

Climate Emergency Task Group

End of year report 2020

The responsibility of our profession within the climate emergency

Progress made by the Institution and Climate Emergency Task Group in 2020

The Institution's and Task Group's goals for 2021

Forewords



A little over 12 months ago, the Institution's Trustee Board made a fundamental decision to place climate change on a par with its enduring commitment to structural safety. The initial objective has been to support the structural engineering profession take appropriate responsibility for the impact of their work through the provision of guidance, access to information, standard calculation tools and personal development opportunities

This report provides an overview of the tremendous progress that has been made in the past year, thanks to the energy and commitment of our Members in collaboration with many others. It deserves close attention since there is no such thing as a definitive reference work on climate impact mitigation for structural engineers. Building meaningful change is an iterative process and the Institution has ambitious plans in place to maintain momentum into 2021 and beyond.

Interest in the Institution's activity is worldwide and wherever you are reading this report there will be information that is relevant and thought-provoking in the context in which you are operating. Have your say, share your experiences, let us know what actions are being taken in your part of the world but please, do not leave this report without setting your own personal climate action objective in your professional life.

Martin Powell

Chief Executive, The Institution of Structural Engineers



The Institution of Structural Engineers set the pace for change this year, recognising the urgent need for engineers to acquire new skills and develop new ways of thinking about their role in this time of climate emergency.

By setting up the Climate Emergency Task Group they provided a small coordinating group to input into many different layers of change: how the Institution itself sets standards for the profession and education, the provision of detailed guidance to help its members raise standards of practice, and contributing to the wider collaborative change that is needed across the construction industry. The Institution has engaged energetically at all these levels.

It has been particularly significant to see how the Institution has collaborated with other built environment institutions to ensure we move in step with each other and provide coherent input to policy development that sets the scene for practice in a rapidly changing world. There is still a great deal to do but the Institution has very clear ambitions to maintain and grow the benefit it can bring to the profession and the industry by facilitating and leading change.

Dr Mike Cook

Chair, The Climate Emergency Task Group

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An emergency is called

A global crisis

In 2018, the Intergovernmental Panel on Climate Change (IPCC) released a special report on the impacts of global warming of 1.5°C above pre-industrial levels. The report stated that global warming is likely to reach 1.5°C between 2030 and 2052 if it continues to increase at the current rate, leading to increased extreme temperatures, and increases in the frequency and/or intensity of both heavy precipitation and drought.

Whilst the emissions already in the atmosphere will continue to cause long-term changes in the climate system, these emissions alone are unlikely to cause global warming of 1.5°C, and the report was clear that it is within our control to be able to reduce our emissions and halt global warming. To achieve this will require rapid

and far-reaching changes across all sectors (including buildings and infrastructure) – unprecedented in terms of scale, but not necessarily in terms of speed.

People around the world are recognising that whilst the weather of recent years has been more extreme than that of the past, that of the second half of this century will be more extreme still if we do not act now. 'Climate change' has been rebranded as 'The Climate Emergency', and governments have started to declare the need to act. Currently, 30 governments around the world have laws or policies to reduce emissions to net-zero within the next few decades, and more are expected to follow in the next year.

The responsibility of the structural engineering profession

Structural engineers have an enormous role to play in the reduction of global emissions.

Buildings and construction account for nearly 40% of all energy-related carbon emissions, whilst also having a significant impact on our natural habitats. And whilst recent decades have seen operational carbon¹ emissions typically decrease, the embodied carbon² of our buildings and infrastructure has stayed the same.

Around 60% of the embodied carbon of a building is due to the substructure, superstructure, and relevant construction emissions, and the percentages are even higher for civil structures such as bridges or dams. This means that the structures we build are responsible for a significant proportion of global energy-related carbon emissions. We estimate that our profession is responsible for around 10% of all energy-related carbon emissions worldwide.

That means that the construction of structures that support our buildings and infrastructure results in four billion tonnes of carbon emissions each year.

In 2019, the Structural Engineers Declare movement (see www.constructiondeclares.com) was launched in an effort to raise awareness and effect changes in response to the climate emergency. The Institution of Structural Engineers pledged to support the movement as part of our commitment to support the profession in tackling the climate emergency.

We have been working hard ever since to put sustainability at the heart of everything we do.

¹ Operational carbon: Emissions associated with the in-use operation of an asset (e.g. heating and cooling, hot water, ventilation, lighting and power).

² Embodied carbon: Emissions associated with the extraction, manufacturing, installation, maintenance, replacement and demolition of materials and products (including transportation).

³ <https://www.istructe.org/IStructE/media/Public/TSE-Archive/2020/Rationalisation-versus-optimisation-getting-the-balance-right-in-changing-times.pdf>

Scale of impact



1 tonne

London to New York
Single, Economy Class



1000 tonnes

Better structural design
20% less material used³

UK Structural Engineers Declare
Climate & Biodiversity Emergency



The Institution's response

Through the last 18 months, we have endeavoured to start bringing about change at the speed and scale required by the IPCC's targets. We would like to share with you our progress so far:

2019

The IStructE Board and Council away-day focusses on the United Nations Sustainable Development Goals, linking the goals to the Climate Emergency, and agreeing unanimously that the profession must act.

Q3

Q4

The IStructE hosts the 2019 Structural Engineers Declare Conference and announces intentions to form its own Climate Emergency Task Group (CETG) to provide alignment between industry and the support required within the profession.

2020

The CETG starts working closely with other institutions, and sets out its mandate for change:

- Collaborate and influence: lead from the front across the industry, working with other UK institutions across the built environment, as well as internationally such as with the Structural Engineering Institute in the USA (SEI)
- Support the profession: continued support for Structural Engineers Declare by assisting in bringing firms together to share knowledge and progress
- Raise standards: provide guidance to help members meet the expectations of this changing world, delivered through publications, training, webinars and conferences
- Set standards: reset what it means to be a structural engineer, from education requirements to our chartership process, continuing professional development (CPD) and awards

Q1



Production of membership guidance starts, with the first guidance notes published on 1 June 2020. Guidance is organised under six themes of change:

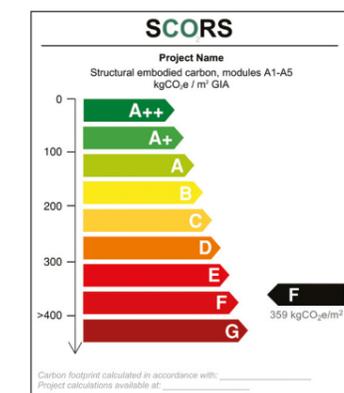
1. Get informed: helping members to understand how their decisions impact the climate
2. Low carbon: making the control of carbon as important as safety
3. Lean design: the safe reduction of material use through efficient, precise design
4. Zero waste: designing structures that reuse where possible, and can be reused in the future
5. Influence the brief: working with others to minimise the impact of the project from the outset
6. Get involved: encouraging members to share information for change

Q2

Q3

How to Calculate Embodied Carbon is published, setting out a single-point-of-information for structural engineers to refer to when calculating the impact of their projects. The publication is made free for anyone who wants it (including non-members). A follow-up article introduces the SCORS rating system and targets.

The Climate Emergency Conference 2020 is held across two days, with around 700 attendees from over 40 countries around the world attending. Day one focusses on guidance for members, with 10 speakers covering a range of topics. Day two hosts discussion across declared firms around what change is required through the next year.



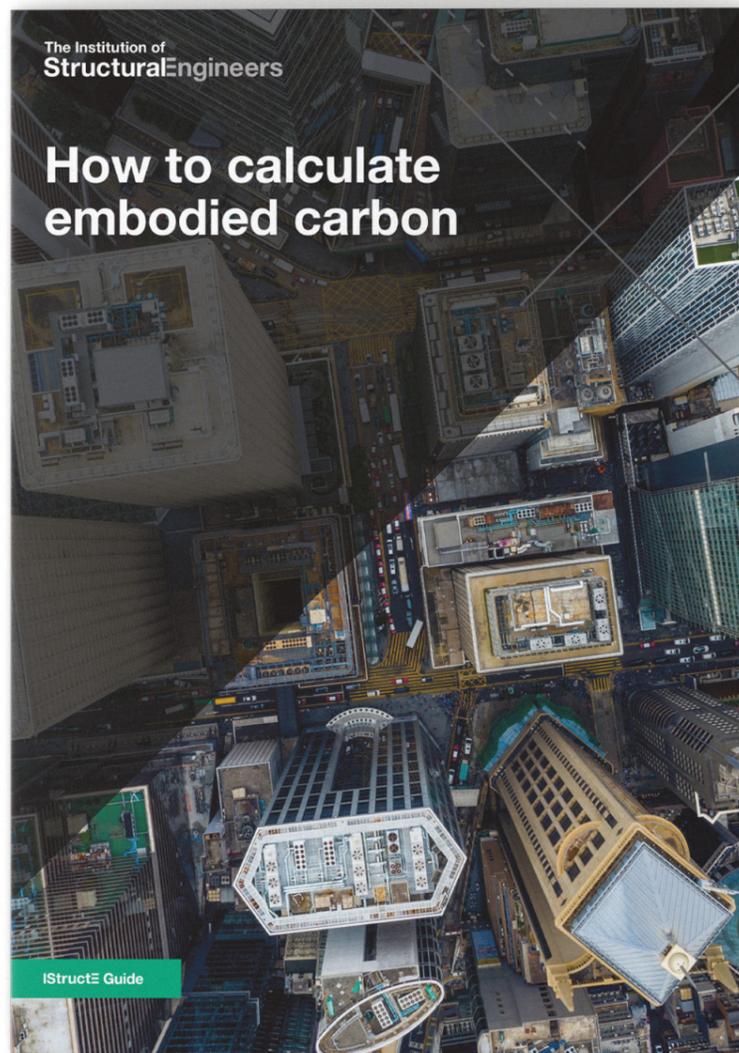
Q4

The Structural Awards 2020 include new categories for Zero Carbon and Minimal Intervention, though unfortunately the awards themselves are postponed due to the COVID-19 pandemic.

Learning requirements for Civil and Structural Engineering degrees in the UK are updated via the new approved JBM Guidelines.

Climate emergency guidance 2020

In 2020 the CETG produced 20 TSE guidance articles, five webpages, and one design guide (see image below) – a total of just under 50,000 words of climate emergency related guidance for members. All of this was made freely available to members and non-members alike, and can be accessed from the table below.



1. Get Informed



2. Low Carbon



Title

- Editorial: Climate Emergency – adapting to change
- Decarbonate: Why we must change
- Turning climate commitment into action
- Six climate emergency actions for structural engineers
- The structural engineer's responsibility in this climate emergency
- Don't let climate grief stop you taking action

Format

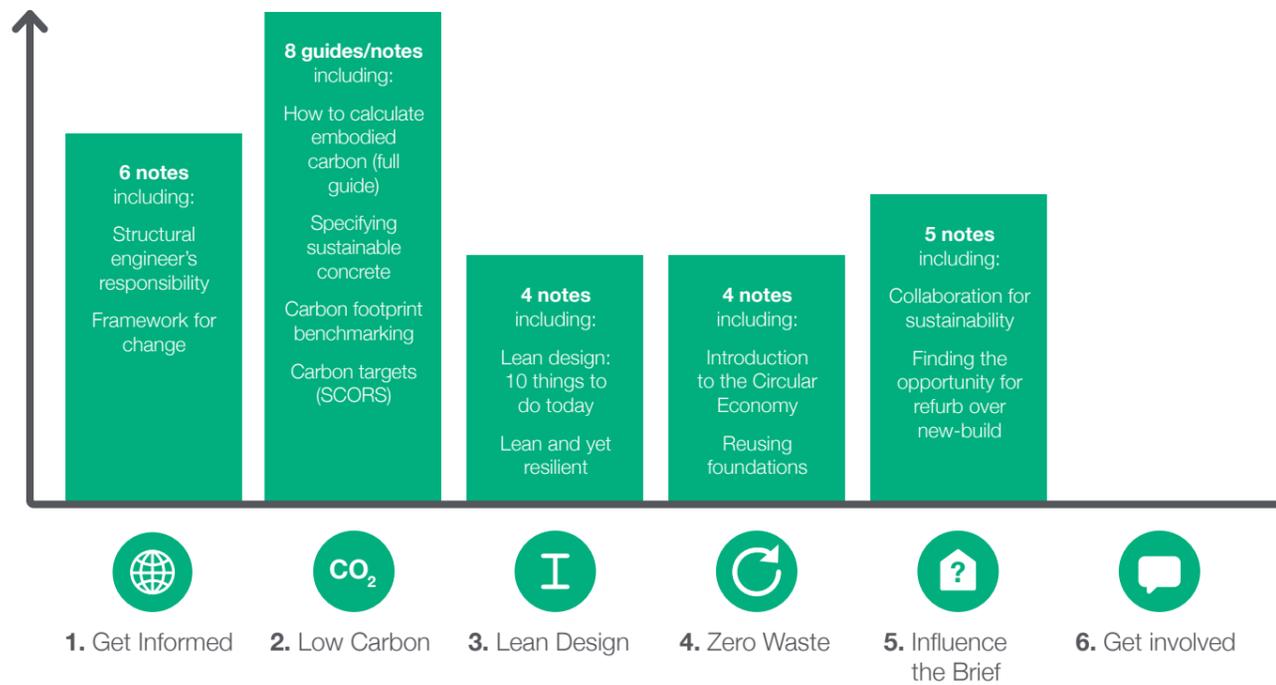
- Free editorial >
- Online >
- Free to members >
- Online >
- Free article >
- Online >

Title

- We signed the climate declaration – now what? Lessons from counting carbon
- A brief guide to calculating embodied carbon
- Scaling low carbon construction materials
- How to calculate embodied carbon
- How to specify lower carbon concrete
- Carbon footprint benchmarking data for buildings
- Setting carbon targets: an introduction to the proposed SCORS rating scheme

Format

- Free article >
- Free article >
- Free article >
- Free design guide >
- Webpage >
- Free editorial >
- Free article >



I 3. Lean Design **C** 4. Zero Waste **H** 5. Influence the Brief **S** 6. Get Involved

Title	Format
Lean design: 10 things to do now	Free article >
Lean and yet resilient – designing for the future	Free article >
What do we mean by efficiency? A holistic approach to reducing embodied carbon	Free article >
Rationalisation versus optimisation – getting the balance right in changing times	Free article >

Title	Format
Practical application of circular economy principles	Online >
Applying circular principles to the design process	Free article >
Refocusing modern methods of construction on the climate emergency	Free article >
An introduction to refurbishment. Part 1: Identifying opportunities at the feasibility stage	Free article >
A short guide to reusing foundations	Free article >

Title	Format
Nothing is better than something	Free article >
How can we create an engineering industry while building nothing?	Free article >
Time for a structural change?	Free article >
Persuasion and influence in a climate emergency	Free article >

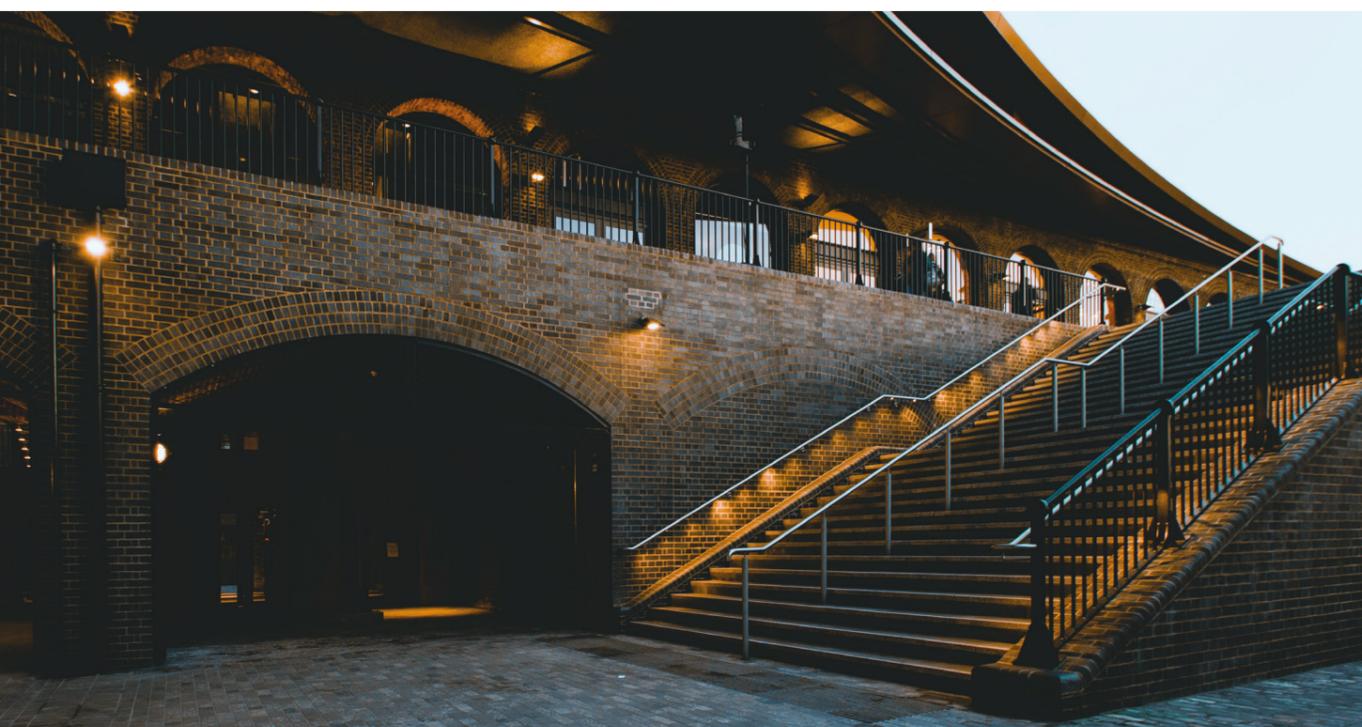
- Share your knowledge to help address the climate emergency [Link >](#)
- Discover your IStructE Regional Group [Link >](#)
- Join the conversation on LinkedIn [Link >](#)

IStructE Climate Emergency Conference 2020

The 2020 Climate Emergency Conference was held to target two of the CETG's workstreams: Raising Standards and Supporting the Profession. The conference was held over two days with the first day focussed on sharing sustainable design knowledge (Raising Standards) and the second on driving forward progress on the commitments for change (Supporting the Profession).

The conference attracted 700 attendees from more than 40 countries across the two days. Participants were encouraged to engage with the presenters and the CETG by submitting questions and comments, many of which were answered and discussed in the Q&A sessions.

The table overleaf outlines the agenda for each day, and also includes links to the videos for each of the recorded sessions.



Day One	Sustainable design in a climate emergency	30 September 2020
Topic 1	Get informed	
	The science, our responsibility, and what this Institution is doing about it? - Will Arnold (IStructE CETG)	Presentation video >
Topic 2	Low Carbon	
	How to count embodied carbon - John Orr (Cambridge University)	Presentation video >
	Balancing embodied and operational carbon - Beth Williams (Build Collective)	
Topic 3	Lean design	
	Lean design examples - Natasha Watson (Buro Happold)	Presentation video >
	Small projects - Margaret Cooke (Integral Engineering)	
Topic 4	Minimise waste	
	Modernising structural design: digital, circular and modern methods - Gavin White (Ramboll)	Presentation video >
	Finding opportunities to reuse existing buildings - Steve Fernandez (Arup)	Presentation video >
Topic 5	Influencing the brief	
	The reality of trying to be sustainable - Shalini Jagnarine-Azan (PAHO/WHO)	Presentation video >
	Questioning the brief - Victoria Martin (BDP)	
Topic 6	Get involved	
	A tool for sustainable design: the IStructE Plan of Work - Andy Yates (Webb Yates)	Presentation video >

Day Two	Driving forward the commitments for change	14 October 2020
Intro	Conference welcome - Mike Cook, Will Arnold & Ed Clark – IStructE Climate Emergency Task Group	Presentation video >
	Making changes within the practice's daily project work - Michelle McDowell – BDP / Simon Pitchers – Craddys / Margaret Cooke – Integral	Presentation video >
	Making changes to influence the project brief and business model - Chris Carroll – Arup / Ailsa Roberts – Expedition / Nitesh Magdani - BAM/Insight Futures / Michael Gryniuk - Le Messurier	Presentation video >
	Key actions for participants and the Institution - Mike Cook, Will Arnold & Ed Clark – IStructE CETG	Presentation video >

Member feedback

Throughout the year, feedback was sought from the membership in order to ascertain the needs of practicing engineers with respect to guidance that was being published. As well as asking the question “what can we do more of” at committee meetings, regional events, and the Climate Emergency Conference, we also ran two parallel online member surveys.

Online Member Surveys

The ‘All Our Ideas’ survey asked respondents to pick ‘the most useful’ between two options at a time, continually refreshing until respondents chose to finish. The second, ‘SurveyMonkey’ survey collected basic demographic data and then asked the respondents to put eight topics in order of importance to them. The priorities from each is summarised below:

‘All Our Ideas’ survey	‘SurveyMonkey’ survey
Material specifications	Reusing existing structures
Reusing existing structures	Carbon guidance (calculations, targets, material information)
Understanding carbon in materials	Lean design, more efficient precise design
Promoting sustainable designs to the client	Tools and advice on persuasion and influence



Conference feedback

We also sought feedback at each conference, which highlighted the following:

Conference Day One Feedback	Conference Day Two Feedback
Case studies and project examples were well received, particularly about smaller and more ‘typical’ projects	An open-source, free institution carbon tool would be welcomed across the industry
Guidance around civil structures would be welcomed	Carbon targets are needed
More in-depth guidance on key topics would be welcomed, rather than just high-level overviews	Engineers need an understanding of offsetting, how to do it well, and its role in getting to net zero
Carbon: Lifecycle scopes, retrofit, cement replacements, contractors’ influence	Use of technology to reduce waste, improve accuracy and get it right first time
Lean: Optimising within existing fees, balancing long-life and lean, building international for an increasing population, effects of climate change on loading	Regional and global aspects of sustainable design
Influence: Reducing loading, persuading clients to pay for low-material high-labour options	Help reducing loading allowances

2021 Guidance Priorities

From the feedback outlined above, in addition to the many conversations had during committee, panel, regional and informal meetings, guidance priorities for 2021 have been set as follows:

Topics started in 2020 requiring more content in 2021	New topics for 2021
Materials-specific guidance	Global aspects of the climate emergency
Reuse of existing structures	Civil Structures
Persuading others	Safety
Lean design	Loading allowances
	Offsetting



Our targeted goals for 2021

In 2021, the Institution of Structural Engineers and the Climate Emergency Task Group will:

Collaborate and Influence:

- Strengthen links with other institutions around the world to help lead a global response to the climate emergency
- Working through our links at The Royal Academy of Engineering and the Construction Industry Council, advise and influence government thinking
- Establish an Institution Policy Panel and agree terms of reference with the Institution Executive and Board

Support the Profession:

- Run another Climate Emergency Conference for 'declared' firms to share experiences and knowledge
- Set up peer-to-peer support networks for firms that wish to work with other like-minded companies to share knowledge and grow faster
- Working with other built environment institutions and organisations, support the development of a multi-disciplinary open-source content sharing website

Raise Standards:

- Publish at least 30 more climate emergency response guidance notes through *The Structural Engineer* and online, and the 'Design for Zero' design guide
- Create a free excel-based Carbon Tool for free use by all members
- Create a CPD course and Certificate in Net Zero Structural Design

Set Standards:

- Complete our work reviewing the Professional Review Interview and Membership Exams to put climate emergency response at the heart of both
- Review member CPD requirements and the Code of Conduct to determine whether an update is required to incorporate climate emergency response into each
- Bring universities up to date with updated JBM Guidelines
- Review the carbon footprint of the institution and prioritise recommended targets for improvement.



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