BO92	98IQ (	Carbon diox	xide - 'therm	al'					43.84													
York	Yorkshire Wa	ter Services Ltd	York	Naburn S	TW		YO23 2X	D 27/24	0124 (	Carbon diox	xide							10.1	8											
York	Yorwaste I td		York				VO23 3E	R BK05	71R (	Carbon diox	vida		13.70	1							0.03									

https://www.gov.uk/government/statistics/uk-local-authority-and-regional-carbon-dioxide-emissions-national-statistics-2005-to-2019

The tables below set out the IPCC sectors from the UK GHGI which are included in each of the LA CO2 sector categories, including the specific fuels or other sub-categories where necessary.

LA CO <sub>2</sub> Sector	CC or other scope Scope
Industry Electricity	Non-domestic, as per BEIS subnational gas statistics
	sub-national-methodology-guidance.pdf
	Some large users included in 'Unallocated' purchases from high voltage lines
Industry Gas	Further split using IDBR data for SIC07 subsections 01-32, 35-39 & 42  Non-domestic, as per BEIS subnational gas statistics
,	sub-national-methodology-guidance.pdf
	Some large users included in 'C. Large Industrial Installations'
	Further split using IDBR data for SIC07 subsections 01-32, 35-39 & 42
Large Industrial Installations	Large industrial installations excl. gas combustion - from e.g. EUETS, IPPC & EEMS  Large gas users excluded from BEIS subnational dataset
Industry 'Other Fuels'	1A2 Blast furnace gas
	1A2 Burning oil
	1A2 Coal
	1A2 Coke
	1A2 Coke oven gas 1A2 DERV
	1A2 Fuel oil
	1A2 Gas oil
	1A2 LPG
	1A2 Lubricants
	1A2 OPG 1A2 Petrol
	1A2 Petroleum coke
	1A2 Scrap tyres
	1A2 Waste
	1A2 Waste oils
	1A2 Waste solvent
	1A4a Burning oil (Railways - stationary combustion)  1A4a Coal (Railways - stationary combustion)
	1A4a Fuel oil (Railways - stationary combustion)
	1A4a Gas oil (Railways - stationary combustion)
	286
	287 288
	2B8 2C3
	2D4
	5C1
Agriculture	1A4c Burning oil
	1A4c Coal 1A4c Fuel oil
	1A4c Fuel Oil
	1A4c Petrol
	3H
Commercial Electricity	Non-domestic, as per BEIS subnational gas statistics
	sub-national-methodology-guidance.pdf
	Some large users included in 'Unallocated' purchases from high voltage lines Further split using IDBR data for SIC07 subsections 33, 41, 43-82, 88-96
Commercial Gas	Non-domestic, as per BEIS subnational gas statistics
	sub-national-methodology-guidance.pdf
	Some large users included in 'C. Large Industrial Installations'
Commercial 'Other Fuels'	Further split using IDBR data for SIC07 subsections 33, 41, 43-82, 88-96
Commercial Other Fuels	1A4a Burning oil (Miscellaneous industrial/commercial combustion)  1A4a Coal (Miscellaneous industrial/commercial combustion)
	1A4a Fuel oil (Miscellaneous industrial/commercial combustion)
	1A4a Gas oil (Miscellaneous industrial/commercial combustion)
Public Sector Electricity	Non-domestic, as per BEIS subnational gas statistics
	<u>sub-national-methodology-quidance.pdf</u> Some large users included in 'Unallocated' purchases from high voltage lines
	Further split using IDBR data for SIC07 subsections 84-87
Public Sector Gas	Non-domestic, as per BEIS subnational gas statistics
	sub-national-methodology-guidance.pdf
	Some large users included in 'C. Large Industrial Installations'
Public Sector 'Other Fuels'	Further split using IDBR data for SIC07 subsections 84-87
Public Sector Other Fuels	1A4a Burning oil (Public sector combustion)  1A4a Coal (Public sector combustion)
	1A4a Fuel oil (Public sector combustion)
	1A4a Gas oil (Public sector combustion)
Domestic Electricity	As per BEIS subnational electricity statistics
D	sub-national-methodology-guidance.pdf  As per BEIS subnational gas statistics
Domestic Gas	As per BEIS subnational gas statistics  sub-national-methodology-guidance.pdf
Domestic 'Other Fuels'	1A4b Anthracite
	1A4b Burning oil
	1A4b Coal
	1A4b Coke
	1A4b DERV 1A4b Gas oil
	1A4b LPG
	1A4b Peat
	1A4b Petrol
	1A4b Petroleum coke
	1A4b SSF 2D2
Road Transport (A roads)	1A3b (A roads) Petrol/DERV
Road Transport (Motorways)	1A3b (Motorways) Petrol/DERV
Road Transport (Minor roads)	1A3b (Minor roads) Petrol/DERV
Diesel Railways	1A3c Gas oil
Transport Other	1A3b Lubricants
	1A3b Lubricants 1A3c Coal
	1A3d
	1A3e
Net Emissions: Forest land	4A
Net Emissions: Cropland	48
Net Emissions: Grassland Net Emissions: Wetlands	4C 4D
INCL EITHSSIUHS, WELIGHUS	
Net Emissions: Settlements	4E

IPCC code	IPCC name
1A2a	Iron and steel
1A2b	Non-Ferrous Metals
1A2c	Chemicals
1A2d	Pulp Paper Print
1A2e	food processing beverages and tobacco
1A2f	Non-metallic minerals
1A2gvii	Off-road vehicles and other machinery
1A2gviii	Other manufacturing industries and construction
1A3bi	Cars
1A3bii	Light duty trucks
1A3biii	Heavy duty trucks and buses
1A3biv	Motorcycles
1A3bv	Other road transport
1A3c	Railways
1A3d	Domestic navigation
1A3eii	Other Transportation
1A4ai	Commercial/Institutional
1A4bi	Residential stationary
1A4bii	Residential: Off-road
1A4ci	Agriculture/Forestry/Fishing: Stationary
1A4cii	Agriculture/Forestry/Fishing: Off-road
2A1	Cement Production
2A2	Lime Production
2A3	Glass production
2A4a	Other process uses of carbonates: ceramics
2A4b	Other uses of Soda Ash
2B1	Ammonia Production
2B1	Chemical Industry: Ammonia production
2B6	Titanium dioxide production
2B7	Soda Ash Production
2B8c	Ethylene Dichloride and Vinyl Chloride Monomer
2B8d	Ethylene Oxide
2B8f	Carbon black production
2B8g	Petrochemical and carbon black production: Other
	Steel
2C1a	Sinter
2C1d 2C3	Aluminium Production
2D1	Lubricant Use
2D2	Non-energy products from fuels and solvent use: Paraffin wax us
2D3	Non-energy products from fuels and solvent use: Other
2D4	Other NEU
2G4	Other product manufacture and use-baking soda
3G1	Liming - limestone
3G2	Liming - dolomite
3H	Urea Application
4A1	Forest Land remaining Forest Land
4A2	Land converted to Forest Land
4B1	Cropland Remaining Cropland
4B1	Cropland Remaining Cropland
4B2	Land converted to Cropland
4C1	Grassland Remaining Grassland
4C2	Land converted to Grassland
4D1	Wetlands remaining wetlands
4D2	Land converted to wetlands
4E1	Settlements remaining settlements
4E2	Land converted to Settlements
4G	Harvested Wood Products
5C1.2b	Non-biogenic: Clinical waste
5C1.2b	Non-biogenic: Other Chemical waste

# Renewable electricity: number of installations at Local Authority Level

	0 Local Authority Name	Region	Estimate number of Country household	f	Onshore Wind	Hydro		Offshore Wind		Sewage Gas Land			Animal Biomass	Plant Biomass	Cofiring	Total
2020 E06000014	York	Yorkshire and The Humber	England 84,	12 3,30	1 6	-	-	-	-	2	2	-	-	-	-	3,311
2019 E06000014	York	Yorkshire and The Humber	England 84,	12 3,28	8 6	-	-	-	-	2	2	-	-	-	-	3,298
2018 E06000014	York	Yorkshire and The Humber	England 84,	12 3,18	3 6	-	-	-	-	2	2	-	-	-	-	3,193
2017 E06000014	York	Yorkshire and The Humber	England 84,	12 3,13	5 6	-	-	-	-	2	2	-	-	-	-	3,145
2016 E06000014	York	Yorkshire and The Humber	England 84,	12 3,08	5 6	-	-		-	2	2	-	-	-	-	3,095
2015 E06000014	York	Yorkshire and The Humber	England 84,	12 2,94	4 6	-	-	-	-	2	2	-	-	-	-	2,954
2014 E06000014	York	Yorkshire and The Humber	England 84,	12 2,38	6 7	-	-	-	-	2	2	-	-	-	-	2,397

# Renewable electricity: Installed Capacity (MW) at Local Authority Level

	Local Authority				stimated imber of				Anaerobic	Offshore			ı	Municipal	Animal	Plant		
	Code	Local Authority Name	Region	Country hou	useholds	Photovoltaics	Onshore Wind	Hydro	Digestion	Wind	Wave/Tidal	Sewage Gas L	andfill Gas	Solid Waste	Biomass	Biomass	Cofiring	Total
202	0 E06000014	York	Yorkshire and The Humber	England	84,212	12.424	0.043	-	-	-	-	0.717	7.119	-	-	-	-	20.302
201	9 E06000014	York	Yorkshire and The Humber	England	84,212	12.1	0.0	-	-	-	-	0.7	7.1	-	-	-	-	20.0
201	8 E06000014	York	Yorkshire and The Humber	England	84,212	11.6	0.0	-	-	-	-	0.7	7.1	-	-	-	-	19.5
201	7 E06000014	York	Yorkshire and The Humber	England	84,212	11.4	0.0	-	-	-	-	0.7	7.1	-	-	-	-	19.3
201	6 E06000014	York	Yorkshire and The Humber	England	84,212	11.1	0.0	-	-	-	-	0.7	7.1	-	-	-	-	19.0
201	5 E06000014	York	Yorkshire and The Humber	England	84,212	10.7	0.0	-	-	-	-	1.1	7.1	-	-	-	-	19.0
201	4 E06000014	York	Yorkshire and The Humber	England	84,212	8.5	0.1	-	-	-	-	1.1	7.1	-	-	-	-	16.8

# Renewable electricity generation: (MWh) at Local Authority Level

Local Authority Code	Local Authority Name	Region	nun	imated nber of seholds	Photovoltaics	Onshore Wind	Hydro	Anaerobic Digestion	Offshore Wind	Wave/Tidal	Sewage Gas	Landfill Gas	Municipal Solid Waste	Animal Biomass	Plant Biomass	Cofiring	Total
2020 E06000014	York	Yorkshire and The Humber	England	84,212	12,213.716	115.613	-	-	-	-	4,258.048	23,021.000	-	-	-	-	39,608.377
2019 E06000014	York	Yorkshire and The Humber	England	84,212	11,181	93	-	-	-	-	5,198	28,665	-	-	-	-	45,138
2018 E06000014	York	Yorkshire and The Humber	England	84,212	11,309	90	-	-	-	-	4,269	28,003	-	-	-	-	43,670
2017 E06000014	York	Yorkshire and The Humber	England	84,212	98,585	357	-	-	-	-	4,503	31,061	-	-	-	-	134,507
2016 E06000014	York	Yorkshire and The Humber	England	84,212	96,738	358	-	-	-	-	4,685	33,587	-	-	-	-	135,368
2015 E06000014	York	Yorkshire and The Humber	England	84,212	8,755	107	-	-	-	-	4,275	34,715	-	-	-	-	47,852
2014 E06000014	York	Yorkshire and The Humber	England	84,212	7,316	269	-	-	-	-	3,762	35,233	-	-	-	-	46,581

https://www.gov.uk/government/statistics/regional-renewable-statistics

SUC Concurring Integrated Starwhere NOS Statendard Conditionand Combination of notation level
Not Estimated Confidential
Confidential
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3

types of emissions factors	IPCC III (MCGACH)	2029	i										
C. Emission sources and emissions			Direct (fast							Child Warning February 1 21 218			
tedar .	\$1.00 GACTON	or see- trs. Description of activity /facility	conduction) or inductional energy or Ethe	ATMENTAL A		Description of entertain course	Emissions factors (kg gas)			Enecoses (syccos)	Notation keys	Explanation for notation key	
Malinary energy	Neuderta' buildings	Domestic space heating and hot water	Direct	Amount (2009) 1477.10 (180).290	Unit MATTER data reference	Cora source  Dementic space-heating and his water Coal  Mayor one ordering Coal	Execute factor reference	CO2 CHE N20	DAM AND GOOD ON BEST 2000 Greenbase and	CG3 CM NJO F	1877.181 MCON		Energy consumption in the UK RICUIT data
			DIRECT	6,458.60 27,613,715 199,318.41 1,081,564,917	EWIN DATA_SCUE EWIN DATA_SCUE EWIN DATA_SCUE EWIN DATA_SCUE EWIN DATA_SCUE	Schedic space heating and Not wines. Moreover products. Strate one ordinariors sub- Schedic space heating and Not water, due the control of the state one ordinariors sub-	Mosi Naturalgas	0.555 0.235 0.000	D 286 EVAN (Gross CV) BETS, 2020, Granchouse gas: D 286 EVAN (Gross CV) BETS, 2020, Granchouse gas:	Parting 66 6,020,000 18,000 18,200 - 19,000 10,000 -	6,018,599 (4CO29 199,218,610 (4CO29		Energy Concumption in the UK (ECUK) Eat. Energy Concumption in the UK (ECUK) Eat.
			Direct Other	18,727.05 65,365,509 639.78 68,380,522 262.09 4,865,090	END SAFA ECUE END SAFA ECUE	Docenetic space-insisting and first waters, the Strictly  Sciencetic space-insisting and first waters (seeing & wastes:  Sciencetic space-insisting and first waters (seeing & wastes:  Sciencetic space-insisting and first waters (social  Sciencetic space-insisting and first waters, social  Science	Bones trac/trae Coal-Jamers) sct	0.001 0.001	D 256 CAYS BETT, 2000 Greenhouse gas D 2001 EVEN BETT, 2000 Greenhouse gas D 2500 EVEN (Green CV) BETT, 2000 Greenhouse gas	maning of 14374,000 \$2,000 \$8,001	56,767 64,039 688,788 64,039 362,687 64,039		Energy concumption in the UK (BCUK) data Energy concumption in the UK (BCUK) data Energy concumption in the UK (BCUK) data
			Other Other	1,765.84 27,602,715 25,908.04 1,080,564,917	EMP DATA SCUE	Donectic space heating and hot wider, Petrolleum products. House one references tab.  Scientic space heating and hot wider, Stor. House one reference tab.  Scientic space heating and hot wider, Stor.	Novijski Novijskisti	0.022 0.000 0.000	B DBE KNIN (Grass CV) BEIS, 2000. Granchouse gas B DBE KNIN (Grass CV) BEIS, 2000. Granchouse gas	maning co	25,806,017 lgCO2#		Energy concumption in the UK (SCUK) data Energy concumption in the UK (SCUK) data Energy concumption in the UK (SCUK) data
		Domestic lighting, appliances, and cooking	Cthe/ DHKT	776-21 68,880,922 NO	END DATA SCUE	Domestic Space-heating and hot water, Bloenergy & waster. House one information stable Domestic lighting, appliances, and cooking, Coal . Hence one information to the coal coal coal coal coal coal coal coal	Biomara Grass/Mow Scill Cool (domestic)	0.805 0.026 0.006	C 555 NWN ESTS, 7000 Greenhouse gas C 365 NWN JORGE CVJ BESS, 7000 Greenhouse gas	myating ca	776,000 kgC02# kgC02# 5/0	No coal graduats reported useffor highing, appliances and cooking in the UK in SCUK data.	Energy concuration in the UK (SCUK) data Energy concuration in the UK (SCUK) data
			Diect Diect Volence	MD 28,006,710 60,821,55 29,006,710	WE DATA SCUE	Domestic lighting, applicates, and cooking: Petroleum graducts: Minors are information to Domestic lighting, applicates, and cooking; day. Minors to information to Domestic lighting, applicates, and cooking; the tracks.	Nosi Saturalgia Electronizarientes	0.292 0.000 0.001 0.184 0.000 0.000 0.294 0.001 0.001	D. 255   KWN (Street CV)   Edits, 2020: Chrenhouse gas     D. 255   KWN (Street CV)   Edits, 2020: Chrenhouse gas     D. 256   KWN   Street CV   Edits, 2020: Chrenhouse gas	Page Tag Col   4,858,236   6,867   2,665	- IgC02# NO 4,862,22# IgC02# 60,821,555 NaC02#	No petalaum products reported used for lighting, appliances and cooking in the U.K in SCUIL data.	Energy consumption in the UK (BCUK) data Energy consumption in the UK (BCUK) data Energy consumption in the UK (BCUK) data
			Direct Other	MD .	ENG DATA SCUE	Comedic lighting, appliances, and cooking: Bioenergy & wastes: Processes and engineering talk Comedic lighting, appliances, and cooking: Coal Processes are referenced talk	Bones bres/brow Coal (domertic), Scill	1 1 1	0.009 kWh Street CV 8811, 2020. Greenhouse gas 0.005 kWh Street CV 8811, 2020. Greenhouse gas	manthy co	- NCO24 NO	No biomergy reported used for lighting, appliances and cooking in the UK:n BCUK data.  No cook products reported used for lighting, appliances and cooking in the UK:n BCUK data.	Energy concumption in the UK (ECUK) data Energy concumption in the UK (ECUK) data
			Other Other	602.84 26,406,722 9,204.14 297,956,005	MAN DAYA SCUK	Ocenedic lighting, applicates, and cooking. Petroleum products: Proces are information to Demedic lighting, applicates, and cooking, doc. Demedic lighting, applicates, and cooking, the Chicky Proces are information to Process are information to Proc	Notice Sci National Sci Electrolygenerated Sci	0.002 0.000 0.000	C DES VANN (Grant CV) ESTS, 2005. Corentations gas C DES VANN (Grant CV) ESTS, 2005. Corentations gas C DES VANN (Grant CV) ESTS, 2005. Corentations gas	maning on maning on maning on 5,128,199 11,898 28,555	632,841 lgC02# 9,204,181 lgC02#	No person-products reported used for lighting, applicates and cooling in the UK in ECULUARS.	Energy concumption in the UK (SCUK) data Energy concumption in the UK (SCUK) data Energy concumption in the UK (SCUK) data
	Commercial buildings & facilities	Commercial space heating, cooling, and hot water	Died Died	50 - 228.95 958,178	ENR DATA_SCUE	Connectic lighting, appliances, and cooking, Bloenergy & worder. Financian one information talls Connected space heating, cooking, and hot worse, Perturbating products. Financial or information talls	Biomass Grass/Straw_Sc2 Mosil	0.393 6.000 0.001	0.055 kWh Street CV 8813, 2020. Greenhouse gas 0.286 kWh Street CV 8813, 2020. Greenhouse gas	maning on 222,633 690 632	223,865 IgC02e 50	No biomenty reported used for lighting, appliances and cooking in the UK in ECUK data.	Energy concumption in the UK (ECUK) data Energy concumption in the UK (ECUK) data
			indirect Dated	11,884.09 64,540,754 28.00 67,581	END DATA_SCUE	Commencial space heating, cooling, and hot water, Electricity throat one reference table Commencial space heating, cooling, and hot water, Electricity throat one reference table Commencial space heating, cooling, and hot water, Cool throat one reference table	Electricity generated Cook (domectic)	0.354 0.000 0.001 0.355 0.334 0.004	C 256 CW1 SETS, 7000 Greenhouse gas     C 265 KWh (Groot CV) SETS, 7000 Greenhouse gas	Separation of 11,786,518 28,951 61,000 - 1 (1,900 to 21,768 1,788 296 -	11,886,689 NgCO29 28,287 NgCO29		Energy concumption in the UK (BCUK) data Energy concumption in the UK (BCUK) data
			Other Other	6034 958,178 8,058,75 126,254,817	END DATA SCUE	Commercial space heating cooking another water Persistents products throug one references table commercial space heating cooking another water date. However one references table through the control of the cooking another water date.	Most Sci	0.001 0.000 0.000	6.06E kWh (Gross CV) 8ES, 2000. Grandboor gas 6.00E kWh (Gross CV) 8ES, 2000. Grandboor gas	myoting co	65,518 lgC02# 8,518,751 lgC02#		Energy concumption in the UK (SCUK) data Energy concumption in the UK (SCUK) data Energy concumption in the UK (SCUK) data
		Commercial lighting, appliances, equipment, and catering	Dieci Dieci	136 67,82 116.66 699,312	KWI DAYA SCUK	Commercial cyace heating, cooling, and hot water, Cool  Commercial lighting, appliances, equipment, and catering. Percolauming throat one information talls	Coal (domectic) Scill Petral	0.393 0.000 0.001	6.000 kWh (Gross CV) BEID, 2020. Greenhouse gas 6.200 kWh (Gross CV) BEID, 2020. Greenhouse gas	#3010g GE 131,868 ES E28	2363 bgC029 236658 bgC029		Energy concumption in the UK (ECUK) data Energy concumption in the UK (ECUK) data
			Sident DiskI	######################################	HAR SAYA BOUK	Commercial lighting, appliances, equipment, and Caltering data. Private one information follows:  Commercial lighting, appliances, equipment, and Caltering (Section):  Commercial lighting, appliances, equipment, and Caltering (Social Finances one information follows):	thiction generated (out (domestic)	0.184 0.000 0.000 0.294 0.000 0.001 0.105 0.228 0.004	0.256 (NW) (Select CV) BEIG, 2020: Expenditure gas 0.256 (NW) (Select CV) BEIG, 2020: Expenditure gas 0.365 (NW) (Select CV) BEIG, 2020: Expenditure gas	myseling col   \$4,002,000   2,000   2,000   1,000	\$1,00,710 bgC02+ - bgC02+ 80	No coal products reported used for commercial I institutes will lighting an appliances in the SIX according to SCUX SIXs.	Energy consumption in the UK (ECUK) data Energy consumption in the UK (ECUK) data Energy consumption in the UK (ECUK) data
			Other Other	81.53 699,312 605.90 25,800,751	SWIP DAVY BOTH SWIP DAVY BOTH SWIP DAVY BOTH SWIP DAVY BOTH SWIP DAVY BOTH SWIP DAVY BOTH SWIP DAVY BOTH	Commercial lighting appliance, equipment, and catering Petroleumpe financine references table commercial lighting appliance, equipment, and catering day. Mosar one origination table	Novijski Novijskjiki	0.001 0.000 0.000	B DBE KNIN (Grass CV) BEIS, 2000. Granchour gas B DBE KNIN (Grass CV) BEIS, 2000. Granchour gas	maning or	81,530 lgCO2# 605,887 lgCO2#		Energy concumption in the UK (SCUK) data Energy concumption in the UK (SCUK) data Energy concumption in the UK (SCUK) data
	snottutional buildings & facilities	Institutional space, heating and hot water	Cthe/ DHKT	NO 66.65 190,394	SWIN DAMA SCUR	Commercial lighting applicance, equipment, and catering Coal Ministrator information table institutional space heating, cooling, and hot water, Petroleum products. Forces one information table	Coal (domestic) Scit Mesui	0.282 0.000 0.001	0.000 kWh (Gross CV) BEIS, 2000. Grandwar gas 0.286 kWh (Gross CV) BEIS, 2000. Grandwar gas	Parting on 44,992 187 126	- 62CO2# NO 46,656 NgCO2#	No coal products repensed used for commercial / avoitational lighting or appliances in the CVX according to SCLXX data.	Energy concuration in the UK (SCUK) data Energy concuration in the UK (SCUK) data
			Direct Direct	30,036.64 338,905,072 2,488.68 8,540,018 MD	NAME DATA SCUR NAME DATA SCUR NAME DATA SCUR	Inditational opace heating, cooking, and hot wader, disc.  Ministrational opace heating, cooking, and hot wader, Shothiday.  Ministrational opace heating, cooking, and hot wader, Shothiday.  Ministrational opace heating, cooking, and hot wader, Cool.  Ministrational opace heating, cooking, and hot wader. Cool.  Ministrational opace heating, cooking, and hot wader. Cool.  Ministrational opace heating, cooking, and hot wader. Cool.	Naturalgas Electricity generated Coal Moments	0.184 0.000 0.000 0.354 0.000 0.001 0.805 0.036 0.006	D. 256 Vehi (Street CV)	### 15   15   15   15   15   15   15   1	2,688,629 lgCO29 - lgCO29 lgCO29	No coal analysis received used for commercial / institutional heating in the VX according to 6 CVX data.	Energy consumption in the UK (BCUK) data Energy consumption in the UK (BCUK) data Energy consumption in the UK (BCUK) data
			Other Other	13.02 180,160 2,606.16 208,905,072	ENG DATA SCUE	Institutional space heating, cooling, and hot water, Petrolleum products. Procur one inferiorist tab- institutional space heating, cooling, and hot water, data. Hence one inferiorist cab.	Novijski Navolga, skil		D DEE KWN (Groot CV) BETS, 2000. Greenhouse gas D DEE KWN (Groot CV) BETS, 2000. Greenhouse gas	manthy co	12,656 agCO2# 2,604,159 agCO2# 368,608 agCO2#		Energy concumption in the UK (ECUK) data Energy concumption in the UK (ECUK) data
		INSTRUDORAL Beforing, appliances and cooking	Cther Direct	NO 5.88 22,997	689 DATA_SCUK	Indicational opace feating, cooling, another worse; Cool Indicational opace feating, cooling, another worse; Cool Indicational opace feating, cooling, another worse; Cool Indicational spring, appliances, equipment, and catering. Petroleumpe floors are information too	Coal (domestic), Scill People	0.20 0.00 0.001	D. DEG EVEN (Gross CV) BEIG, 2005. Greenhour gas D. ZEE EVEN (Gross CV) BEIG, 2005. Greenhour gas	( ppoling col	3,875 (4,02)	No coal graduats reported used for commercial / incitiational heating in the DK according to ECDK data.	Energy concuration in the UK (ECUK) data Energy concuration in the UK (ECUK) data
			Direct Direct	2,606.87 15,862,815 7,895.51 28,981,811	EMP. SAFA_ECUE	Inditational lighting appliances, equipment, and catering das. House one inferior call inditational lighting appliances, equipment, and catering thicknoby. Mosaic one inferior call	Naturalgas Discharge generated	0.382 0.000 0.001 0.386 0.000 0.000 0.386 0.000 0.001 0.355 0.000 0.001	C 265 KWh (Groot CV) BETS, 2020. Greenhouse gas C 256 KWh BETS, 2020. Greenhouse gas	Apparing on 2,804,567 8,812 1,888 - 1 Apparing on 7,817,560 18,807 88,809 -	7,893,508 NgCO2#		Energy consumption in the UK (ECUK) data Energy consumption in the UK (ECUK) data
			Other Other	1.45 22,997 379.75 15,882,835	SIND DAMA SCUE	MODILLOCAL Ighting, applicance, equipment, and Catering, Petroleump of Processor Color MODILLOCAL Ighting, applicance, equipment, and Catering, Technology of Processor Color MODILLOCAL Ighting, applicance, equipment, and Catering, Gos.  **Processor Office Color Processor Color **Modillocal Ighting, applicances, equipment, and Catering, Gos.  **Processor Office Color **Modillocal Ighting, applicances, equipment, and Catering, Gos.  **Processor Office Color **Modillocal Ighting, applicances, equipment, and Catering, Gos.  **Processor Office Color **Modillocal Ighting, applicances, equipment, and Catering, Gos.  **Processor Office Color **Modillocal Ighting, applicances, equipment, and Catering, Gos.  **Processor Office Color **Modillocal Ighting, applicances, equipment, and Catering, Gos.  **Processor Office Color **Modifice Color **Modillocal Ighting, applicances, equipment, and Catering, Gos.  **Processor Office Color **Modillocal Ighting, applicances, equipment, and Catering, Gos.  **Processor Office Color **Modillocal Ighting, applicances, equipment, and Catering, Gos.  **Processor Office Color **Modillocal Ighting, applicances, equipment, and Catering, Gos.  **Processor Office Color **Modillocal Ighting, applicances, equipment, and Catering, Gos.  **Processor Office Color **Modillocal Ighting, applicances, equipment, and Catering, Gos.  **Processor Office Color **Modillocal Ighting, applicances, equipment, and Catering, Gos. **Modillocal Ighting, applicances, equipment, and Catering, applicances, equipment, and Catering, applicances, applicances, applicances, applicances, applicances, applicances, applicances, applicances, ap	Most sca Nativalge, 3ca	0.01 0.01	D. DES SYST (Gross CV) BEID, 7000. Grandshow gas     D. DES SYST (Gross CV) BEID, 7000. Grandshow gas     D. DES SYST (Gross CV) BEID, 7000. Grandshow gas	maning on	1,611 NCO2# 878,767 NCO2#	The took products repairmed software commencers of measurement againing or approximate an entire data transfer of technologies.	Energy concurration in the UK (ECUK) data Energy concurration in the UK (ECUK) data
	Industrial buildings & Societies	Industrial buildings & Societies	Cities Cities Direct	1,119.14 28,988,911 NO 16.122.91 44.41	KAN DATA_SCUK	institutional signing, appliances, equipment, and catering stectricity. Private are referenced toll institutional lighting, appliances, equipment, and catering, coal. I struct one referenced toll institutional lighting, appliances, equipment, and catering, coal. I struct one referenced toll institutional lighting, appliances, equipment, and catering.	Electricity provided _5c2 Coal (dometic)_5c2 Moral	1	C DIN AWA (Greek CV) SEEL 2020. Greenhour gas C DISC AWA (Greek CV) SEEL 2020. Greenhour gas C ZIN AWA (Greek CV) SEEL 2020. Greenhour gas	# point of \$2,847 \$,857 \$,872 # point of \$4,000 \$2,000 \$	1318,166 agcole agcole 80 14322811 agcole	No coal products reported uneither commercial / incitational lighting or appliances in the UK according to ECLIK data.	Energy concurption in the UK (ECUK) data Energy concurption in the UK (ECUK) data Energy concurrance in the UK (ECUK) data
	Photo and Colored St. Colored	and the state of t	Direct Videnct Direct	\$2,004.89 282,900,275 \$5,178.08 215,857,329	END ONTA SCUK	House on information to the property of the control	Naturalizati Electrony presented	0.184 0.000 0.000 0.294 0.000 0.001 0.305 0.326 0.004	6 335 149 (Grade CV) 2513, 7005 Grandway gas 6 256 CW) 2513, 7005 Grandway gas	#90100 to \$1908,000 \$7,001 28,282	\$2,014,811 MCO29 \$5,374,082 MCO29		Energy concurrence in the UK (ECUK) data Energy concurrence in the UK (ECUK) data
			Direct Other	975.54 2,620,006 3,837.59 60,624,003 6,764.62 282,900,275	WE DATA SCUE	Industrial buildings & Facilities Coal  Industrial buildings & Facilities Petroleum products  House one information coal  Ministrator one information coal  Ministrator one information coal	Coal (domertic) Priorii Scit Soturpliese Scit	0.805 0.004 0.004	Sats NW (Greek CV)	mpoting col   887,856   72,853   12,852	872,141 kgC02e 8827,591 kgC02e 6,764,620 kgC02e		Energy consumption in the UK (BCUK) data Energy consumption in the UK (BCUK) data Energy consumption in the UK (BCUK) data
			Other Other	8,809.85 215,857,328 160.82 2,820,006	KWI DAYA SCUK	Industrial buildings & facilities; Electricity Private see information table industrial buildings & facilities; Coal Private see information tab	Electricity generated Scill Cool (domertic), Scill	0.003 6.000 0.000	C DBS VWh (Groot CV) BETS, 2020. Greenhouse gas C DBS VWh (Groot CV) BETS, 2020. Greenhouse gas	Parting on \$667,000 30,793 25,903 (Parting on	8.008.856 bgC029		Energy concumption in the UK (ECUK) data Energy concumption in the UK (ECUK) data
	Agriculture	DT-vaactrangertation	Sider Sider	MO 15,200,015	680 SXA,99 680 SXA,99	Petitideum - Agriculturk3 (Financiae represent tito)	Steel (seeinge botus blend) Steel (seeinge biofue) blend) (kill)	0.261 0.000 0.001 0.264 0.000 0.001 	E 255 (WH) (proct CV) EETS, 2020. Extenditions get E 256 (WH) (proct CV) EETS, 2020. Extenditions get E 256 (WH) (proct CV) EETS, 2020. Extenditions get	myseling on Landaux dis digital -	171179 PC03+ 50	No electricity reported in crit Bills recibilithels reporting for off-valid transportation.	Bith data for residual fuel use per local a- Bith data for residual fuel use per local a- Bith data for residual fuel use per local a-
		Agricultural final energy consumption	Died Died	50 036 867	5000 0000, 99 5000 0000, 99 5000 0000, 99 5000 0000, AG 5000 0000, AG	Materially Scale 3 Person one organization trails are organization trails and property trails are organization trails.	Electricity generated_SCE Natural gas	0.023 0.000 0.000 0.184 0.000 0.000	D DBS KWN (Groot CV) BETS, 2000. Greenhouse gas D DBS KWN (Groot CV) BETS, 2000. Greenhouse gas	maning col 138 0 0	- NCO2+ NO 150 NCO2+	No electricity reported arror Mills modulativels reporting for off-road transportation.	BESS data for residual fuel use per local au Agricultural fuel use from Energy Consums
			Dirict Dirict Vidence	0.80 1.90	ERRO DATA AG	Personal Services  Personal Services Se	blacel (swerage biofuel blend) Electricity generated	0.361 0.000 0.008 0.364 0.000 0.001	S 355 kWh [krost CV]		2,082 NCO2+		Ageoutural fuel use from Energy Consum Ageoutural fuel use from Energy Consum Ageoutural fuel use from Energy Consum
			Other Other	0.02 867 0.03 1,240	689 3555, AG 689 3555, AG 689 3555, AG	Saltural Gaid Minary one references tab Salenegy & waste Means one references tab Means one references tab Means one offences one offence one of table	Naturalizacióni Bogac Scil Naturalización basel Scil		C CDE KWN (Gross CV) BEST, 2000: Grandboor gas C CDE KWN BEST, 2007: Grandboor gas D CDE KWN CVI	maning or	27 lgC02# 80 lgC02#		Ageoutsural fuel use from Energy Consums Ageoutsural fuel use from Energy Consums Association free use from Energy Consums
	Fugitive enicoses	Fugitive emissions	Cther Direct	0.18 3,881 28,786.65 29,786,66	NAS SATA_AG NCCO3e SATA_Rigitive	Sectrolly Press see reference tab righting ScI Press see reference tab	thectsory generated Scit	0.003 0.000 0.000 1.000 · ·	0.088 AVM (Greet CV) 8813, 2020. Greenhouse gast 1.000 n/s 4/6	29,796,516	28,766,656 bgCO26		Agricultural fuel use from Energy Consum Category IB from the UK Devolved Admin
Transportation	DI-1034	Raadisangori / Retoleum Raadisangori / Baerergy & Wate	Dieci	264,968.59 1,281,184,679 H 69,791,914	ext outs fuel	Road Sangort, Petroleus products  Financiae or reference cab  Road Sangort, Bionergy & Watter  Councilles for conditionance  Standard for cond	Direct (purcage biofuel blend) Biomais Grass/Stow	1	5.365 NWh (Gross CV) BEIT, 2005. Disentations gas 5.006 NWh BEIT, 2005. Greenhouse gas 5.706 Data	mystray cal	264,864,887 bgC029 G	Because consumption from on road transport included in Stationary Energy Egyptic  Manager consumption from on road transport included in Stationary Energy Egyptic	flotal final energy consumption at regional flotal final energy consumption at regional
		Raadtransport / Scope II	Other Other	MO -	ENT. DATA SAIR ENT. N.S. ENT. DATA OVERABLES ENT. DATA OVERABLES ENT. DATA OVERABLES	Oncod Schopping Browning & waster, Sch Strong and Information of the Schopping Browning & waster, Sch Strong and Information	Prosi Biones Gras/Stow_Scil	0.383 0.000 0.001	© 286 NWh (Groot CV) 8813, 2025. Greenhouse gas © 516 NWh 8813, 2025. Greenhouse gas	maning on	- NCO24 80	Not repained for this LA.  Becausing consumption from on-road transport included in Stationary Senegy Egyptic	Method TRC Method TRC
	Rail	Railtransport / Cual Railtransport / Retroleum	DIRT DIRT	MD 25,373,815	ext outs_fuel ext outs_fuel	UNITOORly for read transport, WTT and TEO Provisions on information to Trail Casil Photologist Color of the Case one information to Teas (Photologist product) Provision to Teas one information to Teas one Teas one T	Coal (educate) Direct (purcage biofuel blend)	0.003 0.000 0.000 0.001 0.000 0.001	C SEE VAN (Gross CV) SEES, 2005. Grandwar ges C SES VAN (Gross CV) SEES, 2005. Grandwar ges C SES VAN (Gross CV) SEES, 2005. Grandwar ges	maning on maning on maning on 6,126,678 761 85,756	- 1gC02# B0 - 1gC02# B0	Bedinicity consumption from on-road transport excluded in Mationary treety figure: Not regarded for this EA.	Exital final energy consumption at regions focial final energy consumption at regions
		Kalitransport / Electricity Kalitransport / Scope II	Indirect Other	MO -	keen N/A keen Outs_fuel	Electricity for not transport these one references tall train one references tall these one references tall these one references tall	Electricity generated Coal (industrial), Scit	0.254 0.000 0.001	0.256 CRN BEST, 2020. Greenhouse gas 0.065 EVM-Jordes CVJ BEST, 2020. Greenhouse gas	manting co	- lgC02e 80	Electricity consumption from raid included in Statistically Elegy figures. Statings must for this CA.	flotal final energy consumption at regions
	Waterborne savigation	Waterborne transport / internal waterways	Cthe/ Direct	1,277.24 25,270,013 H 1,751.97 7,161,992	ENT SATA_TRANSPORT_MISSEN	Rail Pelicinian probatics  Electricity for roll transport. Sc2  Herois are reference too	Dison (sverage bottom blend) 3c.1 Electricity generated, 3c.7 Dison (sverage bottom blend)	0.002 0.000 0.000 0.361 0.000 0.001	© DBS NWN (Science CV) BETS, 7000 Green following data  © DBS NWN (Science CV) BETS, 7000 Green following data  © 2855 NWN (Science CV) BETS, 7000 Green following data	maning on 1728,688 215 28,062	1,077,040 BgC029 II 1,791,040 BgC029	Electricity consumption from rail included in transcency timing figures	Total final energy consumption at negative EXClust consumption from National Nave
		State-Borne transport / coastal State-Borne transport / electricity	Diecī Indiecī	NO .	INP. SATA TISEGET WIDE INP. SATA TISEGET WIDE INP. SATA TISEGET WIDE INP. SATA TISEGET WIDE SOME SATA TISEGET	Coottal national navigation, petralisus products. Financiae are inferiorate tab.	Discripturage bodyni blend) Discripty generated	0.361 0.000 0.001 0.364 0.000 0.001	0.265 KWh (Groot CV) BEIS, 2005. Grandboor gas 0.256 KWN BEIS, 2005. Grandboor gas	ayatig a	- Mcos a	hace region that CA.  Startalistics was by wasterbarries transport included in stationary energy.	DICTuel concumption from National Navig
	Auxion	Austice/In-boundary	Died Died	II NO	ENT ONTA Transport Water tonnes ONTA Awaton	Description of the Control of the Co	tinctsony generated twacton turbine fuel	0.254 0.000 0.001 3,169,670 1,930 29,800	6 236 CM1 State CM 2513, 7007. Desendance gas \$1,181,177 bookes 2513, 7007. Greenhause gas	reporting on	- NCO24 E	Sections use by water-borne transport included in chalcionary energy too paper in this cocal Authority	Data was extracted from the DK Devolves
	Officered	Aviation / electricity Aviation / out of boundary  Officers from second / Butterland conducts	Siderat Other	H 116,661.87 36,607 76,000 31,901.845	NA MALEON SAN DAY OFFICIAL SAN NA OFFICIAL SAN	Aviation electricity consumption these on reference tab Nation, field, 503 these or reference tab National Aviation of the Company tab	Avation turbine fuel	3,109.670 1833 29.830 0.361 0.000 0.008 0.003 0.000 0.000	3,11,170 April 810, 2020 Greenhouse gas	# # # # # # # # # # # # # # # # # # #	- IgCO2# E 116,061,920 IgCO2#	Blectricity consumption from avoition rust possible to separate from statismony energy data.	Data was extracted from the UK Devolves
Weds	Sulid words disposal	Off-custranger / Electricity total Watte Chipocal / Open-loop	Died Died	NE - G(29)	ENT. N.A. Tomas DATA Waste Tomas DATA Waste	Electricity Indirect_WTT and T&O Process one inference tall Open loop Recurs one inference tall	Electricity generated _Scill Municipal Waster_Open-long	0.022 6.000 0.000	6 DBS XVIII (Gracii CV) BEIS, 2020. Grandouir gai: - bonnes BEIS, 2020. Grandouir gai:	myeting co	- MCO24 NE		Bracte arkings data for England, Northern
		sold Wate Disposi / Close Nos sold Wate Disposi / Landiii sold Wate Disposi / Cope Y	DIRCI	ND 17,882	Tomes OATA_Wate Tomes OATA_Wate	Closed-body Privace on information Cabin Privace on information Cabin Researce on information Cabin Code Women Diagnosis / Sense 2	Municipal Waste Closed-loop Municipal Waste Landfill		SBI S16 Donner BEIS, 2020. Chrenhouse gas SBI S16 Donner BEIS, 2020. Chrenhouse gas	manths of	10,000,000 MCO3A	Nothing respond for this count nutrionity in the data available.  The second of the se	Waste arisings data for England, Northern Waste arisings data for England, Northern
	Bological treatment	Buildgraf Treatment / Composting Buildgraf treatment / Scope 8	Direct Other	MD II	Tomes OATA_Waste Tomes N/A	Comparing Process Lab Malagical treatment / Scape 2 House use inferiorant tab	Organic_Composting	1 1	20.305 School 8513, 2023 Greenhour gas - 1/2	apathy of	- NCO24 80	Nothing responded for this cocal nucleority in the data available.  Insure data is ablocated at the point of generation, regardless of treatment location, so all emissions including the coope I attributable to that waste are included in the coope I figure.	Waste arrangs data for England, Northern
	traineration and open burning  traineration and open burning	tricineration and open burning / Combustion tricineration and open burning / Scope 3 Machinistic Systems and discharge	Diect Diect	821.19 87,332 H 8.828.26 3.427.151	Tomes N/A Vector Tomes N/A Vector Tomes N/A Vector	Combustion Stream or information to the information and open burning / Scope 2 House use information to the	Municipal Waste_Conduction  Municipal wode wodewater-organizate		21 855 binner 8811, 2020. Graenhouse gas: - 1/2 2 0.395 mil 8811, 2020. Graenhouse gas:	maning of	805,395 lgC02e - lgC02e B 8.828,261 lgC02e	Strate-data is abounded at the point of generation, regarders of treatment location, as all emissions including the coope I attributable to that waste are included in the coope I figure.	Macte arisings data for England, Northern  Mit we drawater treated has been calcular
PPU	Industrial process	Wastewater / Scope 3 Industrial process	Other Direct	5,807,050 5,298,54 6,207,050	est DATA_Workwater 68th DATA_P	Nichmater Process can reference tab	Industrial Processes, your and steel		C 852 kWh BETS (Amondo Printstone, Ato	d	5,298,546 bgC02#		MS wedewater treated has been calculat 5. Fuel concurription share per LA Calculat
			DIRECT DIRECT DIRECT DIRECT DIRECT	899.84 13,687,852 8,606.88 88,142,551	68 047A_Wodawaler 589 047A_P 589 047A_P 589 047A_P 589 047A_P	Non-Newton, metals: Press see rejeverent tob Meneraligenducts: Efects see rejeverent tob Chemicals: Meast see rejeverent tob	InduStral Processes, Non-terrous metals: InduStral Processes, Mineral graducts. InduStral Processes, Chemicals		C DE 1995 BITS (Amonda Printstone, 40 DDG 1995 BITS) (Amonda Printston	ager of freedom	ESSESS OCCUP ESSESS OCCUP ESSESS OCCUP		Fuel concumption share per LA Calculat     Fuel concumption share per LA Calculat     Fuel concumption share per LA Calculat
	tridustrial product use	triduct foll product use	DIRT	68,336.74 368,966,903 8000 283,059,697	END SATA_P	Sther industry Fecus one organization table 1956 Industrial Fecus one organization 1956 Industrial Fecus one organization 1957 Industrial Fecus one organization 1957 Industrial Fecus one organization 1957 Industrial Fecus	Industrial Processes_Other industry Product use_Product use		0.365 kWh BETS (Amonda Printstone, Bo 0.000 kWh BETS (Amonda Printstone, Bo	agratives	6 NCO20		<ol> <li>Fuel concumption share per LA Calculate</li> <li>Fuel concumption share per LA Calculate</li> </ol>
APCLU	Evertock	Destack	DIRCI	8,927.82 1,600 12,623.31 7,244	head SMA_DAWGESS head SMA_DAWGESS	Table number of dairy cattle from the first one references table  1906 number of new-dairy cattle from the first one references table  1906 number of new-dairy cattle from the first one references table	Savy Carrie Non-dany carrie	- 266.557 0.526 - 61.716 0.576	4,517.778 head UK average the data emission 3,754.952 head UK average the data emission	on focus 266,671 826 - on focus 627,661 6,184 -	6,807,918 MC02+ 12,013,132 MC02+	No dany cattle recorded for this CA. No cattle recorded for this CA.	Data for Newtock holdings per Local Audio Data for Newtock holdings per Local Audio
			Direct Direct	MD 11,110 MD 15,002	Med DATA DANDON MED DATA DATA MED DATA DATA MED DATA	Total number of divery Processor and Processor of Process	Sheep Same	284.337 0.100 - 284.337 0.100 - 2174 0.370 - 5374 0.400 - 5386 0.400 - 1586 0.400 - 1000 - 1000	1,716.900 head UK overage for made entition 127s.127 head UK overage for made entition 128s.207 head UK overage for made entition 1505.998 head UK overage for made entition 1505.998 head UK overage for made entition 1505.998 head	on factor 98,259 29 on factor 98,627 2,668	2,848,611 lgC029 NO 2,848,611 lgC029 NO	No sheep-recorded in this LA.  No pige recorded in this LA.  No bear recorded in this LA.	buta for Investock holdings per Local Audio buta for Investock holdings per Local Audio buta for Investoria holdings per Local Audio
	tand use	tand use non-CO3	Direct	165.60 93,676 631 9	MAN DAMA DELICA ANACOD	Total number of pouttry Measure or information table SULICE non-CO3 Measure or information table	Poultry In/a	0.005 1.000	1.36 head UK average for Each emission 1.000 k/s 4/6	one focuse 1,125 da1	265,621 FgC029 9 FgC029	No positry reported in this LA	Data for livestack holdings per Local Audi- Land Dae, Land Dae Change and Ponestry e
		copland Gradual	DIRG DIRG	7,751.07 7,751,066 7,811.71 7,811,706 18,226.81 18,226.812	GCOS ONA JULICA GCOS ONA JULICA	P. MORENT MER SHIEDDRE FORMED  10. LUDIOP Net SHIEDDRE Copiland  P. LUDIOP Net SHIEDDRE Copiland  P. LUDIOP Net SHIEDDRE Copiland  P. LUDIOP Net SHIEDDRE Copiland	n/a n/a	1.000 1.000 1.000	1 000 0/3 4/6 1 000 0/3 4/6 1 000 0/3 4/6	7,01,700 7,01,700 11,224,017	7,811,938 (gCO2 18,224,832 (gCO2		Land Use, Land Use Change and Forestry of Land Use, Land Use Change and Forestry of Land Use, Land Use Change and Forestry of
		Betland: Settlements	Direct Direct	433636 4330351	BCOS DWA DIFFICE BCOS DWA DIFFICE	2. LUCUST Not Executed. We find. Proof or information told. C. DELICET Not Executed Settlements told. These on information told. These one information told.	1/0 1/0		1.000 a/a 4/a 1.000 a/a 4/a	COLUM	4334359 lgC02 50	No data for revelands reported in this LA	Land Use, Land Use Change and Forectly of Land Use, Land Use Change and Forectly of
		MAP UNIO MA COS	Dieci	NO II	GCOS ONA JULIOF GCOS OMASSONO DAS	Total of represent use  1. LUSIDE'S Net Emissions: Howested Wood Products  Struct one reference tab  DELICE Net Emissions  Meast one reference tab	n/p	1.000	1.000 N/S N/S		- MC03 80	No state for make Loner reported as the Lone This data for considered within reports for LULLEY  This data is considered within reports for LULLEY	Land Use, Land Use Change and Forestry of Land Use, Land Use Change and Forestry of
des within of grid supplied energy	Dither AFOLU Electricity analy generation	DIRECTORY OF PROCESS OF STATE	DIRT	MS MD	## MMS9000, 0009  ## No.  ## N	Other AFOLU Reason on reference tab Make the reference tab	Natural day	0.184 0.000 0.000	- 1/2 6 386 VWN (Grock CV) 8813, 7020, Grandous gas	a contraction of the contraction	- NCO24 NE	Mathural day power generation not reported ands; LA.II DENTS	Power classes in the LX have been adjud
		Electricity only generation / Cod Electricity only generation / Electricity only generation / Biomaccity and logs	DIRT	NO NO	END DATA DUXES S.11 END DATA DUXES S.11	Technical Property Color Property Color Co	Cool (rectricity generation) Biomers: Woodings	0.804 0.000 0.003	0.300 kWh (bross CV) 8813, 7005. Grandsow gas 0.006 kWh (bross CV) 8813, 7005. Grandsow gas 0.006 kWh	mysting of	- MCOSA 40	use our percentage of the properties of the Anniestas  Code power generation on the properties of this Anniestas  Code power generation on the properties of this Anniestas  Tomass Prefets power generation not reported in this Anniestas  Tomass Prefets power generation not reported in this Anniestas  Tomass Prefets power generation not reported in this Anniestas  Tomass Prefets power generation not reported in this Anniestas  Tomass Prefets power generation not reported in this Anniestas  Tomass Prefets power generation not reported in this Anniestas  Tomass Prefets power generation not reported in this Anniestas  Tomass Prefets power generation not reported in this Anniestas  Tomass Prefets power generation to the prefets  Tomass Prefets power generation  Tomas	Power customs in the UK have been about Power customs in the UK have been about Power customs in the UK have been about
Secretion of orid supplied energy		Electricity-only generation / Biomaccitrass/Braw Electricity-only generation / Deset Electricity-only generation / Natural Gas.	Diect Diect	NO NO	689 0A7A_DUXES S.11 689 0A7A_DUXES S.11 689 0A7A_DUXES S.11	Stores discultation Stores of reference to Seed Stores or reference to Make the reference to Make the reference to	Bromers Grass/Straw Strant (sverage biofuel blend) Sockesters Scit	0.363 0.000 0.003	0.008 5495 (Greet CV) 8813, 2020 Greet Accordance gas 0.365 5495 (Greet CV) 8813, 2020 Greet Accordance 0.525 5495 (Greet CV) 8813, 2020 Greet Accordance 0.525 5495 (Greet CV)	maning on	- NCO24 NO - NCO24 NO	Sconsaci Group/Schaw power generation not reported in this LA in DOXES Descriptioner generation ent reported in this LA in DOXES Descriptioner generation ent reported in this LA in DOXES SECURITY (Security provided in Control of the Control of th	Power stations in the UK have been allocal Power stations in the UK have been allocal Power stations in the UK have been allocal
		Electricity-only generation / Gas-DB Electricity-only generation / Goal	Other Other	MD -	689 0A7A_DUXES 5.11 689 0A7A_DUXES 5.11	Sas OI Please see reference tab Coal Please see reference tab	Sac Oil, Scill Cool (Mectricity generation), Scill	1 1 1	C DIS NWh (Greet CV) BETS, 2020. Greenhouse gas C DIS NWh (Greet CV) BETS, 2020. Greenhouse gas	maning co	- IgC02# NO	Six Oil gower generation not reported in this LA in DOMES Coal gower generation not reported in this LA in DOMES	Power distinct in the UK have been allocal Power distinct in the UK have been allocal
		Electricity-only generation / Biomacc Blood logs Electricity-only generation / Biomacc brasis/foraw Electricity-only generation / Decal	Other Other	NO -	686 SMA_DUXSS11 686 SMA_DUXSS11	Romais Primo: Romais Grau/Mow Researce references tale Romais Grau/Mow Researce references tale Researce references tale	Biomais troor/straw_sct Biomais troor/straw_sct Direct (overage biofue) slicit		C EES VAN BEIG, 7000: Grandour ges C ESS VAN BEIG, 7000: Grandour ges C ESS VAN (Grace CV) BEIG, 7000: Grandour ges	maning or	- NCO24 NO - NCO24 NO	Sconiasi Prifets power generation not reported in this LA Individual Sconiasi Group/State gover generation not reported in this LA Individual Creati power generation not reported in this LA Individual Creating Creating Creati	Power dutices in the UK have been about Power dutices in the UK have been about Power dutices in the UK have been about
	DePgeneration	CHP generation / Coal CHP generation / Fuel oil	DIRT	25.84 66,228 8.78 36,285	699 DATA DUXES S.11 699 DATA DUXES S.11 699 DATA DUXES S.11 699 DATA DP 699 DATA OP	Coal Person are information talk Person are information talk Person are information talk	Coal (industrial) Sac oil	0.30% 0.000 0.003 0.254 0.000 0.003	G 332 KWh (Gross CV) BESS, 2005. Grandboor gas G 235 KWh (Gross CV) BESS, 2005. Grandboor gas	( myseling col. 15,772	13,817 lgC02e 8,777 lgC02e		Daile sale Det scheme in the United Si Daile sale Det scheme in the United Si
		CHP generation / Receivable funis CHP generation / Other funis	DIRT	0.68 1,229.826	SATE DATA OF	Name and par.  House one information call  State Sales  Places one information call  State Sales  Places one information call	tiogs tops tanolgs	0.184 0.000 0.000	0.000 NW HILL, 7000 Desendance gas 0.000 NW HILL, 7000 Desendance gas 0.000 NW (Section CV) BED, 7000 Desendance gas	#90100 GE 200.8% \$20 188	676 MCO29 265,829 MCO29		Large scale CMP schemes in the United Str Large scale CMP schemes in the United Str
		CHP generation / Fuel oil CHP generation / Fuel oil CHP generation / National Jan	Other Other	2.01 Mc,038 2.01 Mc,085 106.93 18.255.219	MA DATA OF MA DATA OF	Code Header des representes talo Header des representat talo Hader des references talo Hader des references talo	Sac of Scil		D DES ANN (GROSS CV) BETS, 2025. Grandware gas D DES ANN (GROSS CV) BETS, 2025. Grandware gas D DES ANN (GROSS CV) BETS, 2025. Grandware gas	reporting color	2,880 NgCO2# 2,881 NgCO2# 838,880 NgCO2#		Large scale GM schemes in the United Sit Large scale GM schemes in the United Sit Large scale GM schemes in the United Sit
		CHP generation / Renewable Suris CHP generation / Cither Suris	Cither Cither	77.44 8,319,914 81.91 1,894,600	18th DATA OP 18th DATA OP 18th DATA OP 18th DATA OP 18th DATA OP 18th DATA OP 18th DATA OP	Renewable fuels. House one originates State State fuels. House one originates State	Rogar, Scil Natural gar, Scil	0.354 6.000 0.001	E EDE SWIN (Gross CV) BEST, 2020. Grannhour gas B EDE SWIN (Gross CV) BEST, 2020. Grannhour gas	maning co	77,639 kgC029 81,600 kgC029		Large scale DeP schemes in the United Sti Large scale DeP schemes in the United Sti
	seus/coldgeneration social renewable generation	Onthine wind Stone wind Stone (Off show)	DIRE	NO .	689 0A7A_DUXES \$ 11 689 0A7A_DUXES \$ 11	Production (Production California)  What de reference california  What can reference california  What can reference california  What can reference california	IF_Wed IF_Wed (Offstern)	0.34E 0.001 0.001	D 256 EXR1	IC OF SIGN S	- 14039 80 - 14039 80	CCRES bage-scale innervables data reports on Wind generation for this LA  CCRES bage-scale innervables data reports on Wind (XPR) and (generation for this LA	Newer distinct in the UK have been allocal Newer distinct in the UK have been allocal
		Solar PV Sucteor	Direct Direct	NO .	699- 0AFA DUXES \$11 699- 0AFA DUXES \$11	Solar PV Straat one references Sala Buddeler Hense one references Sala	IP_Salar PV IP_Saction	1 1 1	- EVAN Zera emissions - all emissions - EVAN Zera emissions - all emissions	IC OF SIGHT S	- IgC02# NO	COURS to age-coale receivables data reports no solar PV generation for this UA. COURS to age-coale receivables data reports no Nuclear generation for this UA.	Never distinct in the UK have been allocal Never distinct in the UK have been allocal
		Hydro, Pumped Storage Small-Scale / Salar PV	Disk!	MD 201,225,028	500, 500, 5003 5 11 600, 500, 5003 5 11 600, 500, 800-95561	Propose Photos can information tab Hydroc/Perupad Stockage Honor can information tab Photosiodation Honor can informatic tab	17_Hydrs/Pumped Storage 19_Salar PV		SWIN Zero emissions - all enocoon     SWIN Zero emissions - all enocoon     SWIN Zero emissions - all enocoon	ns are stope a ns are stope a	- MCOS+ 20 - MCOS+ 20	School to agent more received to the control of Hydric globed 200 http://dx.ich.  COSTS Stagen - Coale in new abbric data reports; no Hydro, Plumped Storage generation for this LA.	Power customs in the UK have been allocated to the UK have been allocated to the UK have been allocated the UK have been allocated to the UK have been alloc
		Small-Scale / Onchare Wind Small-Scale / Hydro Small-Scale / Manarobic Dynamica	Direct Direct	156,929 NO NO	600 SATA Renewables 600 SATA Renewables 600 SATA Renewables	Doddore Wind Heater one references tall hydro Heater one references tall Managed Committee on references tall Heater one references the reference Heater one reference Heater one Heater one Heat	EF_Medi EF_Media		SANA Zero emissione - of enococen- sanh Zero emissione - of enococen- posta sana	is are stope it.	- 1gC02e 50	COURS tage-ocke weekwolder, data reports no hydro generation for this LA. This report of Assender Determine in local interwebber data.	Recovable electricity generation (MWI):  Recovable electricity generation (MWI):  Recovable planting approximation (MWI):
Ì		insal-scale / Off-born Wed insal-scale / Wave/Total	David David	NO	65th DATA Renewables 65th DATA Renewables	Officer Wind Printed to Printed t	EF, Wind (Offshore)	1.000	1000 6/5 4/6	to are stope &	- PCOS 20 - PCOS 20	No report of Cff dure Wind is local renewables data No report of Nove/Tsda in local renewables data	Recensive electricity generation (MMI): Recensive electricity generation (MMI):
		Smait-Scale / Sewage Gas Smait-Scale / Candfill Gas Smait-Scale / Municipal Solid Waste	DIRCI DIRCI DIRCI	189 5,187,629 5,78 28,665,000 MD	KNN DATA Renewables KNN DATA Renewables KNN DATA Renewables	Inhage das Hear on infrared tab  Autopa Das Viside Hear on infrared tab  Manager Das Viside Hear on infrared tab	Bogst Landfill gas Municipal Words, Electricity		G 000 kWh BEIS, 2020 direnthour gas G 000 kWh BEIS, 2020 direnthour gas kWh econum Lis (2020) electric	maning or maning or cty, from mus	1,000 lgC029 5,781 lgC029 1 lgC029 50	No report of Municipal Sold Waste in Social renewables data	tennyalin rincholy generation (MWI)   tennyalin rincholy generation (MWI)   tennyalin rincholy generation (MWI)
		small-Scale / Annual Biomacs Small-Scale / Plant Biomacs	DIRCI	NO .	600 DATA Renewables 600 DATA Renewables	Mental Element Float one references tab Plant Blomaco Mental con references tab	Bonnes Gree/Stow Bonnes Gree/Stow		C DON WAS BEST, 2020 Greenhouse gast C DON WAS BEST, 2020 Greenhouse gast	maning co	- ugcoze 60	No report of Anneal Reviews in Sect innewables data. No report of Plant Review is not convenient data.	teorwable electricity generation (MWI)   teorwable electricity generation (MWI)
		Onshore wind Wind (Offshore)	Deshit Deshit		N/A Renewables N/A	Measure on information tab  Measure on information tab  Measure on information tab	exercit Woodings		D DDB BWN BEST, 2020, direnthouse gast	O Company side	- MCO3+ RO	one report to transming an extent references the Color	Receivable Hecholty generation (MWN)
		Solar PV Suchar	Deshit Deshit		4,0.	Measur one inflorments talk Measur one inflorment talk			- 4/2 - 4/2		- MC03n		
1		matro humand Marcare	Design		- Co	Measur see references talls	<b>-</b>		The second secon		- NOTES	1	

2019		EE name Data was		003	25	2 5-002-	State Source Tab Source Hale Location Method SS ton
	Industrial Processes_Chemicals	Chemicals Luta year	2016 kWh	cg CO2	kg CH4 kg N2i	0.0945	2016 BEIS (Amanda Penistone, Roger Littlewood, Sam Bradley); Scottish Gow(DA Pivot Tables wi(http://naei.beis.go/UK Industrial Processes_Chemicals2019
		Iron and steel Mineral products	2016 kWh 2016 kWh			0.8495	2016 BEIS (Amanda Penistone, Roger Littlewood, Sam Bradley); Scottish Gow(DA Pivot Tables wii http://naei.beis.go/UK Industrial Processes_fron and steel2019 2016 BEIS (Amanda Penistone, Roger Littlewood, Sam Bradley); Scottish Gow(DA Pivot Tables wii http://naei.beis.go/UK Industrial Processes_Mineral products/2019
2019	Industrial Processes Non-ferrous metals		2016 kWh			0.0383	2016 BEIS (Amanda Penistone, Roger Littlewood, Sam Bradley); Scottish Gove DA Pivot Tables wii http://naei.beis.go/UK Industrial Processes_Non-ferrous metals20
		Other industry Product use	2016 kWh 2016 kWh			0.2654 2.01826E-05	2016 BEIS (Amanda Penistone, Roger Littlewood, Sam Bradley); Scottish Gove DA Pivot Tables withttp://naei.beis.go/UK Industrial Processes_Other industry/2019 2016 BEIS (Amanda Penistone, Roger Littlewood, Sam Bradley); Scottish Gove DA Pivot Tables withttp://naei.beis.gov.uk/reports/reports/section   Product use Product use 2019
2019	Aviation spirit	Aviation spirit	2019 tonnes	3127.67		29.8 3218.92	2019 BEIS, 2020. Greenhouse gas reporting: conversion factors 2019. Convers Fuels https://www.gov.uk/government/pu/Fuel for pis/ Aviation spirit2019
2019	Aviation turbine fuel	Aviation turbine fuel Biogas	2019 tonnes 2019 kWh	3149.67 0	1.91	29.8 3181.37 0 0.00021	2019 BEIS, 2020. Greenhouse gas reporting: conversion factors 2019. Convers Fuels https://www.gov.uk/government/puf.Fuel for turl. Aviation turbino fuel2019 2019 BEIS, 2020. Greenhouse gas reporting: conversion factors 2019. Convers Bioenergy https://www.gov.ul/UK Biogasz019
2019	Biogas Sc3	Biogas WTT	2019 kWh	0	0	0 0.02405	2019 BEIS, 2020. Greenhouse gas reporting: conversion factors 2019. Convers'WTT - bioenergy https://www.gov.uUK Biogas_Sc32019
2019	Biomass Grass/Straw Sc3	Biomass_Grass/straw Biomass Grass/Straw_Sc3	2019 kWh 2019 kWh	0	0	0 0.00909	2019 BEIS, 2020. Greenhouse gas reporting: conversion factors 2019. Conversibilionergy https://www.gov.ul.UK Biomass Grass/Strant/2019 BEIS, 2020. Greenhouse gas reporting: conversion factors 2019. Conversivit - bloenergy https://www.gov.uk/government/publications/gr/Biomass Grass/Strany_Sc32019
2019	Biomass Wood logs	Biomass_Wood logs	2019 kWh	0	0	0 0.01563	2019 BEIS, 2020, Greenhouse gas reporting; conversion factors 2019, Convers Fuels https://www.gov.u/UK Biomass Wood Joos2019
2019	Biomass Wood logs Sc3 Coal (domestic)	Biomass Wood logs Sc3 Coal (domestic)	2019 kWh 2019 kWh (Gross CV)	0.3147	0.02565 0.0	0 0.01277 0438 0.34473	2019 BEIS, 2020. Greenhouse gas reporting: conversion factors 2019. Convers/WTT - fuels https://www.gov.uk/government/publications/gr/dicmass/Wood/logs_Sc32019 2019 BEIS, 2020. Greenhouse gas reporting: conversion factors 2019. Convers/Fuels https://www.gov.uk/government/publications/gr/dicmassic/2019
2019	Coal (domestic)_Sc3	Coal (domestic) Coal (domestic) Sc3	2019 kWh (Gross CV)	0	0	0 0.04976	2019 BEIS, 2020. Greenhouse gas reporting: conversion factors 2019. Convers/WTT - fuels https://www.gov.u/ UK Coal (domestic) Sc32019
		Coal (electricity generation) Coal (electricity generation)_Sc3	2019 kWh (Gross CV) 2019 kWh (Gross CV)	0.30373	0.00009 0.0	0.30561	2019 BEIS, 2020. Greenhouse gas reporting: conversion factors 2019. Convers Fuels https://www.gov.u/UK Coal (electricity generation)2019 2019 BEIS, 2020. Greenhouse gas reporting: conversion factors 2019. Convers WTT - fuels https://www.gov.uk/government/publications/gr/Coal (electricity generation)_Sc32019
2019	Coal (industrial)	Coal (industrial)	2019 kWh (Gross CV)	0.32835	0.00093 0.0	0256 0.33183	2019 BEIS, 2020, Greenhouse gas reporting; conversion factors 2019, Conversifieds https://www.gov.uUK Coal (inclustrial)/2019
		Coal (industrial) WTT Diesel	2019 kWh (Gross CV) 2019 kWh (Gross CV)	0.24137	0.00003 0.0	0 0.04976 0322 0.24462	2019 BEIS, 2020. Greenhouse gas reporting: conversion factors 2019. ConversWTT - fuels https://www.gov.uUK Coal (industrial)_Sc:22019 2019 BEIS, 2020. Greenhouse gas reporting: conversion factors 2019. Convers Fuels https://www.gov.uUK Diesel (average biofuel blend)/2019
2019		Diesel Electricity	2019 kWh (Gross CV) 2019 KWh	0.25358	0.00065 0.0	0 0.05822 0137 0.2556	2019 BERS, 2020. Greenhouse gas reporting: conversion factors 2019. ConversiWTT - fuels https://www.gov.u/UK Diesel (average bioliuel blend)_Sc32019 2019 BERS, 2020. Greenhouse gas reporting: conversion factors 2019. ConversiUK Electricity https://www.gov.u/UK Electricity generated2019
2019	not used	WIT- UK electricity (generation)	2019 KWh 2019 KWh	0.25358	0.00065 0.0	0 0.03565	2019 BEIS, 2020, Greenhouse gas reporting; conversion factors 2019, Convers/WTT- UK & oversea https://www.gov.uk/government/publications/gr.not used/2019
2019	not used Electricity generated Sc3	WTT- UK electricity (T&D) WTT and T&D	2019 KWh 2019 KWh (Gross CV)	0.02153	0.00005 0.0	0 0.00303 0012 0.03868	2019 BEIS, 2020. Greenhouse gas reporting: conversion factors 2019. ConversiUK Electricity https://www.gov.uk/government/publications/gr/not used2019
2019	Fuel Oil	Fuels	2019 kWh (Gross CV)	0.26683	0.00035 0.0	0065 0.26782	2019 BEIS, 2020. Greenhouse gas reporting: conversion factors 2019. Convers Fuels https://www.gov.uk/government/publications/gr Fuel Oil2019
2019	Fuel Oil_Sc3	WTT - fuels Liquid fuels_Gas oil	2019 kWh (Gross CV) 2019 kWh (Gross CV)	0.25359	0.00027 0.	0 0.05076 0029 0.25676	2019 BERS, 2020. Greenhouse gas reporting: conversion factors 2019. ConversiWTT - fuels https://www.gov.uk/government/publications/gr/Fuel O/I_Sc32019 2019 BERS, 2020. Greenhouse gas reporting: conversion factors 2019. ConversiFuels https://www.gov.uk/government/publications/gr/Fuel
2019	Gas Oil Sc3	Gas Oil Sc3	2019 kWh (Gross CV)	0.25359	0.00027 0.	0.05888	2019 BEIS, 2020. Greenhouse gas reporting: conversion factors 2019. Convers/WTT - fuels https://www.gov.uk/government/publications/gr/Gas_O//_Sc32019
2019	Eandfill gas Landfill gas_Sc3	Landfill gas Landfill gas WTT	2019 kWh 2019 kWh	0	0	0 0.0002	2019 BEIS, 2020. Greenhouse gas reporting: conversion factors 2019. Conversible onergy https://www.gov.ul.UK Landfill gas2019 2019 BEIS, 2020. Greenhouse gas reporting: conversion factors 2019. ConversiWTT - bloenergy https://www.gov.ul.UK Landfill gas2_Sc32019
2019	9 LPG	LPG	2019 kWh (Gross CV)	0.21419	0.00014 0.0	0014 0.21447	2019 BEIS, 2020, Greenhouse gas reporting; conversion factors 2019, ConversiFuels https://www.gov.u/UK LPG2019
	PG_Sc3 Marine fuel oil	LPG WTT Marine fuel	2019 kWh (Gross CV) 2019 kWh (Gross CV)	0.25918	0.00011 0.0	0 0.02697 0369 0.26298	2019 BEIS, 2020. Greenhouse gas reporting: conversion factors 2019. ConversiWTT - fuels https://www.gov.u.UK LPG_Sc32019 2019 BEIS, 2020. Greenhouse gas reporting: conversion factors 2019. ConversiPuels https://www.gov.u.UK Marine fuel oil2019
2019	Marine fuel oil Scope 3	Marine fuel	2019 kWh (Gross CV)	0	0	0 0.05076	2019 BEIS, 2020, Greenhouse gas reporting; conversion factors 2019, Convers/WTT - fuels https://www.gov.uUK Marine fuel oil Scope 32019
2019	Municipal Waste Closed-loop Municipal Waste Combustion	Refuse Municipal Waste Closed-loop Refuse_Municipal Waste_Combustion	2019 tonnes 2019 tonnes	0	0	0 21.3538	2019 BEIS, 2020. Greenhouse gas reporting: conversion factors 2019. Convers/Waste disposal 2019 BEIS, 2020. Greenhouse gas reporting: conversion factors 2019. Convers/Waste disposal https://www.gov.u.UK As defined (Municipal Waste_Combustion2019  Littps://www.gov.u.UK As defined (Municipal Waste_Combustion2019
		Refuse_Municipal Waste_Landfill Refuse_Municipal Waste_Open-loop	2019 tonnes 2019 tonnes	0	0	0 586.5138	2019 BEIS, 2020. Greenhouse gas reporting: conversion factors 2019. Convers/Waste disposal https://www.gov.u/ UK This factor i Municipal Wassie_Landfill2019 2019 BEIS, 2020. Greenhouse gas reporting: conversion factors 2019. Convers/Waste disposal https://www.gov.u/ UK As defined i Municipal Wassie_Open-loop2019
2019	Municipal waste wastewater-treatment	Refuse Municipal Waste Open-loop	2019 m3	0	0	0 0.708	2019 BEIS, 2020. Greenhouse gas reporting: conversion factors 2019. Convers'Water treatment https://www.gov.uUK Municipal waste_wastewater-treatment2019
2019	Natural gas Natural gas_Sc3	Natural gas Natural gas WTT	2019 kWh (Gross CV) 2019 kWh (Gross CV)	0.18351	0.00024 0.	0001 0.18385 0 0.02391	2019 BEIS, 2020. Greenhouse gas reporting: conversion factors 2019. Conversifuels https://www.gov.ul.UK Matural gas2019 2019 BEIS, 2020. Greenhouse gas reporting: conversion factors 2019. ConversiWTT - fuels https://www.gov.ul.UK Matural gas2_Sc32019
2019	Organic Composting	Refuse Organic: mixed food and garden	2019 tonnes	0	. 0	0 10.2039	2019 BEIS, 2020. Greenhouse gas reporting: conversion factors 2019. Convers/Waste disposal https://www.gov.u/UK As defined ( Organic_Composting2019
2019	Petrol	Petrol (average biofuel blend) Petrol (average biofuel blend) WTT	2019 kWh (Gross CV) 2019 kWh (Gross CV)	0.23235	0.00072 0.0	0066 0.23373 0 0.06318	2019 BEIS, 2020. Greenhouse gas reporting: conversion factors 2019. ConversiFuels https://www.gov.u.UK Potrol/2019 2019 BEIS, 2020. Greenhouse gas reporting: conversion factors 2019. Convers/WTT - fuels https://www.gov.u.UK Potrol_Sci2019
2019	Municipal Waste Electricity	electricity, from municipal waste inciner	2019 kWh	0	0	0 0	2019 ecoinvent 3.6 (2019): electricity, from municipal waste incineration to generic market for ell https://www.gpv.uk/government/publications/gr/ Municipal Waste Electricity/2019
		electricity, from municipal waste inciner Used where data is provided in CO2e	2016 m3 0 n/a	0	0	0 0.000015	2016 European Environment Agency; EMEP (2016) EMEP/EEA air pollutant emission inventory guidebook 2016 Europe Municipal wastewater_NIM/VOC2019 0 n/a
2019	Dairy Cattle	Dairy Cattle	2017 head	0	166.5572698 0.516		2017 UK average livestock emissions factors Table3.As1; Table3.As1; Table3.hstp://naei.beis.go/UK These are ti Dairy Cattle2019
2019	Deer Goats	Deer Goats	2017 head 2017 head	0	20.22 0.10 5.13 0.053	2133 144.1075656	2017 UK average livestock emissions factors Table3.Ast; Table3.Ast; Table3.http://naei.beis.go/UK These ore tf/Deir2019 2017 UK average livestock emissions factors Table3.Ast; Table3.http://naei.beis.go/UK These are tf/Goats2019
2019	Horses	Horses	2017 head 2017 head	0	19.56 0.542 61.71394352 0.577	2575 650.5927352	2017 UK average livestock emissions factors Table3 http://naei.beis.go/UK These are tl Horses2019
2019	Poultry	Non-dairy cattle Poultry	2017 head	0	0.012014023 0.004	9174 1.765735214	2017 UK average livestock emissions factors Table3 As1: Table3 http://nael.beis.go/UK These are til Poultry2019
2019	3 Sheep	Sheep	2017 head	0	4.973816124 0.002 5.574262898 0.169	6216 125.1266456	2017 UK average livestock emissions factors Table3 As1; Table3 http://naei.beis.go/ UK These are tl Shoop2019
2019	EF Hydro	Swine electricity production, hydro, run-of-rive	2017 head 2013 kWh	0	5.5/4262898 0.169 0	4965 189.8665171 0 0	2017 UK average Nestock emissions factors Table3 Ast; Table3 Http://race/ beis.go/ UK These are if Swinz2019 2013 Zine emissions - all emissions are scope 3 and not included GB EF. Hydro/2019 2013 Zine emissions - all emissions are scope 3 and not included GB EF. Hydro/Pumped Storage2019
2019	EF Hydro/Pumped Storage	electricity production, hydro, pumped s electricity production, nuclear, pressure	2013 kWh 2013 kWh	0	0	0 0	2013 Zero emissions - all emissions are scope 3 and not included GB EF_Hydro/Pumped Storage2019 2013 Zero emissions - all emissions are scope 3 and not included GB EF_Nuclear2019
2019	EF_Solar PV	electricity production, photovoltaic, 570	2013 kWh	0	0	0 0	2013 Zero emissions - all emissions are score 3 and not included GR FF Solar PV2019
2019	EF Wind	electricity production, wind, 1-3MW tur electricity production, wind, 1-3MW tur	2013 kWh 2013 kWh	0	0	0 0	2013 Zero emissions - all emissions are scope 3 and not included  (SB   EF. Wind2019  2013 Zero emissions - all emissions are scope 3 and not included  (SR   EF. Wind2019  (SR   EF. Wind2019
		electricity production, wind, 1-3MW tur Chemicals Iron and steel	2013 kWh kWh kWh	0	0	0 0.094475132	2013 Zero emissions - all emissions are scope 3 and not included  GB [EF_Wind (Otthbrorig/D19  2016 BES (Amanda Penistone, Roger Uttlewood, Sam Bradley); Scottish Gow(DA Pivot Tables withtp://nael.beis.go/UK   Industrial Processors_Chamicals/D18  2016 BES (Amanda Penistone, Roger Uttlewood, Sam Bradley); Scottish Gow(DA Pivot Tables withtp://nael.beis.go/UK   Industrial Processors_Iron and stret/2018
2018	B Industrial Processes_Iron and steel B Industrial Processes Mineral products	Iron and steel	kWh kWh	0	0	0 0.849476877	2016 BEIS (Amanda Penistone, Roger Littlewood, Sam Bradley); Scottish Gove DA Pivot Tables wif http://nael.beis.go/ UK Industrial Processes_iron and stee! 2018 2016 BEIS (Amanda Penistone, Roger Littlewood, Sam Bradley); Scottish Gove DA Pivot Tables wif http://nael.beis.go/ UK Industrial Processes_Mineral products 2018
2018	Industrial Processes Non-ferrous metals	Non-ferrous metals	kWh	0	0	0 0.03833475	2016 BEIS (Amanda Penistone, Roger Littlewood, Sam Bradley); Scottish Gove DA Pivot Tables wit http://naei.beis.go/ UK Industrial Processes_Non-ferrous metals20
2018	Industrial Processes Other industry	Other industry Product use	kWh kWh	0	0	0 0.26536312 0 2.01826E-05	2016 BEIS (Amanda Penistone, Roger Littlewood, Sam Bradley); Scottish Gow/DA Pivot Tables wil http://naei.beis.go/UK Industrial Processes_Other industry2018 2016 BEIS (Amanda Penistone, Roger Littlewood, Sam Bradley); Scottish Gow/DA Pivot Tables wil http://naei.beis.gov.uk/reports/reports/reports/reports/reports/reports/reports/reports/reports/
2018	Aviation spirit	Aviation spirit	tonnes	3127.67		29.8 3213.91	2018 BEIS, 2019. Greenhouse gas reporting: conversion factors 2018. Convers/Fuels Fuel for pist Aviation spirit 2018
		Aviation turbine fuel Biogas	tonnes kWh	3149.67	1.69	29.8 3181.15	2018 BEIS, 2019. Greenhouse gas reporting: conversion factors 2018. Convers Fuels Fuel for turi. Aviation furbine fuel/2018 2018 BEIS, 2019. Greenhouse gas reporting: conversion factors 2018. Convers Bioenergy UK Biogas
2018	Biogas Sc3	Biogas WTT	kWh			0.02405	2018 BEIS, 2019. Greenhouse gas reporting: conversion factors 2018. Convers/WTT - bioenergy UK Biognas_Sc32018
2018	Biomass Grass/Straw Biomass Grass/Straw Sc3	Biomass Grass/straw Biomass Grass/Straw Sc3	kWh kWh			0.01314	2018 BEIS, 2019. Greenhouse gas reporting: conversion factors 2018. Conversion factors 2018. Full set (for advanced users)  Biomass Grass/Straw2018  2018 BEIS, 2019. Greenhouse gas reporting: conversion factors 2018. Conversion factors 2018 - Full set (for advanced users)  Biomass Grass/Straw_Sc32018
2018	Biomass Wood logs	Biomass_Wood logs	kWh			0.01506	2018 BEIS, 2019, Greenhouse gas reporting: conversion factors 2018, Convers Bioeneray UK Biomass Wood Joseph 1
2018	Biomass Wood logs_Sc3	Biomass Wood logs_Sc3 Coal (domestic)	kWh kWh (Gross CV)	0.3147	0.02565 0.0	0.01277 0438 0.34473	2018 BEIS, 2019. Greenhouse gas reporting: conversion factors 2018. Conversion factors 2018 - Full set (for advanced users)  2018 BEIS, 2019. Greenhouse gas reporting: conversion factors 2018. Conversifuels  UK  Coal (domestic)2018
2018	3 Coal (domestic) Sc3	Coal (domestic) Sc3	kWh (Gross CV)			0.05066	2018 BEIS, 2019. Greenhouse gas reporting: conversion factors 2018. ConversiWTT - fuels UK Coal (domestic)_Sc32018
2018	3 Coal (electricity generation) Sc3	Coal (electricity generation) Coal (electricity generation) Sc3	kWh (Gross CV) kWh (Gross CV)	0.30924	0.00009 0.0	0.05066	2018 BEIS, 2019. Greenhouse gas reporting: conversion factors 2018. Convers Fuels  2018 BEIS, 2019. Greenhouse gas reporting: conversion factors 2018. Convers Fuels  Coal (electricity generation)_Sc32018
2018	3 Coal (industrial)	Coal (industrial)	kWh (Gross CV)	0.32153	0.00089 0.0	0239 0.32482	2018 BEIS, 2019. Greenhouse gas reporting: conversion factors 2018. Conversifuels UK Coal (industrial)/2018
	3 Coal (industrial)_Sc3 3 Diesel (average biofuel blend)	Coal (industrial) WTT	kWh (Gross CV) kWh (Gross CV)	0.24414	0.00004 0.	0.05066 0035 0.24768	2018 BEIS, 2019. Greenhouse gas reporting: conversion factors 2018. Convers'WTT - fuels  2018 BEIS, 2019. Greenhouse gas reporting: conversion factors 2018. Convers'Fuels  UK  Diesel (average biofuel blend/2018)
2018	B Diesel (average biofuel blend) Sc3	Diesel	kWh (Gross CV)			0.05833	2018 BEIS, 2019. Greenhouse gas reporting: conversion factors 2018. ConversiWTT - fuels UK Diesel (average biofuel blend)_Sc32018
2018	B Electricity generated	Electricity WTT- UK electricity (generation)	KWh KWh	0.28088	0.00066 0.0	0.28307 0 0.04198	2018 BEIS, 2019. Greenhouse gas reporting: conversion factors 2018. ConversiUK Electricity UK Electricity UK Electricity generated/2018 2018 BEIS, 2019. Greenhouse gas reporting: conversion factors 2018. ConversiWTT- UK & overseas elec Electricity generated/2018
2018	Electricity generated	WTT- UK electricity (T&D)	KWh	0	0	0.00358	2018 BEIs, 2019. Greenhouse gas reporting: conversion factors 2018. Conversi <u>WTT-UK &amp; overseas elec</u> Electricity generated2018
2018	B Electricity generated_Sc3	WTT and T&D Fuels	kWh (Gross CV) kWh (Gross CV)	0.26733	0.00034 0.0	0 0.04556 0064 0.26831	2018 BEIS, 2019. Greenhouse gas reporting: conversion factors 2018. Convers/WTT- UK & overseas elec UK Electricity generated_Sc32018 2018 BEIS, 2019. Greenhouse gas reporting: conversion factors 2018. Convers/Fuels Fuel O
2018	Fuel Oil Sc3	WTT - fuels	kWh (Gross CV)	0	0	0 0.05076	2018 BEIS, 2019. Greenhouse gas reporting: conversion factors 2018. Convers/WTT - fuels Fuel Oil_Sc32018
2018	3 Gas Oil 3 Gas Oil Sc3	Liquid fuels Gas oil Gas Oil Sc3	kWh (Gross CV) kWh (Gross CV)	0.25359	0.00028 0.0 0	2265 0.27652 0 0.05888	2018 BEIS, 2019. Greenhouse gas reporting: conversion factors 2018. ConversFuels  UK Gas Oil2018  2018 BEIS, 2019. Greenhouse gas reporting: conversion factors 2018. ConversWTT - fuels  Gas Oil_Sc32018
2018	B Landfill gas	Landfill gas	kWh			0.0002	2018 BEIS, 2019. Greenhouse gas reporting: conversion factors 2018. Conversible Conversibl
2018		Landfill gas WTT LPG	kWh kWh (Gross CV)	0.21419	0.00015 0.0	0014 0.21448	2018 BEIS, 2019. Greenhouse gas reporting: conversion factors 2018. ConversiWTT - bioenergy 2018 BEIS, 2019. Greenhouse gas reporting: conversion factors 2018. ConversiFuels UK LPG2018
2018	B LPG Sc3	LPG WTT	kWh (Gross CV)			0.02697	2018 BEIS, 2019. Greenhouse gas reporting: conversion factors 2018. Convers WTT - fuels UK LPG_Sc32018
		Marine fuel Marine fuel	kWh (Gross CV) kWh (Gross CV)	0.25877	0.00011 0.0	0.26255	2018 BEIS, 2019. Greenhouse gas reporting: conversion factors 2018. Convers Fuels  2018 BEIS, 2019. Greenhouse gas reporting: conversion factors 2018. Convers WTT - fuels  UK Marine fuel all Scope 32018  Marine fuel all Scope 32018
2018	Municipal Waste Closed-loop	Refuse Municipal Waste Closed-loop	tonnes			21.3842	2018 BEIS, 2019. Greenhouse gas reporting: conversion factors 2018. Convers/Waste disposal UK As defined (Municipal Waste_Closed-loop2018
2018	Municipal Waste Combustion Municipal Waste Landfill	Refuse Municipal Waste Combustion Refuse Municipal Waste Landfill	tonnes			21.3842 565.1471	2018 BEIS, 2019. Greenhouse gas reporting: conversion factors 2018. Convers/Waste disposal  2018 BEIS, 2019. Greenhouse gas reporting: conversion factors 2018. Convers/Waste disposal  UK As defined (Municipal Waste, Combustion2018  UK This factor (Municipal Waste, Landfil2018
	Municipal Waste_Open-loop	Refuse_Municipal Waste_Open-loop	tonnes			21.3842	2018 BEIS, 2019. Greenhouse gas reporting: conversion factors 2018. Convers/Waste disposal UK As defined (Municipal Waste_Open-loop2018
2018	Municipal waste wastewater-treatment	Refuse Municipal Waste Open-loop	m3 kWh (Gross CV)	0.18362	0.00024 0.	0.708 0001 0.18396	2017   BEIS, 2019. Greenhouse gas reporting: conversion factors 2018. ConversiWater treatment UK Municipal wasto_wastowater-treatment2018   BEIS, 2019. Greenhouse gas reporting: conversion factors 2018. ConversiFuels UK Natural gas2018
2018	Managed and	Natural and		0.16302	0.00024 0.		2018 BEIS, 2019. Greenhouse gas reporting: conversion factors 2018. Convers/WTT - fuels UK Matural gas_Sc32018
2018 2018 2018	3 Natural gas_Sc3	Natural gas Natural gas WTT	kWh (Gross CV)			0.02557	
2018 2018 2018 2018	3 Natural gas_Sc3 3 Organic Composting	Natural gas WTT Refuse Organic mixed food and garden waste Compos	ting tonnes	0.72724	0.00077 0		2018 BEIS, 2019. Greenhouse gas reporting; convention factors 2018. Convers/Waste disposal  UK As defined (Organic Composting/2018  2018 BEIS, 2019. Greenhouse gas reporting; convention factors 2019. Convers/Estate  UK As defined (Organic Composting/2018)
2018 2018 2018 2018 2018 2018	3 Natural gas_Sc3 3 Organic Composting 3 Petrol 3 Petrol Sc3	Natural gas WTT Refuse Organic: mixed food and garden waste Compos Petrol (average biofuel blend) Petrol (average biofuel blend) WTT	ting tonnes kWh (Gross CV) kWh (Gross CV)	0.23234	0.00072 0.	0.02557 0007 0.23377 0.06317	2018 BETS, 2019. Greenhouse gas reporting: conversion factors 2018. Conversives UK Petrol 2018  2018 BETS, 2019. Greenhouse gas reporting: conversion factors 2018. Conversive UK Petrol 5cs2018  UK Petrol 5cs2018  Petrol 5cs2018
2018 2018 2018 2018 2018 2018 2018	3 Natural gas_Sc3 3 Organic Composting 3 Petrol 5 Petrol Sc3 5 Municipal Waste_Electricity	Natural gas WTT Refuse Organic: mixed food and garden waste. Compos Petrol (average biofuel blend) Petrol (average biofuel blend) WTT electricity, from municipal waste incineration to generic	kWh (Gross CV) kWh (Gross CV) marke kWh	0.23234	0.00072 0.	0007 0.23377 0.06317	2018 BEIS, 2019. Greenhouse gas reporting: conversion factors 2018. Conversifueds UK Petrol 2018 UK Petrol 2018 Petrol 2019 BEIS, 2019. Greenhouse gas reporting: conversion factors 2018. Conversifued UK Petrol 2017 Becomment 3.4 (2017), electricity, from municipal waste incineration to generic market for el https://www.eccinvent.org/ Municipal Waste, Electricity2018
2018 2018 2018 2018 2018 2018 2018 2018	Natural gas_Sc3 Organic Composting Petrol Petrol_Sc3 Municipal Waste_Electricity Municipal wastewater_NMVOC	Natural gas WTT  Refuse Organic mixed food and garden waste Compos  Petrol (average biofuel blend)  Petrol (average biofuel blend)  WTT  electricity, from municipal waste incineration to generic  electricity, from municipal waste incineration to generic  Load where data is provided in CO2e	kWh (Gross CV) kWh (Gross CV) marke kWh	0.23234		0007 0.23377 0.06317 0.000015	2018 ERS, 2019. Greenhouse jas sporting, comention factor 2018. Convertifient 2018 ERS, 2019 Greenhouse jas sporting, comention factor 2018. Convertifient 2018 ERS, 2019 Controllator jas sporting, convertion factor 2018. Convertifient 2018 ERS, 2019 Greenhouse jas sporting, convertion factor 2018. Convertifient 2018 ERS, 2019 Greenhouse jas sporting, convertion factor 2018. Convertifient 2018 ERS, 2019 Greenhouse jas sporting, convertion factor 2018 Convertifient 2018 ERS, 2019 Greenhouse jas sporting, convertifient factor 2018 Convertifient 2018 ERS, 2019 Greenhouse jas sporting, convertifient factor 2018 Convertifient 2018 ERS, 2019 Greenhouse jas sporting, convertifient factor 2018 Convertifient 2018 ERS, 2019 Greenhouse jas sporting, convertifient factor 2018 Convertifient 2018 ERS, 2019 Greenhouse jas sporting, convertifient factor 2018 Convertifient 2018 ERS, 2019 Greenhouse jas sporting, convertifient factor 2018 Convertifient 2018 ERS, 2019 Greenhouse jas sporting, convertifient factor 2018 Convertifient 2018 ERS, 2019 Greenhouse jas sporting, convertifient factor 2018 Convertifient 2018 ERS, 2019 Greenhouse jas sporting, convertifient factor 2018 Convertifient 2018 ERS, 2019 Greenhouse jas sporting, convertifient factor 2018 Convertifient 2018 ERS, 2019 Greenhouse jas sporting, convertifient factor 2018 Convertifi
2018 2018 2018 2018 2018 2018 2018 2018	Natural pas. Sc3 3 Organic. Composting Petrol Petrol Numicipal Vaste Electricity Municipal wastewater_NMVOC In/a Dairy Cattle	Natural gas WTT  Refuse Organic: mixed food and garden waste. Compos  Petrol (average bioduel blend)  Petrol (average bioduel blend)  Petrol (average bioduel blend) WTT  electricity, from municipal waste incineration to generic  electricity, from municipal waste incineration to generic  Used where data is provided in CO2e  Dairy Cattle  Dairy Cattle	ting tonnes kWh (Gross CV) kWh (Gross CV) marke kWh marke m3 head	0.23234	159.9454446 0.505	0007 0.23377 0.06317 0.00015 0.000015 4756 4149.267853	2038 BES, 2039. Generatorus par sporting, convention dato 2018. Conventifieds 2038 BES, 2039. Generatorus par sporting, convention dato 2018. Conventified to 2019. Conventified to 2019. Convention dato 2019. Convention d
2018 2018 2018 2018 2018 2018 2018 2018	Natural gas_S2     Organic Composting     Petrol     Petrol S2     Numicipal Waste, Electricity     Municipal wastewater_NMVOC     numicipal wastewater_NMVOC     Dairy Cattle     Dierr     Cloosts	Natural gas WTT  Refuse Organic mixed food and garden waste Compos  Petrol (average biofuel blend)  Petrol (average biofuel blend)  WTT  electricity, from municipal waste incineration to generic  electricity, from municipal waste incineration to generic  Load where data is provided in CO2e	kwh (Gross CV) kwh (Gross CV) marke kwh marke m3 head head head	0.23234	159.9454446 0.505 20.22 0.110 5.13 0.055	0007 0.23377 0.06317 0.000015 0.000015 4756 4149.267853 3286 538.3779275 5516 144.804374	2038 ERS, 2035 Greenhouse jax sporting coversion factors 2035 Convent Feats UK. PAPED/0786 2035
2018 2018 2018 2018 2018 2018 2018 2018	Natural gas Sc3     Organic Composting     Netrol     Netrol     Natural     Natural     Numicipal Waste_Electricity     Municipal Waste_Electricity     Orally Cattle     Doalry Cattle     Oper     Goats     Hornes	Natural gas WVT Refuse Organic mixed food and garden waste Composited (parage before them) Petrol (parage before them) Petrol (parage before them) electricity, from municipal waste incineration to generic clude where data is provided in CO2e Coard (parage) Coard	kwh (Gross CV) kwh (Gross CV) marke kwh (Gross CV) marke marke m3 head head head head	0.23234	159.9454446 0.505 20.22 0.110 5.33 0.055 19.56 0.61	0007 0.23377 0.06317 0.00015 0.000015 14756 4149.26783 3286 538.377927 5516 144.804374 6082 672.5924373	2038 BES, 2039. Greenhouse jas reporting committee factors 2038. Convertifiest 2031 BES, 2039. Greenhouse jas reporting committee factors 2038. Convertifiest 2037 scienters 14 (2077), electricity, from municipal waste scienterion to genetic market for 6 https://www.convert.org/ 2037 Scienters 14 (2077), electricity, from municipal waste scienterion to genetic market for 6 https://www.convert.org/ 2037 Scienters 14 (2077), electricity, from municipal waste scienterion to genetic market for 6 https://www.convert.org/ 2037 Scienters 14 (2077), electricity, from municipal waste scienterion to genetic market for 6 https://www.convert.org/ 2037 Scienters 14 (2077), electricity, from municipal waste scienterion to genetic market for 6 https://www.convertifies.com/ 2037 Scienters 14 (2077), electricity, from municipal waste scienterion to genetic market for 6 https://www.convertifies.com/ 2037 Scienters 14 (2077), electricity, from municipal waste for 6 https://www.convertifies.com/ 2037 Scienters 14 (2077), electricity, from from from from from from from from
2014 2014 2014 2014 2014 2014 2014 2014	Natural gas Sc3     Ologranic Composting     Petrol   Ologranic Composting     Petrol   Sc3     Naturicipal Waste Electricity     Naturicipal Waster Electricity     Naturicipal Waster Electricity     Naturicipal Waster     Natu	Natural gas WTT  Minkine Cogain: missel food and garden waste. Compositive Cogain: missel food and garden waste. Compositive Cogain: missel food and garden waste. Compositive Cogain Section (Section Cogain): missel food garden (Section Cogain): missel food garden (Section Cogain): missel food garden (Section Cogain): missel garden (Section Cogain):	king tonnes kWh (Gross CV) kWh (Gross CV) kWh (Gross CV) marke kWh marke m3 head head head head head head	0.23234	159,9454446 0.505 20.22 0.110 5.13 0.055 19.56 0.61 63.0428222 0.582 0.021247011 0.00	0007 0.2337 0.06377 0.00015 0.000015 4756 4149.267853 3286 538.3779275 5516 144.804374 6082 672.592.4373 6773 1749.705425 4933 2.001219647	2038 ERIS, 2035 Greenhouse par sporting coversion factors 2014. Convert Feats UK. PAPEO/1876/1976 VI. PAPEO/1876/1976 VII. PAPEO/1876/1976 VIII. PAPEO/1876/1976/1976/1976/1976/1976/1976/1976/19
2014 2014 2014 2014 2014 2014 2014 2014	Natural gas Sc3     Ologranic Composting     Petrol   Ologranic Composting     Petrol   Sc3     Naturicipal Waste Electricity     Naturicipal Waster Electricity     Naturicipal Waster Electricity     Naturicipal Waster     Natu	Natural gas WTT  Riffusic Organic mixed food and garden waste. Compose  Petrol (pureups before tilend)	kwh (Gross CV) kwh (Gross CV) kwh (Gross CV) marke kwh marke m3 head head head head head	0.23234	159.9454446 0.505 20.22 0.110 5.13 0.055 19.56 0.61 63.0428222 0.582 0.021247011 0.00 4.667992956 0.002	0007 0.2337 0.06317 0.000015 4756 4149.267853 3286 538.3779275 5516 144.804374 6082 672.5924373 6673 1749.705425 4933 2.001219647	2038 ERIS, 2035 Greenhouse par sporting coversion factors 2014. Convert Feats UK. PAPEO/1876/1976 VI. PAPEO/1876/1976 VII. PAPEO/1876/1976 VIII. PAPEO/1876/1976/1976/1976/1976/1976/1976/1976/19
2014 2014 2014 2014 2014 2014 2014 2014	Natural pas, Sci 3 Organic Compositing Patrol	Natural gas WTT  Inflation (Septiment Good and garden waste. Composition of the Composition of Compos	ting tonnes kWh (Gross CV) kWh (Gross CV) kWh (Gross CV) kWh (Gross CV) marke m3 head head head head head head head head	0.23234	159.9454446 0.505 20.22 0.110 5.13 0.055 19.56 0.61 63.0428222 0.582 0.021247011 0.00 4.667992956 0.002	0007 0.2337 0.06377 0.00015 0.000015 4756 4149.267853 3286 538.3779275 5516 144.804374 6082 672.592.4373 6773 1749.705425 4933 2.001219647	2028 BEILS, 2025 Greenhouse are separting coveration factors 2028 Convertifient 2021 Continued to 1007/2014 declifority, from unsigned used incidental to specific critical for either polynomial continued to the continued of the
2014 2014 2014 2014 2014 2014 2014 2014	Natural gas. Sci	Natural gas WTT  Mintale Cogain: mained food and gardin waste. Composition  Mintale Cogain: mained food and gardin waste. Composition  Fetcol General Bednet Brand WTT  Fetcol General Bran	ing tonnes  XWh (Gross CV)  XWh (Gross CV)  Marke KWh  head	0.23234	159.9454446 0.505 20.22 0.110 5.13 0.055 19.56 0.61 63.0428222 0.582 0.021247011 0.00 4.667992956 0.002	0007 0.2337 0.06317 0.000015 4756 4149.267853 3286 538.3779275 5516 144.804374 6082 672.5924373 6673 1749.705425 4933 2.001219647	2038 BEIG. 2015 Greenhouse par sporting coversion factors 2014 Convertifient.  2016 Early Confidence of the Convertifient of the Conver
2014 2014 2014 2014 2014 2014 2014 2014	Natural pas, Sc5	Takaruri gar WTT  Maharuri gar WTT  Maharuri Capain: marel food and garden waste. Compose Maharuri Capain: marel food and garden waste. Compose Maharuri Capain: marel food and garden waste. Maharuri Capain: Mah	ing tonnes  XWh (Gross CV)  XWh (Gross CV)  XWh (Gross CV)  Mark (Gross CV	0.23234	159.9454446 0.505 20.22 0.110 5.13 0.055 19.56 0.61 63.0428222 0.582 0.021247011 0.00 4.667992956 0.002	0007 0.2337 0.06317 0.000015 4756 4149.267853 3286 538.3779275 5516 144.804374 6082 672.5924373 6673 1749.705425 4933 2.001219647	2028 EEE, 2026. Greenhouse are specified convention factors 2014. Convent Feet U.S
2014 2014 2014 2014 2014 2014 2014 2014	Natural ps. 5-3 Organic Cemporalism Divarios Carporalism Petrol J.G. Nancipal Waste Scientisty Mancipal Waste Scientisty Natural Divarios Natural Divarios Natural Divarios Natural Divarios Natural Divarios Divarios Natural Divarios	Natural gas WTT  Minker Cogain: mained food and gardin waste. Composite Market Cogain: mained food and gardin waste. Composite Market Cogained	ing tonnes  kwh (Gross CV)  kwh (Gross CV)  markel kWh  head  head  head  head  head  head  head  ked  ked  ked  ked  ked  ked  ked	0.23234	159.9454446 0.505 20.22 0.110 5.13 0.055 19.56 0.61 63.0428222 0.582 0.021247011 0.00 4.667992956 0.002	0007 0.3337/ 0.06317 0.00015 0.000015 4756 4149.26785 3286 538.3779278 5516 144.80437 6082 672.592437 6673 1749.0686 673 1749.0686 674 1749.0686 674 1749.0686 675 674 6740.0686 675 675 675 675 675 675 675 675 675 675	2038 BEIG. 2035 Greenhouse are specified coveration factors 2014. Convertifient 2016 Early 2016 Control 2017 Age (2017) A
2014 2014 2014 2014 2014 2014 2014 2014	Natural ps. 5-3 Openic Cemporality Natural Ps. 5-3 Natural Science Cemporality Natural Science	Natural gas WTT  Market Organic mised food and garden waste. Composition for production provided from the composition of the co	ing tonnes  kWh (Gross CV)  kWh (Gross CV)  marke KWh  head  head  head  head  head  head  head  kWh  kWh  kWh  kWh  kWh  kWh  kWh	0.23234	159.9454446 0.505 20.22 0.110 5.13 0.055 19.56 0.61 63.0428222 0.582 0.021247011 0.00 4.667992956 0.002	0007 0.33377 0.06317 0.000015 44756 4449_2678527 3286 538_3778527 5516 144.80437 6673 1749.705425 6673 1749.705425 6674 2179.568763 6793 2.001276 6793 2.001276	2038 BEIG. 2015 Greenhouse par sporting coversion factors 2015 Convertifient.  2016 Convertifient of the properties of t
2014 2014 2014 2014 2014 2014 2014 2014	Natural ps. 50 Organic Cemporalisis Developed Congress Cemporalisis Percel Acid Mancipal Vastas Electricity Developed Construction Developed	Natural gas WTT  Market Capain: market food and gardin waste. Composite Market Capain: market food and gardin waste. Composite Market Capain: market food and gardin waste. Prefect (severage biddeet blend) WTT  Brown of the common of the c	Ling Connes  Lixth (Gross CV)  Lixth (Gross CV)  markel kWh (Gross CV)  markel m3  head	0.23234	159.9454446 0.505 20.22 0.110 5.13 0.055 19.56 0.61 63.0428222 0.582 0.021247011 0.00 4.667992956 0.002	0007 0.23377 0.06317 0.000015 4756 4149_267853 2226 538,3779275 5556 144,804374 0002 672.5924573 673 1749_07673 124,07673 124,07673 0002 072.5924573 0002 072.592457473 0002 072.592457474747474747474747474747474747474747	2028 EEE, 2025 Greenhouse are sporting coveration factors 2028 Convent feats.  2020 Excellent 24 (2027) electricity, from imaging usate incineration to specific market for elhtps://www.convent.org/ 2026 Excellent 2027 Excellent 2020 Excellent 202
2014 2014 2014 2014 2014 2014 2014 2014	Natural ps. 5-3 Organic Composition Organic Co	Natural gas WTT  Market Organic market food and gardin waste. Composite Market Organic market food and gardin waste. Composite Market Organic market food and gardin waste. Composite Market Organic Market Sea (Market Sea Market Sea (Market Sea Market Sea Market Sea Market Sea Market Sea Market Sea (Market Sea Market Sea Market Sea (Market Sea Market Sea (Market Sea Market Sea (Market Sea Market Sea Mark	Ling Lonnes  KWh (Gross CV)  KWh (Gross CV)  Marke KWh (Gross CV)  Marke KWh (Gross CV)  Marke KWh  Marke M  M  Marke M  M  Marke M  M  M  Marke M  M  M  M  M  M  M  M  M  M  M  M  M	0.23234	159.9454446 0.505 20.22 0.110 5.13 0.055 19.56 0.61 63.0428222 0.582 0.021247011 0.00 4.667992956 0.002	0007 0.33377 0.06317 0.000015 44756 4449_2678527 3286 538_3778527 5516 144.80437 6673 1749.705425 6673 1749.705425 6674 2179.568763 6793 2.001276 6793 2.001276	2038 BEIG. 2015 Greenhouse jar sporting coversion factors 2014 Convertifient.  2016 England Conference of Conferen
2014 2014 2014 2014 2014 2014 2014 2014	Natural ps. 450 Organic Cemporalist Organic Cemporalist Device Commission Nancipal Vasta Electricity N	Natural gas WTT  Marked Coganic model food and garden waste. Compose Marked Coganic model food and garden waste. Compose Marked Coganic model food and garden waste. Preteo (severage boldent libered) WTT  Preteo (severage boldent libered) WTT  Preteo (severage boldent libered) WTT  Coganic Code (severage boldent libered) waste independent to generic description, but in provided in CODe  Deer  Code (severage boldent libered) waste in CODe  Deer  Code (se	Ling Lonnes LAWN (Gross CV) MANY (Gross CV) Marke XWN (Gross CV) MANY	1	159.9454446 0.505 20.22 0.110 5.513 0.055 5.510.055 5.510.055 5.510.055 6.51	0007 0.23377 0.05317 0.000015 4756 4449.267853 12286 538.3779278 5316 779278 5316 779278	2028 BEILS, 2025 Greenhouse par sporting coveration factors 2014 Convert feet 1 2021 Economical 10 (2027), electron, from managed water incentions to peace careful for ellipsyl/www.convent.org/ 1 2026 Economical 2027 Econo
2014 2014 2014 2014 2014 2014 2014 2014	Natural ps. 5-0 Organic Cemporalisis Development Devel	Natural gas WTT  Market Cogain: mained food and gardin waste. Composite Market Cogain: Market Co	Ling Lonnes  KWH (Gross CV)  KWH (Gross CV)  Marke KWH (Gross CV)  Marke KWH  Bead  head  head  head  head  head  head  KWH  KWH  KWH  KWH  KWH  KWH  KWH  KW	0.23234	159,9454446 0,505 20,22 0,110 5,13 0,055 19,56 0,002 1	0007 0.33373 0.0007 0.33573 0.0007 0.33573 0.0007 0.33573 0.0007 0.3001 0.0001	2028 ERIS, 2025 Greenhouse par sporting coversion factors 2018 Convertifient 2021 Continued 10 April 2027 described, from management and production of the p
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201012020202020202020202020202020202020	Natural ps. 50 Organic Cemporalist Organic Cemporalist Develop Congress Developed Manicipal Vasida Electricity Developed	Natural gas WTT  Market Capain: market food and gardin waste. Composite Market Capain: market food and gardin waste. Composite Market Capain: market food and gardin waste. Composite Market food and gardin waste. Composite Market Capain.  Protect (severage buildest blend) WTT.  Protect (severage buildest blend) WTT.  Deer Control of Capain (Capain)  Pool of the Market of Capain (Capain)  Pool of the Market of Capain (Capain)  Pool of the Market Capain (Capain)  And Capain (Capain)  And Capain (Capain)  Pool of the Market Capain (Capain)  And Capain (Capain)  Pool of the Market Capain (Capain)  And Capain (Capain)  Report	Ling Lonnes  WWh (Gross CV)  WWh (Gross CV)  Warder (W)  And (Gross CV)  Marker (M)  Marke		159,9454446 0,505 20,22 0,110 5,13 0,055 19,56 0,002 1	0000 0 0.00001  000001	2021 BEST, 2025 Greenhouse par sporting coverstion factors 2021 Coversified and Conference of the Conf
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FileName	Data reference	Reference	Reference 2 URL Tab Data	vear Method
DATA_AG	DATA_AG	Agricultural small area statistics: 2002 to 2017	Welsh Governmer https://gov.SmallAreas	year memod 2017 Original small area statistics have been pasted. Residual codes have been mapped to individual local authority codes with reference to the Wales_LA tab, as all local authorities were matched correctly no further action was required.
DATA_AG		ECUK Data tables U5 Farm Census - LGD2014, 2013-2016	Energy Consumpti https://www.U5 OpenData NI https://datan/a	2018 ECUK data table - units added, year added, external references removed, type added 2016 Existing LA codes have been mapped against the 2018 LA list to ensure they are correct. As all data matched correctly, no further
DATA_AG		Number of holdings with crops and grass and area of crops and grass by regional	Scottish Governm https://www.2016	actions were required.  2016 Original agriculutral holding file has been pasted, and the number of local authorities in each sub-region has been listed (only sub-
DATA_AG		grouping and region, June 2001 and 2016		regional data available). Sub-regions have been mapped to individual local autorities, and sub-regional averages have been apportioned to each local authority depending on the amount of local authorities in each sub-region
		Structure of the agricultural industry in England and the UK at June, English geographical breakdowns, local authority.	Department for Erhttps://www2013-2016 L	2017 Original agriucultural structure file has been pasted, and existing LA codes have been mapped against the 2018 LA list to ensure they are correct.
DATA_AG	DATA_Aviation	2014-based local authority population projections for Wales, 2014 to 2039	Welsh Governmnthttps://stat.n/a	Aggregated data has been removed.  2014 Original population file has been pasted, and existing LA codes have been mapped against the 2018 LA list to ensure they are correct. The data has been filtered for "all age" in the AGG GROUP column and local authority codes have been updated where necessary. Weeklh data has been extrapolated to 2014, is 2014-based population projections are currently only available for
DATA_Aviation		2016-based Population Projections for Areas within Northern Ireland, 11 LGDs -	Northern Ireland !https://wwwLGD14	Wales.  2016 Original population file has been pasted, and existing IA codes have been mapped against the 2018 IA list to ensure they are
DATA_Aviation		population totals (2016-2041)		correct. The data has been filtered for 'all ages' in the AGE GROUP column and local authority codes have been updated where necessary.
DATA_Aviation		Greenhouse Gas Inventories for England, Scotland, Wales & Northern Ireland: 1990 2018	- Luke Jones, Glen Thttp://naei. UK By Sourc	2018 Categories 1A3a and Aviation Bunkers for England, Wales, Scotland and Northern Ireland.
		Population Projections for Scottish Areas (2016-based)	National Records https://www.Table 2	2016 Original population file has been pasted, and existing LA codes have been mapped against the 2018 LA list to ensure they are correct. The data has been filtered for 'all ages' in the AGE GROUP column and local authority codes have been updated where
DATA_Aviation  DATA Aviation		Population projections for local authorities: Table 2, 2016 based	Office for Nationa https://www.Persons	necessary.  2016 Original population file has been pasted, and existing LA codes have been mapped against the 2018 LA list to ensure they are correct. The data has been filtered for 'all ages' in the AGE GROUP column and local authority codes have been updated where
DATA_CHP	DATA_CHP	DUKES 7.2 Fuel used to generate electricity and heat in CHP installations	Department for Bihttps://wwv7.2	necessary. The units have been changed from thousand-persons to persons. 2018 n/a 2018 n/a
DATA_CHP		DUKES 7.10 Large scale CHP schemes in the United Kingdom, operational at the end of December 2018 (DUKES 7.10)	Department for Binttps://www.7.10	2018 Large scale CMP schemes in the United Kingdom as at December 2017. Each power plant has been manually assigned to a Local Authority, and the fuel consumption for heat and electricity is given an average value according to its installed capacity, based on DIKES 7.2, Fuel used to generate electricity and heat in CMP installations
DATA_CHP		Inland consumption of primary fuels and equivelents for energy use, 1970 to 2018 (DUKES 1.1.1)	Department for Bihttps://www1.1.1	2018 n/a
	DATA_DUKES 5.11	Power stations in the United Kingdom, May 2019 (DUKES 5.11)	Department for Bihttps://wwv5.11	2018 External links, footnotes, table headings and blank rows removed and unit column added. The local authority codes from the ONS list have been matched to station names. The plant installed capacity (MW) has been converted to kWh and mutiplied by
DATA_DUKES 5.11	DATA_ECUK	RETAIL MARKET MONITORING Annual Transparency Report For calendar year 2018	Northern Ireland Ihttps://wwwn/a	respective load factors for different fuel types from DUKES 6.5 or DUKES 5.10.  2018 Northern Ireland gas and electricity consumption data has been apportioned to local authorities based on total industrial and
DATA_ECUK DATA_ECUK	_	ECUK Data tables U3	Energy Consumpti https://www.U3	domestic fuel consumption in other fuel types as published by BEIS 2018 External links removed, columns added for units, type, and year. Type tag as "domestic".
DATA_ECUK DATA_ECUK		ECUK Data tables U4 ECUK Data tables U5	Energy Consumpti https://www.U4 Energy Consumpti https://www.U5	2018 External links removed, columns added for units, type, and year. Type tag as "industrial". 2018 ECUK data table - units added, year added, external references removed, type added
DATA_ECUK		Total final energy consumption at regional and local authority level	Department for Bihttps://www.2018r GWh	2018 Mapped against full Local Authority list to apply final LA code; combined areas (e.g. England, Outer London) removed from dataset.
DATA_Emissions	DATA_Emissions DATA_Fuel	2005 to 2018 UK local and regional CO2 emissions – data tables RETAIL MARKET MONITORING Annual Transparency Report For calendar year 2018	Department for Bihttps://wwvFull dataset Northern Ireland Ihttps://www.n/a	2018 LA mapping checked and codes updated 2018 Northern Ireland gas and electricity consumption data has been apportioned to local authorities based on total industrial and
DATA_Fuel		Total final energy consumption at regional and local authority level	Department for Bihttps://www.2018r GWh	domestic fuel consumption in other fuel types as published by BEIS 2018 Mapped against full Local Authority list to apply final LA code; combined areas (e.g. England, Outer London) removed from
DATA_Fuel	DATA_Fugitive	2014-based local authority population projections for Wales, 2014 to 2039	Welsh Governmnthttps://stat.n/a	dataset. 2014 Original population file has been pasted, and existing LA codes have been mapped against the 2018 LA list to ensure they are
DATA C				correct. The data has been filtered for 'all ages' in the AGE GROUP column and local authority codes have been updated where necessary. Welsh data has been extrapolated to 2041, as 2014-based population projections are currently only available for
DATA_Fugitive		2016-based Population Projections for Areas within Northern Ireland, 11 LGDs - population totals (2016-2041)	Northern Ireland !https://www.LGD14	Wales. 2016 Original population file has been pasted, and existing LA codes have been mapped against the 2018 LA list to ensure they are
DATA_Fugitive			Liuka Janes Clas Thittay/fassi LIV Dy Caura	correct. The data has been filtered for 'all ages' in the AGE GROUP column and local authority codes have been updated where necessary.  2017 Category 18
DATA_Fugitive		Greenhouse Gas Inventories for England, Scotland, Wales & Northern Ireland: 1990 2017 Population Projections for Scottish Areas (2016-based)	National Records https://www.Table 2	2016 Original population file has been pasted, and existing LA codes have been mapped against the 2018 LA list to ensure they are
DATA Fugitive		reputation respectations and account areas (2010 bases)	national necolus inteps,// www.tubic 2	correct. The data has been filtered for 'all ages' in the AGE GROUP column and local authority codes have been updated where necessary.
		Population projections for local authorities: Table 2, 2016 based	Office for Nationa https://www.Persons	2016 Original population file has been pasted, and existing LA codes have been mapped against the 2018 LA list to ensure they are correct. The data has been filtered for 'all ages' in the AGE GROUP column and local authority codes have been updated where
DATA_Fugitive	DATA_IP	1.1 Aggregate energy balance 2018	DUKES 1.1-1.3 https://www 2018	necessary. The units have been changed from thousand-persons to persons.  2018 > Dukes 1.2 2009 Units have been added in column A. Industrial fuel consumption has been tagged in column B against industry
DATA_IP DATA_IP	_	Devolved Administration GHG Inventory 1990-2019	BEIS (Amanda Penhttp://naei.beis.gov.uk/	type: Iron and steel, Non-ferrous metals, Mineral products, Chemicals  2018 DA Pivot Tables with GHG emissions by source (1990-2016), filtered for "Industrial Process"
DATA_IP		Electricity: commodity balances (DUKES 5.1)	DUKES_5.1 https://www.Internet onl	2018 > Dukes 5.1 Units have been added in column A. Industrial electricity has been tagged in column B against industry type: Iron and steel, Non-ferrous metals, Mineral products, Chemicals
DATA_IP		RETAIL MARKET MONITORING Annual Transparency Report For calendar year 2018		2018 Northern Ireland gas and electricity consumption data has been apportioned to local authorities based on total industrial and domestic fuel consumption in other fuel types as published by BEIS
DATA_IP		Total final energy consumption at regional and local authority level	Department for Bihttps://www.2018r GWh	2018 Mapped against full Local Authority list to apply final LA code; combined areas (e.g. England, Outer London) removed from dataset.
DATA_Livestock DATA_Livestock	DATA_Livestock	Agricultural small area statistics: 2002 to 2018 Cattle populations in Northern Ireland from 1981 to 2018	Welsh Governmer https://gov.SmallAreas Department of Ag https://www.CATTLE	2018 2017
DATA_Livestock		ENGLAND COW NUMBERS BY COUNTY ERSA C10 (ii) Number of livestock by regional grouping and region June 2001 and	Agriculture & Horthttps://dair.compare_20 Scottish Governm https://www.2017	2016 2016 Sub-regions have been mapped to individual local autorities, and sub-regional averages have been apportioned to each local
DATA_Livestock		2016		authority depending on the amount of local authorities in each sub-region. Dairy/non-dairy cattle proportions have been allocated based on Number of cattle, 2007 to 2017 from the Scottish Agricultural Census.
DATA_Livestock		Farm Census - LGD2014, 2013-2016	OpenData.NI Farm https://datan/a Department for Enhttps://www.2013-2016 L	2016 Proportion of dairy and non-dairy cattle has been allocated based on a dataset, Cattle populations in Northern Ireland from 1981 to 2018, published by the Northern Ireland Department of Agriculture, Environment and Rural Affairs
DATA_Livestock		Structure of the agricultural industry in England and the UK at June, English geographical breakdowns, local authority.	Department for Ernttps://www.2013-2016 L	2016 Data has been allocated from sub-regions to Local Authorities based on number of authorities in that sub-region. Dairy/non-dairy cattle numbers per local authority have been applied according to a dataset "England Cow Numbers by County" published by the Agriculture & Horticulture Development Board.
DATA_Livestock		Table 3. Number of cattle, 2007 to 2018: Data obtained from Cattle Tracing Scheme	Scottish Agriculturhttps://www.Table 3 catt	Agriculture & Horticulture Development Board.  2018
DATA_OFFROAD	DATA_OFFROAD DATA_Renewables	Total final energy consumption at regional and local authority level Renewable electricity by local authority	Department for Bihttps://www2018r GWh Department for Bihttps://wwwLA - General	2018 1% of total on-road fuel consumption apportioned to off-road 2018 Renewable electricity generation (MWh) for England, Scotland, Wales and Northern Ireland allocated at local authority level.
DATA_RF	DATA_RF	Sub-national residual fuel consumption data, Residual fuel consumption at regional and local authority level.	Department for Bihttps://www.2016	2018 Original residual fuels file has been pasted, and existing LA codes have been mapped against the 2018 LA list to ensure they are correct. Aggregated totals are excluded.
DATA_Waste	DATA_Waste	Business waste data 2018	Scottish Environmhttps://www.Total_local	2018 External links removed, column added for units and local authority codes from ONS list matched to local areas. The dataset has been checked for any local authority exclusions.
DATA_Waste		Household waste summary data, 2018	Scottish Environmhttps://www.Table 1	2018 External links removed, column added for units and local authority codes from ONS list matched to local areas. The dataset has been checked for any local authority exclusions.
DATA_Waste		LAC Municipal Waste Data Tables Appendix: 2018-19	Department of Ag https://www.Table 3	2018 External links removed, column added for units and local authority codes from ONS list matched to local areas. The dataset has been checked for any local authority exclusions.
		Local authority collected waste generation from April 2000 to March 2019 (England and regions) and local authority data April 2018 to March 2019	Department for Erhttps://www.Table 2	2018 External links removed, column added for units and local authority codes from ONS list matched to local areas. The dataset has been checked for any local authority exclusions, whereby, averages have been taken for local authorities in County Councils and
DATA_Waste		Rolling 12 month period of combined municipal reuse/recycling/composting rates	Rolling 12 month https://stat:Waste Land	Metropolitan Borough Councils.  2018 The individual data exports (i.e. waste tonnages by variable) from the Stats Wales online data tool were compiled into a master
DATA_Waste		by local authority	Forting the Forting time of the Control of the Cont	local authority waste dataset. External links removed column added for units and local authority codes from ONS list matched to local areas. The dataset has been checked for an Icoal authority exclusions.
DATA_Waste		Waste From All Sources Application - Waste management (tonnes), Mangement subcategory	Scotland's Enviror https://www.environme  Welsh Governmn/https://stat.n/a	2018 External links removed, column added for units and local authority codes from ONS list matched to local areas. The dataset has been checked for any local authority exclusions.
	DATA_Wastewater	2014-based local authority population projections for Wales, 2014 to 2039	weisii Governminttps://statn/a	2014 Original population file has been pasted, and existing LA codes have been mapped against the 2018 LA list to ensure they are correct. The data has been filtered for 'all ages' in the AGE GROUP column and local authority codes have been updated where necessary. Welsh data has been extrapolated to 2041, as 2014-based population projections are currently only available for
DATA_Wastewater		2016-based Population Projections for Areas within Northern Ireland, 11 LGDs -	Northern Ireland :https://www.LGD14	necessary. Welsh data has been extrapolated to 2041, as 2014-based population projections are currently only available for Wales.  2016 Original population file has been pasted, and existing LA codes have been mapped against the 2018 LA list to ensure they are
DATA Wastewater		2016-based Population Projections for Areas Within Northern Ireland, 11 LGDs - population totals (2016-2041)		zuso original population nie nas been pasted, and existing LA codes nave been mapped against the ZUSE LA list to ensure they are correct. The data has been filtered for 'all ages' in the AGE GROUP column and local authority codes have been updated where necessary.
DATA_Wastewater		Devolved Administration GHG Inventory 1990-2019 Population Projections for Scottish Areas (2016-based)	BEIS (Amanda Penhttp://naei.beis.gov.uk/ National Records https://www.Table 2	necessary. 2018 2018 Original population file has been pasted, and existing LA codes have been mapped against the 2018 LA list to ensure they are
DATA_Wastewater		Population projections for Scottish Areas (2016-based)  Population projections for local authorities: Table 2, 2016 based	Office for Nationa https://www.Persons	correct. The data has been filtered for 'all ages' in the AGE GROUP column and local authority codes have been updated where necessary.  2018 Original population file has been pasted, and existing LA codes have been mapped against the 2018 LA list to ensure they are
DATA_Wastewater		, , , , , , , , , , , , , , , , , , , ,		correct. The data has been filtered for 'all ages' in the AGE GROUP column and local authority codes have been updated where necessary. The units have been changed from thousand-persons to persons.
		UK Informative Inventory Report (1990 to 2017)	Ricardo Energy & https://uk-a6.6 Wastewater	NMVOC emissions from municipal wastewater treatment (WWT) plants are estimated using the Tier 1 method given in the 2016 EMEP/EEA Guidebook. The approach uses the default emission factor (15 mg NMVOC/m3 wastewater handled) and activity data
DATA_Wastewater				estimates based on a time series of waste water generated from residential properties for treatment from the UK water companies.
ECUK_3.02 ECUK_4.04	ECUK_3.02 ECUK_4.04	ECUK Data tables U3 ECUK Data tables U4	Energy Consumpti https://www.U3 Energy Consumpti https://www.U4	2018 External links removed, columns added for units, type, and year. Type tag as "domestic". 2018 External links removed, columns added for units, type, and year. Type tag as "industrial".
ECUK_5.04	ECUK_5.04 Data_Transport_Water	ECUK Data tables US	Energy Consumpti https://www.U5	2018 ECUK data table - units added, year added, external references removed, type added
				This dataset provides the total energy consumption, by fuel, for UK National Navigation. This is defined as Fuel oil and gas/diesel oil delivered, other than under international bunker contracts, for fishing vessels, UK oil and gas exploration and production, coastal and inland shipping and for use in ports and harbours.
				coastal and inland shipping and for use in ports and harbours.  Final fuel consumption from national navigation. DUKES have aligned energy demand for shipping in line with the estimates of
				marine fuel use in the UK's National Atmospheric Emissions Inventory (NAEI). The NAEI figures use BEIS's estimate of marine fuels and derive the split between international and domestic use ("national navigation") based on an activity based study of the UK's
		Digest of UK Energy Statistics	1.1 Aggregate ene http://njs.analysisoncba	and derive the spirt detween international and domestic use ( national navigation ) based on an activity based study of the UK s 2018 marrine fuel use.
		Locations of Canal & River Trust owned or managed waterways within England and	NKm canal by Local http://data-canalrivertri	2018 Linear data containing two layers with locations of Canal & River Trust owned or managed waterways within England and Wales.  Table PORT0701 (a) Waterborne transport within the United Kingdom, goods lifted (tonnes) Note - Coastal or offshore traffic
				which starts or finishes at a point upstream of the inland waterways boundary is included twice – once in "O's inland waters traffic" (in the coastwise or one-port components of seagoing traffic by route) and once in "Coastwise traffic between UK ports" or
				'Oneport traffic of UK ports'. This is done to ensure that all traffic on inland waterways is included in the statistics even if the traffic started or finished outside inland waters. To avoid double counting when calculating total waterborne freight transport in
		Department for Transport Statistics Domestic Waterborne Freight Statistics	Waterborne transhttps://www.Table PORT(	the UK in terms of goods lifted, only the internal and foreign components of inland waters traffic are added to the coastwise 2018 traffic and one port traffic totals to derive the overall totals.
				Table PORT0701 (b) Waterborne transport within the United Kingdom by cargo category, goods moved (billion tonne-kilometres) To avoid double counting of goods moved in Table PORT0701 (b) from 2000 onwards, only the internal and foreign components of
		Department for Transport Statistics Domestic Waterborne Freight Statistics	Waterborne transhttps://www.Table PORT0701	inland waters traffic are added to the coastwise traffic and oneport traffic totals to derive overall totals of waterborne freight
		Department for Transport Statistics Domestic Waterborne Freight Statistics Department for Transport Statistics Domestic Waterborne Freight Statistics	Internal inland wahttps://www.Table PORT0703 All UK major and ihttps://www.Table PORT0101	

# Pathways calculation method

### Introduction

The general method for calculating the emissions trajectories is based on factors for the change year-on-year in the city area in terms of the starting data point – for example fuel consumption, numbers of trees/animals, or levels of different types of waste.

The starting point for all the pathways is the Inventory data. These emissions sources are referenced in the Interventions descriptions below. There is one key area where we haven't used this approach. For the energy supply baseline in Pathways, we've apportioned national energy generation trajectories to local authorities by area etc., rather than using the actual reported data per area, to try to come to a better estimation of future capacity for the different scenarios.

When multiple interventions are applied to an inventory area, the effect is the product of all these interventions

## Electricity supply method

A key difference with how the inventory and pathway are calculated is that the pathway considers locally-generated electricity to be used locally, in preference to using the grid electricity.

Locally-produced electricity which we have calculated from the source data is used first. When this all used, remaining demand is met with imported electricity. This has a different expected emissions factor each year. The grid factor projections, which change year on year have been taken from BEIS projections to 2100<sup>2</sup>.

If too much local electricity is produced, this is considered exported. Electricity to be used locally is used in the following order until total demand for that year is met:

- Solar PV
- Onshore wind
- Hydro
- Offshore Wind
- Wave/Tidal
- Biomass
- Nuclear
- CHP
- Fossil Fuels

## Comparison to the Tyndall Centre carbon budget and BEIS LACO<sub>2</sub> data

Please be aware that the scope for the inventory calculated by SCATTER differs from the Emissions of carbon dioxide for Local Authority areas published by BEIS in a few key ways. SCATTER includes other gases to CO<sub>2</sub>, uses different starting data, and includes categories not covered by the BEIS dataset. This is also the dataset used by the Tyndall Centre for their budgets.

The key reason for the discrepancy is that the more granular fuel consumption data we use for local authorities doesn't include large industrial installations. Among the exclusions is "A considerable amount of consumption fed directly to power stations and some very large industrial consumers, as this would be disclosive." These are mostly installations using power through a central voltage system.

<sup>&</sup>lt;sup>2</sup> Treasury Green Book supplementary appraisal guidance on valuing energy use and greenhouse gas (GHG) emissions. - Table 1: Electricity emissions factors to 2100, kgCO2e/kWh (March 2019)

### Interventions

### **Forestry**

- Metric: Increase in forest land area.
- Emissions sources affected: Emissions arising from land classified as "forestry"
- Interventions Increase in forest land area
  - 1. 5% increase in forest cover by 2030.
  - 2. 10% increase in forest cover by 2030.
  - 3. 16% increase in forest cover by 2030.
  - 4. 24% increase in forest cover by 2030.

Original land use trajectories from DECC 2050 are used. Each land use type is mapped to a land use type used in the current SCATTER, by km<sup>2</sup>. The rate of change in each land use trajectory is calculated for five-year chunks.

### Land Management

- Metric: Increase in land used to grow crops for bioenergy
- Emissions sources affected: Emissions arising from land classified as grasslands, cropland, settlements and "other".
- Interventions
  - 1. 2% decrease in grassland
  - 2. 3% decrease in grassland
  - 3. 4% decrease in grassland
  - 4. 7% decrease in grassland

Original land use trajectories from DECC 2050 are used. Forestry is treated as a separate lever Each land use type is mapped to a land use type used in the current SCATTER, by km^2 The rate of change in each land use trajectory is calculated between 2020 and 2050 The mapping is as follows: Arable, for food crops (grades 1–3) LU\_C Cropland Arable, for 1st gen energy crops (grades 1–3) LU\_C Cropland Arable, for 2nd gen energy crops (grades 3–4) LU\_G Grassland Grassland, for livestock and fallow (grades 3–5) LU\_G Grassland Settlements LU\_S Settlements Forests LU\_F Forestland Other LU\_O Other.

## Livestock Management

- Metric: Number of livestock
- Emissions sources affected: Total number of dairy cattle; Total number of non-dairy cattle; Total number of sheep; Total number of pigs; Total number of horses; Total number of poultry
- Interventions
  - 1. 0.2% annual growth in dairy cows & livestock
  - 2. No change from current levels
  - 3. 0.2% annual reduction in livestock numbers
  - 4. 0.5% annual reduction in livestock numbers

Annual rates of change are applied for livestock. These are linear trajectories, but currently modelled in five-year periods. The trajectories are unchanged from the original DECC 2050 pathways and SCATTER V1. Trajectories impact dairy and non-dairy cattle, pigs. horses, and sheep, but not poultry.

### Tree-planting

Increase in non-woodland tree planting in the area.

- Metric: hectares of tree canopy
- Emissions sources affected: Tree cover outside woodland.

The baseline data for this is based on the National Forestry Inventory's data<sup>3</sup> on tree cover outside woodland, including small woods, groups of trees, lone trees, and hedgerows. Statistics are for England, Scotland, Wales, GB, individual NFI regions, and separately for urban and rural areas. Where urban/rural classification is available (English Local Authorities)[2], the data has been apportioned according to this; in Wales and Scotland data is apportioned according to Country only. No data is available for Northern Ireland. The Forest Research report and datasets also provide information on the numbers, and mean areas of these tree cover features, plus estimates of lengths and areas of hedgerows.

#### Interventions

- 1. Tree-planting to increase current coverage by 30% by 2030; no subsequent commitments.
- 2. Tree-planting to increase current coverage by 30% by 2030; from 2030-2050 further increase of 5%.
- 3. Tree-planting to increase current coverage by 30% by 2030; from 2030-2050 further increase of 10%.
- 4. Tree-planting to increase current coverage by 30% by 2030; from 2030-2050 further increase of 20%.

Tree planting rates are calculated based in Manchester City of Trees (2014), A Potential Woodland Study - Phase 1 report.

The sequestration of carbon dioxide per hectare of trees is based on estimates of the tonnes carbon per hectare relationship and per biome estimate of total carbon storage potential for temperate broadleaf and mixed forests, using the original estimates from a Bastin et al's 2019 paper The global tree restoration potential<sup>4</sup>, and exclusions of soil organic carbon carried out in the follow-on study by Taylor & Marconi (2020)<sup>5</sup>. The resulting tonnes C increase with 1 hectare canopy, without soil organic carbon, is 81.

Using the example of one urban tree, gaining a canopy cover of  $25m^2$  – the average according to Forest Research<sup>6</sup> – the lifetime uptake is around 750 kgCO<sub>2</sub>. We have modelled this uptake profile over the

<sup>&</sup>lt;sup>3</sup> https://www.forestresearch.gov.uk/tools-and-resources/national-forest-inventory/what-our-woodlands-and-tree-cover-outside-woodlands-are-like-today-8211-nfi-inventory-reports-and-woodland-map-reports/

<sup>&</sup>lt;sup>4</sup> Bastin, J.F., Finegold, Y., Garcia, C., Mollicone, D., Rezende, M., Routh, D., Zohner, C.M. and Crowther, T.W., 2019. The global tree restoration potential. Science, 365(6448), pp.76-79. Supplementary material available from: <a href="https://science.sciencemag.org/content/sci/suppl/2019/07/02/365.6448.76.DC1/aax0848-Bastin-SM.pdf">https://science.sciencemag.org/content/sci/suppl/2019/07/02/365.6448.76.DC1/aax0848-Bastin-SM.pdf</a>

<sup>&</sup>lt;sup>5</sup> Taylor, S.D. and Marconi, S., 2020. Rethinking global carbon storage potential of trees. A comment on Bastin et al.(2019). Annals of Forest Science, 77(2), pp.1-7. Paper available at: <a href="https://www.biorxiv.org/content/10.1101/730325v2.full.pdf">https://www.biorxiv.org/content/10.1101/730325v2.full.pdf</a>

<sup>&</sup>lt;sup>6</sup> <a href="https://www.forestresearch.gov.uk/tools-and-resources/national-forest-inventory/what-our-woodlands-and-tree-cover-outside-woodlands-are-like-today-8211-nfi-inventory-reports-and-woodland-map-reports/">https://www.forestresearch.gov.uk/tools-and-resources/national-forest-inventory/what-our-woodlands-and-tree-cover-outside-woodlands-are-like-today-8211-nfi-inventory-reports-and-woodlands-are-like-today-8211-nfi-inventory-reports-and-woodlands-are-like-today-8211-nfi-inventory-reports-and-woodlands-are-like-today-8211-nfi-inventory-reports-and-woodlands-are-like-today-8211-nfi-inventory-reports-and-woodlands-are-like-today-8211-nfi-inventory-reports-and-woodlands-are-like-today-8211-nfi-inventory-reports-and-woodlands-are-like-today-8211-nfi-inventory-reports-and-woodlands-are-like-today-8211-nfi-inventory-reports-and-woodlands-are-like-today-8211-nfi-inventory-reports-and-woodlands-are-like-today-8211-nfi-inventory-reports-and-woodlands-are-like-today-8211-nfi-inventory-reports-and-woodlands-are-like-today-8211-nfi-inventory-reports-and-woodlands-are-like-today-8211-nfi-inventory-reports-and-woodlands-are-like-today-8211-nfi-inventory-reports-and-woodlands-are-like-today-8211-nfi-inventory-reports-are-like-today-8211-

duration of the project based on the carbon calculations provided by the Woodland Carbon Code<sup>7</sup>, for the increasing annual sequestration rate as the tree grows.

## Demand for heating and cooling

- Metric: TWh electricity and gas use by lighting, appliances and cooking
- Emissions sources affected: Domestic lighting, appliances, and cooking; Petroleum products (2);
   Domestic lighting, appliances, and cooking; Gas; Domestic lighting, appliances, and cooking;
   Electricity
- Interventions
- 1. By 2050, domestic lighting and appliance total energy demand has dropped by 80%.
- 2. By 2050, domestic lighting and appliance total energy demand has dropped by 66%.
- 3. By 2050, domestic lighting and appliance total energy demand has dropped by 39%.
- 4. By 2050, domestic lighting and appliance total energy demand has dropped by 27%.

Reduced net TWh demand from domestic lighting and appliances.

## Electrification of lighting, appliances, and cooking

- Metric: TWh electricity and gas use by lighting, appliances and cooking
- Emissions sources affected: Domestic lighting, appliances, and cooking; Petroleum products (2); Domestic lighting, appliances, and cooking: Gas; Domestic lighting, appliances, and cooking: Electricity
- Interventions
- 1. Small reductions in energy demand from cooking; no change in heat source.
- 2. Small reductions in efficiency of domestic cooking. Proportion of cooking which is electric increases to 100% in 2050. This lever combines reductions in energy demand from domestic cooking with an anticipated shift to electrified heat.

Scenario 1 assumes small efficiency gains but no shift in the share of domestic cooking which is electric; Scenario 2 increases electrification proportion to with 100% cooking electrified by 2050.

## Domestic space heating and hot water - Demand

The key metric used in the *demand* trajectory in SCATTER is the total TWh energy consumed each year by households. Reductions in the total energy (TWh) consumed per household each year are applied to the total energy consumption for domestic water heating. This is the proportion of total energy reported domestic energy consumption for each fuel<sup>8</sup> allocated to hot water using statistics for Energy Consumption in the UK (ECUK)<sup>9</sup>.

Total growth or reduction in demand per year is allocated to each fuel based on how much it is used in domestic water heating. The per-annum percentage changes in consumption of each fuel type for each intervention level are below.

<sup>&</sup>lt;sup>7</sup> https://www.woodlandcarboncode.org.uk/standard-and-guidance/3-carbon-sequestration/3-3-project-carbon-sequestration

<sup>&</sup>lt;sup>8</sup> https://www.gov.uk/government/collections/total-final-energy-consumption-at-sub-national-level

<sup>&</sup>lt;sup>9</sup> https://www.gov.uk/government/statistics/energy-consumption-in-the-uk

Level 1 is an increase in domestic hot water demand, and level 2 assumes no change. These are proportionate to the scenarios mapped out in the original DECC 2050 Pathways calculator.

Intervention	Electricity	Solid	Liquid	Gaseous
		hydrocarbons	hydrocarbons	hydrocarbons
1	0.102%	0.007%	0.018%	0.245%
2	-	-	-	-
3	(0.072%)	(0.005%)	(0.013%)	(0.173%)
4	(0.171%)	(0.012%)	(0.031%)	(0.412%)

### Insulation of new houses

This metric is applied to the current heating demand for your local authority. Numbers of new houses are taken from local authority household projections for England<sup>10</sup>. Where these do not go to 2041, the data has been extrapolated based on the trend. This amounts to a 12% increase between 2020 and 2040 in the number of households across the UK, a 2-3% increase every five years.

Demolition rates are assumed to be 0.1%<sup>11</sup> of current housing stock, roughly 28,000 dwellings per annum.

- Emissions sources affected: Domestic space heating and hot water; Coal (2); Domestic space heating and hot water; Petroleum products (2); Domestic space heating and hot water; Gas; Domestic space heating and hot water; Electricity; Domestic space heating and hot water; Bioenergy & wastes
- Interventions:
  - 1. All new houses are built to 2013 building regulations (no change).
  - 2. 50% new houses are built to 2013 building regulations; 40% to AECB standard; 10% to passivhaus standard.
  - 3. 30% new houses are built to 2013 building regulations; 40% to AECB standard; 30% to passivhaus standard.
  - 4. 100% new build is built to passivhaus standard.

We have modelled interventions based on application of combination of the following standards to all new build properties:

2013 building regulations (base case)

Association for Environment Conscious Building (AECB) standard

The AECB standard refers to a standard developed by the Association for Environment Conscious Building, aimed at those wishing to create high-performance buildings using widely available technology at little or no extra cost.

### PassivHaus standard

Passivhaus is an international energy performance standard. The core focus of Passivhaus is to dramatically reduce the requirement for space heating and cooling, whilst also creating excellent indoor

https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections/datase ts/householdprojectionsforengland

<sup>10</sup> 

<sup>&</sup>lt;sup>11</sup> [7] 2050 Calculator Tool (DECC) IX.A DOMESTIC SPACE HEATING AND HOT WATER <a href="http://2050-calculator-tool-wiki.decc.gov.uk/pages/31">http://2050-calculator-tool-wiki.decc.gov.uk/pages/31</a>

comfort levels. This requires very high levels of insulation; extremely high performance windows with insulated frames; airtight building fabric; 'thermal bridge free' construction; and a mechanical ventilation system with highly efficient heat recovery. For more information see the UK Passive House Organisation website.

The key metric used in the insulation trajectory in SCATTER is the average kWh per year consumed by houses in the local area. To carry out these calculations, we partnered with the Association for Environment Conscious Building. Space heat demand has been modelled in PHPP (Passive House Planning Package).

The kwh/year energy consumption assumed for these standards, respectively, are:

	kwh/year
New build 2013 building regulations	10,335
New build AECB standard	2,720
New build Passivhaus standard	1,020
Comparison with EPC scoring (SAP)	

The PHPP system has been used to estimate savings in space heat demand from buildings. This is a more accurate and detailed assessment method than the Standard Assessment Procedure (SAP), which is based on the annual energy costs for space heating, water heating, ventilation and lighting (minus savings from energy generation technologies) under standardised conditions, used for generating EPC scores. It uses a scale from 1 to 100. The method used means that the Specific Space Heat Demand of a building is often underestimated.

		PHPP Space	PHPP	SAP	SAP under (-ve) or
		heat demand	assessment of	assessment of	over (+ve) estimate
		for different	Specific Space	Specific Space	estimating SHD
		housing	Heat Demand	Heat Demand	compared to PHPP
		kwh/yr	kWh/m2.a	kWh/m2.a	%
Bungalow	Original house	15,275	230	161	-30%
	Deep IWI				
	retrofit	4,500	75	44	-41%
	Deep EWI				
	retrofit	3,142	51	32	-37%
Town house	Original house	17,772	117	112	-4%
	Deep IWI				
	retrofit	5,183	40	42	5%
	Deep EWI				
	retrofit	2,106	18	25	39%
Semi-	Original house				
detatched	Original flouse	11,714	179	140	-22%
	Deep IWI				
	retrofit	4,895	62	45	-27%
	Deep EWI				
	retrofit	2,507	26	22	-15%

## Retrofit

The options presented allow you to change the proportion of houses that will receive different levels of retrofit assumed in your area in a target year of 2040.

The starting point for this is a weighted average of average kwh/year consumed by house types across England only – which has been applied to all local areas. A possible future improvement would be to localize this starting point per Local Authority, but this has not been done in this iteration as more localized and comparable data was not available.

The house types which have been modelled to generate this average, with the weightings, are:

- Bungalow (17%)
- 3-storey mid-terrace town house (35%)
- 2-storey semi-detached (48%)

### The retrofit options are:

- Unimproved (repair & maintenance only)
- "medium" (deep inner wall insulation)
- "deep retrofit" (deep external wall insulation)

The assumed space heating demand (total kwh/household) are as follows:

			kwh/year
	Original	Deep inner-wall insulation	Deep external wall insulation ("deep
House type	(unimproved)	("medium retrofit"	) retrofit")
Bungalow	15,275	4,500	3,142
Town house	17,772	5,183	2,106
Semi-detached	11,714	4,895	2,507
Weighted average	14,444	4,927	2,478

#### Interventions:

- 1. All current households remain at weighted average heat loss.
- 2. By 2050, 30% of current stock is retrofitted to a medium level; 20% deep retrofit
- 3. By 2050, 40% of current stock is retrofitted to a medium level; 40% deep retrofit.
- 4. By 2050, 10% of current stock is retrofitted to a medium level; 80% deep retrofit.

### Technology mix for heating

SCATTER considers thirteen technologies for heating buildings:

- 1. Gas boiler (old)
- 2. Gas boiler (new)
- 3. Resisitive heating
- 4. Oil-fired boiler
- 5. Solid-fuel boiler
- 6. Stirling engine μCHP
- 7. Fuel-cell μCHP
- 8. Air-source heat pump
- 9. Ground-source heat pump
- 10. Geothermal
- 11. Community scale gas CHP
- 12. Community scale solid-fuel CHP
- 13. District heating from power stations

Trajectories are modelled as a linear trend from the current mix towards the selected end distribution in 2050. In order to estimate the current technology mix, we compared the scenarios defined in the DECC 2050 Calculator with the Energy Technologies Institute Clockwork model<sup>12</sup> results for Manchester.

<sup>&</sup>lt;sup>12</sup> ETI (2015), UK Energy Systems Model Clockwork and Patchwork Results Charts http://www.eti.co.uk/programmes/strategy/esme

The scenarios from the 2050 calculator have been organised into order for the trajectories by prioritising high electrification, and district heating, with dependence on solid fuel the lowest priority.

The optimum scenario from the ESME analysis, which includes cost and return estimates (not within the scope of SCATTER) corresponds most closely to level 8, 50% of heating from heat-pumps (air and ground-source); the rest from community scale CHP.

Some scenarios have been excluded on the basis of their dependency on coal, and their similarity to other scenarios.

The primary fuel source, electrification level and heating system mix in 2050 for each scenario is summarised in the table below:

			boiler	boiler	Resistive	fired	fuel	Stirling engine µCHP	Fuel-cel μCHP	Air- I source heat pump	Ground- source heat pump	Geothermal	scale gas	Community scale solid- fuel CHP	_
BASELI	NE Electrification	Primary fuel	44%	39%	7%	6%	5 2%			- 19	<b>6</b> -		1%	_	_
(1)	level	source	1170	3370	170	, 0,1	,	,		17	·		170		
	2 Very low	Gas		90%	10%	5									
	3 Very low	District					10%	19%	5			1%	24%	35%	11%
	4 Low	Gas			10%	, )			909	6					
	5 Low	Mixed / None					5%	,	169	6	25%	1%	23%	23%	7%
	6 Low	District					15%	,		149	6 20%		15%	25%	11%
	7 Medium	Gas						10%	209	6	30%		33%		7%
	8 Medium	Mixed / None					10%	,		259	6 25%		13%	20%	7%
	9 Medium	District								589	6 30%	1%			11%
	10 High	Solid								509	6 30%			20%	
	11 High	Gas		20%						609	6 20%				
	12 High	Mixed / None			10%	·				609	6 30%				
	13 <mark>High</mark>	District			7%	5				609	6 30%				3%

In order to translate these into year-on-year changes to the energy consumption reported at a local level in the BEIS fuel data, we calculated the proportion of space heating with each technology per year, applying technology efficiencies to understand the total demand for each fuel type. The change in demand in fuel each year is applied to the current demand. Technology efficiencies are summarised below:

	Heating / cooling efficiency
	(annual mean)
Gas boiler (old)	76%
Gas boiler (new)	91%
Resisitive heating	100%
Oil-fired boiler	97%
Solid-fuel boiler	87%
Stirling engine µCHP	63%
Fuel-cell μCHP	45%
Air-source heat pump	200%
Ground-source heat pump	300%
Geothermal	85%
Community scale gas CHP	38%
Community scale solid-fuel CHP	57%
District heating from power	90%
stations	3078

## Biomass/coal power stations

- Metric: TWh generation
- Emissions sources affected: fossil fuel generation and biomass generation recorded at a national level in DUKES.
- Interventions

- 1. No change in solid fuel power generation.
- 2. Solid biomass generation increases by 50% in 2025, dropping off after that; Coal phase-out follows trajectories from the National Grid's Two Degrees scenario.
- 3. Solid biomass generation doubles in 2025, dropping off after that; Coal phase-out follows trajectories from the National Grid's Two Degrees scenario.
- 4. Solid biomass generation quadruples in 2025, dropping off after that; Coal phase-out follows trajectories from the National Grid's Two Degrees scenario.
- 5. Biomass generation replaces fossil fuel powered generation. Trajectories for phase-out are taken from the National Grid Future Energy Scenarios<sup>13</sup> Two Degrees scenario.

### Hydroelectric power stations

- Metric: TWh generation
- Emissions sources affected: Hydro, Hydro pumped storage
- Interventions
  - 1. Hydroelectric power generation grows to 19 MWh per hectare inland water in 2030; 20 in 2050
  - 2. Hydroelectric power generation grows to 19 MWh per hectare inland water in 2030; 21 in 2050.
  - 3. Hydroelectric power generation grows to 25 MWh per hectare inland water in 2030; 26 in 2050
  - 4. Hydroelectric power generation grows to 34 MWh per hectare inland water in 2030; 41 in 2050.

Increasing baseline hydroelectric power generation capacity. The TWh generated per GW capacity is calculated using the assumptions in the National Grid's Two Degrees scenario (2019).

### Offshore wind

- Metric: TWh generation
- Emissions sources affected: Offshore wind
- Interventions
  - 1. No change to large-scale offshore wind generation.
  - 2. Large-scale onshore wind generation grows to 3.4 MWh per hectare in 2030; 5.3 MWh in 2050.
  - 3. Large-scale onshore wind generation grows to 8 MWh per hectare in 2030; 5.9 MWh in 2050
  - 4. Large-scale onshore wind generation grows to 8 MWh per hectare in 2030; 6.9 MWh in 2050.
  - 5. Increasing the rate at which offshore wind generation capacity changes. The TWh generated per GW capacity is calculated using the assumptions in the National Grid's Two Degrees scenario (2019).

### Onshore wind

Metric: TWh generation

Emissions sources affected: Onshore wind

<sup>&</sup>lt;sup>13</sup> https://www.gov.uk/government/collections/total-final-energy-consumption-at-sub-national-level

#### Interventions

- 1. Large-scale onshore wind generation grows to 26 MWh per hectare in 2030; 1.46 MWh in 2050.
- 2. Large-scale onshore wind generation grows to 1.56 MWh per hectare in 2030; 1.75 MWh in 2050.
- 3. Large-scale onshore wind generation grows to 1.75 MWh per hectare in 2030; 1.93 MWh in 2050.
- 4. Large-scale onshore wind generation grows to 1.9 MWh per hectare in 2030; 2.2 MWh in 2050.

This lever works to increase the rate in installed GW per annum for onshore wind. The TWh generated per GW capacity is calculated using the assumptions in the National Grid's Two Degrees scenario (2019).

#### Small-scale wind

- Metric: TWh generation
- Emissions sources affected: Onshore wind not from Major Power Producers
- Interventions
  - 1. No change to small-scale onshore wind.
  - 2. Small-scale wind grows to 3 MWh per hectare in 2030; 2.6 in 2050 (from a baseline of 1.2 MWh per hectare.)
  - 3. Small-scale wind grows to 2.6 MWh per hectare in 2030; 2.9 in 2050 (from a baseline of 1.2 MWh per hectare.)
  - 4. Small-scale wind grows to 2.8 MWh per hectare in 2030; 3.3 in 2050 (from a baseline of 1.2 MWh per hectare.)

Total small-scale wind capacity is calculated in GW. The change each year is calculated for each five-year period of time. This change is applied to current reported small-scale wind.

## Solar PV - Large

- Metric: TWh generation
- Emissions sources affected: Solar PV from Major Power Producers
- Interventions
  - 1. No change in large-scale solar generation to 2030; growing to 100 kWh per hectare in 2050 (from a baseline of 50 kWh per hectare.)
  - 2. Large-scale solar generation grows to 100 kWh per hectare in 2030; 200 in 2050 (from a baseline of 50 kWh per hectare.)
  - 3. Large-scale solar generation grows to 100 kWh per hectare in 2030; 250 in 2050 (from a baseline of 50 kWh per hectare.)
  - 4. Large-scale solar generation grows to 200 kWh per hectare in 2030; 400 in 2050 (from a baseline of 50 kWh per hectare.)

### Solar PV - Small

- Metric: TWh generation
- Emissions sources affected: Solar PV not from Major Power Producers
- Interventions

- 1. Local solar capacity grows to allow generation equivalent to 750 kWh per household in 2030; 1350 in 2050 (from a baseline of 400 kWh per household.)
- 2. Local solar capacity grows, generating equivalent to 1200 kWh per household in 2030; 2200 in 2050 (from a baseline of 400 kWh per household.)
- 3. Local solar capacity grows, generating equivalent to 1550 kWh per household in 2030; 3000 in 2050 (from a baseline of 400 kWh per household.)
- 4. Local solar capacity grows, generating equivalent to 2500 kWh per household in 2030; 5200 in 2050 (from a baseline of 400 kWh per household.)

Total small-scale solar PV is calculated in TWh generated, based on defined rates of total installed capacity (GW). The TWh/GW capacity generation efficiencies from 2017 - 2050 are taken from the National Grid's Two Degrees scenario (2019) for large scale solar PV, but the year on year rates of change are applied to the domestic / small scale solar PV recorded.

### Demand for heating and cooling

- Metric: Change in energy demand for commercial lighting, appliances and catering.
- Emissions sources affected: Commercial space heating, cooling, and hot water; Petroleum products (2); Commercial space heating, cooling, and hot water; Gas; Commercial space heating, cooling, and hot water; Electricity; Commercial space heating, cooling, and hot water; Coal (2); Institutional space heating, cooling, and hot water; Petroleum products (2) Institutional space heating, cooling, and hot water; Electricity; Institutional space heating, cooling, and hot water; Coal (2)
- Interventions
  - 1. In 2050, commercial heating, cooling and hot water demand is 103% of today's levels
  - 2. In 2050, commercial heating, cooling and hot water demand is 83% of today's levels
  - 3. In 2050, commercial heating, cooling and hot water demand is 70% of today's levels
  - 4. In 2050, commercial heating, cooling and hot water demand is 60% of today's levels

Changes are linear between 2020 and 2050.

## Technology mix for heating and cooling

- Metric: Change in energy demand for commercial, industrial and institutional lighting, appliances and catering.
- Emissions sources affected: Commercial lighting, appliances, equipment, and catering; Petroleum products (2); Commercial lighting, appliances, equipment, and catering; Gas; Commercial lighting, appliances, equipment, and catering; Electricity; Commercial lighting, appliances, equipment, and catering; Coal (2); Institutional lighting, appliances, equipment, and catering; Gas; Institutional lighting, appliances, equipment, and catering; Gas; Institutional lighting, appliances, equipment, and catering; Coal (2); Institutional lighting, appliances, equipment, and catering; Petroleum products (2); Interventions

### SCATTER considers eleven technologies for heating buildings:

- Gas boiler (old)
- Gas boiler (new)

- Resisitive heating
- Oil-fired boiler
- Solid-fuel boiler
- Stirling engine μCHP
- Fuel-cell μCHP
- Air-source heat pump
- Ground-source heat pump
- Geothermal
- Community scale gas CHP
- Community scale solid-fuel CHP
- District heating from power stations

Trajectories are modelled as a linear trend from the current mix towards the selected end distribution in 2050. See Domestic Buildings for more detail on the modelling of these.

Energy demand for lighting, appliances and cooling

- Metric: TWh in energy demand for commercial, industrial and institutional lighting, appliances and catering
- Emissions sources affected: Commercial lighting, appliances, equipment, and catering;
   Petroleum products (2); Commercial lighting, appliances, equipment, and catering; Gas;
   Commercial lighting, appliances, equipment, and catering; Electricity; Institutional lighting, appliances, equipment, and catering; Petroleum products (2); Institutional lighting, appliances, equipment, and catering;
   Electricity
- Interventions
  - 1. Commercial lighting & appliance energy demand increases 28% by 2050
  - 2. Commercial lighting & appliance energy demand increases 15% by 2050
  - 3. Commercial lighting & appliance energy demand decreases -4% by 2050
  - 4. Commercial lighting & appliance energy demand decreases -25% by 2050

Total demand (TWh) from commercial, industrial, and institutional lighting and appliances increases in scenarios 1 and 2; decreases in scenarios 3 & 4.

Electrification of lighting, appliances, and catering

- Metric: Energy demand mix for commercial lighting, appliances and catering through electrification
- Emissions sources affected: Commercial lighting, appliances, equipment, and catering;
   Petroleum products (2); Commercial lighting, appliances, equipment, and catering; Gas;
   Commercial lighting, appliances, equipment, and catering; Electricity; Institutional lighting, appliances, equipment, and catering; Petroleum products (2); Institutional lighting, appliances, equipment, and catering;
   Electricity
- Interventions
  - 1. Share of cooking which is electric is as today.
  - 2. By 2050, 100% of commercial cooking is electrified.

This lever combines reductions in energy demand from commercial cooking with an anticipated shift to electrified heat. Scenario 1 assumes small efficiency gains but no shift in the share of commercial cooking which is electric. Scenario 2 increases electrification proportion to with 100% cooking electrified by 2050. This results in an increase in electricity consumption and decrease in other fuels used for commercial cooking.

## Industrial processes – Efficiency

- Metric: Total TWh consumption and energy mix from energy intensity of industry.
- Emissions sources affected: Industrial buildings & facilities; Petroleum products; Industrial buildings & facilities; Gas; Industrial buildings & facilities; Electricity; Industrial buildings & facilities; Coal
- Interventions
  - 1. Industry moves to higher natural gas consumption, with electricity consumption falling before 2035 then remaining constant.
  - 2. Industrial electricity consumption as a share of total energy increases between 2035 and 2050, reaching 40% of total energy consumption.
  - 3. Industrial electricity consumption is 50% of total energy consumption by 2035; 65% by 2050.

This lever impacts the energy consumption trajectories from industrial buildings and facilities, and split by energy demand. The trajectories are focused on electrification of industry.

## Industrial processes - Output

- Metric: GHG emissions from industrial processes
- Emissions sources affected: Iron and steel process emissions; Non-ferrous metals process emissions; Mineral products process emissions; Chemicals process emissions; Other industry process emissions
- Interventions
  - 1. Other industry process emissions are reduced at a rate of 2.6% per year.
  - 2. Reductions in process emissions from all industry, with larger emissions reductions in the chemicals industry (0.4% pa) and other industry (6% pa). Metals and minerals industries also reduce process emissions 0.2% pa and 0.1% pa respectively.
  - 3. Reductions in process emissions from all industry: general industry reduces process emissions at a rate of 4.5% per year. Chemicals emissions reduce 1% per year; metals 0.7% per year, and minerals 0.8% per year.

This lever impacts the process emissions from industrial activity. Separate trajectories are modelled for chemicals, metals, and minerals, industries. Growth rates are applied to the different industries' direct greenhouse gas emissions. Growth in "output index" from industry which applies to current process emissions and energy demand. Specific trajectories per industry type, mapped from 2015 - 2025 and 2025 – 2050.

## Domestic freight (road and waterways)

- Metric: TWh fuel use by on-road transport; TWh fuel use by waterborne freight
- Emissions sources affected: On-road transportation, waterborne transport
- Interventions

- 1. 47% increase in distance travelled by road freight; 40% increase in efficiency. In waterborne transportation, 15 %decrease in fuel use.
- 2. 27% increase in distance travelled by road freight; 60% increase in efficiency. In waterborne transportation, 6 %increase in fuel use.
- 3. 6% decrease in distance travelled by road freight; 71% increase in efficiency. In waterborne transportation, 25 %increase in fuel use.
- 4. 22% decrease in distance travelled by road freight; 75% increase in efficiency. In waterborne transportation, 28 %increase in fuel use.

Domestic freight interventions affect both on-land and waterborne freight.

On-land freight interventions are based on the on-road fuel consumption allocated to your Local Authority<sup>14</sup>. For this iteration of SCATTER, it has not been possible to separate the proportion of this attributable to freight. A UK-wide average has been applied to every Local Authority, based on the Local Authority specific data available for road transport fuel consumption[2].

For Waterborne freight, total fuel consumption from national navigation increases as waterborne transport is increased.

Domestic passenger transport - Demand

- Metric: TWh fuel use across all transport
- Emissions sources affected: Petroleum products (2)Road transport; Onroad Sc Petroleum; Coal (2) Rail; Petroleum products (2)Rail
- Interventions
  - 1. No change to total travel demand per person
  - 2. 5% reduction in total distance travelled per individual per year by 2030.
  - 3. 15% reduction in total distance travelled per individual per year by 2030.
  - 4. 25% reduction in total distance travelled per individual per year by 2030.

Domestic passenger transport - Modal Shift

- Metric: TWh fuel use by different transportation options
- Emissions sources affected: Petroleum products (2)Road transport; Onroad Sc Petroleum; Coal (2) Rail; Petroleum products (2)Rail

The initial modal split used is taken from the National Travel Survey's 2017/18 Average Distances Travelled by Mode<sup>15</sup>. The split represents the distribution between average distance travelled per transport mode in Urban Conurbations across England. "Urban conurbation" has been chosen with the intention of representing LA's using the tool who have both urban and rural coverage. Full statistics are available summarized in the Factsheets published by the DfT<sup>16</sup>. The Rural Urban Classification is an Official Statistic and is used to distinguish rural and urban areas. The Classification defines areas as rural if they fall outside of settlements with more than 10,000 resident population<sup>17</sup>. The mode share data is

<sup>&</sup>lt;sup>14</sup> https://www.gov.uk/government/collections/road-transport-consumption-at-regional-and-local-level

<sup>&</sup>lt;sup>15</sup>https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\_data/file/822089/nt\_s-2018-factsheets.pdf

<sup>&</sup>lt;sup>16</sup>https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\_data/file/822089/nt\_s-2018-factsheets.pdf

<sup>&</sup>lt;sup>17</sup> https://www.gov.uk/government/statistics/2011-rural-urban-classification

a national breakdown of average mode share, which does not split by local authority, therefore this is not tailored to each local authority area.

The following changes are applied to reach level 4 ambition:

- o % walking x3
- o % cycling x3
- % using buses x3
- % using railways x1.5

Levels 2 and 3 are mid-points between L1 and L4.

#### Interventions

- 1. No change to current national average modal split by total miles: 74% transportation by cars, vans and motorcycles.
- 2. Average modal share of cars, vans and motorbikes decreases from current national average 74% total miles to 56% in 2050.
- 3. Average modal share of cars, vans and motorbikes decreases from current national average 74% total miles to 47% in 2050.
- 4. Average modal share of cars, vans and motorbikes decreases from current national average 74% total miles to 38% in 2050.

	Trajectory			
Mode	1	2	3	4
Walking	6.3%	12.5%	15.7%	18.8%
Pedal cycles	1.1%	2.2%	2.7%	3.3%
Cars, Vans, and Motorcycles	73.9%	58.8%	51.2%	43.6%
Buses	4.2%	8.4%	10.5%	12.5%
Railways	14.5%	18.1%	20.0%	21.8%

# Domestic passenger transport – Technology

- Metric: TWh fuel use by different transportation options
- Emissions sources affected: Petroleum products (2)Road transport; Onroad Sc Petroleum; Coal (2) Rail; Petroleum products (2)Rail
- Interventions
  - 1. Cars, buses and rail is 100% electric by 2050. Slight increase in average train occupancy.
  - 2. Cars, buses and rail is 100% electric by 2040. Slight increase in average train occupancy and bus occupancy.
  - 3. Cars, buses and rail is 100% electric by 2035. Average occupancies increase to 18 people per bus km (from 12), 1.62 people per car-km (up from 1.56), and 0.42 people per rail-km (from 0.32).
  - 4. Cars and buses are 100% electric by 2035, rail is 100% electric by 2030. Average occupancies increase to 18 people per bus km (from 12), 1.65 people per car-km (up from 1.56), and 0.42 people per rail-km (from 0.32).

## International aviation

- Metric: TWh fuel use from aviation
- Emissions sources affected: Aviation\_fuel\_Sc1; Aviation\_fuel\_Sc3

#### Interventions

- 1. Department for Transport "central" forecast for aviation.
- 2. Department for Transport "high" forecast for aviation.
- 3. Department for Transport "low" forecast for aviation.

Department for Transport growth forecasts<sup>18</sup> for international aviation, applied to both in-boundary airport emissions and to scope 3 emissions from people in the local area travelling. A rate of change calculated between aviation in 2030, 2040 and 2050.

The "Central" forecast represents the DfT base-case; "Low" encapsulates 'lower economic growth worldwide with restricted trade, coupled with higher oil prices and failure to agree a global carbon emissions trading scheme'; "High" scenario projects 'Higher passenger demand from all world regions, lower operating costs and a global emissions trading scheme'<sup>19</sup>.

## International shipping

- Metric: TWh fuel use by on-road transport; TWh fuel use by waterborne freight
- Emissions sources affected: Petroleum products (2)Road transport; Onroad Sc Petroleum 004:Petroleum products\_internal; 004:Petroleum products\_coastal
- Interventions
  - 1. 47% increase in distance travelled by road freight; 40% increase in efficiency. In waterborne transportation, 15 %decrease in fuel use.
  - 2. 27% increase in distance travelled by road freight; 60% increase in efficiency. In waterborne transportation, 6 %increase in fuel use.
  - 3. 6% decrease in distance travelled by road freight; 71% increase in efficiency. In waterborne transportation, 25 %increase in fuel use.
  - 4. 22% decrease in distance travelled by road freight; 75% increase in efficiency. In waterborne transportation, 28 %increase in fuel use.

For Waterborne shipping, total fuel consumption from national navigation increases as waterborne transport is increased. Road freight trajectories are developed from a combined impact of reduced distance travelled by HGVs (mostly diesel; electric trajectories only begin in the 2040s) with an increased efficiency (i.e. reduced energy demand per vehicle-km). The starting point for road freight efficiency is 5.29 TWh/bn vehicle-km (BEIS 2017), Road transport energy consumption at regional and local authority level, 2015) Baseline trajectory sees this efficiency increased to 3.15 TWh/bn vehicle-km by 2050. For the most ambitious (L4) scenario, the efficiency in 2050 is 1.34TWh/bn vehicle-km.

Road freight trajectories are developed from a combined impact of reduced distance travelled by HGVs (mostly diesel; electric trajectories only begin in the 2040s) with an increased efficiency (i.e. reduced energy demand per vehicle-km). The starting point for road freight efficiency is 5.29 TWh/bn vehicle-km (BEIS (2017), Road transport energy consumption at regional and local authority level, 2015) Baseline trajectory sees this efficiency increased to 3.15 TWh/bn vehicle-km by 2050. For the most ambitious (L4) scenario, the efficiency in 2050 is 1.34TWh/bn vehicle-km.

<sup>&</sup>lt;sup>18</sup> https://www.gov.uk/government/publications/uk-aviation-forecasts-2017

 $<sup>^{19} \</sup>underline{\text{https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment data/file/781281/uk} - aviation-forecasts-2017.pdf$ 

## Increase in rates of recycling

- Metric: Increase in proportion of total waste directed towards recycling.
- Emissions sources affected: Open-loop; Closed-loop; Landfill; Composting; Combustion;
   Wastewater
- Interventions
  - 1. 65% recycling, 10% landfill, 25% incineration by 2040; remaining constant to 2050
  - 2. 65% recycling, 10% landfill, 25% incineration achieved by 2035 remaining constant to 2050
  - 3. 65% recycling, 10% landfill, 25% incineration achieved by 2035, recycling rates increasing to 75% by 2050
  - 4. 65% recycling, 10% landfill, 25% incineration achieved by 2035, recycling rates increasing to 85% by 2050

This lever interacts with reduction in volume of waste to define the total waste arisings and which waste stream they are captured in. Here, trajectories calculate the percentage recycling, landfill and "other" waste, applying these changes to the waste recorded in each category.

The "base case" is that the EU targets for 65% recycling are reached in 2035<sup>20</sup>; subsequent trajectories have different anticipated dates for reaching this. In Scenario 2, 65% recycling is met between 2045 and 2050. In Scenario 3, recycling increases steadily from 65% just after 2035 to 81% in 2050. In scenario 4, the recycling target is met earlier than 2035 and by 2050 85% all waste is recycled. The scenarios are applied to reported recycled and landfilled waste, as the change in the anticipated % waste recycled.

#### Reduction in volume of waste

- Metric: Reduction in volume of waste
- Emissions sources affected: Open-loop; Closed-loop; Landfill; Composting; Combustion;
   Wastewater
- Interventions
  - 1. Total volume of waste is 124% of 2017 levels by 2040.
  - 2. Total volume of waste is 109% of 2017 levels by 2040.
  - 3. Total volume of waste is 86% of 2017 levels by 2040.
  - 4. Total volume of waste is 61% of 2017 levels by 2040.

Total volume of waste arising is calculated by type (Household, Commercial & Industrial, Construction & Demolition) according to defined percentage changes in each. This total is summed for each five-year period. The change in this total each year is applied to all types of reported waste for the local authority.

By simplifying the trajectory, and applying the same reduction in wastage rates uniformly, a level of detail between different types of waste arising has been lost. However, the original waste trajectories are similar.

<sup>&</sup>lt;sup>20</sup> European Waste targets for 2035 <a href="https://www.letsrecycle.com/news/latest-news/eu-set-softer-targets-55-recycling-2025/">https://www.letsrecycle.com/news/latest-news/eu-set-softer-targets-55-recycling-2025/</a>