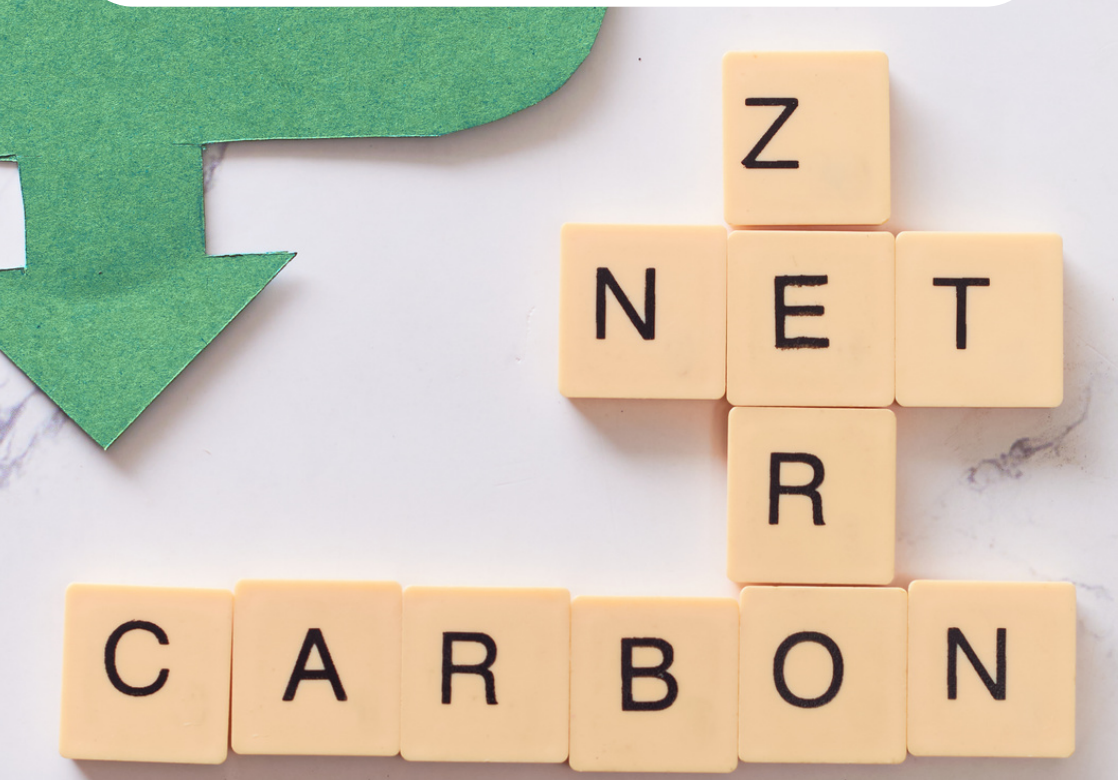
COMMUNITY ENERGY PLUS

Includes tips on ways to reduce your footprint

Understanding the language of Carbon and Net Zero



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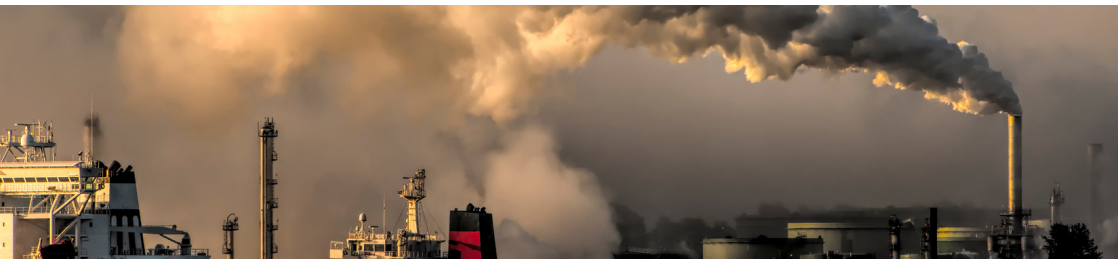
The word ‘carbon’ is used a lot in the language of tackling climate change, and more recently the phrase ‘net zero’ has become popular; but what do these terms mean? Often, they are used as shorthand and the meaning can be unclear, so this guide aims to explain the language and the ideas behind some of the words commonly used (in **bold**).

The element **Carbon** is found throughout natural life, it is in us, in the animals, plants, the air around us, and in the soil beneath our feet. When carbon combines with oxygen it forms **Carbon Dioxide**, **CO_2**, which at room temperatures is a colourless, odourless gas – we breathe it out with every breath and plants breathe it in as part of photosynthesis. When materials like wood, coal and oil are burnt for heating, or when powering an engine, the carbon in the fuel combines with oxygen forming CO_2 which escapes to the atmosphere; this release of CO_2 is called **emissions**, so, when people talk about “**reducing carbon**”, they generally mean lowering the emissions of carbon dioxide and other gases.

Carbon Dioxide has always been present in the atmosphere, but the problem is that our modern lifestyles are putting too much CO_2 into the air.

The atmosphere above us is made up of different layers, and it is in the lowest layer, the **Troposphere**, where most of the heat is caught. (The **Ozone** layer, that protects us from harmful UV sits above this layer.)

As the proportion of CO_2 and other gases build up, they trap more heat from the Sun and the balance keeping the Earth not too cold and not too hot is upset – hence CO_2 is called a **Greenhouse Gas**, contributing to **Global Warming** – too much gas means too much warmth is caught in the atmosphere and in the oceans.



We measure the amount of CO_2 in the atmosphere in 'parts per million (ppm)'. For most of human history, the levels of atmospheric CO_2 were steady at about 270ppm; from the start of the Industrial Revolution, when we started to burn large amounts of coal, and since then, exploiting the refined products of crude oil and gas, the number has steadily increased. Today, because of all that burning of **fossil fuels**, the measure has exceeded 417 ppm and is increasingly rapidly. Perhaps this doesn't sound much, but this increase is making a big difference; a concentration of less than 350 ppm is still seen as the safe threshold of CO_2 and why urgent action is needed.

CO_2 will last in the atmosphere for about 100 years before breaking down; what we do today will still be having an effect for many years to come. CO_2 is used as the reference point for a collection of other gases that all contribute to the heating process.

Intensive farming and agriculture are major sources of two of these other important gases: **Methane** and **Nitrous Oxide**.

- **Methane** (CH_4) traps at least 25 times more heat, but breaks down more quickly than CO_2
- **Nitrous Oxide** (N_2O) (laughing gas) traps more than 265 times more heat than CO_2 and lasts as long.

Several other gases that are used in important manufacturing processes trap more heat and last in the air far longer than CO_2, causing a build-up of the over-heating problem.

The amount of heat these gases trap is measured by comparing their effect to CO_2 and so an 'e' is often added to include the combined effect of these gases: **Carbon Dioxide Equivalent (CO_2e)**.

CO_2e is measured in the metric system, in grammes and tonnes, so you will see this written as 500g CO_2e (the CO_2 and other gases emitted producing a bottle of locally brewed beer bought from your corner shop) or 35 tonnes CO_2e (the amount used to make a new top-of-the-range car).

Why is temperature so important?

The direct link between the levels of CO_2 in the atmosphere and its impact on global temperatures has been known since the mid-1800s. The Earth has always had natural cycles of warming and cooling, but nothing like we are seeing now in the speed of change; the 10 top hottest years ever recorded have been since 2000, with records being beaten year after year.

Simply, the more of these heat-trapping gases that are in the atmosphere, the hotter the air and the oceans will get. Warmer temperatures mean that the air will hold more moisture and there is more energy in weather systems and major ocean currents – this is upsetting the stable systems that we have lived with, and we will see more disruption and more extreme weather events – wildfires, hurricanes, droughts, flooding, significant sea level rise, and much worse.

What is the importance of 1.5°C?

To limit the amount of disturbance to climate systems, we need to slow down and reverse the rise in global temperatures.

In 2015, 195 members of the United Nations signed an international treaty on climate change: **the Paris Accords**. The members agreed to keep the rise in average global temperature increase to "well below 2°C above pre-industrial levels", and preferably limit the increase to 1.5°C.

Recent research has suggested that this threshold of a 1.5°C average increase will likely be breached within the next five years - we are currently at 1.2°C and the speed of increase is alarming. Even with the increased temperatures we have already seen, major climate change is happening and causing significant problems around the world: a world where temperatures have risen by 3 - 4°C, figures now regularly being discussed, would be absolutely catastrophic for us and most other living things.

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A lot of media coverage is often focused on the immediate effects of heat waves and extreme weather; however, when they discuss environmental systems changing, Climate scientists also talk about **Tipping Points** and warn about **Cascade effects**.

A Tipping Point marks a point of major change in a system. As we hit higher temperatures, we pass thresholds that mean that systems which naturally vary each year are disrupted and cannot recover. Tipping Points are often marked by sudden, very disruptive changes and will be the start of a period of chaotic disturbance.

For instance, the amount of permanent ice in the Arctic Sea which changes over the seasons in a year, is now shrinking at an alarming rate. Less ice cover means the sea warms even more, and so more ice is lost in a cascade effect. Loss of ice at both poles will contribute to global sea level rise.

Rising sea levels make coastal communities very vulnerable, not just from the greater risks of flooding and the impacts of storms.

Land used to grow food and to graze livestock is lost due to the inundation of fields with salt water. And, as the groundwater is polluted by the sea, serious health impacts for people using it follow. When these people lose their homes where do they move to?

London, New York & Bangkok are already recognised as being at serious risk; what happened in New Orleans after Hurricane Katrina in 2005 is an important lesson about the challenges of being prepared for major weather-related events.

- Flooding, together with the pollution of fresh water supplies, with all the health risks involved, is only the start. Stagnant water breeds disease at a point when health systems may be seriously compromised.

- Subsidence of buildings, the disruptions of key transport infrastructure and systems providing communications, power and food take huge efforts to recover.

- As was seen in New Orleans, the mass evacuation of people can mean some communities take decades to rebuild and some will disappear entirely.

What is your Carbon Footprint?

A Carbon **Footprint** is a shorthand term that means making the best estimate possible about the emissions and impact something has on climate change – this measurement can be of anything, from something we do or buy, to totalling up the impacts of our household lifestyle, or the company we work for, or of our neighbourhood.

This is very difficult to do accurately, so online Carbon Footprint calculators give a good, but approximate guide. It is difficult because when assessing the greenhouse gas emissions associated with any product or activity, there will always have to be assumptions about what can be measured, and how precise we can be. Normally, carbon footprints are calculated to give an annual emissions number.

Currently, across the world, the average annual CO_2 emissions of each person has been estimated at 4.2 tonnes; in the UK, the count for the average person is 4.6 tonnes, compared to a US citizen of about 14 tonnes, and for someone from Central Africa, a fraction of that, at 0.05 tonnes (2020 data from CarbonBrief.org). But don't forget, the UK started the industrial revolution in the late 1700s, so our historical contribution to the problem is very large.

The typical household in the UK produces 6 tonnes of emissions annually from heating, lighting and other energy consumption in the home. The Government's aim is that this average falls below 4.5 tonnes CO_2e annually by 2030, while the UN Environment Programme has said, globally, our target per person needs to be 2.1 tonnes. **So, how will you lose 2.5 tonnes from your annual footprint?**

To find out more about footprinting and what you can do practically, we recommend reading **How Bad Are Bananas?** (2020 edition) by Mike Berners-Lee

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When starting to think about reducing your own footprint, there are **four key areas** that will have a big impact. Before making any changes, make sure you understand the issues, ask lots of questions, and make a plan for change.

Keeping our homes warm and cool

Over the next decade most of us will have to consider new ways to heat our homes, both for space heating and hot water. Most homes will transition to using electricity as the main heating fuel. For this to be affordable we need to make sure that we can keep the heat in, and we will need to improve the insulation of our homes.

- Insulation and affordable warmth is Community Energy Plus' focus; there's lots of advice about keeping warm on our website.
- We must also think about how to keep cool in a heat wave. Simple actions will help, like closing curtains in full sun.

How we move around

Transport is not just about switching to an electric car - not everyone can afford to make that change - and we need to think about how to reduce our reliance on cars. Other options have the added benefit of keeping us healthier, especially with more walking and cycling.

- Rediscover the benefits of using public transport where it is available - lots of people, having chosen not to fly, are now enjoying the delights of international rail trips.
- Local car share schemes are now also more common.

Our clothing - fashion

The carbon impact of the clothing industry is now under great scrutiny. We all need to ask questions about the clothes we wear, what they are made of, where they are made, how many clothes we buy, and how often we use them.

- More and more people are rediscovering the skills and habits of our grandparents to repair, adapt and make our own clothes.
- Pre-loved, reused clothing from charity shops is a good option.
- Also check out the Facebook page for Cornwall Repair Cafe Network.

The food we eat

This is perhaps the biggest, and most personal challenge of all. Reducing the emissions related to agriculture and food production will potentially make the biggest impact. This is why health professionals recommend a big change - to eat less meat (especially beef) and dairy products. Moving to a 100% plant-based diet maybe too much for many people, but a 'flexitarian' diet is a good start.

The EAT-Lancet Planetary Health Diet is a very helpful resource: **www.eatforum.org/eat-lancet-commission/the-planetary-health-diet-and-you/**

Net Zero: Balancing the equations

Many governments, businesses and other organisations around the world are now setting targets to achieve "**Net Zero**" by 2035, or 2040, or 2050.

Again, this phrase is a shorthand and refers to tackling our carbon dioxide equivalent emissions (be careful, sometimes the 'net' is lost when the term is used, and getting to zero carbon emissions is very difficult).

Simply put, the term Net Zero implies that for every unit of CO_2e that our activities and consumption put into the atmosphere, we need to reduce other activities by the same amount, so we can balance the equation and keep things equal.

However, there are a lot of problems in thinking this way:

- How can we be sure that our equation balances? What if we have missed important amounts when we tried to calculate our own footprint? Trying to measure every element of the process that created the bag of crisps, or the cup of tea on your kitchen counter is not straightforward.

- What about all the emissions we are responsible for in the past? These gases are already in the atmosphere and contributing to current heating. How do we account for these?

- Even if we were able to reach a balance of 'Net Zero', we need to do much more – this is not the end of the journey. We have put so much CO_2e into the atmosphere, net zero possibly may stop things getting even worse, but we have to correct the damage already done to get back to below the 350 ppm threshold.

Taking CO_2 from the atmosphere is called **Drawdown**. Find out more about many of the efforts being made all over the world here: **www.drawdown.org**

Carbon Offsetting

When discussing how to balance our emissions, sooner or later we must recognise that it is almost impossible to reduce these to zero. If we have done all we can to reduce our emissions, what can we do about the amount that we are still emitting (called **residual emissions**)? This is where the controversial idea of **Offsets** comes in.

Airline companies have been keen to promote this idea because flying emits a lot of damaging gases every time a plane flies; the companies' idea is that by making a financial contribution based on a per person calculation of the carbon cost of the flight, by doing something that reduces the equivalent amount of emissions, this allows people to fly "guilt free".

Some people have suggested that we could pay for activities like planting trees (that will, possibly, soak up the equivalent of that carbon dioxide we emit today at some point in the future) or we could buy '**credits**', equivalent to the emissions that someone else has reduced elsewhere, assuming that they have shifted their balance to the 'carbon positive' side of the equation.

Offset schemes are controversial and their effectiveness is being seriously questioned. A big problem is that the idea of balancing can allow us to think that we can behave as usual and perhaps ease the feelings of guilt about things we are doing, without challenging ourselves about the impact of the way we live.

Before we try to offset, we need to ask difficult questions like:

- Is this flight really necessary?
- Should we give up on holidays to exotic places and cheap overseas air travel?
- Are there alternative ways to travel?
- How can we change our lifestyle to reduce our contribution to the problem?

Work to stop the overheating of the planet is not easy and we all will need to make significant changes to how we live, especially those of us who have bigger carbon footprints. Offsetting should not be an easy option to avoid facing the reality that each of us has a responsibility to reduce our own emissions and encourage others to do the same.

Capturing Carbon

One of the reasons that airlines and big companies are talking about planting trees is that, as they grow, plants draw in carbon dioxide from the atmosphere. So, in the drive to balance the Net Zero equation, ambitious plans are being made to plant lots more trees, along with restoring peat lands which are great at locking up carbon for a long time (if not disturbed), that are often described as "**carbon sinks**".

However, the amount of CO_2e that is being released by industrial processes, like making cement and steel, or in power generation is so great, that other methods are being developed and tested.

Additionally, given the rapid changes we are seeing in climatic conditions, it is questionable whether we have enough time or land available to plant enough trees. We urgently need to replant more trees as part of attempts of address the crisis in nature, but for carbon storage, planting **the right tree in the right place** may become very difficult.

Direct Air Capture (DAC) is technology that pulls large quantities of air through chemical filters that extract the CO_2, which can then be liquified and reused or stored.
The problem is, that with our current technology, we would need a huge number of extractors even to slow the rise in emissions, let alone reduce what is in the air already.

Industrial scale **Carbon Capture, Usage & Storage (CCUS)** is technology to capture CO_2 emissions as they are produced at an industrial plant. The CO_2 is then pumped into long-term storage underground, such as exhausted oil fields under the sea. Although billions are being invested, this remains an idea at the prototype stage. There are concerns about how long the CO_2 will be trapped, and how to ensure that it will not escape into the atmosphere.

The 'Usage' part of CCUS is a proposal that by pumping the CO_2 into depleted oil and gas reservoirs, it can help extract even more oil and gas from these deposits.

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Divestment

To avoid the tragedies that are coming, we urgently need to leave the remaining oil supplies in the ground and quickly find alternatives to fossil fuels. As part of this, you may have seen news coverage about the Church of England and several major UK universities making decisions to move the money they invest on the Stock Market and in pension funds away from supporting oil and gas companies.

When considering your own carbon footprint, one of the most significant changes you can make is to look at the bank you use and where your pension is invested – **is your money being used to finance fossil fuel extraction?**

A really useful tool to help answer this question is the Bank Green website: **https://bank.green**

Enter the details of your bank and see how they score, and then think about moving if the result is not positive.

Climate Chaos and Disruption

While we, personally, may not have seen many direct changes yet, it won't be long. We are all beginning to get familiar with summer drought conditions and the water and food shortages they trigger. However, in other parts of world people are already experiencing serious disruption from extreme storms that bring flooding, and from long-term drought and wildfires.

While the reasons for people fleeing from their home countries are complex, it is already evident that changing climate conditions were a major factor in the crisis in Syria, for example, and the mass displacement of people all over the world will get much worse.

Scientists are already noting the movement of disease-bearing insects - tics (Lyme disease) and mosquitos (Zika virus) – that are appearing in places that are unusual, again caused by changing climate patterns.

While the overall picture can appear grim and the time for action is limited, every change we make today will make a difference and help our communities become more resilient.

Cornwall's energy advice charity

Our services to help householders in Cornwall enjoy warmer, energy efficient homes include:

- Insulation and heating solutions
- Energy efficiency advice and surveys
- Planning for renewables services
- Help to understand and reduce energy bills

In certain circumstances, we can access funding for services - call us to discuss your needs.

Visit our website for our full range of advice guides*.

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*The information in this guide is correct at the date of publishing, however some details and funding opportunities are subject to change. Visit our website for the latest guidance.