

Net Zero: The Ambition Gap

Will the UK Government's Net Zero Strategy keep 1.5°C alive?



An objective, science-led assessment of the UK Net Zero Strategy and the first independent report to focus on the gap between UK targets and what is necessary for 1.5°C

ZERO HOUR 



Net Zero: The Ambition Gap

Zero Hour is an environmental organisation calling for science-led legislation to address the climate-nature crisis via a whole-of-government approach.

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ENDORSEMENTS

"We will never solve the problems of climate change without the help of the natural world. This excellent report makes it crystal clear that the UK must take serious action now. **This is it; we may not get another chance.**"

Dr George McGavin - Entomologist, author, TV presenter and explorer, **Zero Hour Ambassador**

"This is an utterly convincing quantitative assessment of a notoriously complex roadmap to an identifiable goal: net zero emissions."

Prof Sir Partha Dasgupta - Ecological Economist, University of Cambridge

"This report identifies just how much we rely on nature to help tackle the climate crisis, and what we can do to maximise its potential. Excessive use of pesticides and fertilizers in farming is polluting our soils and streams, impacting wildlife, damaging soil microbes and crippling the capacity of our ecosystems to absorb carbon. We urgently need to dramatically reduce chemical inputs and move towards a truly sustainable farming system."

Prof Dave Goulson - Ecology & Insect Conservation, University of Sussex

"The importance of a resilient, sustainable and fair food system which provides decent farmer incomes and affordable food has never been more evident, as droughts, conflicts and supply chain crises multiply. Failing to address the climate impact of the food system, from seed to fork - or its huge potential to mitigate climate change through agroecological, nature-based farming and sustainable diets, is a huge mistake.

The evidence is overwhelming that we need to change food production, consumption and governance as this report clearly shows and the CE Bill would trigger. Empty words and feeble strategies are no longer acceptable."

Vicki Hird - Head of Sustainable Farming, Sustain

"This is such a clear report, allowing every UK policy maker to understand what the science says we need to do, how it all fits together and why."

Prof Mike Berners-Lee - Leading expert on carbon footprinting, Lancaster University

"Climate impacts are hitting us even faster than expected and we have very little time now to avert calamitous consequences. I urge all politicians to read this comprehensive report and act robustly and with urgency to secure a liveable future for all."

Prof Joanna Haigh - Former President of the Royal Meteorological Society, Imperial College London

"This report does an excellent job of highlighting the level of ambition needed in the UK in contributing to the global effort to avoid the worst consequences of the climate crisis. It provides a transparent and coherent analysis that should be taken seriously when planning a positive vision of a zero carbon future. It demonstrates the need to be realistic about future technologies and underlines the need for systemic change to deliver our climate ambitions."

Prof John Barrett OBE - Chair in Sustainability Research, University of Leeds

"Contrary to popular political rhetoric - action genuinely consistent with limiting warming to 1.5°C will provide: energy security, reduce energy prices, protection for our natural environment and biodiversity, cleaner air, water and beaches, and new jobs and export possibilities. It will also show the UK as a global leader in the fight to save our precious environment and climate. The only possible reaction to this report is why are we not doing all this already?"

Prof Mark Maslin - Earth systems science & IPCC Lead Author, University College London

"The climate crisis is the challenge of our time, but right now the UK's not moving fast or far enough towards meeting zero emissions and the game plan looks full of loopholes and pitfalls. This report offers a great tool in helping understand key areas where we need to see more action, and can act as a useful resource for politicians looking to hold the government's feet to the fire"

Rebecca Newsom - Head of Politics, Greenpeace UK

"This short, clear and evidenced report shows what the UK government needs to do to be effective on the climate and ecological emergencies. The guidance, based on the best available science, indicates the policy decisions that are required in the best interests of UK citizens and of all life on Earth"

Prof Julia Steinberger - Ecological Economics & IPCC Lead Author, University of Lausanne

FOREWORD

Prof Andrew Watson

Head of Atmospheric and Ocean Science Group, University of Exeter

Climate change, biodiversity decline and ecosystem degradation threaten our civilization. These linked problems have a common root cause - our collective failure to realise that explosive growth in our consumption has disrupted the “Earth system”: the cycles of energy and matter that maintain a habitable planet. Though the problems affect everyone on Earth, the UK can play an important part in solving them. Our Government has recently set an emissions reduction target for 2035, a genuinely world-leading initiative. It is however now necessary to follow through on that, and to go further where necessary, guided by science. That is where there is an ambition gap. Government plans are vague and lacking in immediacy, but most importantly, the UK’s Net Zero Strategy does not adequately address the need to protect nature from the damage stemming from our energy use and consumption, particularly of food. While the problems are dauntingly large, we do know what needs to be done to tackle them, and if the UK shows sufficient leadership, others will follow. This report calls therefore for urgent and immediate action, both because of the pressing need, and because there are practical and economic advantages to being in the vanguard of these changes.

Dr Nathalie Pettorelli

Head of Environmental Monitoring and Conservation Modelling Team, Zoological Society of London

The droughts, the wildfires, the heatwaves, the autumn storms and the winter floods: ten years ago, few people paid attention to the IPCC predictions, perceiving them as distant future threats they may never experience. Now most people in the UK have started to witness what climate breakdown looks like in practice, and it mostly isn’t pleasant. Yet this is just the beginning: without changes in what we do and how we live, environmental conditions will continue to get harsher, undermining our economy, and threatening food security, health and quality of life.

But the future isn’t written: we can turn things around. We know that today’s rapid changes in climatic conditions are due to greenhouse gas emissions, meaning that if we want to stop climate change, we need rapid, bold and collective action to transition economies away from fossil fuels.

We also know that climate change is only one component of the current environmental crisis, another being the rapid loss of biological diversity. These twin crises are fundamentally connected: climate change is accelerating biodiversity loss, while the loss of biodiversity is deepening the climate crisis. Reduced species abundance, and local extinctions, as well as the rapid degradation or loss of ecosystems such as forests, peatlands and seagrass, all have a major impact on our planet’s ability to store carbon, as well as impeding our ability to adapt to changing climatic conditions. Because of these connections, it is a no brainer to prioritise actions that jointly address both crises.

The world’s most advanced economies bear a huge responsibility for the current state of our living world. Their relative wealth makes them well placed to lead on the changes needed to stabilise our climate and help nature recover. Yes, it won’t be easy; yes, it’s going to be costly (but much less costly than delaying action); yes, it demands major changes in how we live; and yes, there are challenges ahead, including scientific ones. But we can do this, and we must: we should not give up on our future, the future of our youth, and the future of generations after that.

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SUMMARY

The Government's [Net Zero Strategy](#) (NZS), published last October, is a major step forward. It takes the UK further than most nations with its aim to limit global heating to 1.5°C, and clear warnings about the consequences of failure. Nevertheless, the NZS falls significantly short of what the science tells us is necessary to limit warming to 1.5°C, and in July 2022, the [High Court ruled it unlawful](#).

The window for limiting heating to 1.5°C is fast closing. Our response should be to initiate change at a pace unprecedented in peacetime. Our economy must adapt at the rate that science tells us is necessary to avert disastrous consequences. This report explains why the NZS must go further, and its remit must be wider.

On emissions, the UK's carbon budgets are no longer sufficient to achieve 1.5°C. And once we include emissions from the goods we import, the UK's total carbon footprint will exceed its share of the global carbon budget for a 67% chance of 1.5°C by more than a factor of two.¹ The NZS also puts too much emphasis on the future removal of emissions using unproven and heavily disputed technologies, and not enough on cutting emissions at source today.

Keeping emissions within our share of the carbon budget will require a major national

“Above 1.5°C we risk reaching climatic tipping points like the melting of arctic permafrost – releasing millennia of stored greenhouse gases – meaning we could lose control of our climate for good.”

HM Government: Net Zero Strategy

effort to reduce energy usage and to transition to renewable power. Fortuitously, this is also the best solution to the cost of living crisis. New renewables are now [9 times cheaper than gas power](#), and a [strong consensus](#) is emerging that a 100% renewable power system is now feasible. Action to reduce demand is usually the cheapest and fastest way to save money and carbon. It will also buy us time to build a green power system. That means a step-change in the pace of housing retrofit and transport decarbonisation. The investment cost will be large, but the Climate Change Committee (CCC) forecasts that with soaring oil prices, decarbonising our economy will in fact save us money—[0.5% of GDP](#). If we fail, the Office for Budget Responsibility warns that debt will [spiral to 290% of GDP](#) by the end of the century.

The NZS largely ignores Earth's interconnected [natural support systems](#): atmosphere, oceans, freshwater systems, land, soils and biodiversity. These vital systems provide our food, air, clean water and shelter. **They also regulate the climate.** Scientists at the Stockholm Resilience Centre have identified [nine planetary boundaries](#) that enable a 'safe operating space' for humanity—climate change being just one.² We have now [breached seven of the nine boundaries](#), including the limit for fresh water which puts the Amazon rainforest at serious risk. These boundaries are interwoven. Breaching one boundary impacts on others, risking dangerous, irreversible tipping points, with dire consequences, including the loss of the Greenland ice sheet—probably already inevitable—and the transition of the [Amazon rainforest to savanna](#).

Scientists have mapped critical ecosystems containing [irrecoverable stocks of carbon](#), most of which is stored in mangroves, peatlands, old-growth forests and marshes across the world, including the UK's peatlands. If these ecosystems are allowed to reach tipping points

1. Based on projected emissions under the NZS, and the global carbon budget that gives a 67% chance of limiting heating to 1.5°C according to the Intergovernmental Panel on Climate Change (IPCC) - see appendix

2. [This recent documentary](#) featuring Sir David Attenborough and Prof. Johan Rockström provides an excellent introduction to planetary boundaries.

they will release enormous amounts of CO₂ risking irreversible climate breakdown.

COP26 recognised that we can't solve the [climate crisis without saving nature](#). Nature provides our best chance of mitigating climate change and its worst impacts, such as flooding and drought. Protecting ecosystems that regulate climate or contain critical carbon stores such as ice sheets, forests, peatlands, wetlands and the ocean, must take equal priority with cutting emissions. These areas are also some of the richest [remaining areas of biodiversity](#)—

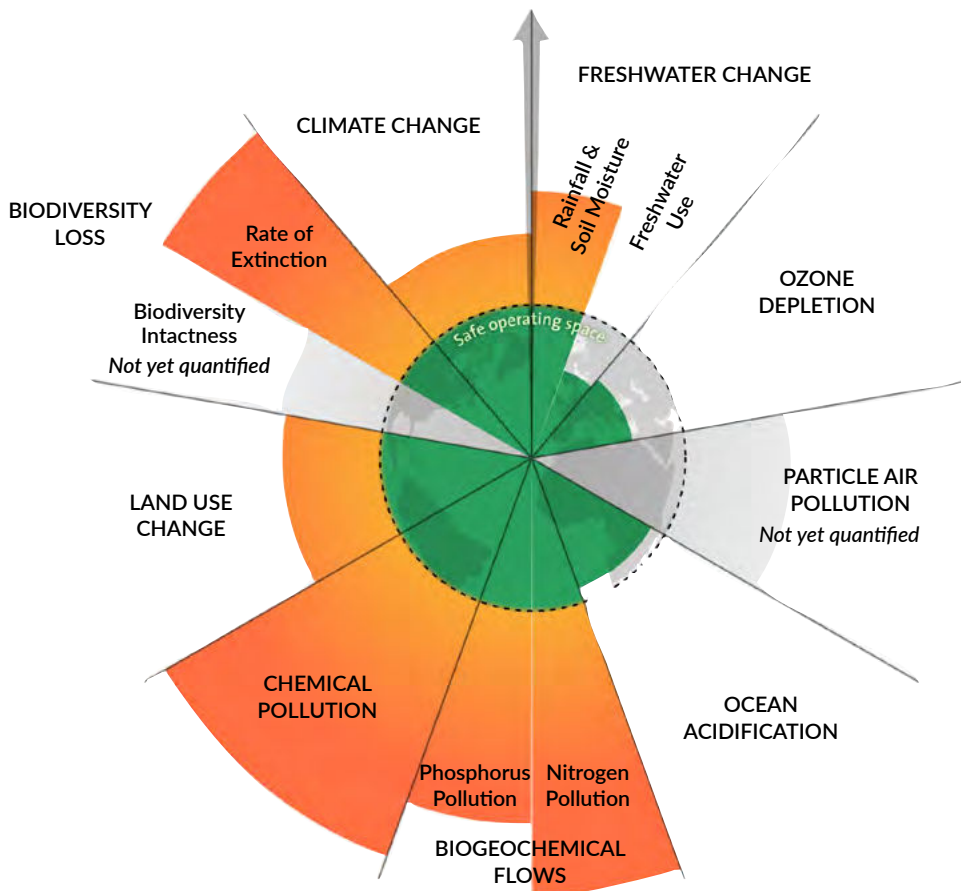
“Limiting warming to 1.5°C above pre-industrial levels would require transformative systemic change, integrated with sustainable development.”

[The 2018 IPCC 2018 1.5 report](#)

which is vital to keep carbon stores functioning. The Government must treat the climate and nature crisis as one.

Planetary Boundaries

NZS report does not reflect the latest science on planetary boundaries. Our energy and food systems have profound impacts on all of the planetary boundaries that have already been breached: Land System Change, Biodiversity Loss, Climate Change, Novel Entities—plastics, chemicals and pesticides, Nutrient Use—flows of nitrogen and phosphorus and Freshwater Use, as well as Ocean Acidification which is close to being breached due to carbon emissions and pollution.



A new film, [‘Breaking Boundaries’](#), by Sir David Attenborough and Prof Johan Rockström, shows that ‘this is the decisive decade’ in which transformative change must happen to secure a positive future for humanity. It emphasises the importance of the food system, and of taking action beyond national borders.

Planetary Boundaries - showing 7 that have breached safe limits

Source: Stockholm Resilience Centre

“If current gas prices continued out to the Sixth Carbon Budget period, decarbonising the economy would result in a saving of 0.5% of GDP”

The Climate Change Committee

Scientists working on the [Global Biodiversity Framework](#) for COP15 agree with the IPCC on the urgent need for transformative change which means addressing ‘social and economic drivers’. This includes transforming our food system, which is ultimately responsible for [35% of the UK’s carbon footprint](#) but overlooked by the NZS.

The Government has not adopted the CCC’s recommendation that meat consumption be cut by 20% by 2030, perhaps due to the public’s lack of understanding of the climate and nature crisis. Not only is this dietary shift [necessary to keep 1.5 alive](#), it will also unlock a cascade of co-benefits including improved food security, nature restoration, better public health and a boost to rural economies.

The NZS only takes account of domestic emissions, proposing cuts largely from the energy and transport sectors. But this ignores half of our impacts: the emissions, ecological

“Lack of progress on limiting global warming to 1.5°C is likely to seriously compromise attaining ambitious goals for biodiversity’. ‘ In a complementary fashion, ambitious action on biodiversity is necessary to achieve climate mitigation and adaptation goals set out in the Paris Agreement and recently reaffirmed at UNFCCC COP26.”

Scientific advisory body for COP15:

destruction and resource use resulting from the goods we consume that are produced overseas. The UK imports half of its food, and its demand for [7 key commodities](#) (palm oil, soy, timber, wood pulp/paper, rubber beef/leather and cocoa) uses 21.3 million hectares overseas—the equivalent of 88% of the UK’s total land area. The Government must acknowledge the UK’s entire emissions and ecological footprint. The science is clear: action by developed nations, including the UK, is far from sufficient. Only radical and rapid emissions reductions, coupled with restoration of critical ecosystems, will prevent climate breakdown. The latest IPCC report is described by the [UN Secretary General](#) as a “litany of broken climate promises” and a “file of shame”.

A legally binding commitment to act on the latest science will send a much needed signal to business and to the wider public. It will demonstrate the Government’s serious intent to rise to the challenge—and to stay the course. This step is the key to unlocking a wave of private investment, giving business the confidence to build supply chains. The Government must take the lead in order to engage the public and deliver transformative change.

Current policies around the globe put us on track for close to [3°C of global heating](#), with all the devastating impacts that entails. But with immediate, robust and courageous action there is still a chance of limiting heating to 1.5°C. The UK led the world with the Climate Change Act of 2008, and again with its commitment to Net Zero by 2050, both of which were emulated by other nations. We now have the opportunity to lead the way again.

KEY CONCERNS

EMISSIONS REDUCTION

- | | Section |
|--|---------|
| <p>1. Too Weak for 1.5°C
Carbon budgets up to 2032 were not tightened to reflect the more recent ‘Net Zero by 2050’ target. These budgets ignore international aviation and shipping—until 2033. They are also based on an unrealistic assumption: that the rest of the world will cut emissions at our pace. They do not allow for population growth and improving living standards in developing nations.</p> | 1.1 |
| <p>2. Only a 50% Chance of Success
UK plans were devised for just a ‘greater than 50% chance’ of keeping to 1.5°C.</p> | 1.1 |
| <p>3. 40% of our total carbon footprint is ignored
UK has no target to reduce imported emissions. This is a particular issue for the UK as the largest net importer of CO₂ emissions per capita in the G7.</p> | 1.1 |
| <p>4. The UK is continuing to develop new fossil fuels
Despite warnings from the UN, the International Energy Agency (IEA) and the CCC that this is not consistent with limiting global heating to 1.5°C.</p> | 1.1 |
| <p>5. Housing is set to use almost 50% of the CCC's recommended carbon budget
With 300,000 homes built a year, each causing 50 tonnes of emissions, and no major retrofit programme, sector emissions will be far too high for 1.5°C.</p> | 1.2 |
| <p>6. Demand-reduction measures on transport are too weak
Roads and airports are even set to expand, and there is no action to curb soaring SUV sales.</p> | 1.2 |

“Any further delay in concerted anticipatory global action on adaptation and mitigation will miss a brief and rapidly closing window of opportunity to secure a liveable and sustainable future for all.”

IPCC

- | | Section |
|---|---------|
| <p>7. Over-reliance on Negative Emissions Technologies
Bioenergy with Carbon Capture and Storage (BECCS) at Drax cannot deliver promised CO₂ removals and has devastating impacts on nature. Direct Air Carbon Capture and Storage (DACCS) cannot be carbon negative until there is spare renewable power—well outside the critical time frame for limiting heating to 1.5°C.</p> | 1.3 |
| <p>8. A coherent methane plan is needed
To avoid missing 1.5°C and to meet our commitment to the Global Methane Pledge.</p> | 1.4 |
| <p>9. Alternative fuels are a dangerous dead end
Blue hydrogen can be worse than coal for the climate. Biofuels for aviation threaten food security and ignore contrails, which account for at least half the warming impact of aviation. Biofuels will also drive biodiversity loss, as they already have in countries such as Brazil and Indonesia.</p> | 1.5 |
| <p>10. The taxpayer continues to fund fossil fuels
With £10bn in tax breaks every year.</p> | 1.6 |

KEY CONCERNS

NATURE AND LAND USE

- | | Section |
|--|---------|
| <p>1. Nature takes a back seat in the NZS</p> <p>Cuts in emissions from fossil fuels are only half the solution. We are reliant on nature to achieve net zero and adapt to the worst impacts of warming. But we cannot rely solely on conservation and stewardship schemes which have failed to halt the decline in nature. Transformative change is needed across all sectors of government and society. Only by addressing key social and economic drivers will we succeed.</p> | 2 |
| <p>2. 'Business as usual' in the food system</p> <p>This will prevent us from achieving the 1.5°C target. The NZS overlooks the need for transformative change in the food system, the largest user of land—responsible for 35% of emissions. The CCC's recommended 20% cut in meat consumption by 2030 has not been adopted. A rapid reduction in livestock production will deliver two key outcomes: lower emissions and the freeing up of large areas of land for restoring critical ecosystems that absorb carbon—'doubling the carbon dividend'.</p> | 2.1 |
| <p>3. Our food system makes excessive use of agrochemicals</p> <p>As well as contributing to climate change, food-related emissions and pollutants are causing immense damage to the environment and human health. Agrochemicals and livestock waste poison the land, erode soil, pollute rivers and leach into drinking water systems. Almost 50% of UK methane, 70% of nitrous oxide and 87% of ammonia pollution comes from agriculture. Ammonia is the largest component of particle air pollution.</p> | 2.3 |
| <p>4. Degraded peatlands account for almost 5% of the UK's greenhouse gas emissions</p> <p>The NZS's aim to restore 20% of England's peatland must be significantly expanded, and there should be bans on burning and extraction on all peatland.</p> | 2.4 |
| <p>5. Plans for 30,000 hectares of trees a year are a good start</p> <p>But at this rate, it will take over 8 years to increase woodland cover by just 1%. Doubling the cover from 13% to at least 26% within 10 years is achievable, according to Rewilding Britain.</p> | 2.4 |
| <p>6. The NZS overlooks blue carbon</p> <p>The strategy should recognise that the ocean can store more carbon than any other ecosystem, and must be restored. CO₂ emissions from bottom trawling are similar to those from international aviation.</p> | 2.4 |
| <p>7. The NZS does not recognise the UK's global ecological footprint.</p> <p>To be effective, any net zero strategy must involve taking responsibility for impacts beyond our own borders. The UK's contribution to pushing the Earth's stores of irrecoverable carbon beyond safe boundaries is the greatest threat to the economy and our future.</p> | 2.5 |

"At a planting rate of 30,000 hectares of trees a year, it will take over 8 years to increase woodland by just 1%"

1. EMISSIONS REDUCTION

Last year the UK adopted the world’s most ambitious emissions target: A 78% reduction in carbon emissions by 2035 against a 1990 baseline.

This target is commendable. But the science shows that ambitious future milestones will not be enough. We need to cut emissions fast right now. Humanity has left it so late to confront this challenge that we have no choice but to place our nation on an emergency footing.

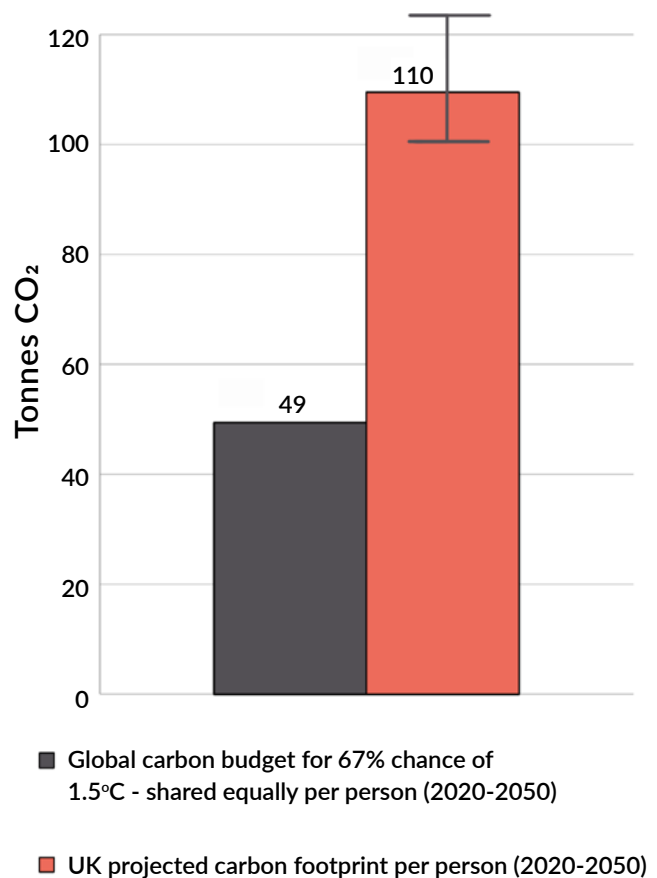
The once leading Climate Change Act 2008 urgently needs to be overhauled, with climate impacts such as the July 2022 European / UK 'heat dome' developing more quickly than anticipated. Carbon budgets (see 1.1) set years ago are no longer sufficient, and new science shows that relying on technologies to avoid the need for systemic change is no longer tenable.

The NZS currently gives the UK over twice its share of the IPCC’s global carbon budget³.

This runs contrary to the principle of Common But Differentiated Responsibilities signed by the UK under the 1992 United Nations Framework Convention on Climate Change (UNFCCC)⁴.

In 2018, the Intergovernmental Panel on Climate Change (IPCC) called for “**rapid, far-reaching, and unprecedented changes in all aspects of society**” a challenge that no major nation has yet risen to. With concern over climate change ranked as one of the top issues in the UK, the public is ready for action.

UK set to emit twice its share of the Global Carbon Budget - based on cumulative CO₂ emissions per person from 2020-2050



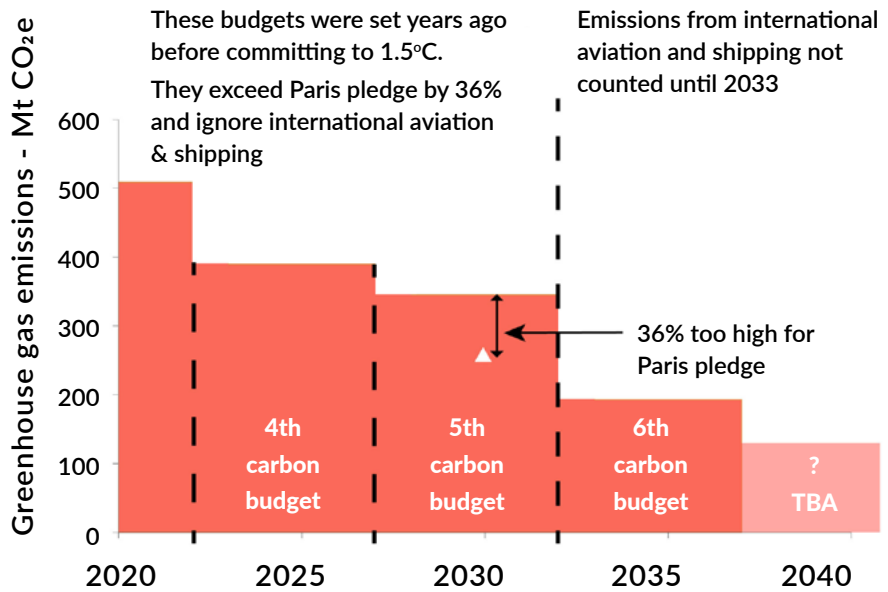
3. Comparing UK’s projected emissions from 2020-50 under the NZS to its per capita share of the IPCC’s carbon budget for a 67% chance of limiting warming to 1.5°C.

4. Signatories to the UNFCCC meet annually at Conferences of the Parties (COPs), the most recent of which—COP26—was held in Glasgow in November 2021.

1.1 ADEQUACY OF TARGETS

Carbon Budgets - Too Weak for 1.5°C

The UK's pathway to net zero comprises a series of five-year carbon budgets. Aside from the 6th, these were all set before the [IPCC's landmark 2018 special report on 1.5°C](#), and the UK's consequent step-up in its climate ambitions. However, carbon budgets have not been revised.



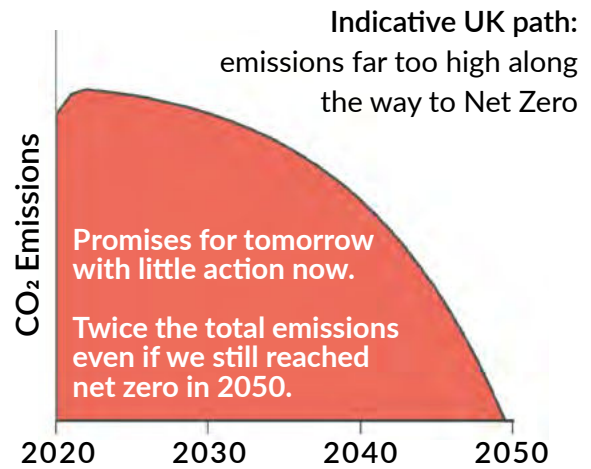
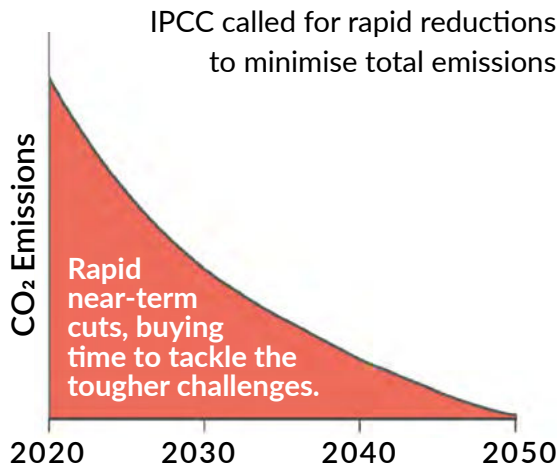
Issues

- When considering the heating impact of CO₂, it is cumulative emissions that matter, not the date on which we reach net zero. It's the path we take - not when we get there (see [Explainer overleaf](#)).
- In 2019, the UK adopted a 'Net Zero by 2050' target, which aims to limit heating to 1.5°C. However, our carbon budgets up to 2032 were not tightened accordingly.
- Carbon budgets 3 - 5 exclude the UK's share of international shipping and aviation. Such emissions contribute to warming and must be accounted for.
- The CCC's assertion that our carbon budgets set out a pathway compatible with 1.5°C relies on an assumption that the UK's plan is replicated across the world. But it is unrealistic (and unethical) to expect developing nations to cut emissions at our pace, given rising populations and growth in economic activity as more people escape poverty.
- Carbon budget 5 was not tightened to align with the UK's nationally determined contribution (NDC)⁵. If we intend to honour our international commitment, why is our domestic target still so much weaker?
- UK carbon budgets ignore 'blue carbon' stored in marine ecosystems, which is being released due to the damage caused by industrial fishing. Changes in blue carbon are also not included in the UK's emissions reporting.
- Climate change is accelerating, and its negative impacts are already **greater and more widespread than anticipated**. We have very little time left, and so our response must be urgent. Five-yearly budgets are no longer a suitable tool. A system of annual targets and monitoring would align with moves at the UN Framework Convention on Climate Change to introduce annual reporting.

5. NDCs are the commitments made by each country to contribute to the achievement of the Paris Agreement.

The Wrong Focus

It's not when we reach net zero that matters - it's the path we take.



Only a 50% Chance of Success

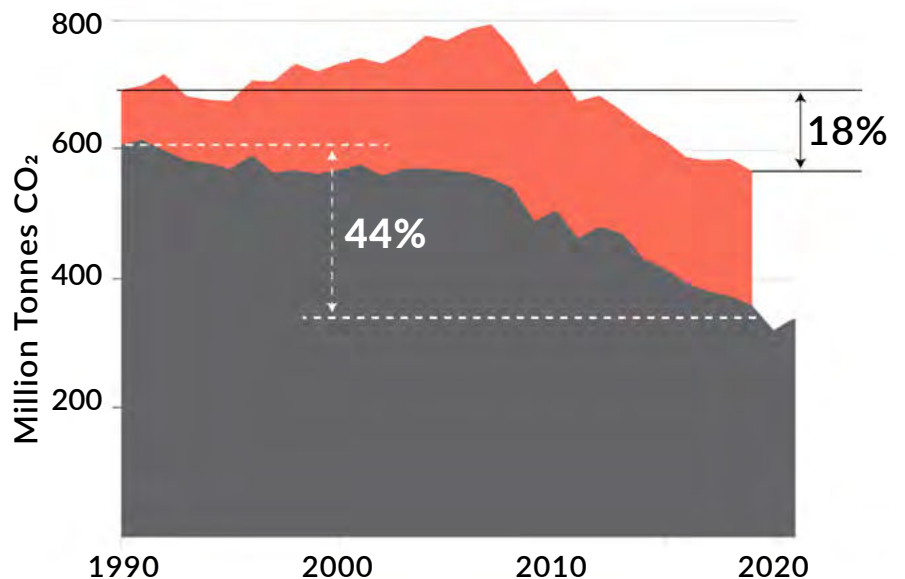
The Government rightly warns of the danger of exceeding 1.5°C of global heating. But the NZS is based on an emissions reduction pathway which only has a 'greater than 50% chance' of success. A safe future for humanity is being decided on the toss of a coin.

Ignoring over 40% of our Carbon Footprint

UK territorial emissions—those occurring on our own soil—have fallen by 46% since 1990⁶. This is a great achievement. But when we look at our entire footprint, including imported emissions, the picture is less rosy: a reduction of only 18%.

The UK's carbon budgets only apply to our territorial emissions. We currently take no responsibility for the emissions from the goods we import, and there are **no targets in place to reduce them**. The Government is following international practice in this regard. But this omission gives a misleading picture, particularly as the UK is the **largest net importer of CO₂ emissions** per capita in the G7.

UK Emissions Reduction
Limited Progress on Total Footprint



- Net imports + aviation & shipping (Global Carbon Project)
- Territorial Emissions (Dept for BEIS)

6. In the figure, IAS stands for international aviation and shipping.

By not having targets to reduce imported emissions, the Government encourages manufacturers to offshore more production as domestic targets bite. Conversely, recognising our entire carbon footprint provides an incentive for policies such as a **carbon border adjustment tax**, which will bring production back home to the UK and create new jobs.

New Fossil Fuel Development?

The United Nations, and even the International Energy Agency (IEA) have said there must be **no new fossil fuel development** if we are to limit global heating to 1.5°C.

The NZS recognises that there must be a managed transition away from North Sea oil. However, **the NZS lacks an explicit statement, reflecting scientific advice, that there will be no new fossil fuel development.**

The **Government has now** lifted the moratorium on fracking for shale gas as well as giving the green light to a new licensing round for oil and gas exploration in the North Sea, contrary to the scientific advice.

The energy crisis undoubtedly presents a serious threat to our nation, but as CCC chair Lord Deben set out in a **letter to Kwasi Kwarteng**, new fossil fuels will not help, with average development times of 28 years. Furthermore, fracking has now been shown to be **worse than coal for the climate** due to methane's extremely potent warming characteristics, and the unavoidable leaks into the atmosphere along the supply chain.

Instead the answer lies in a rapid transition to renewable power—with **new renewables 9 times cheaper** than electricity generated in gas power stations—combined with urgent action to reduce energy use.

Fortuitously, a **strong scientific consensus is emerging** that 100% renewable power is now feasible, by using diverse sources (wind, solar, tidal, wave, geothermal, hydro), by organising countries into blocs linked by interconnectors, using time-shifting to even out demand, and with storage in batteries and pumped hydro.

A groundbreaking **study from Stamford University** has shown that a 100% renewables power system would save over 60% in energy costs, with an extremely fast payback of just 6 years. 100% renewables will of course also end our reliance on hostile regimes for oil and gas.

This conclusion is echoed by a **new study** from the Oxford Martin School at University of Oxford which concludes that a rapid transition to a decarbonised energy system would save the world at least \$12 trillion, and that the faster we go, the more we will save.



Image: RossHelen

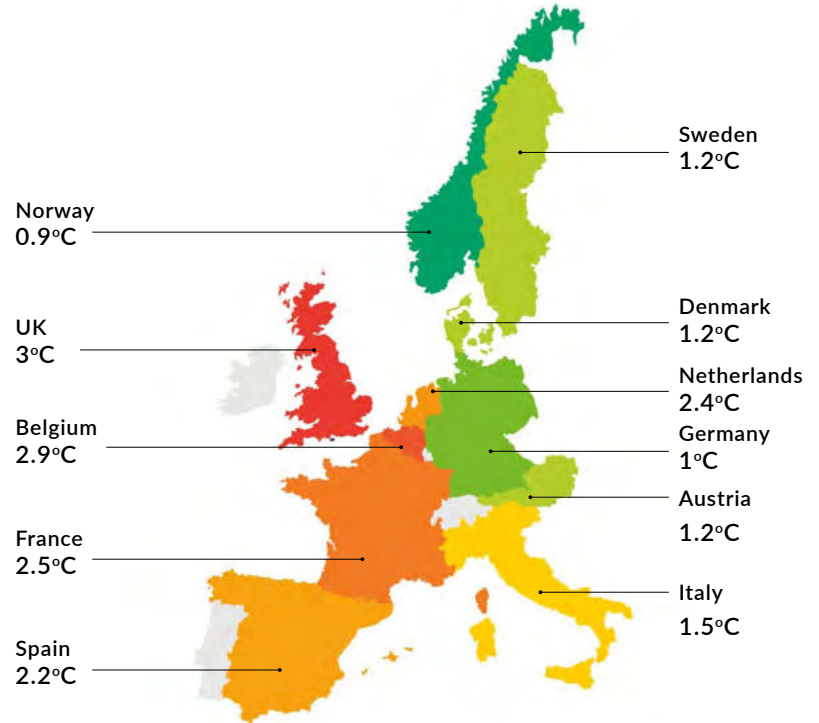
1.2 ENERGY USE

Our housing stock is among the most poorly insulated in Europe, we fly far more than climate experts advise, and we have too many large gas-guzzling cars.

The UK faces a herculean task: we must build a clean energy grid large enough to power homes and transport—and do it rapidly enough to stay within our carbon budget. To make this challenge achievable, urgent action is needed to cut unnecessary demand. As well as helping minimise global heating, demand reduction will also provide significant savings on the cost of grid expansion. **But demand-reduction measures are largely absent from the NZS.**

Home temperature loss after 5 hours

With a temperature of 20°C inside and 0°C outside



Based on a sample of over 80,000 European homes

Source: Tado

The Built Environment

- The [boiler upgrade scheme](#) is only funded for 90,000 homes over 3 years. At this rate, refitting 25 million homes would take over 800 years. The grant also only pays up to £6,000, short of the [£8,000-£16,000 cost of a heat pump installation](#), which usually also requires an insulation upgrade.
- The £1,000 ECO home insulation grant applies only to low income families and is not universally available. The cap is also far too low. Insulation of older solid wall buildings can [cost around £9,000](#) just for a semi-detached home. For comparison, [Italy covers 110% of the cost](#) of home retrofits, with a cap of €100,000 per home.
- The construction of a new home in the UK is typically responsible for around [50 tonnes of CO₂](#)— **one person’s entire lifetime share of emissions** when the 1.5°C global carbon is divided equally per capita.

“Meeting carbon budgets aligned with net-zero by 2050 without substantial reductions in energy demand is extremely difficult and undesirable”

[Positive Low Energy Futures report](#) by Centre for Research into Energy Demand Solutions (CREDS)

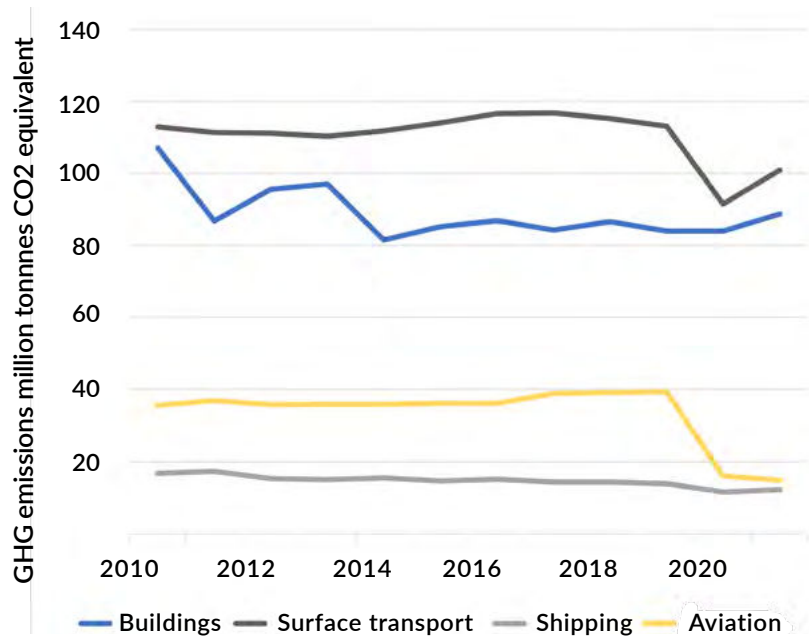
- The Government’s current housing strategy is to build [300,000 new homes per year](#), with limited retrofit of the existing stock. A study by built environment specialists shows that delivering this strategy would consume a staggering [48% of the UK’s cumulative carbon budget](#). This could be cut to 29% by accelerating the retrofit programme and addressing the vast number of empty homes, estimated at 1.2 million.

Transport

The NZS misses key opportunities to reduce emissions in the transport sector including:

- No clear incentives to reduce car journeys in favour of active travel and public transport.
- Tax on domestic flights [will be halved from 2023](#), increasing emissions.
- Missed opportunity to electrify rail, which [industry sources warn](#) is slipping behind target.
- UK [SUV sales are growing](#), which means higher emissions, even if they are electric.
- Multiple UK airports have [plans](#) to expand. Yet the [IEA says that emissions from air travel must fall by 50% by 2050](#) to limit global heating to 1.5°C.
- A £27 billion road programme remains in place, despite [independent studies](#) showing that vehicle miles must be cut, with a shift to active travel and public transport.

Emissions from Transport and Buildings



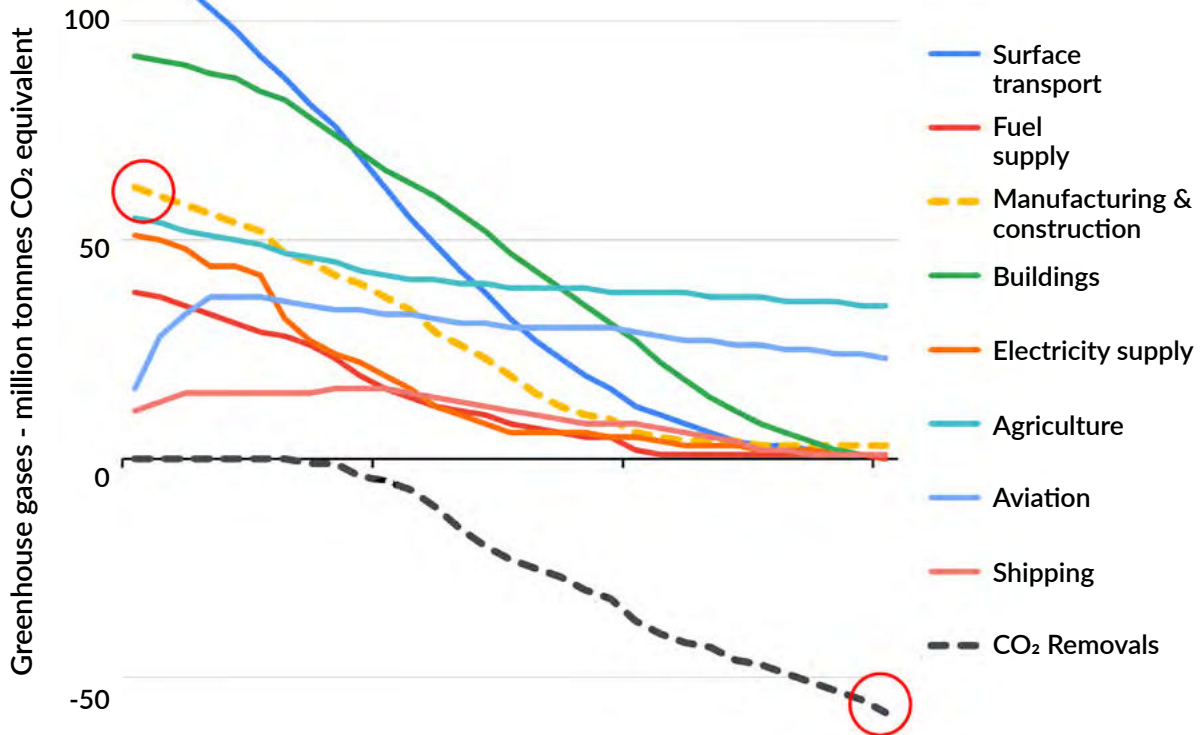
Apart from a drop caused by the Covid pandemic, there has been minimal progress in tackling emissions from transport and buildings. Without bold action now, the UK will miss its targets.

Data from CCC Progress Report 2022

1.3 OVER-RELIANCE ON NEGATIVE EMISSIONS TECHNOLOGIES

The Government’s Net Zero Strategy is dangerously reliant on engineered CO₂ removals, particularly Bioenergy with Carbon Capture & Storage (BECCS) and Direct Air Carbon Capture and Storage (DACCS). According to the latest science, these technologies will make the situation worse, wasting precious public funds and time. The UK risks committing hundreds of billions of pounds in taxpayers’ money to technologies which will not deliver. The allure of future removals distracts from the need to cut emissions now, at source.

CCC Net Zero Sectoral Pathways for CO₂ removals from the 6th Carbon Budget Report



Annual removals are programmed by 2050 to reach the same scale as today’s entire manufacturing and construction sector - despite the science clearly showing that the technologies will not deliver

Projected Annual Removals by 2050 (6th carbon budget)	Million Tonnes
BECCS power (Drax)	19.1
BECCS hydrogen (Drax)	14.3
BECCS biofuel	8.3
DACCS	5.0*
Other NETs	11.6
Total	58.3

* increased up to 29 million tonnes in NZS

Why BECCS should not be treated as carbon negative

Trees and other biomass absorb CO₂ as they grow. So the theory behind BECCS is that by burning biomass and locking the gas released underground, you can permanently remove CO₂ from the atmosphere. However, [new science shows that](#), as well as causing damage to nature and human health, BECCS is not even carbon negative. This is due to emissions in logging, chipping and shipping, and the significant time lag before replanted woodland begins to absorb carbon.

- UK plans require BECCS to be scaled to around 2.5 times the capacity of Drax by 2050⁷. Yet Drax already consumes over 50% of the global wood pellet market [according to UCL](#).
- BECCS plants would require an area almost the size of Wales to grow the biomass needed⁸. This thirst for land would not only lead to large-scale destruction of nature, it is also a threat to UK food security, especially with global crop yields already falling due to climate change.
- Drax sources timber from forests in North America and Eastern Europe. A new BBC [Panorama](#) investigation found that Drax is clear-cutting primary forest. We cannot expect source countries to continue to permit this practice, let alone increase capacity.
- The whole-life cost to the taxpayer of the proposed plant at Drax is [estimated at £31.7bn](#).
- The carbon capture and storage (CCS) technology, on which BECCS relies, is not proven at scale. The USA has [spent over \\$7 bn on failed attempts](#) to get CCS off the ground over many years.
- BECCS is [not even carbon negative](#) due to emissions in logging, chipping and shipping, and because, once harvested, [forests can take up to 50 years to re-grow](#) sufficiently to ‘pay back’ the carbon lost.
- Drax produces dangerous levels of particle air pollution. The NZS report warns of “significant negative air quality impacts at both regional and local scales”.
- BECCS for hydrogen relies on new unproven processes with a high risk of failure.

New science shows that, as well as causing damage to nature and human health, BECCS is not even carbon negative.



Drax Power Station, near Selby, North Yorkshire

7. [Drax aims](#) to capture 10,000 tonnes of CO₂ per day from each of its 4 plants by 2050—this amounts to approx 14MtCO₂ per year.

8. [This study](#) concludes that a land area the size of the EU28 (i.e. before the UK left) would be required for 10 GtCO₂ removals. For the 4.1 MtCO₂ assumed for BECCS power, hydrogen and biofuel, the pro-rata requirement is 19,459 km².

Why DACCS should not be part of the UK's Net Zero Strategy

DACCS extracts CO₂ from the air and bonds it to rock deep underground. This is an energy-intensive process requiring significant amounts of electricity. DACCS is only carbon negative when powered by renewable electricity.

- The world's first plant is now operational in Iceland. The [Orca plant](#) will capture 4,000 tonnes of CO₂ per year. But the UK's NZS has DACCS capturing up to 29 million tonnes of CO₂ per year by 2050. That would require 7,250 Orcas in the UK alone—a **build rate of five every week between now and 2050**. Even assuming success in scaling up operations, this rate is clearly unrealistic.
- The UK [power grid must at least double in size](#) to decarbonise our economy. Renewable power will therefore remain a scarce resource for many decades. Building DACCS plants in the meantime would require gas power stations to increase their output. The additional gas burned would therefore negate the benefit of DACCS.
- DACCS needs the right geology, and will be subject to the challenges of land purchase and planning. There is no evidence that suitable sites exist in the UK.
- The capital outlay for Orca was [\\$10-15 million](#) so 7,250 plants could cost in the region of £50 billion. Unlike BECCS, DACCS produces no revenue. So the entire cost, including ongoing operational costs, would need to be taxpayer funded.
- DACCS is likely to have an important future role in bringing atmospheric CO₂ down to safer levels, but only once clean power generation catches up with demand—and we need to reach net zero before then.

Deploying DACCS at scale before the UK has abundant surplus clean power (which is many decades away) means burning more gas to generate the electricity required. That means that DACCS would cause roughly as much CO₂ to be emitted as it removes.

1.4 OTHER GREENHOUSE GASES

The role of CO₂ in global heating is widely understood by the public, but there are three other important greenhouse gases: methane, nitrous oxide and f-gases. Of these, methane has the most significant impact: it is responsible for 0.5°C of the 1.2°C warming seen to date.

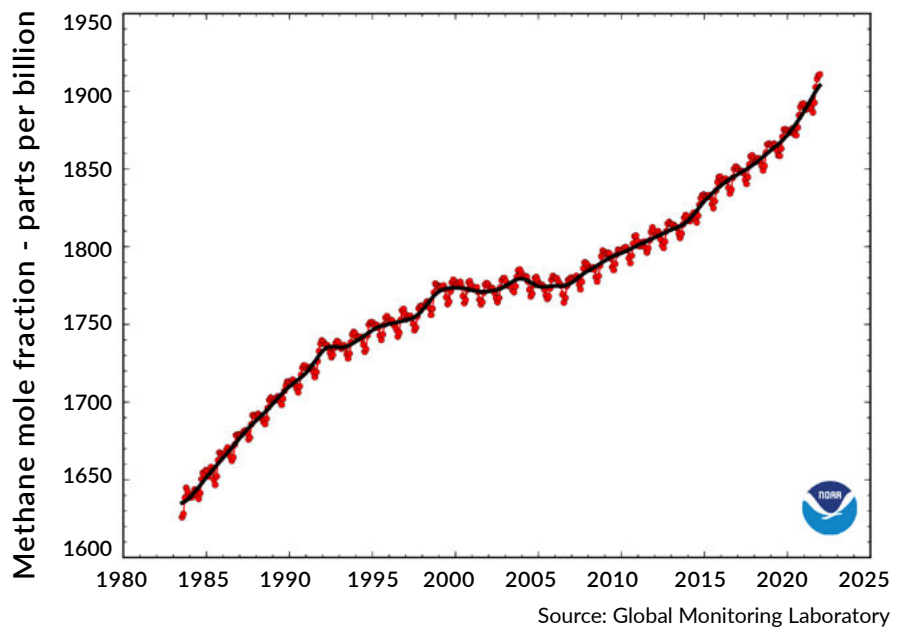
Methane is short-lived. It does not accumulate in the atmosphere over a long timescale like CO₂. That means that **faster cuts in methane will in fact offset some of the heating caused by CO₂.**

The UN Environment Programme (UNEP) has emphasised the **urgency with which we must cut methane emissions**. The world is currently severely off track, with a **record annual increase in 2021**.

Failing to control methane makes it likely that we will pass tipping points, risking what the NZS describes as ‘losing control of our climate for good’. New science shows that a 45% reduction in methane by 2030 could avoid around 0.3°C of warming by the 2040s.

The UK has signed up to the **Global Methane Pledge** to reduce emissions by 30% by 2030, on 2020 levels. This is a good start, but we **must go further**. The NZS contains some measures to reduce methane and other greenhouse gases,

Methane - Global Monthly Mean



but these are piecemeal, with very little action on agricultural methane emissions—almost **50% of UK methane emissions** are caused by livestock. (See section 2.3 on food-related emissions and pollutants.)

The NZS sets no individual targets for greenhouse gases other than CO₂. Instead, these gases are bundled into a single metric, ‘Greenhouse Gases’, which is expressed in tonnes of CO₂ equivalent (CO₂e). But other greenhouse gases affect the climate in very different ways, and grouping them together like this misrepresents the impact of powerful short-lived warming gases like methane. Methane only lasts in the atmosphere for around 12 years, yet its heating impact, when incorporated into the combined ‘Greenhouse Gases’ metric, is assessed over 100 years. This outdated metric consequently seriously underestimates the impact of methane over the near term, during which it is vital to avoid crossing tipping points like the melting of large ice sheets, or the loss of the Amazon Rainforest.

1.5 ALTERNATIVE FUELS

Hydrogen

'Green' hydrogen, made by electrolysing water using renewable electricity, is a clean technology. However, it is a highly inefficient use of energy, with a round-trip efficiency (converting from power to hydrogen and back to power) of **under 40%**. 'Green' hydrogen, which can be produced from surplus renewable power, needs to be reserved for difficult-to-decarbonise sectors like heavy industry and shipping.

Widespread deployment of hydrogen would make net zero more difficult and costly to reach, by taking up scarce clean energy capacity. It would also open the door to 'blue' hydrogen, made from methane, which can be **worse than coal** for the climate due to unavoidable leaks ('fugitive emissions').

According to the [American Medical Association](#), using hydrogen of either type to heat homes will cause dangerous air pollution, compounding asthma and dementia, as well as increasing the risk of explosion.

Hydrogen is also a significantly more costly method of home heating. That is because heat pumps deliver an astounding **6 times more heat** per unit of electricity than can be achieved by burning green hydrogen.

Hydrogen's clear unstuitability for home heat is [well documented](#), but it is being promoted heavily by powerful fossil fuel interests looking to preserve the market for methane, and to avoid the gas grid becoming a stranded asset.

Green Hydrogen	Blue Hydrogen
<ul style="list-style-type: none"> – Made by electrolysing water using renewable energy – Likely to be required in difficult-to-decarbonise areas, such as industrial energy, shipping, aviation & seasonal power storage – Energy inefficient & expensive – Limited supply until we have surplus clean power/nuclear fusion later this century. 	<ul style="list-style-type: none"> – Made from methane using unproven carbon capture and storage technology – Unavoidable leaks of methane ('fugitive emissions') can make blue hydrogen worse than coal for the climate – Promoted by fossil fuel industry as route to continue extracting methane

'Blue' hydrogen, which is made from methane, does not mitigate climate change. In fact, the latest science shows its overall climate impact can be worse than coal.

Using land to grow fuel for aviation would pose significant risks to food security, which is inextricably linked to national security. This has become particularly clear with the war in Ukraine: Russia and Ukraine produce **30% of the world's wheat exports**.



Rapeseed fields - used extensively for biofuels

So-called sustainable aviation fuels

Scientists warn of an increasing risk of simultaneous crop failure in the world's main breadbasket regions [due to climate change](#). As a major net importer of food, the UK is particularly exposed to supply chain disruption and food insecurity. With the need to improve food security and restore nature, can the UK afford to use land for biofuels? Energy crops already account for [2.1% of the UK's arable land](#), a similar area to that dedicated to growing fruit and vegetables, where the UK is only 23% self-sufficient.

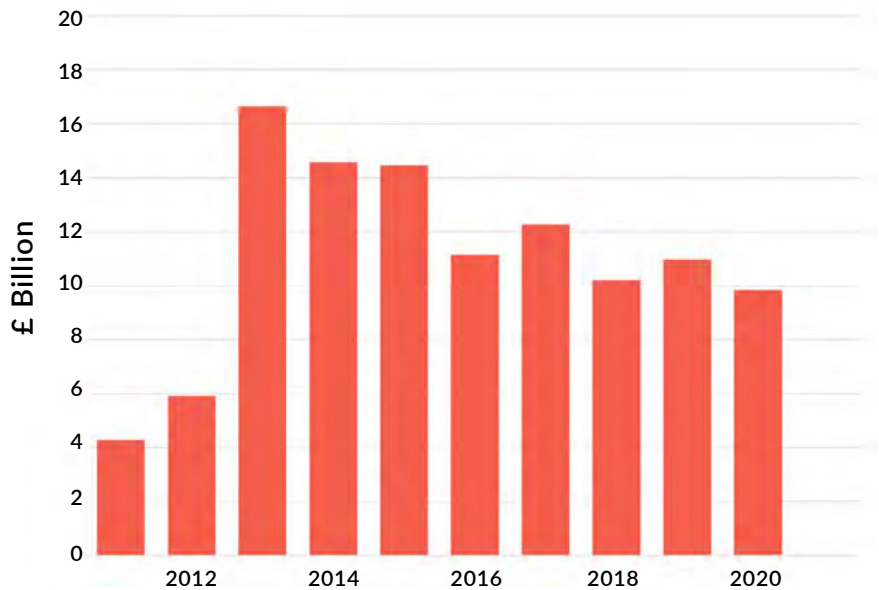
The condensation trails ("contrails") left by aircraft are thought to be responsible for at least [half of the warming impact of aviation](#). Even if a genuinely sustainable alternative fuel were to be found, it would only reduce aviation's impact by half.

1.6 THE WRONG INCENTIVES

The UK taxpayer supports fossil fuels with £10 billion every year in tax breaks.

This distorts the market, slowing the transition to green power and incentivising operators to extract the increasingly costly reserves that remain. Meanwhile, the CCC warns that the UK is on course to miss its carbon budgets from 2023 onwards. To get back on track, it is not fossil fuels that need support but renewables.

UK Taxpayer Fossil Fuel Support



Source: OECD

The UK Government’s position is that it does not subsidise fossil fuels, but this assertion rests on a very narrow definition where ‘subsidy’ is taken to mean lowering prices below world market prices.

The £10 billion in annual support includes tax relief for oil companies, incentivising exploration and helping boost profits. It also includes tax relief for industry and consumers (reduced VAT), lessening the incentive to move away from fossil fuels. Note that this figure only includes direct support. It does not take into account environmental externalities such as the cost to the UK of flooding.

Reduced tax rates on red diesel, making up £2 billion of the support provided in 2020, were withdrawn in April 2022. This is a welcome development, though exemptions continue in areas such as agriculture.

The new Energy Profits Levy, will worsen the situation, with a provision that will have taxpayers hand back 91p for every £1 invested



New oil and gas to be developed in North Sea despite IPCC warnings.

by fossil fuel companies. This rebate is not designed to incentivise investment in renewable power but in new oil and gas, against the explicit recommendations of the UN, the International Energy Agency and the Climate Change Committee.

2. NATURE AND LAND USE: DOUBLING THE CARBON DIVIDEND

Research from the [Natural History Museum](#) ranks the UK in the 12 most nature-depleted nations in the world. Deteriorating ecosystems are making climate change worse. But protecting and restoring nature is our best chance of mitigating climate change and its worst impacts, such as flooding, drought and extreme heat.

The natural world is complex and the role it plays in regulating the climate is often overlooked. Protecting critical ecosystems that contain large stores of [irrecoverable carbon](#), such as forests, peatlands, wetlands and the ocean, must take equal priority with cutting emissions. This is essential if we are to avoid tipping points that may lead to the large-scale release of carbon, resulting in catastrophic heating. **Cuts in emissions from fossil fuels are only half the solution.**

Climate change accelerates biodiversity loss. At the same time, biodiversity loss exacerbates climate change, degrading nature's capacity to absorb and store carbon and adapt to the impacts of global heating. The NZS strategy recognises the importance of nature and the need for land use change, but it does not offer the transformative policies needed to make a real impact. It misses the opportunity to harness the power of nature to help tackle the climate crisis.

According to the [first report](#) published by the new Office for Environmental Protection (OEP) in May 2022, key UK ecosystems are close to tipping points. The OEP's chief insights officer, [Simon Brockington](#), identified some of the key causes of degradation, including seabed trawling, which destroys the integrity of the ecosystem, and the pollution of farmland and rivers with fertilisers and livestock manure. The report criticises the Government's slow progress in the face of the collapse of nature.

The new Environment Act has introduced a "[species abundance target](#)" to halt the decline in the abundance of species, by 2030. But as one of the world's most nature-depleted nations, scientists are calling for a much more ambitious target, to **halt and reverse the decline of nature**. This would entail "increasing the health, abundance, diversity and resilience of species, populations, habitats and ecosystems so that by 2030, and measured against a baseline of 2020, nature is visibly and measurably on the path of recovery."⁹

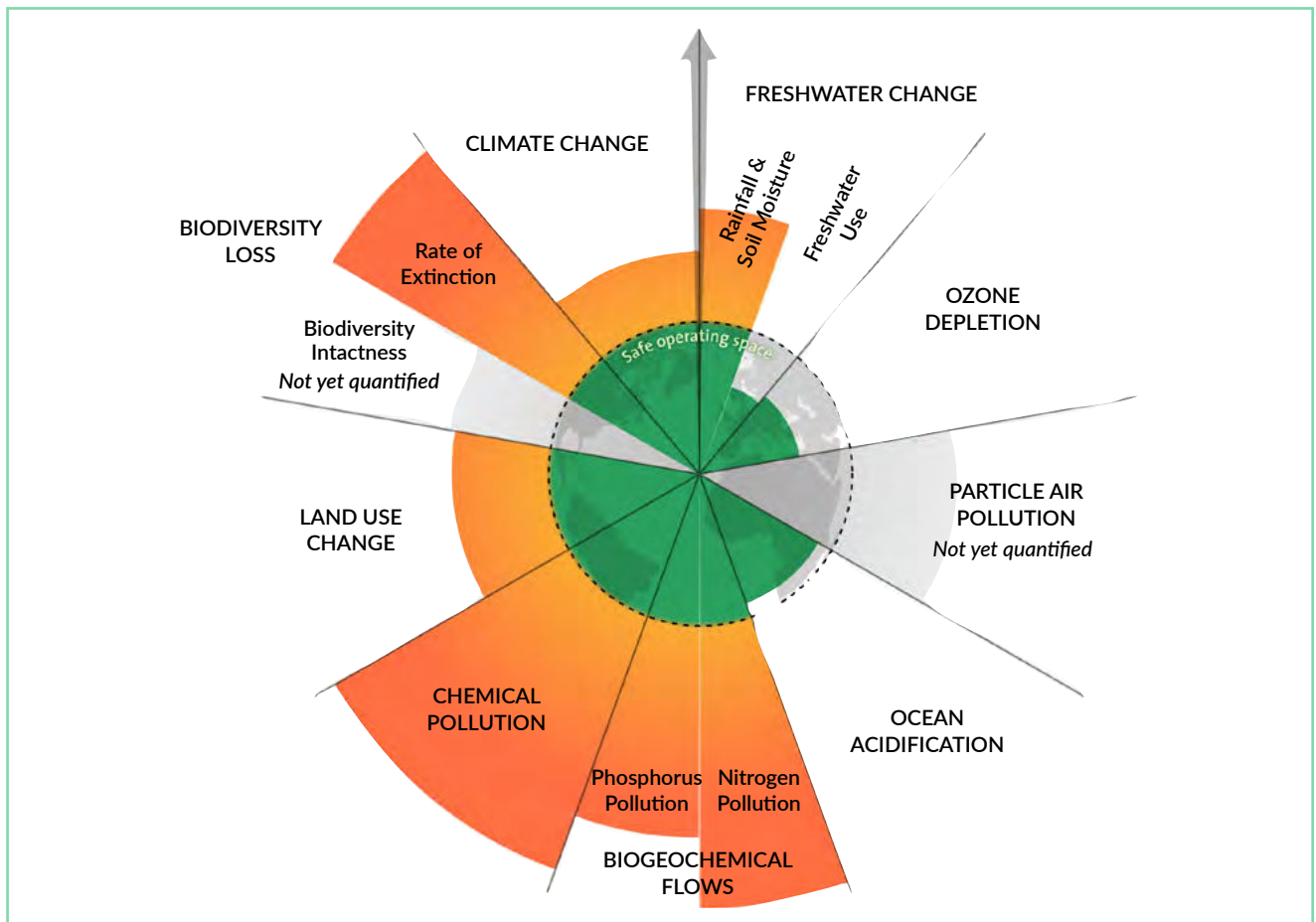
The UK does have a longer term target to halt "[the decline in our wildlife populations](#)" by 2042 and to increase species populations by 10% on 2030 levels. But the [Wildlife and Countryside Link](#) warns that in the absence of concrete plans to address the current rate of decline, the state of nature is on course to worsen considerably by 2030. This risks pushing ecosystems beyond dangerous points from which they may not be able to recover.

9. Outlined in clause 1(2)(b)(i) of the Climate and Ecology Bill

2.1 OUR FOOD SYSTEM

Our food system is a major source of emissions and the primary cause of the destruction of nature through the control it exerts over agriculture and the use of land and sea. The food system accounts for around 20% of UK greenhouse gas emissions, according to the [National Food Strategy](#) commissioned by the Government; rising to 35% when we include the [food we import](#). Climate change is now the biggest risk to our food security, but even if fossil fuel emissions were halted as quickly as possible, ‘business as usual’ in global food systems would prevent us [achieving the 1.5°C target](#) and, by the end of the century, could even threaten the 2°C target:

- ‘Defra’s 2021 [report on Food Security](#) says the biggest risk to the food system comes from climate change, which emphasises how climate and nature are intertwined.
- Over 70% of UK land is used by the food system, the majority to feed livestock and to produce ultra-processed foods—both high in emissions of CO₂ and powerful greenhouse gases, methane and nitrous oxide. This is an inefficient use of agricultural land, with very little used for crops that feed people directly.
- The food system is the main cause of ecological damage in the UK, preventing ecosystems on land and at sea from effectively sequestering carbon. The UK food system also contributes to profound negative impacts on seven critical planetary systems where safe limits have already breached. Without transformative action we will be unable to reverse the decline and return to a ‘safe operating space’.



Planetary Boundaries - showing 7 that have breached safe limits

Source: Stockholm Resilience Centre

“Moving towards a more plant-based diet could give rich countries a ‘double carbon dividend’ by lowering emissions and freeing up land which can be restored and used to draw carbon out of the atmosphere.”

Dr Paul Behrens, Specialist in Environmental Change, Leiden University

The NZS rightly calls for a joined-up approach to tackling the climate and nature crisis, but it **overlooks the pivotal role of the food industry**. Efforts to address the impact of agriculture and land use change will fail, unless directed at the source of the problem.

Food industry commentators often point to ‘consumer choice’ as the driver of problems in today’s food system. But the industry itself has driven demand for novelty and shaped our diets. It has created an unsustainable market in which all stakeholders, including farmers and consumers are now trapped. The industry continues to drive growth in meat products and **ultra-processed foods**—detrimental to people and the planet—through multi-billion pound promotional campaigns. The Food Foundation’s **Broken Plate** report shows that advertising spend on fruit and vegetables is just 2.5% of total food and soft drink advertising.

An estimated third of all **food produced is wasted**. Powerful retailers drive **overproduction in agriculture**, increasing emissions and wasting enormous amounts of energy and natural resources. The **Dasgupta Review**, commissioned by the Government, estimates that 60% of waste comes from livestock production.

Global food supply chains are not resilient to shocks. The Covid pandemic, the war in Ukraine and the climate crisis are causing shortages and price rises in grain and oil seeds, the majority of which are fed to animals. Populations are now threatened with food shortages, even though

grain production has risen faster than population growth in the recent past. So livestock competes with people for food while the cost of living soars. Meanwhile, just like fossil fuel companies, the **big grain traders** are enjoying record profits.

Growing fruit, vegetables and grains to feed people directly is low in emissions and according to the **National Food Strategy Report**, generates around 12 times more calories per hectare than livestock production.

The food sector is the driver for the issues associated with agriculture described in the sections below. The majority of farmers cannot make the radical changes required to meet climate and nature targets within the current system. Equally, individual organisations such as supermarkets cannot act unilaterally without damaging their businesses. Only a coordinated transition of the food system can deliver the extent and pace of change now needed. There are **many examples** of how farmers have taken up the challenge to farm sustainably, reducing stock levels, cutting chemical inputs and managing land to capture carbon and increase biodiversity. But the majority need support to make this transition and the food industry needs to change in parallel.

In its own **Food Strategy** published in June 2022, the Government acknowledged the damage caused by the ‘Junk Food Cycle’ and ultra-processed foods. This was also highlighted in the Government-commissioned National Food Strategy Report (NFS). However the Government has not made a concrete plan to adopt the NFS **report’s recommendations** which would help reduce emissions and minimise ecological destruction.

2.2 LAND USE

The NZS acknowledges the need for land use transformation. However, it does not identify the food sector—the biggest user of land—as an integral part in this process.

Livestock production is the largest user of land in the UK and globally. There is a growing [scientific consensus](#) that a substantial reduction in the production of meat and ultra-processed foods is the key to achieving climate and nature targets, as well as improving public health. This means eating less meat—not necessarily becoming vegan. But the NZS does not address meat consumption.

A [recent study](#) published in Nature Food quantifies the benefits of transitioning to a more [plant-based food system](#). This is described in terms of “[doubling the carbon dividend](#)” because it will:

1. **Reduce greenhouse gases**, including methane and nitrous oxide as well as the carbon associated with animal feed production. This can buy us time to decarbonise the rest of the economy.
 2. **Free up land for nature.** As livestock dominates agricultural land use, shifting to a more plant-based diet¹⁰ in the UK could save an area almost the size of Scotland. If policy were to guide the restoration of these lands, the restored ecosystems would absorb CO₂, doubling the benefit from emission reductions in the food system alone. Restored lands will also help us adapt to the worst impacts of climate breakdown, such as flooding and drought, while boosting biodiversity.
- Reducing dependence on livestock farming would enable an increase in food production—of crops which feed people directly—and unlock a cascade of co-benefits, including:**
- a. **Room to grow:** A wide variety of healthier low carbon foods that take up a fraction of the land area.
 - b. **Improved food self-sufficiency and security:** The UK is dependent on imports for [50% of vegetables and 84% of fruit](#) via long supply chains that are vulnerable to conflict and climate change.
 - c. **Adaptation to safeguard farmers and our food supply:** Defra’s 2021 [report on Food Security](#) shows that the risk of [severe heat stress](#) to livestock is projected to increase by 1000% in the South West, and over 3000% in Northern Ireland, regions particularly reliant on dairy cattle. Likely impacts are on livestock productivity, fertility, welfare, and mortality.
 - d. **Improved public health:** Switching to a diverse, plant-rich diet will improve the nation’s health, slashing the cost of dietary diseases to the NHS. The [Zoe Health Study](#) found that it boosts the immune system, guarding against diseases such as Covid. Becoming less dependent on meat will also reduce the overall risk of antimicrobial resistance caused by overuse of antibiotics in livestock production.
 - e. **Boosting local economies** by shortening supply lines, with local producers increasingly supplying local people. [Analysis from Sustain](#) shows this could create as many as 200,000 new jobs.

10. For example, as defined by the EAT-Lancet Commission.

- f. **Nature-friendly farming:** With a more plant-based diet requiring significantly less land, agriculture can be less intensive. Farmers would therefore be able to adopt agroecology and organic methods with less chemical input.
- g. **Cleaner air and water, and restored soil:** By reducing the high chemical inputs used in intensive livestock agriculture.
- h. **More land for people:** People need better access to nature for health and wellbeing.

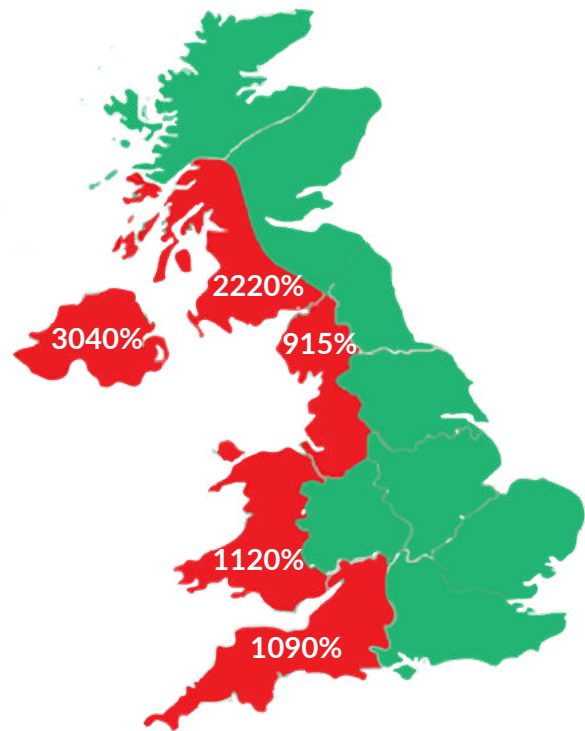
Environmental Land Management Schemes

The NZS refers to the Environmental Land Management Schemes (ELMs) in England saying that they will ‘provide a powerful vehicle for achieving net zero’. But the Government estimates that, within the schemes, there is only potential to create or restore up to **300,000 hectares of habitat** by 2042 (about 2.3% of land in England). ELMs are voluntary and this estimate is based on an optimistic “wide take-up” of the schemes. The amount of habitat restored could be even less after the Government appeared to **weaken its commitment** to the Landscape Recovery Scheme and reduced funding for the recovery of nature.

In the **6th Carbon Budget**, the CCC’s ‘Balanced Net Zero Pathway’ recommended a 20% cut in meat consumption by 2030 with a further 15% by 2050 to avoid missing our climate targets. It suggests that a total of “**around one-third of agricultural land is freed up through changes in output and more efficient farming practices.**”

A 20% reduction in livestock production in England by 2030 would release an estimated 1 million hectares by 2030 and about 1.8 million hectares by 2050. For the whole of the UK, the amount of land released could be 4 million hectares by 2050.¹¹

Projections from the Met Office for increased risk of heat stress in cattle. In Southwest England, the region with most dairy cattle, the risk increases by over 1000. Other key areas of high risk are Northern Ireland, Wales, the Midlands, North West England and Western Scotland. Source: Defra/ Met Office.



In its report **Feeding Britain from the Ground Up**, the Sustainable Food Trust suggests that 2.4 million hectares could be freed up through reduced livestock and adoption of agroecology. It proposes allocating “10% of the croppable area for on-farm habitats for nature, and a further 10% of all farmland for agroforestry”. It concludes that with more room to grow food for humans the UK could become more self-sufficient, dramatically improving its food security.

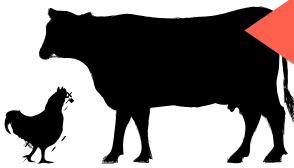
There is support among industry leaders for a Government-led transition. **In evidence to the Environmental Audit Committee**, Tesco said that “the UK’s food strategy cannot be left to the market”. They called for a strategy to help livestock farmers diversify to reduce meat and dairy consumption and increase fruit and vegetables, and said they would support action taken by Government, in consultation with industry and civil society.

11. Estimates based on [DEFRA statistics](#) on agricultural land use for livestock and feed crops, together with [AHDB data on feed crops](#).

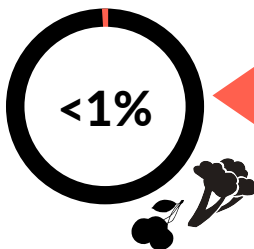
Food Facts



Over 70% of UK land is farmland and more than 85% of that is used to produce livestock: pasture for grazing and crop production to feed to animals (NFS)



UK livestock and poultry total 238.3 million animals



Less than 1% of agricultural land was used for fruit and vegetables in 2021



The UK imports around 50% of veg and 84% of fruit consumed

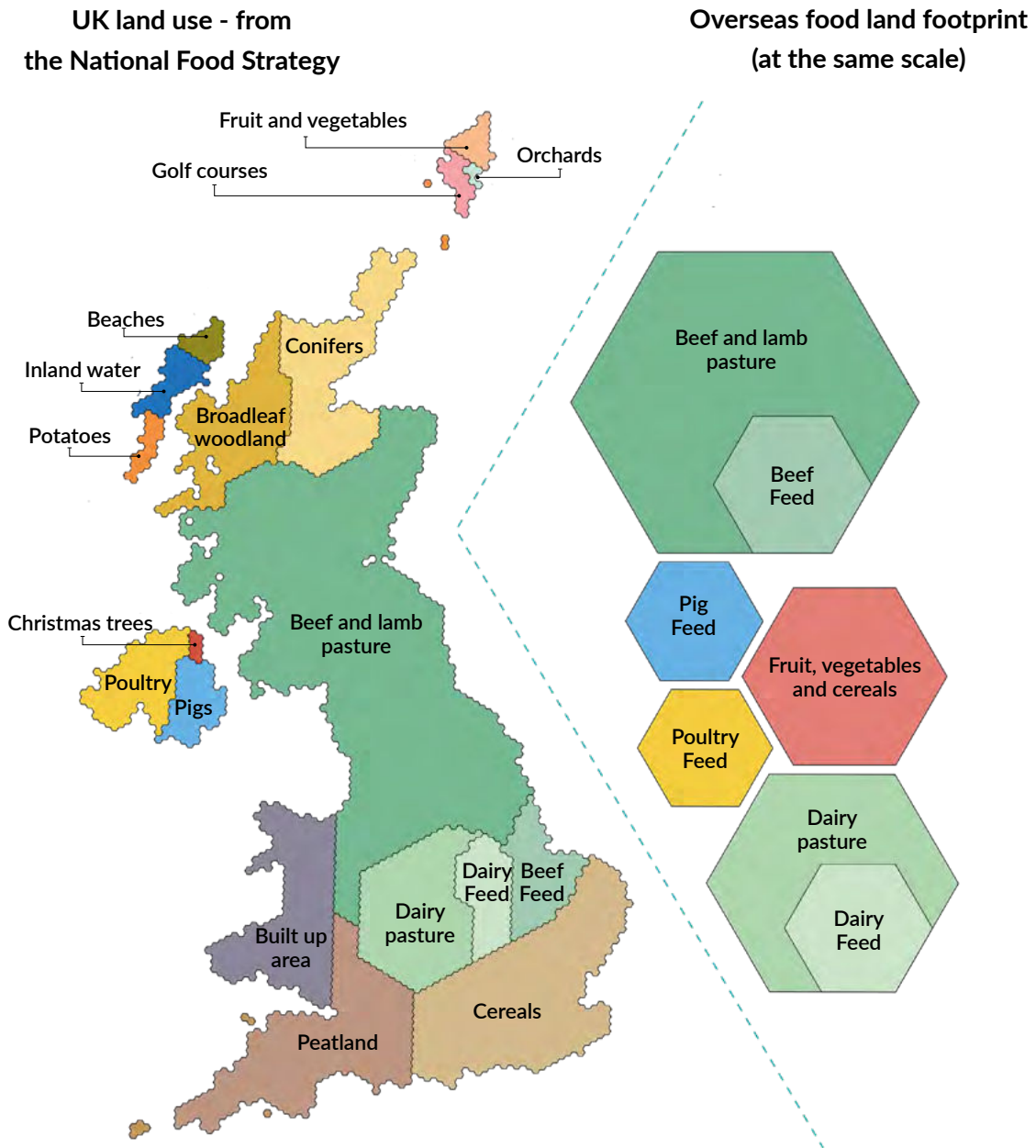
DEFRA land use statistics for 2021 confirm that only a small percentage of UK farmland feeds people directly.

The National Food Strategy says:

“Reducing meat consumption is the single most effective lever we can pull”.

- Growing fruit, vegetables and grains to feed people directly uses a small fraction of the land and generates around 12 times more calories per hectare than livestock production.
- The UK needs to increase fruit and vegetables consumption by 30% by 2032 for climate, nature and human health.

Below is an illustration summarising UK land use, from the National Food Strategy, highlighting the scale of agricultural use. It shows that the vast majority of UK land is used to produce livestock. Defra statistics for 2021 show the breakdown: cattle 9.6 million, pigs 5.3 million, sheep 33 million, poultry 190 million. The total for all livestock on farms is over 238 million animals.



Source: National Food Strategy

2.3 FOOD INDUSTRY-RELATED EMISSIONS AND POLLUTANTS

Our unsustainable food industry is driving excessive use of agrochemicals. [The RSPB](#) recently produced a report on the impacts on wildlife. Nitrogen and phosphorus pollution are two of the main environmental threats globally. We have exceeded safe [planetary limits](#) for both of these as well as synthetic chemicals such as pesticides. These pollutants are heavily associated with the vast areas of intensively farmed monocrops used for animal feed. Pollution levels can be significantly reduced by accelerating the shift towards lower meat consumption—enabling more people to be fed on less land, farmed less intensively.

Excessive use of agrochemicals—compounded by animal waste—pollutes air, land and water, damaging the natural systems that regulate the climate and support biodiversity, and which are essential to human health.

- Twenty-two million people in England live in areas with unsafe levels of [particle air pollution](#).
- Pollution from livestock production is preventing [rivers from achieving good ecological status](#).
- A cocktail of pollutants is poisoning the land, eroding soil and leaching into [drinking water](#) systems, costing the taxpayer millions of pounds and risking health.

Methane Emissions

Livestock production causes almost [50% of UK methane](#) emissions. Methane is an extremely potent greenhouse gas, with 83 times more warming impact than CO₂ over 20 years. The [UN stresses the urgent](#) need for rapid reductions in methane to maximise our chances of limiting global heating to 1.5°C. New science shows that a 45% reduction by 2030 could avoid around [0.3°C of warming by the 2040s](#). The UK has signed up to the [Global Methane Pledge](#) to reduce emissions by 30% by 2030, on 2020 levels: good start but it [should go further](#). The UK will fall far short of its methane pledge unless it follows scientific advice to end new fossil fuel exploration and reduce meat consumption.

Nitrous Oxide Emissions

Nitrous oxide has almost 300 times the warming potential of CO₂. Almost [70% of nitrous oxide](#) emissions are caused by agriculture, largely from overuse of nitrogen fertiliser used primarily in the production of animal feed, as well as animal waste.

Ammonia, Nitrogen & Phosphorus Pollution on Land and in Water

A 2018 [Government report](#) shows that [ammonia](#), mostly from fertiliser and livestock waste, is polluting more than 60% of the UK's land area—including statutory protected sites—and causing severe [damage to biodiversity](#). Critical carbon sinks such as peatlands, woodlands and species-rich grasslands are particularly susceptible. An [update in 2022](#) shows that little has changed. [87% of ammonia emissions](#) come from agriculture, and [a report in the journal Science](#) shows it is the largest component of particle air pollution.

The primary sources of [nitrogen](#) pollution are the burning of fossil fuels and overuse of fertilisers and animal waste. On average, [40% of nitrogen](#) fertiliser used in the UK is surplus. It degrades soil, causing acidification and soil loss through erosion. Degraded soil floods easily in heavy rain, and 'run-off' from the land is polluting water systems with sediment and agrochemicals.

We need a joined-up approach to pollution in the environment—it has multiple interconnected impacts on climate, nature and people.

The **Local Government Association** recently reported that pollution levels in our rivers from agriculture and water companies are preventing the development of new homes. The Government has introduced a **new directive** which could allow developers to offset potential nutrient pollution. But will this address the source of pollution?

Northern Ireland is responsible for 12% of the UK's **ammonia** emissions due mainly to the high density of livestock.

The River Wye is in a state of environmental collapse due to poultry waste. Lawyers for **River Action** have called on Tesco to take responsibility for its toxic local supply chain.

The **Environmental Audit Committee** reports that **phosphorus** pollution remains the most significant cause of water bodies failing to achieve good ecological status. Livestock waste and surplus agrochemicals are poisoning freshwater and marine biodiversity and causing **eutrophication**. This leads to dead zones and damages the ability of critical ecosystems—on land and at sea—to sequester and store carbon.

Pesticides

Agricultural pesticides combine with fertiliser, animal waste and livestock veterinary treatments to create a cocktail of pollutants that degrade soil and pollute water systems. Their **combined effects** increase toxicity for biodiversity on land and at sea—and they are increasingly found in drinking water. Neonicotinoid pesticides persist in soil for years and have been found in plants and trees all over the countryside. The UK recently allowed a **banned neonicotinoid** to be used on sugar beet, a crop with little nutritional value for humans, that is used mainly for the production of ultra-processed foods and livestock feed.



Too many rivers are being suffocated with algal bloom caused by nutrient pollution.

2.4 PROTECTING CARBON SINKS AND STORES

The UK's critical carbon sinks and stores—such as peatland, woodland, soils, wetlands and seas—are being allowed to deteriorate, reducing their capacity to absorb carbon. In some cases, they have become net carbon sources, creating a serious risk that we will miss our climate commitments. If we protect and restore these ecosystems, they will lock up more carbon. But the NZS will not achieve this positive goal because it lacks a concrete action plan for restoration and protection. The following are notable areas of concern.

Peatland

The UK is among the top ten nations for peatland area, with more than 3.5 million hectares, and is home to 13% of the world's [blanket bog habitat](#). Peatland stores vast amounts of carbon—around eight times an equivalent [area of tropical rainforest](#). But 80% of these precious habitats are degraded in the UK (87% in England) and have become a net source of carbon. Astonishingly, this now accounts for almost **5% of UK net greenhouse gas emissions, due largely to “drainage for agricultural use, overgrazing and burning.”**

The [Centre for Ecology & Hydrology](#) estimates that around 3.2 billion tonnes of carbon is stored in UK peatlands—equivalent to 34 years of UK's total CO₂ emissions¹². Peatlands also provide around a quarter of the UK's drinking water. If restored, they could provide substantial wildlife habitat and flood prevention.

The NZS refers to the [England Peat Action Plan](#) (EPAP) for the strategy on peatland restoration in England. But its commitment to fund 35,000 hectares of peatland restoration by 2025, and a less detailed ambition of 280,000 hectares by 2050, falls short:

- This is less than 20% of England's 1.4 million hectares of peatland (EPAP).
- It relies on ELMs as the main delivery

- 260,000 tonnes of CO₂ are released every year from rotational burning on peat in England. This also reduces the biodiversity value of upland peat habitats and affects water quality.
- There are around 325,000 hectares of lowland peatland in England. 75% of that is under cropland which consequently has the 'highest greenhouse gas emissions of any form of UK land use'



12. 3.2 bn tonnes of carbon converts to 11.7 bn tonnes of CO₂, 34 times BEIS CO₂ emissions of 342 MtCO₂ in 2021

mechanism after 2024-25. ELMs are voluntary schemes with no guarantee of delivery.

- It does not address the root causes of degradation: drainage for agriculture; grazing and trampling, mainly from sheep and deer in the uplands; burning on shooting estates and [swaling](#) to keep land clear for grazing.

The [Office for National Statistics estimates](#) that restoring **all UK peatlands** “would deliver carbon benefits alone of £109 billion and would outweigh the costs by an estimated 5 to 10 times.”

History has shown that conservation measures will not be sufficient on their own. Unless we address the root causes of degradation, particularly overgrazing and burning, government investment will be undermined and our goals will remain beyond reach. Investment in reducing livestock numbers should take equal priority with conservation efforts, in close consultation with the food industry, farmers and civil society groups. This will enable farmers and landowners to deliver meaningful change. It will also reduce production of damaging animal feed crops on lowland peat. Freeing up land from livestock production will allow horticultural crops to be shifted from peat to mineral soils, where their environmental impact will be lower.

Woodland

The UK sits near the bottom of the European league table on woodland cover. Our uplands are largely devoid of trees, causing regular flooding in our lowlands. The lack of woodland habitat is a key reason why the UK ranks in the 12 most nature-depleted nations in the world.

Woodland covers around 13% of the UK (10% of England). Only around 7% is in good ecological condition, according to the Woodland Trust’s [2021 State of Woodlands](#) report. Woodland suffers from similar pressures to peatland: livestock browsing and grazing, which prevents

natural regeneration; pollution, particularly nitrogen and ammonia from agriculture; and poor management.

Woodland Carbon Sequestration

According to a [Natural England report](#), woodland is the habitat with the highest rates of carbon sequestration. Ancient and veteran trees store large amounts of carbon, but astonishingly they have [no legal protection](#).

The report also shows that agricultural land has the potential to sequester much more carbon, but that arable land is generally a net source of emissions. Permanent pasture can be an effective carbon sink, but this is offset by methane and nitrous oxide emissions. By reducing livestock and nitrogen fertiliser use, [grasslands would become more biodiverse](#), potentially sequestering significant amounts of carbon, particularly with the widespread integration of [agroforestry](#).



UK farmland covers more than 70% of land, but woodland cover on farmland is less than 6%. It is easy to see from the aerial view below just how fragmented woodland can be.



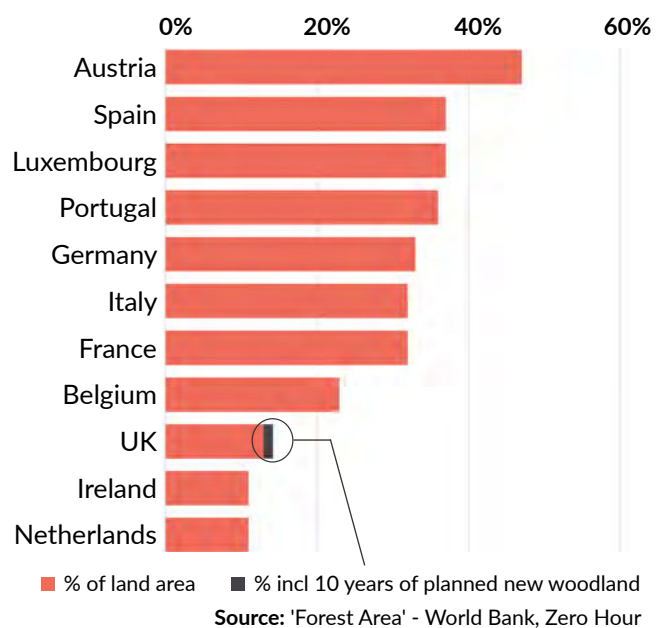
the risk that they are used to justify delaying emissions reduction at source.

Friends of the Earth says the UK can find enough land to [double tree cover](#). Rewilding Britain concurs and [has published evidence](#) that allowing woodland to regenerate naturally can be cheaper, much more rapid and more beneficial than afforestation. The report suggests that doubling the cover of woodland and “woodland in the making” from [13% to at least 26% within 10 years](#) is achievable: “partly through a rapid expansion of the area where young woodlands are regenerating and growing into the natural forests”. There is evidence of successful large-scale natural regeneration as a result of rapid land use change. This would be another benefit of incentivising the reduction of livestock production to free up land. Woodland regeneration, along with agroforestry—integrating trees or shrubs with crops and/or livestock—and re-establishing orchards, present major opportunities for farming and local communities, and would boost biodiversity.

The Government’s proposal to plant [30,000 hectares of trees per year](#) is a welcome start, but it falls far short of what is needed. It will take over eight years to increase UK woodland cover by just 1%¹³. Incremental changes of this kind will have little impact on the nature and climate crisis.

Current plans focus heavily on afforestation—planting trees on land which previously did not have tree cover. The NZS aims to ensure that the “right species of tree is planted in the right place.” However, details of guidance and enforcement action [have not been published](#). [Natural England’s review](#) on how well different habitats absorb and store carbon reports that reforestation—creating woodland where there once was forest cover—has the greatest potential to sequester carbon. There is also a real risk that afforestation would drive more offsetting schemes in the private sector, with

Woodland as Percentage of Land Area - UK and Western Europe



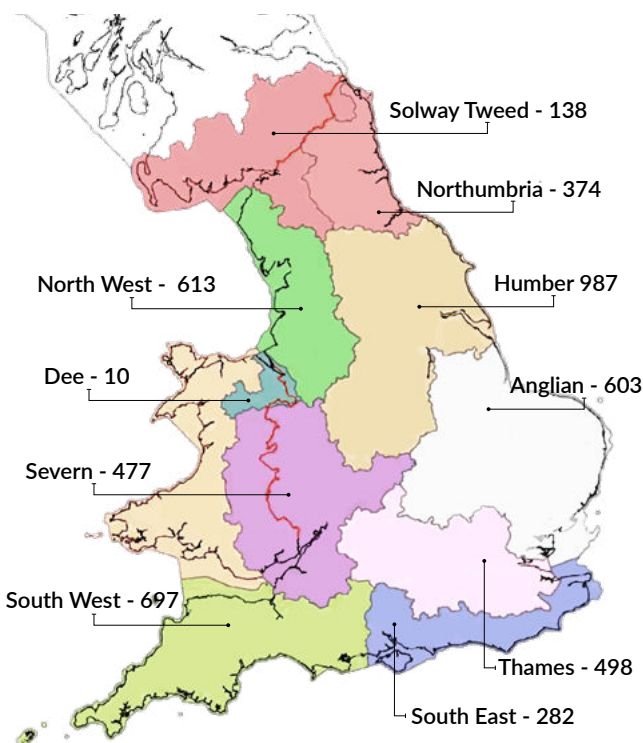
13. 30,000 hectares is approximately 0.12% of the total land area of the UK’s [24.4 million hectares](#).

Water Systems and Seas

Land and coastal water systems [have the potential](#) to absorb and store large amounts of carbon. But pollution running into them from the land can tip these systems from carbon sinks to carbon sources.

The NZS does not mention [blue carbon](#): carbon sequestration by oceanic and coastal ecosystems. Yet the [ocean absorbs and stores more carbon](#), and releases more oxygen, than

Each one of the **4679 surface water bodies** in England's 10 River Basin Districts has failed chemical standards, according to Environment Agency data from May 2022. This includes rivers, lakes, canals and coastal waters. The main sources of pollution are agriculture (nearly 50%) and the water/sewage industry (around 30%).



England's 10 River Basin Districts, containing a total of 4679 surface water bodies: rivers, lakes, canals and coastal waters. All of them have a chemical status of "Failed". Source: Environment Agency.

any other ecosystem. Decades of pollution and overexploitation have damaged and degraded our seas, undermining their potential to absorb carbon. Overfishing causes large additional carbon emissions through the [removal of biomass](#) and risks preventing long-term storage by disturbing the ocean floor. [Oceana reports](#) that 6 out of 10 of the UK's most important fish stocks are overfished or in a critical situation.

We have already crossed the [safe planetary boundaries](#) for nutrient use and novel chemicals, and are close to breaching the ocean acidification boundary. But pollution from agricultural fertilisers, pesticides and animal waste continues unabated. This cocktail of pollutants runs off the land, degrading fresh and saltwater systems and our seas and destroying biodiversity. It contributes to the acidification of the ocean and leads to 'dead zones' that cannot support biodiversity or absorb carbon.

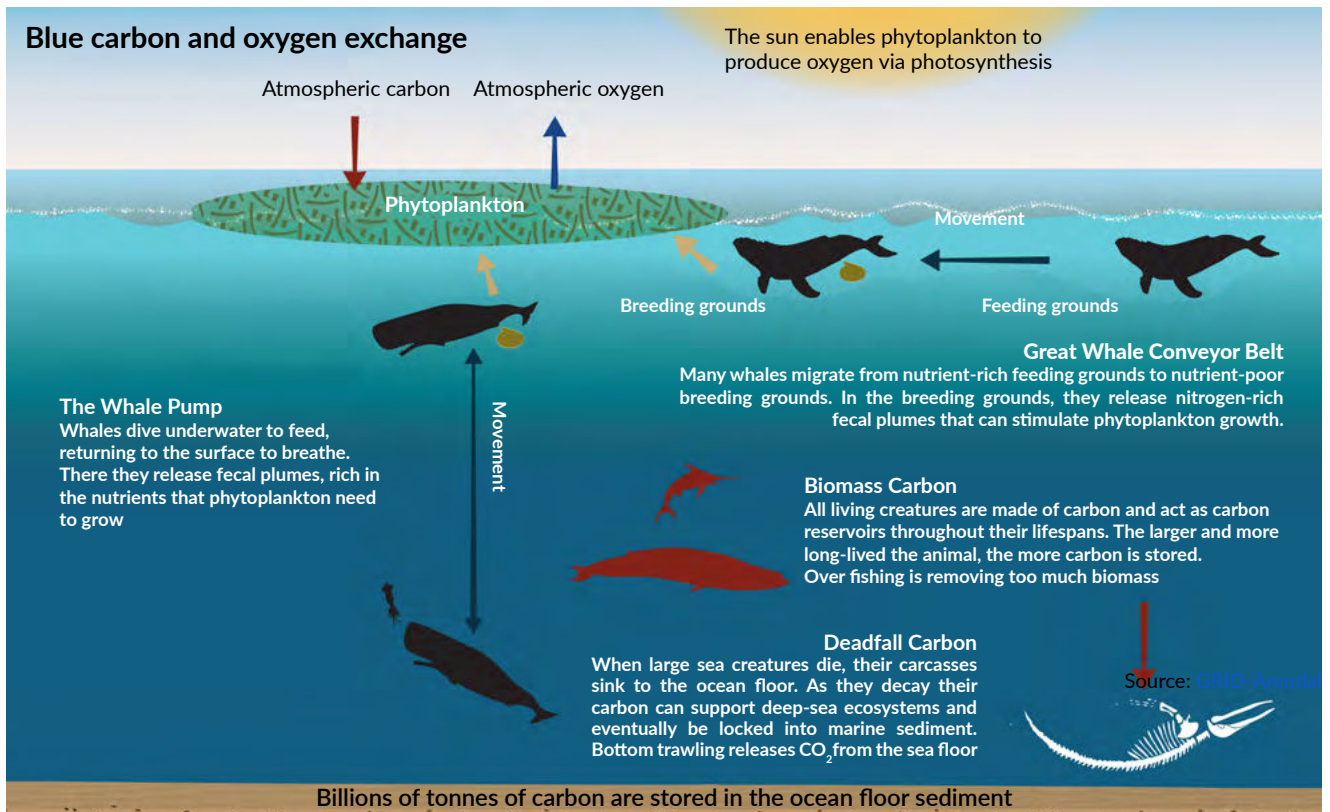
Lord Goldsmith, Minister for the International Environment, recently endorsed a paper showing that industrial fishing—dragging heavy gear across the delicate habitat on the sea bed—destroys biodiversity and [causes similar CO₂ emissions as international aviation](#). This practice is now [banned on most of the west coast of the USA](#), which will allow marine habitats to recover and absorb CO₂. Shifting to less intensive fishing also means [improved incomes and job satisfaction, as evidenced in Lyme Bay](#).

Marine Protected Areas

Extraordinarily, [industrial fishing](#), including bottom trawling, continues in most of the UK's 'protected' areas. An analysis in 2020 showed that [97% of marine protected areas \(MPAs\)](#) were still subject to destructive bottom-trawling. A recent briefing from [Wildlife and Countryside Link](#) warns that there are currently "no areas of English waters fully protected from all extractive or damaging human activities." And yet marine habitats make a remarkable recovery if protected from all but low-impact sustainable fishing: a recent study shows that fish stocks have increased by [430% in the Lyme Bay MPA](#), since trawling and dredging were prohibited.

'Blue carbon' is CO₂ stored in marine and coastal ecosystems including salt marshes and seagrasses. The UK's marine ecosystems continue to be degraded and are likely to be emitting significant amounts of greenhouse gases. As yet though, estimated losses of blue carbon are not included in the UK's greenhouse gas emissions figures and there are no targets to reverse such losses.

This illustration, based on one produced by GRID-Arendal for the IMF, shows how carbon is absorbed by ocean plankton, which in turn release oxygen. Marine biodiversity, particularly whales, engineer this vital process but climate change, overfishing and pollution are putting it at risk.



The ocean absorbs and stores more carbon, and releases more oxygen, than any other ecosystem. But the NZS does not address this essential link between climate and nature.

2.5 UK GLOBAL FOOTPRINT

Any net zero strategy must involve taking responsibility for impacts beyond a country's own borders, including [Scope 3](#) emissions and ecological impacts—often the largest portion of an organisation's impacts. This is the biggest challenge that developed countries face in the race for net zero and the reversal in the destruction of nature. Ignoring our global responsibilities sends the wrong message to other nations.

A priority for all governments in developed countries must be to stabilise the world's critical carbon sinks and stores—the '[global safety net](#)' of ecosystems such as tropical forests, peatlands, and the ocean. Many of these are also the [richest remaining areas for biodiversity](#), which is critical to keeping them functioning and preventing the loss of [irrecoverable](#) carbon.

Groundbreaking new research published in [The Lancet](#) establishes that the EU and the UK are responsible for 25% of global ecological damage. The UK has an extremely high food emissions economy because it imports around 50% of its food. To compound this, more than 50% of UK household food purchases are [ultra-processed](#), compared to 14% for France and 13% for Italy.

We eat an astonishing 79 million ready meals each week.¹⁴

Ultra-processed foods and livestock production use large quantities of water and vast amounts of just a few commodities, such as meat and seafood, soy, palm oil, and wheat. Our diet leaves our economy highly dependent on these commodities and exposed to supply disruption, causing shortages and price rises, as shown by the wheat shortage due to the war in Ukraine and pressure from climate change in India and Canada.

The large-scale production of these commodities causes widespread ecological damage, with beef, soy and palm oil particularly associated with global deforestation. The JNCC has begun work on estimating the global environmental impacts of UK consumption, producing its first [report in October 2021](#).

Exponential growth in the production of unsustainable foods is driving large-scale emissions and ecological breakdown. This poses risks to public health, food security and the stability of Earth's critical carbon stores. It is also inequitable. Developed countries use more than three quarters of the world's farmland to [feed livestock](#), while over [2 billion people](#) have insufficient access to safe and nutritious food. **Richer nations are stripping natural resources from poorer nations**—such as land, minerals, forests, water, and marine resources—hampering their ability to develop sustainably and to protect

- **Since Brexit, UK imports of beef from Brazil and Uruguay have increased.**
- **Deforestation in the Amazon has hit a record peak in April 2021, with twice the number of trees lost compared with April 2020. Will our new due diligence policy on forests be strong enough to stop our contribution to this escalation?**
- **The threat to tropical forests is increasing as the demand for palm oil has risen dramatically with the war in Ukraine having largely destroyed 75% of sunflower supplies.**

14. Food Unwrapped, Channel 4, May 2nd 2022

the critical ecosystems that all countries depend upon.

According to the [Lancet](#), resource consumption in the UK and among the other largest consumers must be reduced by around 70%.

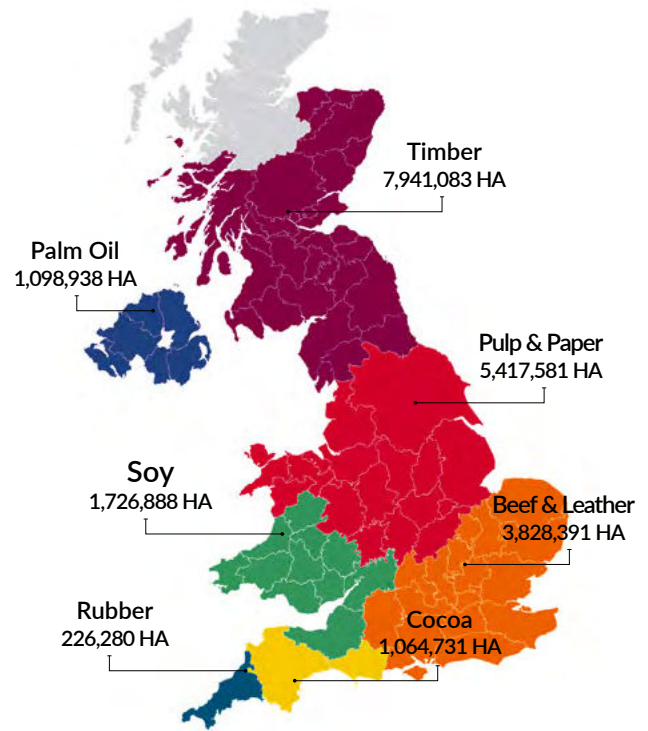
The [WWF concurs](#): “we must reduce the UK’s environmental footprint by three-quarters by 2030 to help the world stay within planetary limits”. The European Parliament also calls for binding targets to [reduce resource footprints](#) by 2030 and bring them within planetary boundaries by 2050. The WWF report [Thriving Within our Planetary Means](#) shows that the UK’s overseas land footprint for just seven commodities takes up a land area almost equal to the size of the UK itself.

There is no doubt that reducing our global footprint presents governments with huge challenges. But a Nature Positive Economy can create significant opportunities and benefits, generating new jobs, innovations and wider economic gains. The NZS recognises the need for a circular economy, but mainly in the context of energy saving and waste reduction. It does not acknowledge the extent to which we are depleting domestic and global natural resources.

The Role of Banking and Finance

The UK must also account for the impacts of its banking, insurance and financial services. As one of the top four banking nations and the most powerful financial centre in the world, its responsibilities extend far beyond the consumption of its citizens.

The 2022 report ‘[Banking on Climate Chaos](#)’ revealed that, despite a major marketing drive to convey the idea that they are transitioning to clean energy, the 60 largest private banks in the world invested £3.8 trillion in fossil fuels since the 2015 Paris Agreement.



The WWF has mapped the UK’s overseas land footprint for just seven key commodities, it amounts to an average annual area of 21.3 million hectares. This is equivalent to 88% of the total UK land area. Source: WWF/3Keel

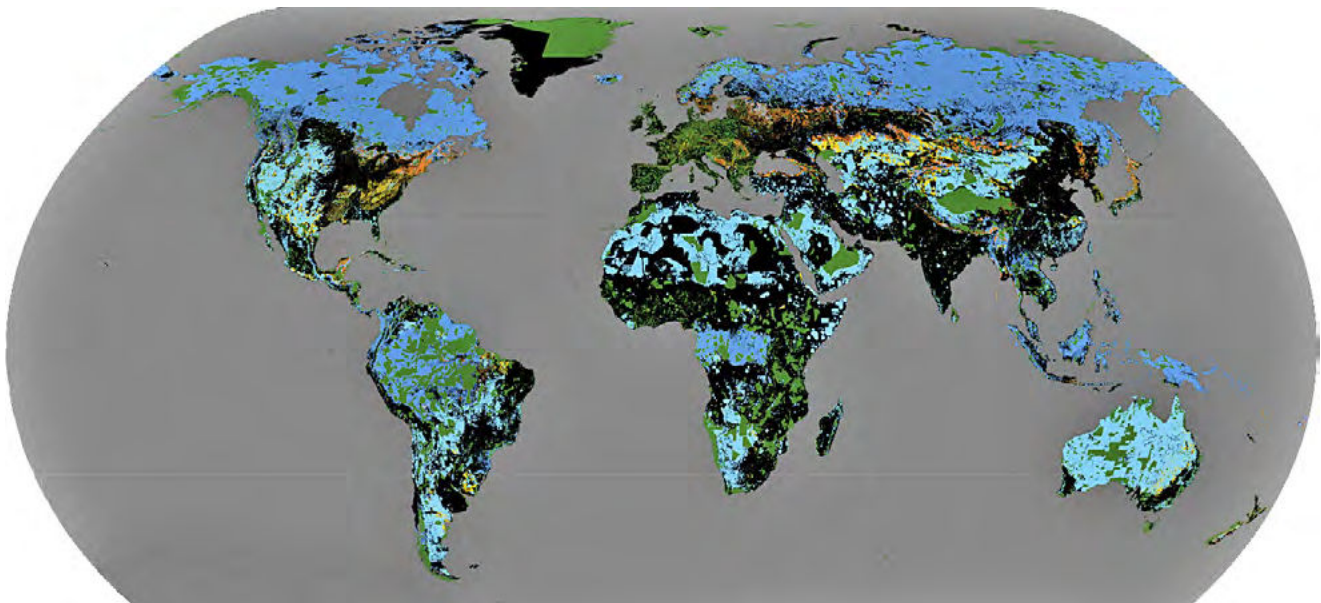
“35% of the UK’s total emissions arise from producing and eating the country’s food & drink, including emissions overseas for imported food”

The most comprehensive mapping of the UK’s food & drink carbon footprint shows a pathway to 50% carbon reduction

[WRAP: UK Food System GHG Emissions](#)

Global Safety Net for saving life on Earth

Scientists at the [Global Deal For Nature](#) have identified that approximately 50% of the Earth's land area must be restored urgently to protect key areas containing large stores of carbon and to enhance natural carbon removal. The illustration below shows that around 15% the key areas (green) are currently protected but around 35% remain unprotected (other coloured areas). The scientists stress that biodiversity is absolutely critical to the health of the Earth's carbon stores to keep them functioning, in order to prevent the release of irrecoverable carbon into the atmosphere. This highlights that the climate and nature crises are inextricably linked and we must "conserve enough nature and in the right places". If temperatures rise above 1.5°C many ecosystems containing large carbon stores would be unable to adapt and, with increased biodiversity loss, could collapse with catastrophic consequences.




Source: Global Deal For Nature

 Current global protected areas (but not necessarily restored)

Target 1: Unprotected areas selected for enhanced biodiversity conservation and carbon storage

 >215 metric tonnes per hectare - median

 <215 metric tonnes per hectare - median

Target 2: Unprotected areas selected as additional climate stabilisation areas

 >215 metric tonnes per hectare - median

 <215 metric tonnes per hectare - median

A priority for all governments in developed countries must be to stabilise the world's critical carbon sinks and stores—the 'global safety net' of ecosystems such as tropical forests, peatlands, and the ocean. Many of these are also the richest remaining areas for biodiversity, which is critical to keeping them functioning and preventing the loss of irrecoverable carbon.

3. THE WAY FORWARD - THE CLIMATE & ECOLOGY BILL

A joined-up whole-of-Government approach is required to tackle the interwoven climate and nature crises. Businesses and individuals need certainty about the way forward, before investing in building supply chains, retraining, and modifying their homes. The country needs a clear mission statement and a firm commitment from the Government that it intends to stay the course.

The Climate & Ecology Bill provides a framework to meet this need. It was created by Zero Hour with the help of scientists and constitutional lawyers. If enacted, the Bill would be a legally-binding commitment to follow the latest science on restoring nature and halting climate change. It is the only legislation before the UK Parliament that offers a science-led and joined-up approach that depoliticises action on the climate and nature crisis and separates it from short-term political considerations.

The CE Bill does not specify detailed policies: it is the role of the Government to develop a suitable strategy, advised by a Climate & Nature Assembly of ordinary citizens. The Bill establishes an overarching legislative framework—a mission statement to guide policy and action.

The UK led the world with the Climate Change Act of 2008, and did so again with its commitment to Net Zero by 2050. In both cases, other countries followed the UK's lead. The CE Bill would set a gold standard as world-leading legislation.

Key Objectives

Under the CE Bill, the Government would develop an emergency strategy with the following objectives.

- **Reverse the destruction of nature**
Regenerate natural life support systems so that humanity can continue to feed, sustain and protect itself.
- **Transition to zero emissions**
Achieve a vibrant fossil fuel-free economy as quickly as possible without creating hardship, so that civilisation can thrive not collapse.
- **Responsibility for our global impacts**
Account for the emissions as well as impacts on nature and human health, resulting from goods and services imported into the UK.

Fundamental Principles

The CE Bill sets out a number of guiding principles that the Government would adhere to in creating its emergency strategy:

1. Limit the UK's total CO₂ emissions to no more than its proportionate share of the remaining global carbon budget.
2. Reduce CO₂ emissions caused in the manufacture of the goods we import, in line with UK territorial emissions.
3. Reduce the UK's emissions of greenhouse gases, other than carbon dioxide, at rates consistent with a proportionate UK contribution to limiting global heating to 1.5°C.
4. Ensure the end of the exploration, extraction, export and import of fossil fuels by the UK as rapidly as possible.
5. Ensure that steps taken to mitigate emissions minimise damage to ecosystems, food and water availability, and human health, as far as possible.
6. Restore and expand natural ecosystems, and enhance the management of cultivated ecosystems, to protect and enhance biodiversity.
7. Ensure that all activities in the UK which affect the health, abundance, diversity and resilience of species, populations and ecosystems:
 - a. Follow the [Mitigation & Conservation Hierarchy](#), and
 - b. Prioritise avoidance of the loss of nature.
8. Taking every possible step to avoid, or where avoidance is not possible, limit, and where limiting is not possible, restore or otherwise offset, the adverse impacts overseas of United Kingdom-generated

cycles of consumption, trade, financing and production on ecosystems and human health; including, but not limited to, the extraction of raw materials, deforestation, land degradation, pollution and waste production.

Transition Support

The Government's strategy must include financial support and retraining to enable people to transition from working in high emissions and high impact industries to new jobs in the low carbon economy. It must also be designed to ensure a positive and fair impact on local communities with high levels of deprivation.

Building Consensus

The IPCC has warned that limiting heating to 1.5°C will require "rapid, far-reaching and unprecedented changes in all aspects of society". Achieving a broad public consensus on the way forward will be essential in rising to this challenge: the British public must be informed about, and feel consulted on, the changes needed.

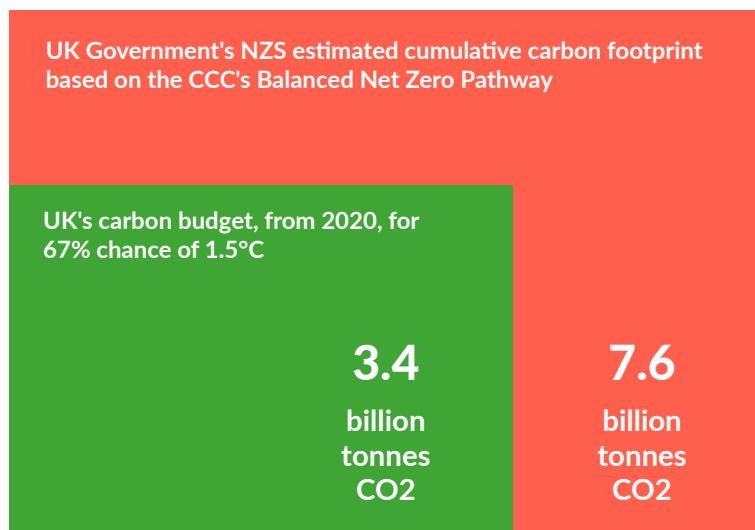
That's why the Climate and Ecology Bill includes a temporary Climate and Nature Assembly to advise Parliament on the emergency strategy. The assembly will be made up of ordinary citizens, randomly selected to represent all sections of society. It will hear evidence from a wide range of experts, deliberate on the options, and make recommendations to Parliament.

The Assembly will provide visible democratic legitimacy for the far-reaching changes that are required to tackle the climate and nature crisis. A robust example of such an assembly was [Climate Assembly UK](#), which was established by several Select Committees in 2019 to help them understand public preferences on how to tackle climate change.

Whatever the Assembly recommends, Parliament will always have the final say.

APPENDIX

In this appendix, we compare the UK’s fair share of the global carbon budget for a 67% chance of limiting global heating to 1.5°C (Table 1), with the expected cumulative carbon footprint under the Government’s NZS (Table 2).



Under the NZS the UK’s carbon footprint from 2020 to 2050 is likely to be at least 2.2 times higher than our proportionate share of the global carbon budget.

Table 1: The UK’s fair share Carbon Budget

A	Global carbon budget, from 2020, for 67% chance of 1.5°C	400	billion tonnes CO ₂
B	World population (forecast average to 2050)	8.2	billion
C	Carbon budget per person (A ÷ B)	49	tonnes CO ₂
D	UK Population (avg. to 2050—ONS projected)	69.7	million
E	UK Share of the carbon budget for 67% chance of 1.5°C (C × D)	3.4	billion tonnes CO ₂

Notes

- The carbon budget is shared proportionately on the basis of population to arrive at a fair allocation for the UK.
- Since so little remains of the global carbon budget for 1.5°C, there is no realistic prospect of the UK emitting less than its proportionate share¹⁵ in order to account for its historic emissions. To limit warming to 1.5°C, developing nations will have to leapfrog the large-scale exploitation of fossil fuels. For this, they will need financial and technical assistance, which must be provided by the UK and other developed nations in line with commitments made under the UNFCCC (the principle of Common but Differentiated Responsibilities).
- To allow for the additional emissions associated with population growth up to global net zero in 2050, we have used average forecast population figures from 2020 to 2050.

15. Many argue that the UK should use less than its per capita share of the remaining global carbon budget on the basis that it is the 5th largest contributor to atmospheric CO₂

- World population: using the lower SSP1 scenario, associated with a green pathway¹⁶.
- UK population: [Forecast by the Office of National Statistics \(ONS\) to 2045](#), projected forward to 2050 at a constant rate.

Table 2: UK's expected carbon footprint under the NZS

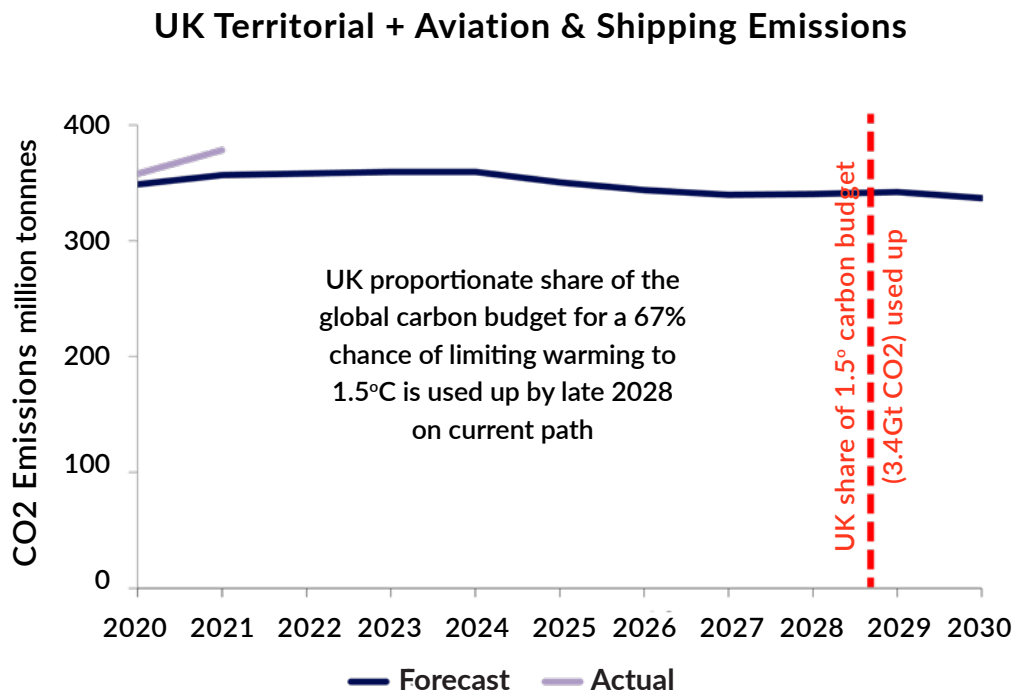
A	Total UK CO₂ emissions 2020 to 2050 UK carbon budgets are expressed in total greenhouse gases (not CO ₂). They are based on the CCC's Balanced Net Zero (BNZ) Pathway ¹⁷ , which differentiates between individual greenhouse gases. Since we need to calculate only CO ₂ to compare to the global carbon budget, we have used the CCC source data for this figure.	4.7	billion tonnes CO ₂
B	Add net imports Calculated using the average ratio of consumption emissions to territorial emissions from the Global Carbon Project for 2018/19 : 41%. We assume this ratio remains constant, i.e. import emissions fall at the same rate as territorial emissions. Note: this is optimistic in the absence of policies to reduce imported emissions.	1.9	billion tonnes CO ₂
C	Add international aviation & shipping emissions to 2032 UK carbon budgets do not include IAS until 2033. However, these emissions cannot be ignored. The data are from the 6th Carbon Budget dataset .	0.5	billion tonnes CO ₂
D	Add back negative emissions pre-2050 UK plans rely on negative emissions from 2029 from discredited BECCS, and also from DACCs, which cannot be carbon-negative until we have spare renewable power. This will take decades. The data are from forecasts in the 6th Carbon Budget dataset .	0.5	billion tonnes CO ₂
E	UK's estimated total carbon footprint (A+B+C+D)	7.6	billion tonnes CO ₂
F	UK Population (avg. to 2050—ONS projected)	69.7	million
G	NZS UK carbon budget per person (E ÷ F)	110	tonnes CO ₂

16. Based on the Shared Socio-Economic Pathway 'SSP1' data used by the IPCC, which will require ambitious efforts to tackle population growth

17. From the [6th Carbon Budget Dataset](#)

The UK's share of carbon budget will be used up in 6 years

The UK's emissions¹⁸ are projected to use up the UK's proportionate share of the global carbon budget by late 2028. We cumulated emissions from 2020 using actuals for 2020 and 2021, combined with the forecast data shown below. We have assumed that forecast emissions from 2022 will be met, but with actuals already exceeding forecast, the true picture could well be even worse.



Government projections from BEIS: 'partially updated in Dec 2021)
<https://www.gov.uk/government/collections/energy-and-emissions-projections>
 International Aviation & Shipping projections from the 6th Carbon Budget report

At a global level, the remaining carbon budget is being used up at approximately 1.4% every month according to Prof Kevin Anderson.

18. Emissions produced on UK soil, plus international aviation and shipping, but excluding emissions from imports

19. For a 67% chance of limiting heating to 1.5°C

"We will never solve the problems of climate change without the help of the natural world. This excellent report makes it crystal clear that the UK must take serious action now. This is it; we may not get another chance."

Dr George McGavin - Entomologist, author, TV presenter, Zero Hour Ambassador

"This is an utterly convincing quantitative assessment of a notoriously complex roadmap to an identifiable goal: net zero emissions."

Prof Sir Partha Dasgupta - Ecological Economist, University of Cambridge

"Climate impacts are hitting us even faster than expected and we have very little time now to avert calamitous consequences. I urge all politicians to read this comprehensive report and act robustly and with urgency to secure a liveable future for all."

Prof Joanna Haigh - Former President of the Royal Meteorological Society

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