

SE 2050 EMBODIED CARBON ACTION PLAN 2022

In March 2021, Simpson Gumpertz & Heger (SGH) signed on to the Structural Engineering Institute (SEI) SE 2050 Commitment program. In our first year, we reported five projects to the SE 2050 database, presented on the SE 2050 commitment internally and externally, disseminated life-cycle assessment (LCA) educational resources to our staff, and updated our specification and proposal templates to highlight opportunities to incorporate LCA and other green strategies into structural design projects.

As we head into Year 2, we use this Embodied Carbon Action Plan (ECAP) to summarize how we will continue to fulfill the four pillars of the program: Education, Reporting, Reduction, and Advocacy.

Photo by Anton Grassl Photography: Summer Star Wildlife Sanctuary, Boylston, MA



EDUCATION

Our goal is to make assessing and reducing embodied carbon a priority in all our engineering and administrative decisions. We will achieve this by providing an initial wave of educational materials and seminars, followed by regular learning opportunities to stay up to date on state-of-the-art practices. We envision embodied carbon takeoffs and tracking will be a standard element of our design projects, which will ultimately inform our long-term embodied carbon reduction strategies and design practices.

ACTIONS AND COMMITMENTS

- I We distributed our 2021 ECAP to the firm via SGH's internal Sustainability Committee (SC) newsletter and intranet. We will do the same with our Year 2 ECAP.
- I SGH's SC is actively engaged in promoting firmwide education programs for embodied carbon reduction and the SE 2050 commitment. The group identifies, creates, and promotes resources to help our engineers learn about embodied carbon and work to reduce our footprint. The group publishes an internal quarterly newsletter and implements many of our education-related initiatives.
- I Michael Tecci and Julia Hogroian are SGH's new Embodied Carbon Reduction Co-Champions. They will act as the representatives and advocates of the program at SGH. In addition, our SE 2050 working group has at least one liaison for each major office to promote our SE 2050 goals. SGH plans to further our internal outreach efforts to grow the working group.
- I Members of our staff continue to regularly attend quarterly external education programs, including Carbon Leadership Forum (CLF), SE 2050, ASCE, SEI, and SEAOSC sustainability committee meetings.
- I The SE 2050 library of resources, along with documents such as "10 Carbon Reducing Actions for Structural Engineers" and "How to Calculate Embodied Carbon," have been added to our internal sustainability hub, disseminated in internal newsletters, and presented during office staff meetings.
- I A working group of employees, led by the SE 2050 reporting group, is actively learning the computer program Tally and other LCA tools, and will disseminate their findings to the rest of the firm. Additionally, SGH plans to train interns in carbon tracking tools to further the knowledge in the industry.
- I SGH distributed a firmwide survey to understand how familiar SGH technical staff is with SE 2050 and embodied carbon and to identify how to best disseminate educational resources. We plan on distributing the survey on a yearly basis to ensure that SGH is learning about SE 2050 and we continue to find effective ways of disseminating information.



EMBODIED CARBON 101

WHAT IS EMBODIED CARBON, WHY DO WE CARE, AND WHAT CAN WE DO ABOUT IT?

Mark D. Webster

29 November 2021

2 December 2021

REPORTING

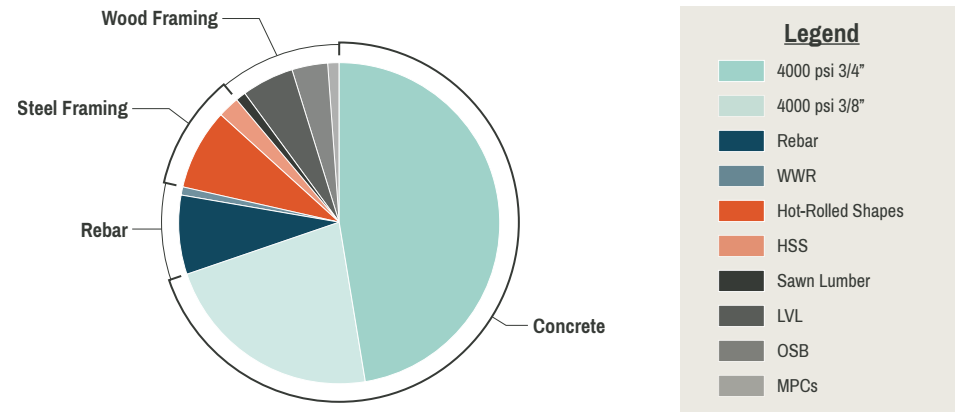
Tracking the embodied carbon on our projects across multiple offices will help us to establish internal benchmarks for different project types and implement reduction strategies. Contributing embodied carbon data from our projects to the SE 2050 database will help the industry set reduction benchmarks.

COMMITMENTS

- I We commit to calculating embodied carbon for a minimum of ten new structural design projects this year. These projects will come from at least five of our office locations. SGH will continue its commitment to increase the target number of projects reported each year to follow.
- I We will continue to grow our understanding and skill set at reporting projects. As part of this, we will continue to learn about the various tools available for calculating embodied carbon. We also commit to continuing to develop our in-house tools.
- I We will extract structural material quantities on all reported projects for submission to the SE 2050 database no earlier than the end of the construction documents phase. We will also coordinate with our clients to identify appropriate projects for estimating embodied carbon throughout design development and aim to reduce it over the course of the project.
- I Our working group is developing a project import form to obtain the critical information from a project engineer prior to completing the LCA. This form is based on SE 2050's project import form and will request information on project size, mix design submittal history, and modeling procedures. The form will create a more efficient reporting process.
- I Our working group is also developing resources for engineers to reference when completing their embodied carbon calculations. These references will include a guide on performing an LCA, Revit modeling practices for integration with LCA software, and guidelines for importing projects into the SE 2050 database.

Photo: Addition to the First United Methodist Church, Westborough, MA. SGH helped the project team reduce the structural embodied carbon by 38% compared to a baseline building reflecting the construction of the original building.

GWP by Material



Graph: Previous project report showing Global Warming Potential (GWP) by material.



ADVOCACY

SGH continues to use multiple channels to spread the word both internally and externally about the SE 2050 Commitment and addressing embodied carbon.

COMMITMENTS

- | During our first year in the SE 2050 program, we kept staff abreast of our embodied carbon reduction work in newsletters and other internal communications. We will continue to keep SE 2050 and embodied carbon at the forefront of internal discussions in Year 2.
- | We published our Year 1 ECAP on our external website last year. We also published an interview Michael Tecci gave as the July Firm Highlight in the SE 2050 newsletter on our website. We will issue a news release upon submission of our Year 2 ECAP.
- | SGH developed boilerplate proposal language in Year 1 that we will promulgate to staff and encourage its use during Year 2.
- | We met with several major clients and partners to discuss the importance of embodied carbon reduction strategies. We will continue to do so in Year 2.
- | Recognizing the critical role of policy drivers in reducing embodied carbon, our SE 2050 team is working with local jurisdictions to implement embodied carbon reduction incentives through zoning and other mechanisms.
- | SGH is collaborating with other structural engineers to develop initiatives to improve the availability of low-carbon concrete and environmental product declarations (EPDs) in the Boston area and establish embodied carbon benchmarks for concrete.
- | We are working to increase our sustainability and embodied carbon marketing material for use with proposals and clients. These efforts include working to release a sustainability cut sheet and a topic brief on embodied carbon and life-cycle assessment.

Photo: Title slide from a webinar Julia Hogroian and Michael Tecci gave with Gensler in May 2022.

DESIGNING FOR CARBON NEUTRALITY

STRATEGIES

SGH will continue to develop effective strategies to help us to meet our embodied carbon reduction goals.

COMMITMENTS

- | We will provide a narrative on what we have learned about embodied carbon reductions from our first year of commitment to SE 2050.
- | We are analyzing the embodied carbon data from completed projects to compare with the baseline benchmarks we established for various structural systems during Year 1. We will compare the embodied carbon intensity of projects submitted during Year 2 with these baseline benchmarks to understand differences between Year 2 and Year 1 projects.
- | We will update our average benchmarks for embodied carbon reduction based on the Year 2 projects submitted to the database.
- | We continue to explore Revit-integrated LCA tools and their data visualization capabilities to highlight the embodied carbon contribution of major structural components. As we explore these options, we are working to develop internal data extraction and visualization tools to use in conjunction with the Revit-integrated tools. We will use these tools to communicate design options' embodied carbon impacts internally among the project team and externally to clients.
- | We commit to creating a project-specific embodied carbon reduction plan for one project.
- | We will implement options for embodied carbon tracking and embodied carbon reduction planning into our standard basis-of-design document.



YEAR 1 HIGHLIGHTS

- | We successfully reported five projects from three different offices in our first year.
- | We added language to project specifications requesting project-specific EPDs for structural materials, including structural steel and concrete, and also recommended embodied carbon reduction language to reference specifications involving cast-in-place concrete, structural steel, and steel decks.
- | We updated our proposal template for new structural design services to include SGH's commitment to SE 2050 and to highlight our LCA service options.
- | Mark Webster, our inaugural SE 2050 Firm Champion, gave two internal "Embodied Carbon 101" webinars educating our staff about the importance of tracking embodied carbon on projects and highlighting our commitment to SE 2050.
- | Michael Tecci and Julia Hogroian, our incoming SE 2050 Firm Co-Champions, teamed up with Gensler to present "Designing for Carbon Neutrality: Engineering and Architectural Perspectives" as part of SGH's external webinar series.



SGH's Mark Webster moderated a special session at the Structures Congress called "Embodied Carbon and the Coming Revolution in Structural Engineering Practice." The distinguished speakers included Kate Simonen, founding director of the Carbon Leadership Forum, and leaders from structural engineering firms and Georgia Tech who are reducing the embodied carbon on their projects.



LESSONS LEARNED

- | The process for developing in-house tools and procedures takes substantial time, effort, and trials. Internal tools can better fit the users' needs when developed in parallel with existing tools and methods. Ultimately, the process helps to avoid veering off course without addressing the initial needs for the tool.
- | The accuracy and quality of an LCA performed through a Revit add-in is only as good as the model itself. General material assignments must be consistent and concrete design information (e.g., compressive strength, weight, reinforcement layout) should be included in the modeled element, as these details can greatly impact LCA results.
- | Project information exchange and design change organization are critical to performing an accurate LCA. Without a procedural set of steps adopted by an organization, there is not an effective or consistent way to implement this practice firmwide.
- | Early conversations with clients are important to build confidence in the effectiveness of embodied carbon reduction strategies.
- | For resources to be effective, awareness and ease of access are as important as quality.
- | The industry is open and ready to implement strategic changes to improve the built environment by reducing the embodied carbon.





Simpson Gumpertz & Heger (SGH) is a national engineering firm committed to delivering holistic advice for our clients' most complex challenges. We leverage our collective and diverse experience, technical expertise, and industry knowledge of structures and building enclosures, advanced analysis, performance & code consulting, and applied science & research to deliver unrivaled, comprehensive solutions that drive superior performance. With more than 600 employees in eight office locations throughout the United States, SGH's industry-leading teams constantly seek to advance the meaning of what's possible.

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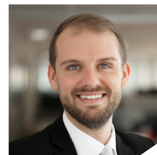
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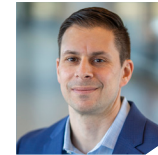
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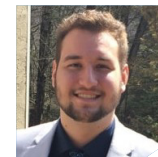
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