1. Get informed

Structural sustainability beyond carbon

Reuben Brambleby and Will Arnold summarise the discussions from a recent IStructE Council meeting that examined how the profession could broaden its sustainability and social impact as it works towards a regenerative future.

Introduction

While the Institution has focused on embodied carbon and the climate emergency since 2020, our wider environmental and social impact as engineers has not been as extensively discussed. A notable exception is the updated Structural Awards, which now demonstrate exemplar projects achieving positive impacts on Planet, People, Process and Profession.

Our responsibilities lie beyond simply designing for safety and low carbon, so in July 2022, the Institution's Council met to discuss the broad impact that structural engineers have on the world, themed under the topics of society, biodiversity, and resource depletion.

Examples of the negative impacts that the construction industry currently has included:

- **Society:** women make up only 7% of executive positions in engineering, and two people working in construction in the UK die by suicide every day.
- **Biodiversity:** we impact nature all over the world through our extraction of materials, such as our mining of 1.5bn tonnes of iron ore each year.
- **Resource depletion:** construction, demolition and excavation account for 60% of material use and waste generation in the UK, and we demolish 50 000 buildings each year.

These examples demonstrate the reach our profession can have. So, as we look towards a more regenerative future, we must ask how to ensure we have positive impacts in these areas. To help start this debate, the Council discussed a set of questions around three themes of individual, Institution, and future **(Table 1)**.

This article captures aspects of the discussions from each of the topics and shares some of the thinking that occurred around each.

Individuals

There was clear recognition in the discussions that early and proactive engagement with the client is key to delivering an effective engineering response to the UN Sustainable Development Goals (SDGs) in our projects.

Individuals should be encouraged and empowered to question any preconceived approaches which hinder sustainability wins that would otherwise be available to the project. We need to be able to demonstrate, to our clients and others in the design team, alternative approaches which will deliver improved sustainability.

An important aspect of this empowerment will be effective knowledge capture from past projects, allied with the effective dissemination of approaches that delivered sustainability successes on previous projects.

Discussions around how we help others in the wider construction industry to adapt further and faster had strong links to these ideas of knowledge proliferation. Some common themes in this context were improved formalised knowledge capture, e.g. recording and highlighting sustainability wins on drawings or other project documentation, and improved sharing of knowledge that has been gained from these sustainability-focused design successes.

By effectively communicating and publicising the design approaches that have demonstrable sustainability benefits, we should find it easier to encourage others to adopt similar methods on future projects.

The fact that the Institution has taken a serious and meaningful approach to the climate emergency was cited as an important source of individual pride and job satisfaction. For many, pride also stems from having opportunities to work on projects which improve the quality of life of others as well as benefiting society in general.

Table 1: Discussion themes – broadening the Institution's sustainability agenda

Theme	Discussion subtopics
Individuals	How might your work most effectively respond to the UNSDGs?
	How do you plan to help others in the industry to achieve more change?
	What makes you proudest about your job?
Institution	What aspects of broader sustainability should the Institution be prioritising?
	How can the Institution help the membership to think in terms of 'more good' rather than 'less harm'?
	What might the Institution do to overcome key barriers to better UNSDG alignment?
Future	How will the structural engineer's role have changed 20 years from now?
	What 'norms' will be extinct 20 years from now that lead to a more positive future?
	What can we do today to accelerate this change?

Institution

When considering broader sustainability priorities for the Institution, there was wide recognition that important progress has been made by the Institution and that a substantial quantity of valuable information is already available.

It was suggested that promoting and spreading this information more widely would be beneficial. As well as continuing to promote these resources to Institution members, proactive dissemination should go beyond members and, in the view of many, should also extend outside the construction industry.

It was suggested that a wider public understanding of the impact that the construction industry has on a broad range of aspects of sustainability (such as resource depletion and biodiversity) could deliver benefits in the future and could help to steer society towards achieving the agenda that is encapsulated in the UNSDGs.

Further guidance from the Climate Emergency Task Group (CETG) covering the structural engineering aspects of these broader topics would be welcomed.

Future

When considering the future role of the structural engineer and how current norms are likely to change, there was wide recognition and acceptance that there should – and will – be a transition away from new-build construction towards the reuse, retrofitting and extension of existing structures and buildings.

There was an understanding that this transition will bring with it the need for enhanced training and upskilling in some aspects of structural and materials engineering that relate specifically to predicting the future behaviour of existing, sometimes historic, materials, as well as understanding the behaviour of outmoded structural forms.

For some, this implied an expanded and more holistic role for structural engineers which will come to incorporate aspects from forensic engineering of existing structures through to the enhanced use, future maintenance and long-term lifecycle assessment of those same structures in a reuse scenario.

During discussions about what we can do today to accelerate change within our profession and within the wider construction industry, some proposals which were common to other discussion themes came to the fore. For example, enhancing sustainability-focused education and training within the profession, sharing our project experiences of delivering sustainability benefits, recording and disseminating best-practice expertise both within and beyond the Institution.

Linked with these ideas of enhanced sharing was the suggestion to broaden the use of open data methodologies for making sustainability information more widely available to all. Another suggestion was that Institution members should be encouraged to use their voice to advocate for accelerated change in the industry, to become active sustainability advocates.

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> **“WE NEED TO ADVOCATE DESIGNS WHICH ALLOW US TO FULFIL SOCIETAL NEEDS WHILE USING OUR CREATIVE INTELLIGENCE TO DELIVER ENGINEERING SOLUTIONS THAT ALLOW US TO DO MORE WITH LESS**

Summary

These discussions around the broadening of the Institution’s sustainability agenda were a useful opportunity to gauge opinion regarding its recent progress in providing related support material, as well as the dissemination of effective sustainability guidance to members.

As noted above, there were recurring discussions around improved training and improved broad dissemination of best-practice approaches.

In the past, we have been a profession looking to impress by reaching higher, spanning further and building quicker. The future of our profession is looking very different; we now need to advocate designs which allow us to fulfil societal needs while using our creative intelligence to deliver engineering solutions that allow us to do more with less, and more with what we already have.

This requires us to enhance our skills in such a way that we can work with our clients and fellow design team members to challenge our briefs, to develop and advocate for holistically sustainable approaches to our projects, and to employ circular principles to extend the useful life of our built environment.

Next steps

Building on the Council meeting that started these discussions, the CETG has since run workshops to identify which ‘broad sustainability’ aspects the Institution could focus its efforts on understanding in 2023. It is hoped that this work will form the basis of future guidance in *The Structural Engineer* and beyond, to help our community maximise its potential for enabling a lasting, positive impact around the world.

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