

? 5. Influence the brief

Engineering climate justice: how can we contribute to equitable global decarbonisation?

In this personal perspective, **Tom Newby** argues that high-income countries have a moral responsibility to decarbonise faster, and urges structural engineers to advocate for changes in the way infrastructure is designed and built in order to work towards this goal.

It is generally well understood that the climate emergency is a global problem, which needs global solutions. Hence the need for the Conference of Parties (COP) process to reach global agreements to mitigate and adapt to climate change.

The COP process includes ongoing discussion of who is responsible for the cost of adaptation and compensating for loss and damage in lower-income countries, based both on ability to pay and responsibility for creating the crisis we face. However, the construction industry has barely confronted issues of equity and climate justice and how these should – and will – affect our ability to decarbonise the built environment globally.

This viewpoint seeks to help those working in the built environment to understand the reality and context of how we, as a profession, respond to the climate emergency in a matter that is equitable and just for all of humanity.

What is climate justice?

The world is a deeply unequal place, and the climate crisis greatly exacerbates this inequality. People in lower-income countries, who make up the majority of the world's population, face a triple injustice of:

- 1) a disproportionately large impact from climate change
- 2) structural disadvantage
- 3) a block on development.

“ THE CONSTRUCTION INDUSTRY HAS BARELY CONFRONTED ISSUES OF EQUITY AND CLIMATE JUSTICE ”

Disproportionate impact

With less-resilient infrastructure, less money, and less capability to respond to and mitigate the climate crisis, and generally with a geography and climate more prone to high temperatures and natural hazards, the effects of climate change are occurring first, and occurring most, in the countries least able to respond to them¹. This while people in these countries have – both historically and currently – made effectively no contribution to the climate emergency.

Structural disadvantage

Lower-income countries are structurally disadvantaged as a result of a history of colonisation and exploitation upon which much

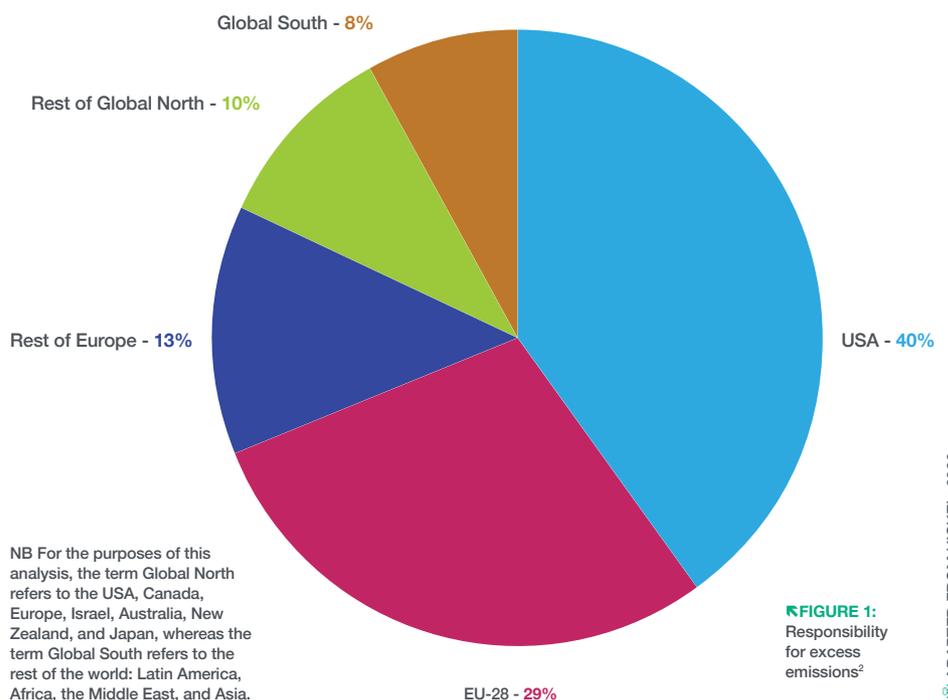
of the wealth of the richer countries of the world is built.

Block on development

In fighting the climate crisis, it is critical that high-income countries stop emitting greenhouse gases, and that lower-income countries do not substantially increase their greenhouse gas emissions. But stopping greenhouse gas emissions now will potentially severely limit the development and resilience of lower-income countries, trapping them in a permanent state of inequality and poverty.

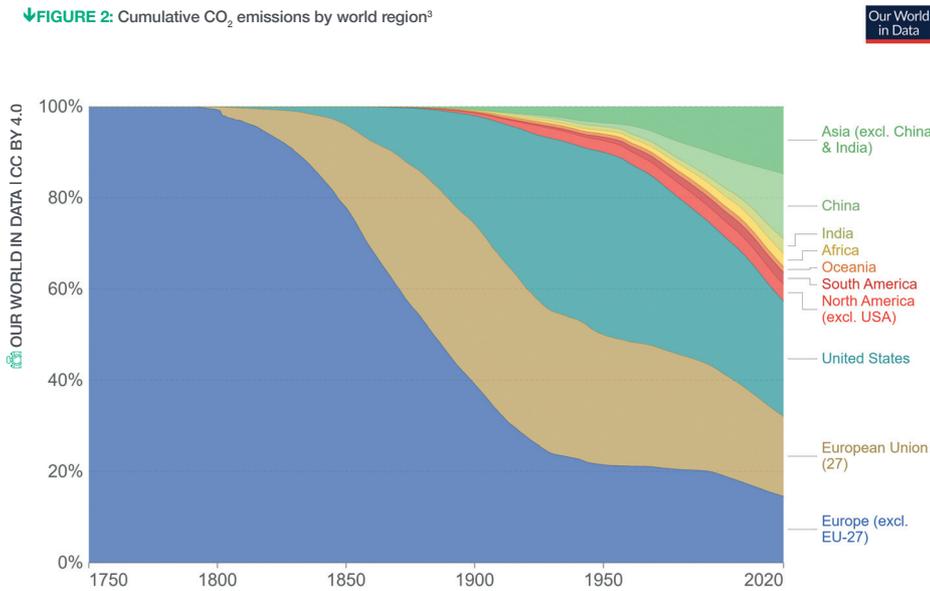
What does this mean?

This triple injustice is what is meant by climate



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FIGURE 2: Cumulative CO₂ emissions by world region³



Source: Our World in Data based on the Global Carbon Project

OurWorldInData.org/co2-and-other-greenhouse-gas-emissions • CC BY

NB The lion's share of emissions pre-1850 are from the UK, resulting from the industrial revolution. Note also that different studies treat emissions embedded in trade, i.e. off-shored emissions, differently.

injustice. Without very deliberately addressing climate justice in the manner in which the world responds to the climate crisis, the injustice and inequality will continue to worsen. While this is clearly a moral imperative; it is also a pragmatic one. There will be no successful globally coordinated action to fight the climate emergency if such action is not just and inclusive. Without globally coordinated action, those higher-income countries which have historically benefited from the inequality set out above will themselves suffer from instability, further disrupted and brittle supply chains, and direct effects of global warming.

Richer countries must bear the costs, and must provide what is needed to lower-income countries to enable them to develop and increase their wealth and quality of life without emitting substantially more greenhouse gases. At the same time, richer countries must urgently and rapidly decarbonise their economies to provide the space for lower-income countries to decarbonise more slowly.

Historic and future carbon emissions

It is a matter of record that the richest countries have contributed most greenhouse gases to the climate emergency (Figures 1 and 2)^{2,3}.

The combined historic greenhouse gas emissions from the world's lower-income countries are utterly eclipsed by those from the world's richest industrialised economies. There can be no expectation of effective global cooperation to reduce carbon emissions if the world's richest countries keep emitting well beyond their fair share of greenhouse gases, given their historical track record.

It is essential that high-income countries stop

their emissions as soon as possible (and this must include emissions from consumption of goods made in other countries). Only then will lower-income countries accept the imperative to follow a low-emissions path to further development. While it is unjust to require the rest of the world to emit less than its fair share of greenhouse gases, it is essential for human survival on Earth that these countries do so.

If Asia and Africa, which collectively represent over three-quarters of the world's population, were to emit greenhouse gases equal to the per-capita amount already emitted by the world's worst polluters, then global warming would vastly exceed 2°C – putting human survival on earth in peril. Successive Intergovernmental Panel on Climate Change reports set out in stark terms what a global catastrophe this would result in.

The future of humanity requires the prevention of future emissions on the same per-capita scale. The challenge facing humanity, and its engineers, is to enable equitable and just human development the world over *without* repeating the global north's emissions many times over.

This is absolutely possible. A recent study shows that eradicating extreme poverty world-wide would increase emissions by less than 1%⁴. A globally equitable approach to addressing the climate emergency could absolutely achieve a good quality of life for all while also staying within planetary boundaries (Figure 3).

Human rights

As the climate crisis deepens, and climate and environmental breakdown occur, the interface of engineering and infrastructure with human rights will change and become more critical.

Some areas of the world are likely to become uninhabitable, or at least much less fertile and productive, while previously inhospitable areas may now become liveable and easier to exploit.

As Hugo Slim argues: '*Climate justice demands agreements on new duties and laws to answer pressing ethical questions about people's right to move repeatedly, their right to be cool and dry, and their 'right to the city'. New laws must set out how people share new land that emerges as productive, and exit well from land that is dying. Rules are needed to clarify when dams, drainage systems, and geo-engineering are fair climate measures, and when they are unjust because they horde [sic] for a few and exclude many others*'⁵.

The emerging discourse about human rights, and what rights people should have in a rapidly changing world, are highly relevant to the built environment, and will be an important consideration in achieving the UN Sustainable Development Goals in a warming world.

The Right to the City⁶, in particular, summarised as the '*right of all inhabitants, present and future, permanent and temporary, to use, occupy and produce just, inclusive and sustainable cities, defined as a common good essential to a full and decent life*', could, and maybe should, become a central tenet of good infrastructure and urban design. With cities often at the forefront of climate and sustainability initiatives, taking actions often much more radical and progressive than those taken nationally, the work and responsibilities of engineers should be taking human rights into consideration if they are to contribute to future climate justice.

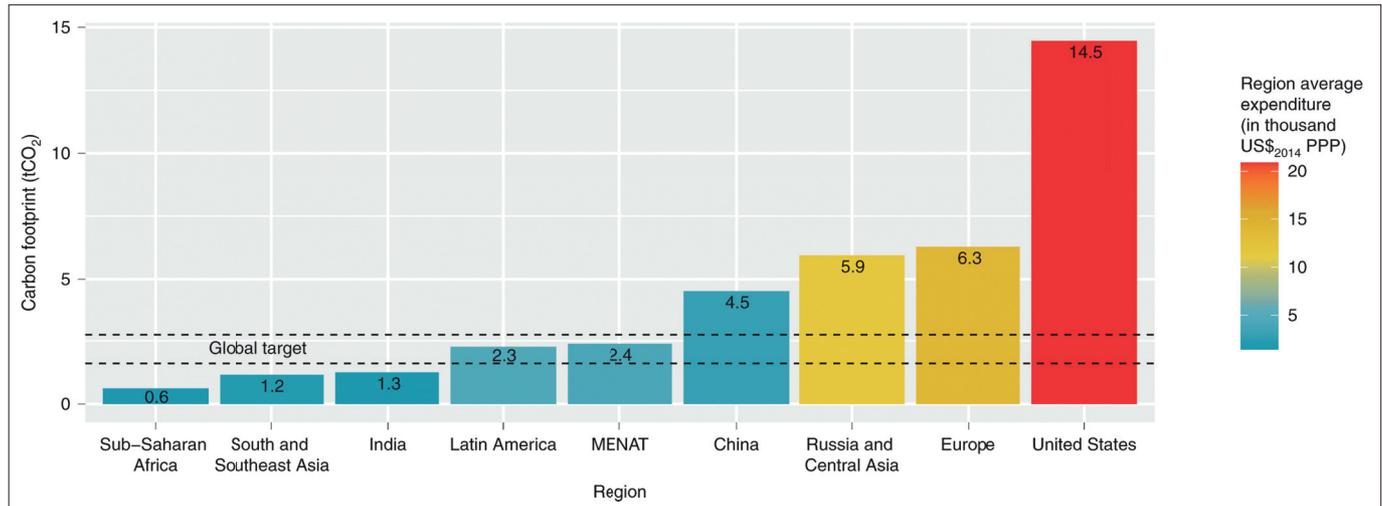
What does all this mean for engineering?

It is difficult to see how engineers can meaningfully address global injustice in their day-to-day work. Indeed, the best thing most engineers can individually do is to eliminate and minimise carbon from their projects, and to advocate for their clients and collaborators to enable this. But engineers collectively, the construction industry, and its institutions must be advocating, and doing so with urgency, for the fundamental changes in the way we design and build our infrastructure that will enable a more just response to the climate emergency by those working in our built environment.

Projects which build important infrastructure for vulnerable and marginalised people are more justified in emitting carbon than projects which build more infrastructure for already wealthy and resilient populations. Historic carbon emissions should be considered in deciding what emissions are justifiable where, and who is responsible for paying for avoiding emissions and mitigating the result of emissions.

Projects in wealthy countries must reach zero carbon all the more quickly to allow this – *much more quickly than currently planned*. In practice, this means stricter and lower carbon

FIGURE 3: Regional average carbon footprints for countries and regions⁴



NB The dotted lines indicate the carbon footprints needed to adhere to the temperature goals set out in the Paris Agreement.

targets on projects in high-income countries than we may have thought. As an international institution with a global reach, the Institution of Structural Engineers should be pushing for such stricter targets, and accompanying regulation, insurance and financing practices, in the interests of all of its members.

People living in lower-income countries have every right to the same standard of living and infrastructure as those in wealthy countries (although that standard of living need not necessarily be achieved following the same model!). Wherever they are working, engineers must seek to show clients and other stakeholders that their needs and expectations can be met by locally appropriate, low-carbon, circular economy approaches. The Circularity Gap Reporting Initiative⁷ provides a useful framework of priorities for low-, middle- and high-income countries that can help guide a more just global economy and construction industry. But engineers must remember always that the most vulnerable – those who contributed least to climate breakdown – must not be denied resilient engineering and infrastructure in the name of decarbonisation.

All of these things are immensely complex. Resolving the sometimes (apparently) conflicting objectives of avoiding carbon emissions with global equity and justice can seem an insurmountable obstacle for many projects. However, consideration of these objectives must become a standard part of an engineer's design thinking. The Institution and the engineering higher education sector must produce structural engineers with the tools to do this. The impact of engineering projects can no longer be considered only local. The impact of any project that produces greenhouse gases is global – and the stakeholders are global.

These are all big questions and challenging propositions with no easy answers. The construction industry supports millions of jobs

and is not easy to change. But it is itself built on a system of growth and consumption, and that growth is happening in the wrong places – building more and more in places that have already consumed too much, to the detriment of places that do not have enough. New economic ideas will need to start reshaping the construction industry to remain within planetary boundaries.

It is no longer acceptable to continue as we have been doing, and it is high time for considerations of global equity and justice to shape what engineers do and how they do it. This viewpoint article sets out some thoughts as to how that process of change could be started,

and a few things engineers themselves can start to consider in their own work. Members of the Institution should be asking their clients and their employers how they are addressing global climate justice.

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REFERENCES

- 1) Intergovernmental Panel on Climate Change (2022)** *Climate Change 2022: Impacts, Adaptation and Vulnerability – Summary for Policy Makers*, B.2.4, B.2.5 [Online] Available at: www.ipcc.ch/report/ar6/wg2/ (Accessed: July 2022)
- 2) Hickel J. (2020)** 'Quantifying national responsibility for climate breakdown: an equality-based attribution approach for carbon dioxide emissions in excess of the planetary boundary', *The Lancet Planetary Health*, 4 (9), E399–E404; [https://doi.org/10.1016/S2542-5196\(20\)30196-0](https://doi.org/10.1016/S2542-5196(20)30196-0)
- 3) Our World in Data (s.d.)** *Cumulative CO₂ emissions by world region* [Online] Available at: <https://ourworldindata.org/grapher/cumulative-co2-emissions-region?country=Asia+%28exc%20l.+China+%26+India%29~CHN~IND~Africa~Oceania~South+America~North+America+%28excl.+USA%29~USA~European+Union+%2827%29~Europe+%28excl.+EU-27%29> (Accessed: July 2022)
- 4) Bruckner B., Hubacek K., Shan Y., Zhong H. and Feng K. (2022)** 'Impacts of poverty alleviation on national and global carbon emissions', *Nat. Sustain.*, 5, pp. 311–320; <https://doi.org/10.1038/s41893-021-00842-z>
- 5) Slim H. (2021)** 'It's time to pivot from war aid to climate aid', *The New Humanitarian* [Online] Available at: www.thenewhumanitarian.org/opinion/2021/10/25/COP26-time-to-pivot-from-war-aid-to-climate-aid (Accessed: July 2022)
- 6) International Institute for Sustainable Development (2016)** *The "Right to the City" and the New Urban Agenda* [Online] Available at: <http://sdg.iisd.org/commentary/policy-briefs/the-right-to-the-city-and-the-new-urban-agenda/> (Accessed: July 2022)
- 7) Circle Economy (2022)** *The Circularity Report 2022* [Online] Available at: www.circularity-gap.world/2022 (Accessed: July 2022)