

We've broken the climate: now what?

Despite the world missing its global heating targets, and ever more extreme weather events occurring, **Will Arnold** sees reasons to be optimistic and urges structural engineers to be bold in their climate action.

It's official, humanity has been unable to keep global heating below 1.5°C compared with pre-industrial levels. This figure has now been confirmed by authoritative groups including the World Meteorological Organization¹, the EU's Copernicus Climate Change Service², and the UK's Met Office³ – with Copernicus's estimate even putting the number at nearer 1.6°C. This doesn't yet contravene the Paris Agreement (which is based on a 10-year average), but it is worrying that the figure has been passed within only 10 years of the agreement being signed by 196 world leaders. A Copernicus spokesperson said in January that it was probably now impossible to keep the planet within a 10-year average of 1.5°C⁴.

The fact that this has been expected for some time doesn't make things any less alarming. 2024 saw unprecedented storms across the USA, devastating flooding in China and Europe (**Figure 1**),

South Africa's worst drought in living memory, and 15M hectares of forest fires across the Amazon Rainforest – that's an area the size of England and Wales combined. Further concern comes from the onset of certain tipping points, such as the fact that areas of the Arctic permafrost have now thawed to the point of emitting more carbon than they absorb each year⁵.

Having read the climate science, it feels neither sensational nor alarmist to say that the climate is now broken. Freak weather events are becoming annual. California's Governor said there is no longer a fire 'season' in his state: 'it's year-round'. Research by environmental thinktank Kisters shows a doubling in the cost of damages caused by natural disasters each decade, outpacing economic growth in most countries. In the UK, it estimates that the cost of flooding will be nearly £40bn in this decade (the equivalent of

increasing the annual policing budget by 10%).

Yet, despite the warnings, humanity also spent the year emitting record amounts of CO₂ into our atmosphere. In fact, we smashed our previous world record by 1bn tonnes (approx. 2.5% increase on 2023) according to the Global Carbon Budget Office (GCBO)*, which highlights that growth in global fossil CO₂ emissions 'remains persistent'. Geopolitical events of 2024 are similarly disturbing, pointing towards the further unshackling of many of the world's most emissive industries.

Reasons for optimism

This all sounds pretty scary. As someone who works in sustainability, such news can be at best disheartening, and at worst despair-inducing. However, I still have hope that we are making progress, and for several reasons.

First, in addition to its warnings about fossil emissions, the GCBO also notes that a decrease in land-use change emissions in the past decade is leading to an overall plateauing of total emissions. **Figure 2** shows this trend, and also indicates that fossil emissions are reasonably likely to plateau in the next decade, taking us past an important inflection point and into what will hopefully become a long period of year-on-year decreasing emissions. Later than needed, but momentum is in the right direction.

Second, despite the negative overall picture last year, we see significant signs of progress around the world. China, for example,

FIGURE 1:
Torrential floods in Valencia, Spain, caused over 230 deaths in October 2024



ISTOCK.COM / SGAPHOTO

*The GCBO estimates that, in 2024, humanity emitted 41.6GtCO₂ into the atmosphere. This includes both fossil emissions and land use change-based emissions, but only includes carbon dioxide emissions, excluding other greenhouse gases.

is already well known for its production of electric vehicles and solar panels; but importantly for our industry, developments last year also led to the publication of an official Chinese low-carbon steel standard (www.c2fsteel.com/), which will now drive the decarbonisation of both primary and secondary steelmaking in a country that produces half of all steel on earth. Similarly, low-carbon cement technologies seem to keep attracting investment, e.g. in the USA, where Brimstone raised nearly a quarter of a billion dollars from private and federal investment.

Finally, I have hope because global climate action is not solely led by those with political power. It is as much about grassroots action. The UK Net Zero Carbon Buildings Standard (www.nzcbbuildings.co.uk/) is an exemplar of this: our industry has been calling for embodied carbon regulation for at least a decade, with little positive response from government. Tired of waiting, the industry came together to launch this standard in 2024 in order to enable financiers, developers and designers to create retrofits and new buildings that are truly aligned with a 1.5°C trajectory.

It's also worth remembering the power of the ripple effects that come from grassroots action. One example is the ways in which Structural Engineers Declare (www.structuralengineersdeclare.com/) brought about a change in industry rhetoric that has led to other action

groups forming, such as the Engineers Reuse Collective (www.terc.org.uk/). Another is the way in which Part Z (<https://part-z.uk/>), an industry-proposed amendment to the UK Building Regulations, continues under its own momentum: in a recent government inquiry into sustainability and housebuilding, almost half of the 81 written responses to the inquiry advocated for better consideration of embodied carbon in government policy⁶. Progress continues, ready to be turbocharged by the inevitable regulation that will eventually come.

Time to be bold

The overall mood music on climate might be a little melancholy right now, but there are plenty of reasons to keep pushing for change. And whether you land on the side of the outraged or the optimistic, one thing is clear: we must take bolder action than ever. Concrete and constructional steel alone are still responsible for around 10% of global emissions, and aggregate extraction still outpaces coal by a factor of six, and oil by a factor of 10. The proportion of global impact that is due to structural engineering will only increase if other industries reduce their emissions faster than we do, and so we must continue to increase our action.

The IStructE doesn't intend to slow down its climate action any time soon, and you shouldn't either. Please, keep talking about embodied carbon

on every project. Keep advocating for solutions that simply *use less stuff*. And keep sharing your knowledge with the wider industry, so we can create change greater than the sum of our parts.

The race to rescue our climate and nature has only just begun.

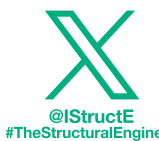
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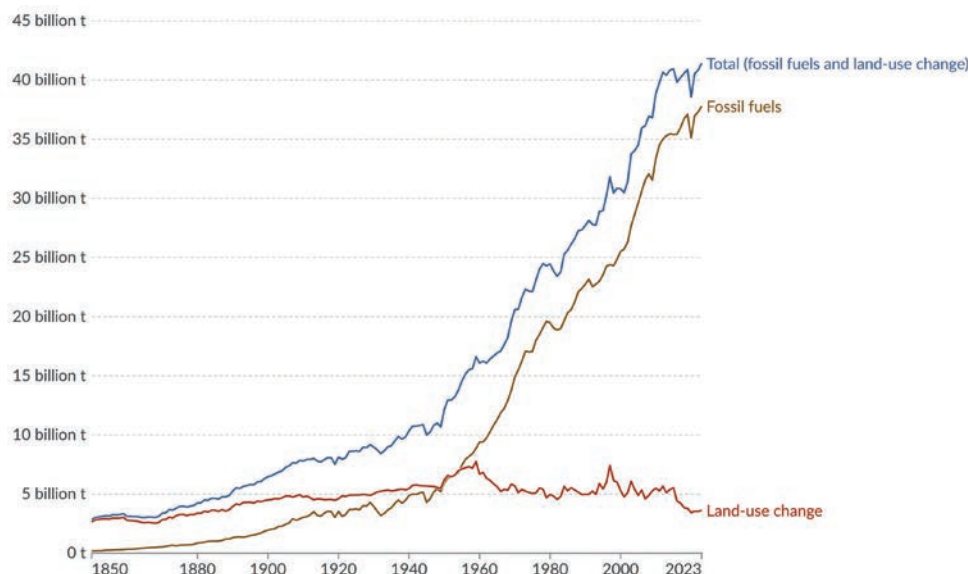


FIGURE 2: World CO₂ emissions from fossil fuels and land-use change
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