SE 2050
EMBODIED CARBON ACTION PLAN
2024-2025

In March 2021, Simpson Gumpertz & Heger (SGH) signed on to the Structural Engineering Institute (SEI) SE 2050 Commitment program. In our first three years, we reported twenty-five projects to the SE 2050 database, presented on the program internally and externally, disseminated educational resources to our staff, and updated our specification and proposal templates to highlight opportunities to incorporate life-cycle assessment (LCA) and other green strategies into structural design projects. This past fall, we hosted an external embodied carbon webinar series, covering embodied carbon basics before diving into considerations specific to structural materials (concrete, structural steel, and wood framing), building enclosure systems, and fireproofing.

As we head into our 2024-2025 term, we use this Embodied Carbon Action Plan (ECAP) to summarize how we will continue to fulfill the four pillars of the program—Education, Reporting, Advocacy, and Reduction—as well as share highlights and lessons learned from the program to date.

Photo by Chuck Choi: Norwell Public Library, Norwell, MA

EDUCATION

Our goal is to make assessing and reducing embodied carbon a priority in all our engineering and administrative decisions. We provide educational materials and seminars, as well as regular learning opportunities to stay up to date on state-of-the-art practices. In the long term, we envision embodied carbon takeoffs and tracking as a standard element of our design projects, which will ultimately inform our embodied carbon reduction strategies and design practices.

ACTIONS AND COMMITMENTS

- We distributed our previous ECAPs to the firm via SGH's internal Sustainability Committee newsletter and intranet platform. We will do the same with this year's ECAP.
- SGH's Sustainability Committee is actively engaged in promoting firmwide education programs for embodied carbon reduction and SE 2050. The group identifies, creates, and promotes resources to help our team members 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.
- In winter 2024, we will re-present the four-part webinar series from fall 2023 in a firmwide presentation series. These internal talks will focus on specific actions SGH professionals can take to reduce embodied carbon on their projects.
- To increase education and engagement from all employees at SGH, we created a general SE 2050 presentation for our employees to use internally and externally.
- We will present SE 2050 updates to the company annually to increase engagement and knowledge of the SE 2050 program and SGH's commitment and progress. We presented the inaugural address in January 2024.
- Julia Hogroian and Michael Tecci are SGH's Embodied Carbon Reduction Co-Champions. They act as the representatives and advocates of the program at SGH. In addition, our SE 2050 working group has members in most SGH office locations, helping to promote our SE 2050 goals on the local office level.
- Members of our staff regularly attend external education programs and Sustainability Committee meetings with Carbon Leadership Forum (CLF), SE 2050, ASCE, SEI, AISC, and SEAOSC.
- We continue to update our internal embodied carbon library with new resources from SE 2050, CLF, and other external sources. We highlight some of these resources to the firm via internal newsletters and office staffing meetings.
- The SE 2050 reporting group is developing a training module to teach other SGH engineers how to conduct embodied carbon take-offs on their own projects using Tally. This training module is part of a larger effort to disseminate project reporting knowledge about SE 2050 among firm engineers.

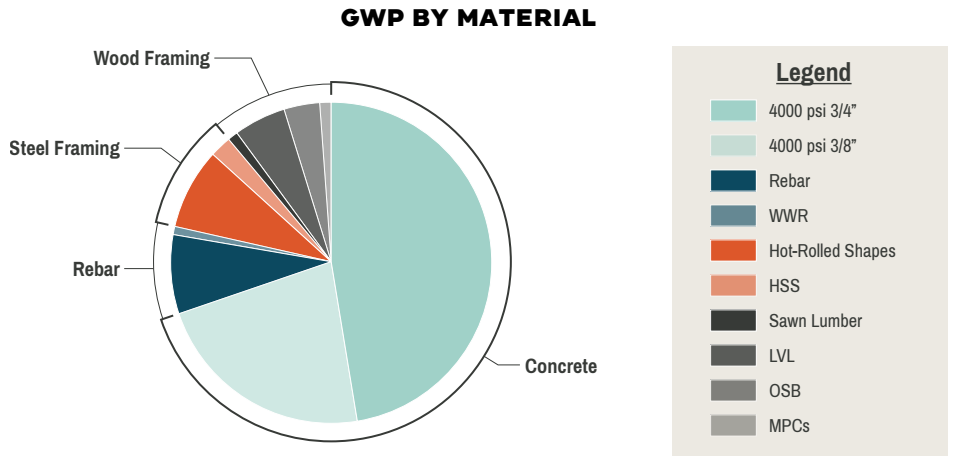
Photo: University of Vermont Medical Center Patient Tower, Burlington, VT

REPORTING

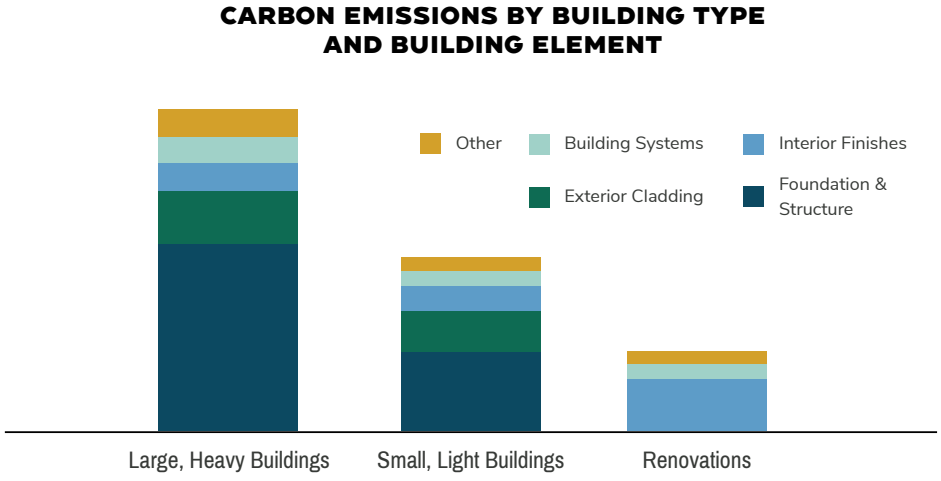
Tracking the embodied carbon on our projects across multiple offices will help us establish internal benchmarks for different project types and implement reduction strategies. Contributing embodied carbon data from our projects to the SE 2050 database will help the industry set reduction benchmarks. This year, the SE 2050 reporting group distributed a survey to our principals to gauge the firm volume of qualifying new design and renovation projects.

COMMITMENTS

- We will calculate embodied carbon for a minimum of fifty percent of our qualifying structural design and renovation projects this year. We will seek projects that are substantially complete or beyond the design phase from at least half of our major office locations with qualifying project work.
- We will continue to grow our understanding and skillset for reporting projects. As part of this, we will continue to learn about the various tools available for calculating embodied carbon. We will also continue developing in-house tools.
- 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.
- Our working group is developing a project import form to obtain 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 goal of the form is to create a more efficient reporting process.
- 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. We intend to deploy our tutorial to our first non-working group engineer in mid-2024.
- We will continue to internally offer to assist design teams in measuring the embodied carbon of projects through easy-to-use tools, such as the Embodied Carbon Order of Magnitude (ECOM) tool on the SE 2050 website.



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



Graph: Taken from the article, "Embodied Carbon in Structures," adapted from CLF's "The Time Value of Carbon."

ADVOCACY

SGH continues to use multiple channels to spread the word about SE 2050 and the need to address embodied carbon.

COMMITMENTS

- We will continue to make SE 2050 and embodied carbon reduction a priority in our internal communications.
- We will continue to meet with clients and partners to discuss the importance of embodied carbon reduction strategies.
- Recognizing the critical role of policy drivers in reducing embodied carbon, our SE 2050 team is working with local jurisdictions and state legislators to implement embodied carbon reduction incentives through zoning requirements, Buy Clean legislation, and other related mechanisms.
- SGH is collaborating with other structural engineers and the wider AEC community 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 continue to be active in carbon-reduction-focused educational and advocacy organizations, such as CLF Regional Hubs.
- We are working to increase our sustainability and embodied carbon marketing material for use with proposals and clients.
- We will promote staff involvement and professional activities addressing embodied carbon for sgh.com and as an internal resource.

Photo: Local 130 UA Parking Garage, Chicago, IL, courtesy of OKW

REDUCTION

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

COMMITMENTS

- We will gather lessons learned from employing embodied carbon reduction strategies and present these lessons to the company.
- We are analyzing embodied carbon reduction data on SGH-completed projects to compare with the baseline values we calculated for various projects during 2022. We will compare the embodied carbon intensity of projects submitted during 2023 with these baseline values to understand the differences between SGH projects in 2023 and 2022.
- We will update our benchmarks for embodied carbon reduction based on the 2023 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 will create 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.
- We have updated our internal material specifications for concrete and steel. We will provide internal reviews of masonry and timber material project specifications for embodied carbon reduction strategies.
- We will work with concrete suppliers to run material characteristic tests for Type 1L cement. We will run strength, time-of-set, and heat evolution tests to compare the material with Type I/II cement. We will provide a cheat sheet for reduction strategies for general structural engineering, as well as material-specific options to project teams moving forward.

Photo: **Apex Plaza**, Charlottesville, VA

HIGHLIGHTS

Here, we share several program highlights from October 2022 to today.

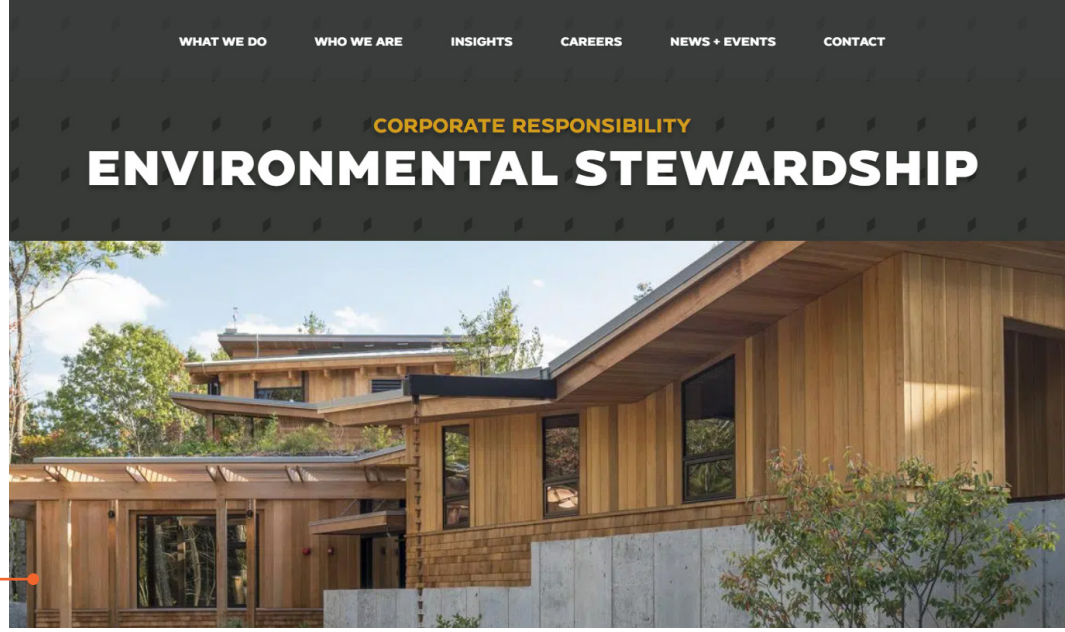
- We successfully reported twenty projects to the SE 2050 project database from four different offices.
- We added language to project specification templates to reduce the embodied carbon in structures. These changes include requesting project-specific EPDs for structural materials, including structural steel and concrete, and recommending embodied carbon reduction language to reference specifications involving cast-in-place concrete and structural steel.
- We updated our new structural design proposal template to include SGH's commitment to SE 2050 and to highlight our LCA service options.
- In fall 2023, we hosted an external embodied carbon webinar series and published a three-minute educational video overview of embodied carbon externally on our website.
- We compiled an internal slide presentation filled with information and resources on embodied carbon and SE 2050 for our staff to use in internal and external presentations.
- We published a topic brief, "Embodied Carbon in Structures: Reducing Environmental Impact in the AEC Industry," on our website and disseminated it through social media.
- We provided guidance to jurisdictions on the implementation of embodied carbon measurement requirements.
- Our members continued to serve on Sustainability Committees and embodied carbon advocacy groups, including the AISC Sustainability Committee, ACI Sustainability Committee, SE 2050, and SEI Sustainability Committee.

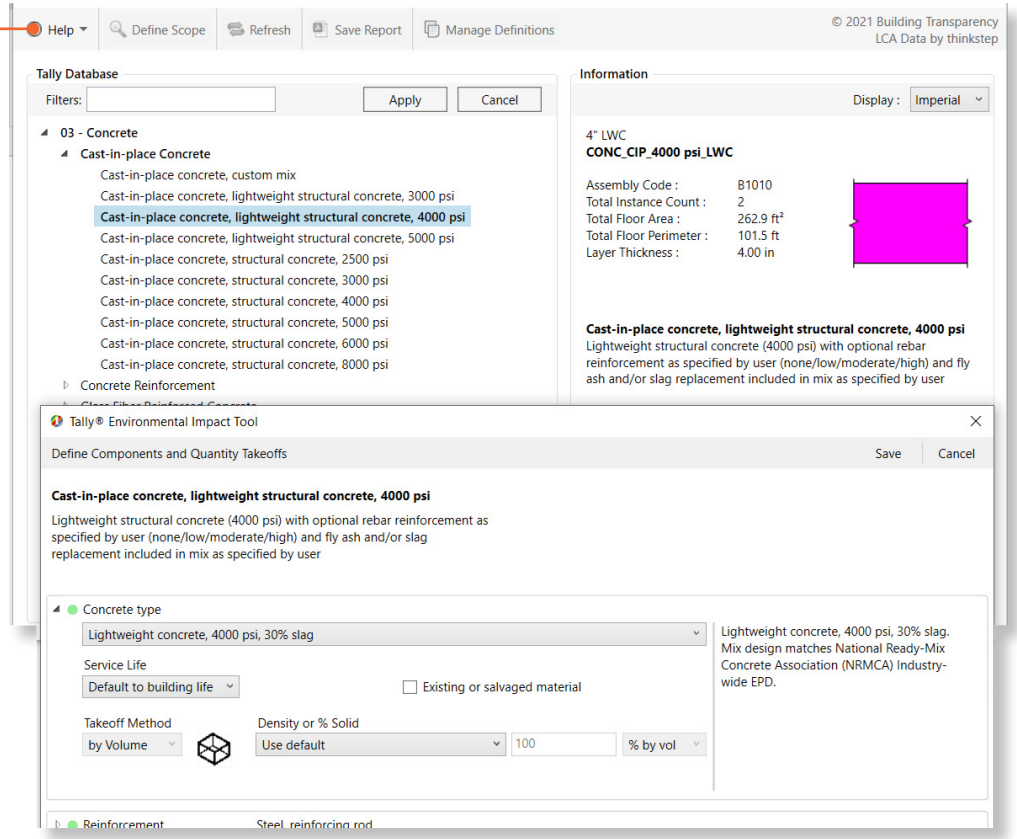
Photos: "Cutting Carbon" webinar series (top); Summer Star Wildlife Sanctuary, Boylston, MA, by Anton Grassl (bottom)

HIGHLIGHTS

(CONTINUED)

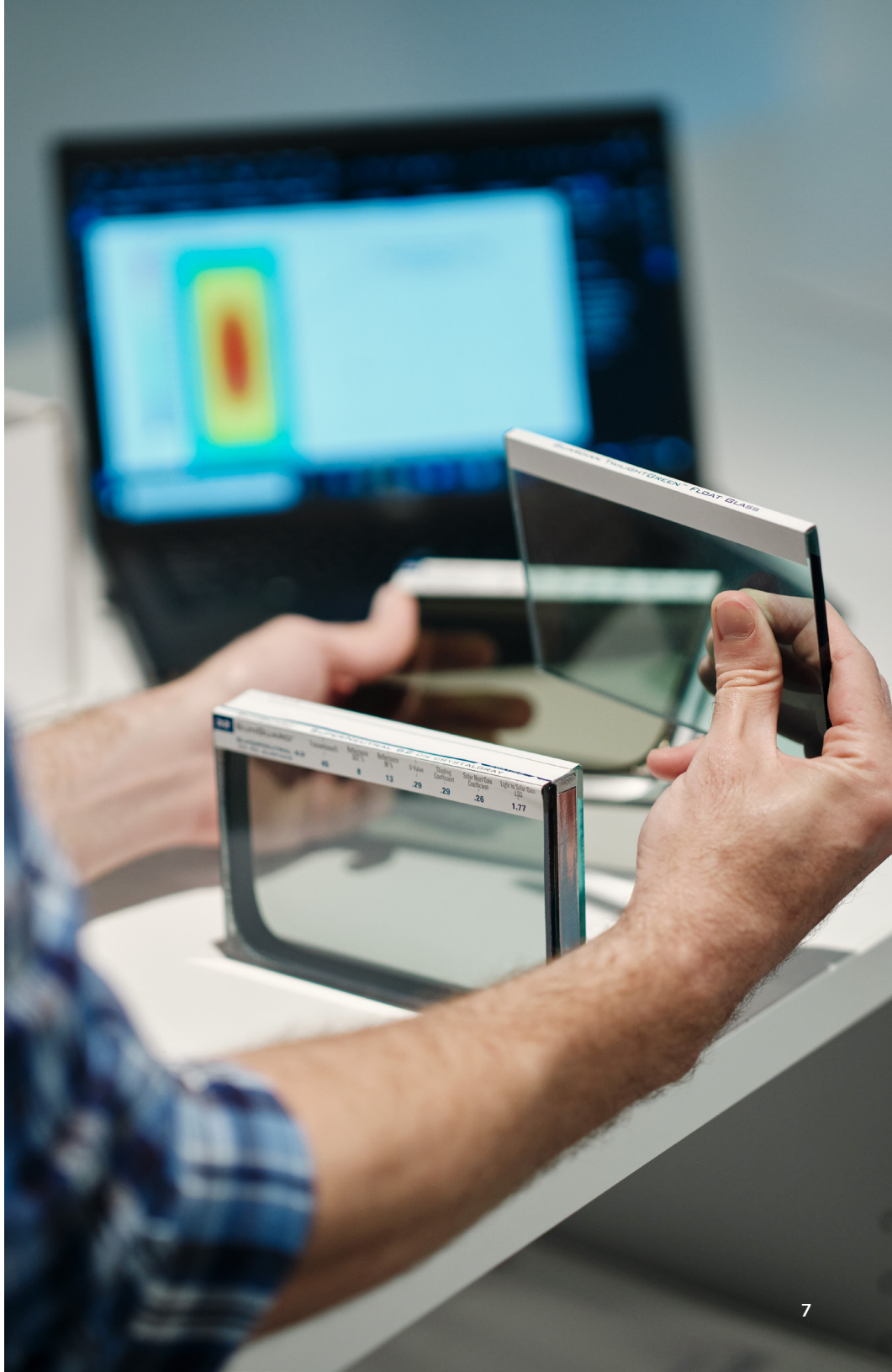
- Our internal Sustainability Committee developed a slide presentation to highlight sustainability commitments and capabilities within SGH, including our commitment to SE 2050.
- We conducted an internal survey to understand approximately how many projects we have as a firm that qualify for SE 2050 program requirements, which helps us set reporting targets.
- SGH expanded our Corporate Responsibility webpage to include a focus on **Environmental Stewardship** in collaboration with our internal Sustainability Committee, providing helpful resources on SE 2050, embodied carbon, passive house, and other green practices.
- We presented our first companywide presentation summarizing the first three years of our commitment to the SE 2050 program, including to-date progress and our goals moving forward.
- The reporting sub-group continued to learn Tally, conducted a side-by-side comparison with TallyCAT, and shared their findings with the rest of the working group.





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 no 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.
- New software programs, while they may have more or improved features, take a considerable amount of time to learn, especially the programs' nuances. This can prevent the adoption of a new program when processes have been established for other software.
- Internal education requires frequent updates through multiple communication channels.
- The industry is open and ready to implement strategic changes to improve the built environment by reducing 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 700 employees in nine 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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SIMPSON GUMPERTZ & HEGER SE 2050 TEAM

Julia Hogroian, P.E., S.E.
LEED Green Associate
Embodied Carbon Reduction Champion
Consulting Engineer
Waltham, MA

Ronan Bates
Associate Project Consultant
Waltham, MA

Eric Fleet, P.E., S.E.
LEED Green Associate
Project Consultant
Chicago, IL

Matt Sander, P.E.
Consulting Engineer
Washington, DC

Zoe Sloane
Associate Project Consultant
Waltham, MA

Mark Webster, P.E.
LEED AP BD+C
Senior Consulting Engineer
Waltham, MA

Michael Tecci, P.E.
LEED Green Associate
Embodied Carbon Reduction Champion
Associate Principal
Waltham, MA

Eleni Blanas
Associate Project Consultant
Waltham, MA

Michael Perkins, P.E., S.E.
Senior Consulting Engineer
Los Angeles, CA

Dana Sher
LEED Green Associate
Associate Project Consultant
Waltham, MA

Blaise Waligun
Project Consultant
Waltham, MA