

SE 2050 Embodied Carbon Action Plan

2025

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Quinnipiac University, Recreation and Wellness Center Image: Anton Grassl



Book Tower. Image: Bedrock Detroit

1. Introduction

At Buro Happold, we believe collective action is the best way to address the climate and biodiversity crisis. It is our responsibility to design and create environments that are sustainable and fair. Every engineer, consultant and advisor must put the environment at the heart of their work. If we make major reductions in greenhouse gas emissions, we can limit global warming to 1.5 degrees. This will mean environmental justice for all.

With this in mind, Buro Happold is proud to commit to the SE 2050 program with the explicit goal of achieving net zero carbon by 2050.

Buro Happold signs Structural Engineers 2050 Commitment Program The SE2050 commitment aligns with our firm wide goals which are outlined in our Net Zero Routemap:

- Achieve net zero operational greenhouse gas (GHG) emissions by 2045.
- Design all new build projects to be net zero carbon in operation by 2030.
- Reduce embodied carbon intensity of all new buildings, major retrofits and infrastructure projects by 50% by 2030

At Buro Happold, we pride ourselves in our problem-solving acumen through our multidisciplinary expertise. With a challenge as complex and far reaching as climate change, we must leverage the collective knowledge and experience of all parties. Buro Happold is committed to leveraging the skills of our various disciplines (Structures, MEP, facades, sustainability) in order to tackle this issue to the fullest extent.

Only together can we begin to set forth a future that is sustainable, equitable, and just.



We believe our biggest responsibility is to shift from sustainability goal setting and planning, into action and implementation... Our vision is that everywhere we live, work, move and socialise will respect and contribute to a more equitable world, enabling our clients and partners to develop built environments that are better for people, places and planet.

- Oliver Plunkett, CEO

All structural engineers shall understand, reduce and ultimately eliminate embodied carbon in their projects by 2050.

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Bu all 20	ro Happold North America is hereby signing on to the SE 2050 Commitment Program. We support the vision that structural engineers shall understand, reduce, and ultimately eliminate embodied carbon in their projects by 50.
Bu ind	ro Happold is committed to regularly reporting and holding ourselves accountable to our people and the wider lustry. We are on a route map to net zero carbon through the following targets:
1.	Reduce our own operational carbon emissions by 21% by 2025 and aim to be net zero carbon from April 2021 by offsetting residual emissions.
2.	Design all new build projects to be net zero carbon in operation by 2030.
3.	Reduce embodied carbon intensity of all new buildings, major retrofits and infrastructure projects by 50% by 2030.
We Co	therefore commit Buro Happold North America to take the following steps which are part of the SE2050 mmitment Program:
•	Within six months and annually henceforth, we commit to reporting an Embodied Carbon Action Plan (ECAP) and permit the ECAP document on form be made public on the SE 2050 website.
•	Within one year and annually henceforth, we commit to submit data to the SE 2050 project database in a collaborative effort to understand embodied carbon in structural engineering projects and to set attainable targets for future projects.
We	look forward to joining this coalition and industry effort to achieve the goals of the SE 2050 Program.
On	behalf of Buro Happold Consulting Engineers P.C.
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stephen.curtis@burohappold.com

SE 2050 COMMITMENT PROGRAM

Buro Happold's SE 2050 commitment etter

Our 12 North America offices are connected through a network of local champions who led our efforts on embodied carbon and host regular Sustainability in Structures Task Group meetings and participate in global Sustainability Community Regional Leads meetings.



Stephen Curtis Principal



Fraser Reid Associate Principal. SE 2050 Embodied Carbon Champion



Luke Lombardi Senior Sustainability Consultant, CLF Member, SE 2050 Education Lead



Luke Bastian Structural Engineer, SE 2050 Committee



Matthew **Jackson-Jones** Senior Structural Engineer, SE 2050 Reporting Lead



Lupe Gomez Structural Engineer,





Andrew Rastetter Associate Structural Engineer, SE2050 Advocacy Lead

Additional Task Group Contributors

Eric Braun, Associate Structural Engineer Terenia Hankewycz, Structural Engineer





Our 12 North American Offices New York, Boston, Seattle, Washington D.C, Los Angeles, Atlanta, Durham, Chicago, San Diego, Pittsburgh,

Detroit, and San Francisco

The current focuses of the Sustainability Task Group is:

- Benchmarking establishing embodied carbon metrics for current and completed projects
- Research undertaking studies to determine where embodied carbon sensitivities lie in structural designs

- Outreach connecting with industry partners to discuss trends and potential opportunities.
- Dissemination sharing information and best practice guidance from national and global industry partners.
- Adoption driving the uptake of embodied carbon measurement on new projects and reflecting on emerging trends.

Over the last couple of years we have seen an increase in the interest and awareness of embodied carbon within the industry. This has ranged from collaborators asking that we share our knowledge and experience to clients indicating EPD targets for materials.



innesota Zoo Treetop Trail. Image: Gaffer Photo

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2. Education

Education is a pivotal step in tackling climate change. Only with a common understanding of the impending climate crisis can we begin to take steps to reduce the environmental impacts of the built environment. Buro Happold's North America Region has taken significant steps to educate our team about the importance of sustainability and how as structural engineers we can influence the impact of our designs.

In the last year, Buro Happold's North America structural teams have continued to expand our educational material and events

- The Sustainability in Structures Task Group formed from Structural Engineers Forum with objectives in the SE 2050 framework to engage more people.
- An Embodied Carbon Playbook has been developed by the reduction task group to offer guidance at various stages of a project.
- Onboarding meetings adapted to include the Embodied Carbon Playbook and Structures Forum content to demonstrate the LCA process and opportunities on our projects to new hires.
- Development of a work bidding Embodied Carbon Cheat Sheet for company leadership to incorporate into project proposals and educate clients.
- Addition of an "Intro to EC3" presentation and recording as an educational resource to support others in the EC series.

The SE2050 initiative is targeting halving embodied carbon in our structures by 2030 and getting it to zero by 2050. It is a lofty goal, but actually it is aligned with the goals Buro Happold set out within our Global Sustainability Report. Many organisations across the engineering community share the same ambition, and it is great to see different strands of industries start to think about taking action: we need all strands to tackle their own challenges if we are to make a difference.

> Stephen Curtis, Principal, Buro Happold Embodied carbon and timber in the USA: in conversation with Buro Happold experts



Buro Happold Embodied Carbon Playbook



Buro Happold have set clear reporting targets to ensure that embodied carbon is measured across our project portfolio. As a minimum, all major projects must have an embodied carbon assessment carried out at each design stage in order to track reduction through the design and to benchmark against similar types of projects. The data reported from these reviews is collected in the Building Performance Dashboard, alongside other sustainability metrics such as operational carbon, to give a holistic overview of a design's performance.

Accountability

To ensure that these reviews are taking place and to hold the team accountable, a new project tracker has been developed and was released in 2023. This gives an overview of all projects and tracks planned and completed embodied carbon reviews over the project lifecycle. What is monitored is the review process rather than the outcome. This ensures that there is a consistent and rigorous approach to reviews that is becoming part of the normal project workflow. During 2025, seven new projects were logged and reviewed.

From the past year, Buro Happold have submitted five projects to the SE2050 database and is committed to submitting a further five over the next year. The projects presented give an overarching view of the work we carry out across all our US offices and encompasses the full range of project scales and types that we work on.

Tools

Buro Happold have developed several embodied carbon measurement tools for engineers to utilize and these will continue to be improved over the coming year.

The internal, structures Web-Based Embodied Carbon Calculator has been developed to give an accessible, easy-to-use option for all engineers. This has a manual data entry function for earlystage assessments as well as a bulk excel import function for handling larger datasets. US EPD values have been uploaded alongside values from around the world and the tool is used globally across all offices. The output from the tool ranks projects on an A-F scale allowing quick comparison to similar projects or between proposed systems. Collation of the output data into several useful charts breaking down the embodied carbon between building components or assessment stages allows designers to target reduction efforts where they have the greatest impact.

The award-winning open sourced and publicly accessible Building Habitats and Object Model (BHoM) LCA toolkit will continue to be developed over the coming years for linking directly to data from BIM software such as Revit or Rhino. The toolkit consists of a suite of tools for measuring the embodied carbon of any building material at any stage of design and compares it to benchmarked datasets. This is useful for early comparative studies as well as being listed as an approved tool by the International Living Futures Institute for the Living Building Challenge.

4. Embodied Carbon **Reduction Strategies**

Innovation is deeply engrained in the history of Buro Happold, through early pioneering work with tensile membrane structures to delivering world class iconic buildings. Throughout this history our clients have valued our efficient designs and sustainable approach to structural engineering. Reducing the embodied carbon of our designs is an extension of this history and a key aspect of our global firm wide sustainability goals. We aim to reduce the embodied carbon intensity of our designs by 50% by 2030.

As we seek to achieve that goal we are making embodied carbon intensity a key metric in our design process, to be considered together with more established metrics including design requirements, constructability and cost.

We have identified an array of strategies and focuses to reduce embodied carbon in our designs. These include:

Material choice – explore more structural framing options and consider hybrid approaches.

Early Comparative analyses - under comparative analyses of embodied carbon intensity during the initial project phases to assist in material selection decisions.

Material usage - optimize the usage of the materials selected.

Material specification – through our designs, Specifications and General Notes documents drive reductions in embodied carbon, the uptake of new technologies and accountability within the industry.

Embodied Carbon tracking - track embodied carbon intensity during the later project phases.

We are seeing some clients join us in establishing goals to reduce embodied carbon in their projects. Either through challenging us to demonstrate how we will drive reductions or by placing embodied carbon requirement on aspects of the project









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Composite Steel Deprit 27.7 In Prinsey Circler W21080 In All Beart W18240 Slab: 37U1 18 5.25 Siab Beinforcement: 0.2% Intal Sour Transmith 0.2% GWP/Arms 100 kg/022e/m System Maco/Area 601b/1/42

Non Composite Steel **RC Flat Plate** Depth: 27.3 In Prinkey Galact W20X62 hi'il Beanc W13X35 Slab: 3YUI-18-3:251 Slab Neinforcement: 0.2% intal GWF 12,000 kgi 0.24 G&P/Avxx 150 kg/CO2v/m3-Salon Max//year 59 lb/ 142

Depth, III.2 In Primary Girden N/A Infill Beam: N/A Sizb: HC 5000psi VW Slab Heinforcement: 1./9 tral cover input older use CMP/Aurie 198 kgCOSa/m31 System Mass/Area: 140 lb/lb/242 Forming Mess/Area 0.0 (b/0.5)

Example of Comparative Floor Framing Analysis Dashboard



5. Advocacy

At Buro Happold, we recognize the role that embodied carbon plays in the broader building decarbonization effort and embrace structural engineers as critical gatekeepers for reducing embodied carbon. Structural engineers hold tremendous credibility within the design team. We exist to ensure that a building is safe to inhabit. By advocating for embodied carbon reduction strategies related to structure, we extend that responsibility to ensuring a safe planet for future generations.

We seek opportunities to share this perspective with our clients, whether they have ambitious carbon reduction goals or are just beginning to understand the importance of embodied carbon. We achieve this by highlighting our commitment and approach in qualification documents, as well as including embodied carbon and life-cycle assessment scopes in our offerings.

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Sample Buro Happold gualifications document

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Arizona State University, Rob and Melani Walton Center for Planetary Health. Image: Bill Timmermar

In addition Buro Happold is an active advocate about embodied carbon within the wider industry, through committee participation, presentations, and publications.

Participation in Relevant Industry Committees:

SE 2050 Leadership Committee : Luke Lombardi participated as Co-Chair SE 2050 Resources Committee : Fraser Reid participated as Committee Member ULI San Francisco Sustainability Committee : Andy Rastetter participated as Committee Member SEI Sustainability Committee : Luke Lombardi participated in Circular Economy Working Group Carbon Leadership Forum : Luke Lombardi participated as Los Angeles Hub Co-Leader SEAOSC : Luke Lombardi participated as Legislative Action Committee Co-Chair SEAONY Sustainability Committee : Terenia Hankewycz participated as Committee Member

Partial List of Presentations and Publications:

AIA California (Spring 2024) : Luke Lombardi contributed to "CalGreen EC Code Webinar Series" SEI+Northeastern (7/22-24/24) : Luke Lombardi led session in "Toward Net Zero Carbon" workshop CU Boulder (7/25-27/24) : Luke Lombardi co-led "Embodied Carbon Bootcamp and Symposium" SEAOC Convention (9/4-7/24) : Luke Lombardi presented "CalGreen 2024 EC Requirements" Net Zero Conference (9/17/24) : Luke Lombardi presented "Establishing Baselines for EC Reduction" Various Venues (Fall 2024) : Andy Rastetter presented "Embodied Carbon and Cal Green" Sustainability Design Workshop with AISC (10/22/24) : Buro Happold co-hosted a workshop Engineers are Too Focused on Carbon - ICE NY Bar Debate (10/24/24) : Shivanie Rambaran debated CLF/SE 2050 Presentation on Material Efficiency (10/29/24) : Fraser Reid co-presented ULI San Diego - CalGreen Embodied Carbon Panel: An Overview (2024): Luke Lombardi Presented Pratt Institute Lecture on Embodied Carbon (2/7/25) : Fraser Reid presented to students Our goal for the future is to continue our work towards holistic carbon assessments, drive the adoption of low carbon technologies, and approaches and to share our lessons learned.

We are proud to support the SE 2050 initiative and highlight this to our collaborators.

Buro Happold signs Structural Engineers 2050 Commitment Program



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Fraser Reid Associate Principal +1 212-334-2025 fraser.reid@burohappold.com

www.burohappold.com