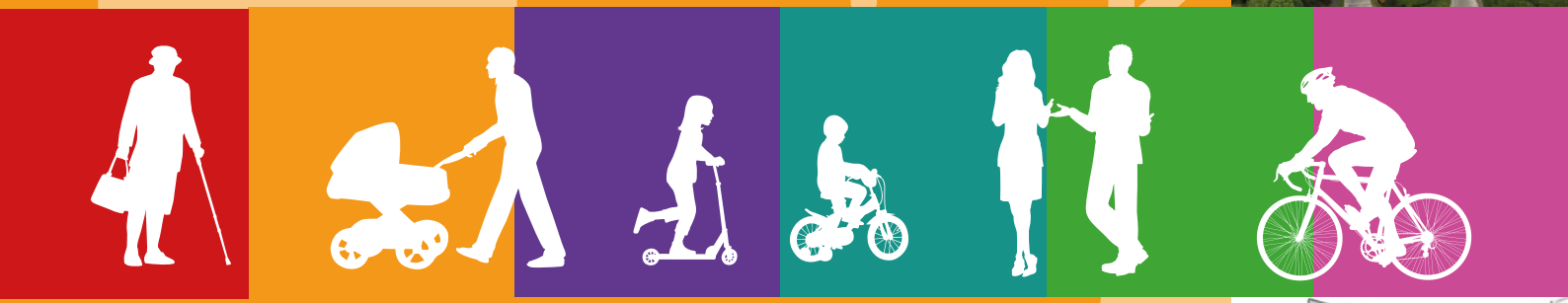
Environment Strategy

Carbon definitions report



West Berkshire Council

Contents




1. Purpose

1.1 This document aims to provide clarity on the terms used by West Berkshire Council (WBC) in relation to carbon emissions and targets, and how these terms relate to the Council's policies, strategies and guidance. It serves to provide further clarity when communicating to Members, Officers, Residents, Businesses and Community Groups on the various nuances of carbon emissions.

1.2 The terminology outlined in this document will be added to the Council's webpage and linked to the final draft of the Environment Strategy Refresh.

2. Background

2.1 On 2nd July 2019, WBC unanimously declared a Climate Emergency. As part of this commitment to act, the Council committed to creating a strategic plan for West Berkshire that aims to deliver carbon neutrality by 2030. Following the declaration, the Environment Strategy and Delivery Plan were produced which outlined the approach the Council would take in meeting the outlined target. The Council, in its monitoring and reporting, has separated out the reporting of its own impact and that of the whole District. It is clear that the Council is working towards a target of carbon neutrality by 2030 and supporting, encouraging and facilitating carbon neutrality across West Berkshire.

2.2 Since the declaration of the Climate Emergency, terms in addition to 'carbon neutrality' have been used to describe carbon emissions which have led to some confusion.

2.3 In October 2023, the Administration added the Ecological Emergency to the declaration. When the Environment Strategy and Delivery Plan was written in 2020, it was written to addressed biodiversity and ecology elements in relation to the Climate Emergency declared, therefore the Administration deemed it appropriate to include Ecological Emergency in the declaration. On officer recommendation, the administration also changed the Council's terminology from carbon neutrality to Net Zero to align it with national Government terminology. The difference between the two terms is expanded on within the definitions below.

2.4 At the end of 2024 and the beginning of 2025, a refresh of the Environment Strategy and Delivery Plan took place to ensure the documents were fit for purpose to deliver against the Council's objectives five years from the 2030 target date.

2.5 Based on research, this document outlines a number of key definitions detailing how these definitions relate to the Council's activity at a Council and District-wide level.

3. Definitions

GHG emissions

3.1 A greenhouse gas (or GHG) is any gas in the atmosphere which absorbs and re-emits heat, therefore keeps the planet's atmosphere warmer than it otherwise would be. The main GHGs in the Earth's atmosphere are water vapour, carbon dioxide (CO^2), methane (CH^4), nitrous oxide (N^2O) and ozone.

3.2 This GHG Protocol Corporate Standard is an internationally recognised standard which provides standards and guidance for companies and other types of organisations preparing a GHG emissions inventory. This is the standard West Berkshire Council follows. It covers the accounting and reporting of the six greenhouse gases covered by the Kyoto Protocol. The Kyoto Protocol is an international treaty for controlling the release of GHGs from human activities and the GHGs controlled under the treaty which are often referred to as "Kyoto gases".

3.3 In line with the Greenhouse Gas Protocol, the six GHG gasses included under the Kyoto gases are as followed.

GHG	Global Warming Potential (GWP)
Carbon dioxide (CO2)	1 *1
Methane (CH4)	29.8 *1
Nitrous oxide (N2O)	273 *1
Hydrofluorocarbons (HFCs)	4 to 12,400 *2
Perfluorocarbons (PFCs)	6,630 to 11,100 *2
Sulphur hexafluoride (SF6)	23,500 *2

[1] Based on the IPCC Sixth Assessment Report
[2] Based on the IPCC Fifth Assessment Report (GHG Protocol)

3.4 Different greenhouse gases last in the atmosphere for different lengths of time, and they also absorb different amounts of heat. The impact a greenhouse gas is expressed by assigning it a Global Warming Potential (GWP) index figure normally over a 100 year period. For example, and as detailed above, CO^2 has an index value of 1, and the GWP for all other GHGs is the number of times more warming they cause compared to CO^2. E.g. 1kg of methane causes 29.8 times more warming over a 100 year period compared to 1kg of CO^2, and so methane as a GWP of 29.8.

Carbon Dioxide Emissions

3.5 In terms of the quantity released and the total impact on global warming, carbon dioxide (CO^2) is the most common GHG emitted by human activities. Sometimes the term "CO^2" is used as a shorthand way of describing all greenhouse gases, this can lead to confusion. A more accurate way of referring to a number of GHGs collectively is to use the term "carbon dioxide equivalent" or "CO^2e".

Carbon dioxide equivalent (CO^2e)

3.6 "Carbon dioxide equivalent" or "CO^2e" is a term for describing different greenhouse gases in a common unit. For any quantity and type of greenhouse gas, CO^2e signifies the amount of CO^2 which would have the equivalent global warming impact.

Carbon

3.7 Carbon is a chemical element which is present in many gases and compounds, for example, carbon combined with oxygen makes carbon dioxide (CO^2). The term "carbon" is often used when talking about greenhouse gas emissions which can be ambiguous and potentially confusing. The term "Carbon" is sometimes used as a shorthand way of referring to CO^2, or greenhouse gases similar to the way CO^2 can be used as shorthand for GHG.

Embodied carbon

3.8 Embodied carbon refers to the total greenhouse gas (GHG) emissions (often referred to simply as "carbon") of a material.

3.9 In the built and infrastructure environment, it refers to emissions arising from the manufacturing, transportation, installation, maintenance, and disposal of building materials (often referred to as 'life cycle') and excludes GHG emissions associated with the operation of a building or portion of infrastructure. It considers how many greenhouse gases (GHGs) are released throughout the supply chain – this can be throughout the entire 'life cycle' or a proportion of a 'life cycle'. Embodied carbon 'life cycle' can be measured from cradle to gate (factory), or cradle to site (of use). Embodied carbon may also be measured with the boundaries of cradle to grave (end of life), which is the most complete boundary condition or 'life cycle'. This boundary includes the extraction of materials from the ground, transport, refining, processing, assembly, in-use (of the product) and finally its end-of-life profile.

3.10 The scope of the embodied carbon needs to be clearly defined at the beginning of a project.

Whole Life-Cycle Carbon

3.11 Whole Life-Cycle Carbon (WLC) emissions are the carbon emissions resulting from the materials, construction and the use of a building over its entire life, including its demolition and disposal.

Operational carbon

3.12 Operational carbon, is the carbon released from the ongoing energy usage from the operation of a building. Operational energy usage comprises of regulated and unregulated energy. Regulated energy is building energy consumption resulting from the specification of controlled, fixed building services and fittings, including space heating and cooling, hot water, ventilation, fans, pumps and lighting. Unregulated energy is building energy consumption resulting from a system or process that is not 'controlled'. E.g. IT equipment, lifts, cooking equipment etc.

Scope 1, 2 and 3 emissions

3.13 Greenhouse gas (GHG) emissions can be categorised into scope 1, 2 and 3 emissions. Scope 1 GHG emissions are produced from sources that an organisation owns or controls directly for example the burning of fuel in boilers, vehicles etc.). Scope 2 GHG emissions are produced indirectly when an organisation purchases electricity, steam, heating and cooling for their own uses. Scope 3 GHG emissions are also produced indirectly, however not as a result of the organisation itself, and not the result of activities from assets owned or controlled by them, but by those that it's indirectly responsible for, up and down stream of its value chain e.g. contractors, purchased goods and materials.

3.14 It is important to produce an inventory of emission sources within each scope (where applicable) so a clear baseline can be set. Usually the baseline is established through looking at a year(s) of the organisations emissions so that an organisation can understand and track emissions over time.

Carbon Sequestration

3.15 Carbon sequestration is the capturing, removal and storage of carbon dioxide (CO2) from the earth's atmosphere and is one of the approaches being taken to tackle climate change. It's recognised as a key method for removing carbon from the earth's atmosphere. Carbon sequestration can happen in two basic forms: biologically or geologically. Also, while it's being encouraged artificially through various biological and geological methods, it also happens naturally in the environment on the biggest scale.

3.16 Biological carbon sequestration happens when carbon is stored in the natural environment. This includes what are known as 'carbon sinks', such as forests, grasslands, soil, oceans and other bodies of water. This is also known as an 'indirect' or passive form of sequestration.

3.17 Geological carbon sequestration happens when carbon is stored in places such as underground geological formations or rocks. This process is largely artificial or 'direct', representing an effective way of neutralising emissions put into human practices, such as manufacturing or construction. It's also largely technological as a result, with recent innovations showing carbon being sequestered more effectively on larger scales.

Offsetting

3.18 The terms carbon offset and carbon offset credit (or simply "offset credit") are used interchangeably, though they can mean slightly different things.

3.19 A carbon offset broadly refers to a reduction in GHG emissions for example via large scale low carbon or renewable technology i.e. solar PV farms – or an increase in carbon storage (e.g., through land restoration or the planting of trees) – that is used to compensate for emissions that occur elsewhere.

3.20 A carbon offset credit is a transferrable instrument certified by governments or independent certification bodies to represent an emission reduction of one metric tonne of CO2, or an equivalent amount of other GHGs. The purchaser of an offset credit can "retire" it to claim the underlying reduction towards their own GHG reduction goals.

"Carbon neutral" vs "Net zero carbon"/ "Net Zero"

3.21 There is not a universally agreed definition of what is "Carbon neutral" and "Net zero carbon"/ "Net Zero", however there is a broad consensus from a number of bodies of their meanings.

3.22 It is generally agreed that carbon neutrality means balancing greenhouse gas (GHG) emissions by 'offsetting' – or removing from the atmosphere – an equivalent amount of carbon for the amount produced. This means a commitment to carbon neutral does not require a commitment to reduce overall emissions.

3.23 In contrast, it is generally agreed that a commitment to net-zero carbon means making changes to reduce carbon emissions to the lowest amount – and offsetting as a last resort. Often the term is simply referred to as "Net zero" meaning this term includes all greenhouse gases, not just carbon dioxide. This definition is supported by a UN report published in 2022 which aims to provide a frame of reference for what it means for companies and other non-state entities to achieve Net Zero.

Science Based Targets

3.24 The Science Based Targets initiative (SBTi) is a global body established be Carbon Disclosure Project (CDP), the United Nations Global Compact, World Resources Institute and World Wide Fund (WWF). The body enables companies and financial institutions to set ambitious emissions reductions

targets in line with the latest climate science. Science-based targets show companies and financial institutions how much and how quickly they need to reduce their greenhouse gas emissions to prevent the worst effects of climate change.

3.25 Targets are considered 'science-based' if they are in line with what the latest climate science deems necessary to meet the goals of the Paris Agreement – limiting global warming to 1.5°C above pre-industrial levels.

Low Zero Carbon Technology

3.26 Low and Zero Carbon Technology (LZC) is the term given to technologies that emit low levels of CO2 emissions, or no net CO2 emissions. Low and Zero Carbon Technology include technologies which are highly efficient but may require an element of grid electricity to operate which may be from a fossil fuel source or a renewable source. It is worth noting that low carbon technologies can be combined with renewable technologies to be even more efficient.

3.27 There are a number of technologies that can be used to provide heat for a building, emitting low or no net CO^2 emissions.

- Solar hot water
- Air source heat pumps
- Ground source heat pump
- Combined Heat and Power (CHP)
- Biomass heating
- Efficient gas boiler
- Solar photovoltaics (PV)
- Wind turbines

Decarbonisation of the Grid

3.28 Decarbonising the grid or power sector means reducing its carbon intensity: that is, reducing the emissions per unit of electricity generated. Decarbonisation is being achieved by increasing the share of low-carbon energy sources, such as renewables and nuclear energy, and a corresponding reduction in the use of fossil fuels. As more low-carbon energy sources are fed into the national grid, the lower the carbon intensity of our energy becomes.

Green Energy

3.29 Green Energy supply is supplied via the National Grid. Some energy suppliers offer green tariffs, which can either mean they'll match your usage with renewable energy generation or they will contribute towards environmental schemes on your behalf. Some green tariffs will directly supply renewable energy. Others involve energy companies purchasing renewable energy guarantee of origin (REGO) certificates on the open market. These certificates are issued to renewable energy generators for each megawatt hour of renewable energy generated. They can sell any excess certificates created at times of surplus to non-renewable energy generators, who then use them to create a 'green tariff'.

Blue Energy

3.30 Blue Energy supply for businesses is supplied via the National Grid. Electricity supply is backed exclusively by nuclear power generated from nuclear power stations. The Ofgem regulations require the Council's electricity supplier, EDF, to update their fuel mix disclosure by the 1 October following each reporting period of 1 April – 31 March. The latest publication therefore confirms that the 'Blue for Business' supply type was zero carbon.

Energy hierarchy

3.31 The Energy hierarchy refers to a way to reduce energy use in order to reduce CO^2 or CO^2e emissions. There are two ways the energy hierarchy is referenced.

3.32 In general terms the Energy Hierarchy lists the actions policy makers, industry and consumers need to take when it comes to energy sources and use, in order of most sustainable to least. The first step is to conserve energy and

change wasteful behaviour to reduce demand. The second step is to be energy efficient by using technology to reduce the demand and eliminate waste. The third step is to investigate renewable, sustainable resources. The fourth step is to investigate low carbon technology and carbon capture. The fifth step is to follow a conventional resource route and look to offset via the purchasing of credits.

3.33 In the built environment the Energy Hierarchy refers to the reduction of energy demand (be lean), the second step is to supply energy efficiently (be clean) and the third step is use renewable energy (be green).

4. Carbon emissions in the context of WBC's Policies, Strategies and Guidance

4.1 On 2nd July 2019, WBC unanimously declared a Climate Emergency. As part of this commitment to act, WBC have set a target of carbon neutrality for the Council by 2030 and to support, encourage and facilitate carbon neutrality across West Berkshire.

Carbon Neutral to Net Zero - Council Operations

4.2 The council is aiming to be a carbon neutral operation by 2030. This includes all scope 1, scope 2 emissions and the scope 3 emissions from business travel and the emissions from some of our contractors. We have included the emissions from our two largest contractors in terms of annual cost to West Berkshire Council which are currently Volker Highways and Veolia and our highest profile contractor which is currently Everyone Active who manage our leisure centres.

4.3 The Council's emissions are monitored in tonnes of CO^2 equivalent or CO^2e (as detailed in the definitions section) which is used to compare emissions from various greenhouse gases (not just carbon dioxide) on the basis of their global warming potential. The Council's emissions baseline was set based on 2019/20.

Scope 1: Sewage processing, refrigerants, stationary combustion (e.g. boilers) and mobile combustion (fleet and personal vehicles).

Scope 2: Purchased electricity

Scope 3: Contractor emissions (Volker Highways, Veolia Waste Management and Everyone Active) and business travel.

4.4 Emissions are monitored from the following asset types: Schools, care homes, community buildings, car parks, day centres, family hubs, industrial buildings, land, libraries, museums, offices, residential, leisure centres, sewage works.

4.5 The Council monitors its scope 1, 2 and 3 emissions with the support of a GHG calculator tool developed by the Consultancy, WSP, which follows the internationally recognised GHG protocol.

Carbon Neutral to Net Zero – District Wide

4.6 District wide emissions are monitored using the UK local authority and regional estimates of carbon dioxide emissions from the Department for Energy Security and Net Zero (DESNZ). The data includes emissions from transport, industry, commercial, domestic and agriculture. The data excludes aviation, shipping and military transport, as this cannot be allocated to local areas. This is monitored in tonnes of CO^2 equivalent or CO^2e (as detailed in the definitions section) which is used to compare emissions from various greenhouse gases on the basis of their global warming potential.

4.7 The scope of the District wide carbon emissions are detailed below alongside steps which can be taken by residents, businesses and community groups on where and how they can reduce their carbon emissions to achieve Net Zero Carbon. Given the scale of the challenge and the backdrop of the national target being 2050, the Council is committed to playing its part in contributing to the achievement of Net Zero Carbon for the District as soon as practicable.

District Emissions Scope	Transport	Industry & Commercial	Domestic	Agriculture
High level action areas	Engagement and Behaviour Change Programmes	Engagement and Behaviour Change Programmes	Engagement and Behaviour Change Programmes	Engagement and Behaviour Change Programmes
	Advice and Grant opportunities	Advice and Grant opportunities	Advice and Grant opportunities	Advice and Grant opportunities
	Implementation of Policies and Strategies to support the transition to Net Zero Carbon. For Example: - Ultra Low Emission Vehicle strategy. - Local Transport Plan - Planning Policy	Implementation of Policies and Strategies to support the transition to Net Zero Carbon. For Example: - Planning Policy - Strategic Masterplans - Economic Development Strategy	Implementation of Policies and Strategies to support the transition to Net Zero Carbon. For Example: - Planning Policy - Strategic Masterplans	Implementation of Policies and Strategies to support the transition to Net Zero Carbon. For Example: -Planning Policy - Economic Development Strategy

Planning Policy - Current Core Strategy

4.8 *"Major development shall achieve the following minimum reductions in total CO^2 emissions (regulated and unregulated energy use) from renewable energy or low/zero carbon energy generation on site or in the locality of the development as long as a direct physical connection is used, unless it can be demonstrated that such provision is not technically or economically viable.*

The percentage reductions in CO^2 emissions should be based on the estimated CO^2 emissions of the development after the installation of energy efficiency measures related to either the Code for Sustainable Homes (no longer applicable), BREEAM or equivalent method has been applied.

- *Residential Development from 2016: Zero Carbon*
- *Non-Residential Development from 2019: Zero Carbon"*

4.9 Regulated Zero Carbon calculations and applicable BREEAM energy issues/ credits are based on the National Calculation Method (NCM). The NCM provides the underlying method and the standard data sets necessary to calculate the annual energy use of a proposed building and comparing it with the energy use of a 'notional' building of a similar type, under similar circumstances. This data is then then converted to CO^2 emissions. The calculation can use Standard Assessment Procedure (SAP), the Approved Dynamic Simulation Models (DSMs) or Simplified Building Energy Model (SBEM) depending on the building type. These methodologies and models are used as the basis of compliance with Building Regulations Part L, EPCs and DECs. SAP (Standard Assessment Procedure) documents are produced for dwellings, while BRUKL (Building Regulations UK, Part L) documents refer to non-domestic buildings.

4.10 Unregulated Zero Carbon calculations and applicable BREEAM requirements can be based on CIBSE TM54 - Evaluating operational energy use at the design stage.

4.11 In relation to the above methodologies and definitions detailed above, Zero Carbon should be expressed as CO^2. This definition is different to the Net Zero definition as it only accounts for CO^2 emissions.

4.12 Planning Policy - Local Plan Review (LPR) – not yet adopted

4.13 *'New development of one or more new dwellings and/or 100sqm or more of new non-residential floorspace should achieve net zero operational carbon emissions (regulated and unregulated energy) by implementing the energy hierarchy.*

4.14 *Full detail including requirements and targets that need to be to be achieve can be found under policy DM4 and supporting text of the Local Plan Review.*

Offsetting Projects

Natural Solutions Delivery Partnership

4.15 West Berkshire Council is a founding member of the Natural Solutions Delivery Partnership which is investigating district wide opportunities for biological carbon sequestration and Biodiversity Net Gain (BNG) across public and private land.

4.16 Carbon associated with biological sequestration is not static, instead it follows an 'S' curve meaning there is a small amount of carbon sequestration in the early years of the project with a steep rise in the middle of the project and then it plateaus towards the end of the project.

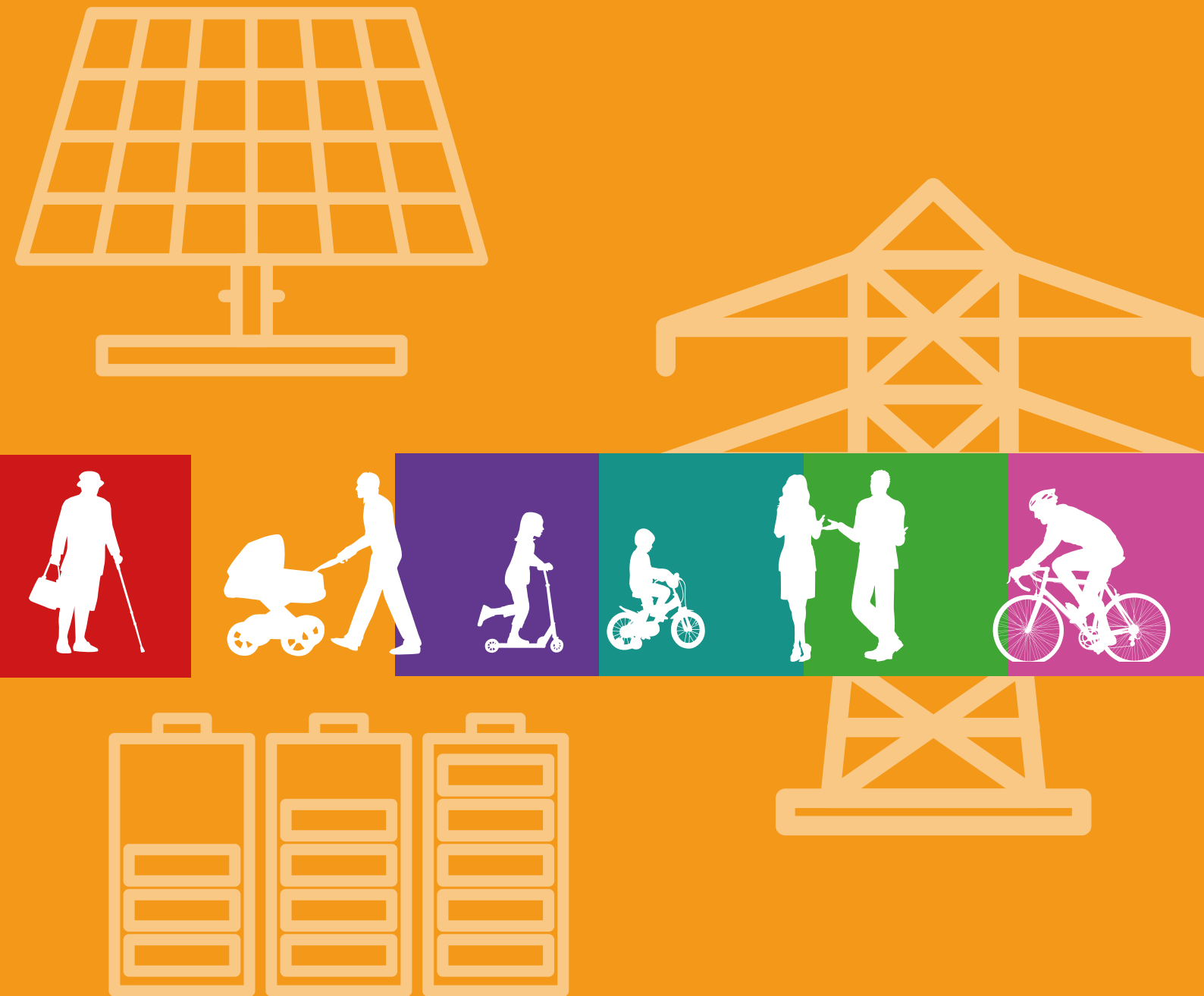
Net Zero Carbon - Council Operations

4.17 Where appropriate, the Council will undertake biological carbon sequestration on land that it owns. Where this is not possible, the aim will be (via the work of the Natural Solutions Delivery Partnership) private land will be identified and landowners encouraged to implement biological carbon sequestration projects (where appropriate).

4.18 Investing in biological carbon sequestration at a local or national level also supports other Council Environmental objectives such as Biodiversity Net Gain and Nutrient Neutrality.

Large Scale Renewable Technology

4.19 Planning permission has been granted for a solar farm at Grazeley. Work on site is due to commence in the summer of 2025. The project will see a 20MWp solar farm installed on up to 75 acres of land the Council already own. The energy generated would represent a significant amount of off-setting which will be measured in CO^2e. How and where the offsetting will be used is to be determined.



WBC/E/HR/0425