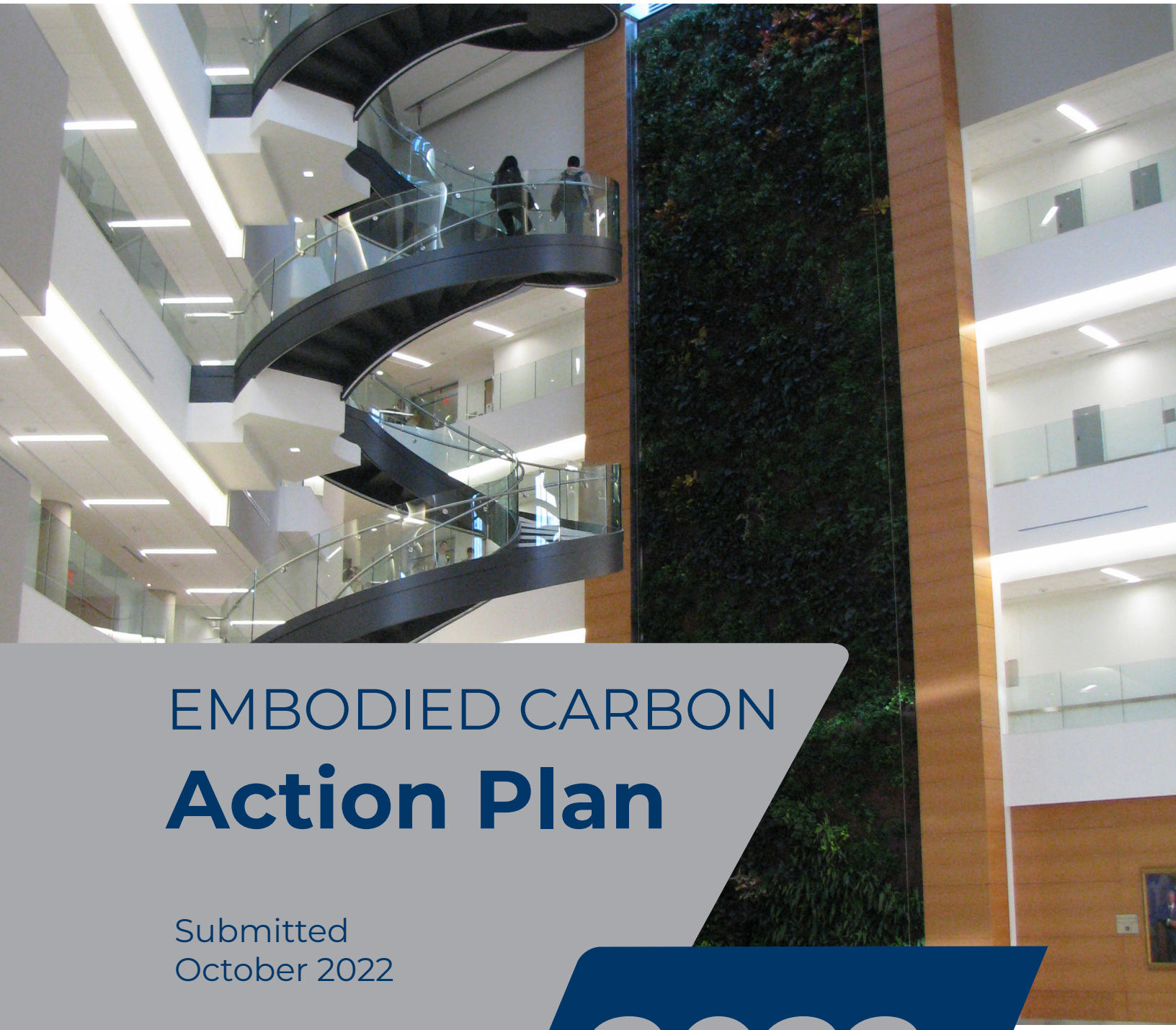
KEAST & HOOD
STRUCTURAL ENGINEERS



EMBODIED CARBON
Action Plan

Submitted
October 2022

2022

Keast & Hood's

Commitment

Keast & Hood joined the SE 2050 commitment in February of 2021, recognizing the effect the construction industry has on global carbon emissions contributing to climate change.

As engineers, we have a responsibility to consider the impact of our work on both the surrounding community and the natural environment. We are hopeful that through collaboration, cooperation, and innovation, our industry will rise to the challenge of minimizing climate change.

We fully support the challenge of the SE 2050 program to reduce embodied carbon in our structures to net zero by 2050. Acknowledging the need for carbon reduction strategies, we will be able to collaborate with other firms in the program through knowledge and resource sharing. Together we will be advocates for change in policy and education of clients and owners. Our profession will have a powerful impact on the reduction of carbon emissions produced by the construction industry.

Over the previous year since joining the SE 2050 commitment, our Sustainability Committee's initial focus was on educating our technical staff on embodied carbon calculation and reduction strategies, and developing process that could be used in our production workflows and standards. In the second year, we are actively working to implement carbon reduction processes on a wider range of projects, gathering more data to understand the carbon footprint of our designs.

We also strongly believe that change cannot happen in a vacuum, so we are actively participating in organizations in the Philadelphia area that advocate for carbon reduction. We strive to be advocates for carbon reduction on our projects, in collaboration with contractors and material local suppliers, and in conversations with local policy-makers. When we continue work towards change, both internally and within the industry.

Respectfully Submitted,
Keast & Hood Sustainability Committee

Denise Richards, PE, Partner
Brian Wentz, PE, Director of Hist. Pres.
Amelia Popovic, Director of Marketing
Amanda Grogin, EIT, Designer
Arieto Seraphin, PE, Project Manager
Lauren Schmitz, EIT, Designer
Fritha Francis, EIT, Designer

Education

Internal & External
Information Transfer

Reporting

Measuring, Tracking & Sharing
Embodied Carbon Data

Embodied Carbon Reduction Strategies

Goals to Reduce Embodied Carbon in Projects

Advocacy

Sharing Knowledge & Value of SE 2050 Program

Keast & Hood

Education

Education Plan

Keast & Hood's Sustainability Committee shares our gathered knowledge with technical staff during our monthly lunch & learn meetings and on an ongoing basis through the messaging platform. At the monthly meetings, we present information on a different material or reduction strategy and ways to implement them on projects. These 5-10-minute presentations have featured a variety of topics, including concrete produced with biogenic materials, and regional examples of carbon reduction strategies. By sharing information continuously, we keep embodied carbon at the forefront of our design team members' minds.

Education

Previous Electives Completed

☑ Nominate a minimum of (1) employee per office to participate in a CLF Community Hub and/or task force.

Denise Richards, P.E., is a participant of the Carbon Leadership Forum – Philly Hub. She gave a presentation as part of Green Buildings United in May 2022.

☑ Attend a presentation or demo of an LCA-based tool used to calculate embodied carbon

The webinar "Sustaining Structures: Embodied Carbon" by SEU and the tutorials for Talley and Beacon were viewed by members of the Sustainability Committee in the Spring of 2022 while developing the firm's standards for calculating embodied carbon. A member of the sustainability committee also attended a presentation given by Kieran Timberlake on the LCA software developed by their team.

☑ Set a date within the first year to present an "Embodied Carbon 101" Webinar to your firm. Include this resource in your orientation/ on-boarding programs.

The "Embodied Carbon 101" webinar was presented during an internal meeting in September 2021 followed by a presentation of the 2021 ECAP.

☑ Initiate an embodied carbon interest group within your firm and provide a narrative of their goals.

Keast & Hood's Sustainability Committee was established in early 2021 following our commitment to SE2050. The group's focus has been on sharing information about materials available to reduce embodied carbon as well as establish firm standards for calculating embodied carbon. The Sustainability Committee is overseeing the firm's commitment to SE2050.

☑ Distribute firm-wide announcement of your firm's pledge to join the SE 2050 Commitment.

Keast & Hood joined the SE 2050 Commitment in February 2021, and an announcement was made to the staff in early March. The staff were enthusiastic about our goals and have been eager to learn more about sustainability. The Embodied Carbon Action Plan was shared and discussed during an internal meeting in August 2021 following submission.

Education

Previous Electives Ongoing

Update the Embodied Carbon Reduction Champion for your firm. Include a brief profile in your ECAP.

Structural Designer Lauren Schmitz, EIT, will serve as the Embodied Carbon Reduction Champion for 2022. Lauren has been actively involved in updating our current ECAP and creating our internal training materials. Her projects are typically existing (and often historic) structures which has encouraged her to consider the later stages of a structure's life cycle.

Present the document "How to calculate embodied carbon" to all technical staff.

Keast & Hood's Sustainability Committee shared the document & the concept of embodied carbon with technical staff during an April 2021 internal presentation. However, with new staff coming on-board and based on questions coming from our current staff, we plan to review this document annually when sharing the ECAP with staff. We will also move the document to a more-prominent location internally so that is easily accessible.

Share the embodied carbon reduction strategies with the firm as outlined in "Top 10 Carbon Reducing Actions for Structural Engineers" document produced by SE 2050.

The Sustainability Committee shared the carbon reduction strategies during an October 2021 internal presentation. Many of the actions presented in the article encourage efficient use of structural materials, which is part of our normal design process. We will highlight the sustainability aspects of efficient design and provide additional information for each action during our internal presentations with a focus on implementation of the action.

Share the SE 2050 library of resources with technical staff.

Keast & Hood's Sustainability Committee first shared the library of resources with our technical staff during a fall 2021 internal presentation and through our messaging platform. With the implementation of our embodied carbon calculation workflow, we will be providing links and encouraging our staff to access the library for additional information.

Have one representative of your firm (any employee) attend quarterly external education programs (e.g. webinar, workshop) provided by SE2050, Carbon Leadership Forum (CLF), or other embodied carbon resources.

A member of the sustainability committee will attend an external education program on a quarterly basis. Local chapters of national professional organizations often present research in their field during monthly meetings.

Education

New Electives

01

Make one webinar focused on embodied carbon available to employees.

Keast & Hood's sustainability committee will share a webinar on lowering the embodied carbon content of cement and concrete with the technical staff. The presentation will focus on potential strategies for lowering the embodied carbon content of cement and concrete through a variety of methods including mix designs. Concrete is a standard material used on the majority of our projects, so understanding reduction strategies will have a widespread effect.

02

Distribute ECAP within your firm upon publishing

Keast & Hood's Sustainability Committee will share and discuss the 2022 ECAP during an internal presentation shortly after submission. We will identify our new goals and review the lessons learned from the 2021 ECAP.

Keast & Hood

Reporting

Reporting Plan

Keast & Hood's Sustainability Committee plans to incorporate the calculation of embodied carbon into our standard project workflows at major project milestones (design development and construction documents). As the majority of Keast & Hood's projects are documented with Revit, we will be utilizing the Beacon or Tally add-ins to complete the calculations.

To streamline the reporting process, the Sustainability Committee collaborated with our standards group to update our Revit template and custom families for ease of organizing and confirming data within Beacon. The Sustainability Committee then developed an internal checklist with information specific to our drafting and design standards for use by the engineers when performing embodied carbon calculations using the software.

During our first year of implementation, Beacon will be the primary software for this task, with a focus on the A1-A3 LCA phases. Outputs from the software will be recorded in our firm's internal sustainability database, with fields that mirror the SE2050's reporting spreadsheet. We will be completing this analysis on all new building projects that have a 3d Revit model, regardless of size.

Previous Electives Completed

☑ Submit an annual minimum of (2) projects per U.S structural office but need not exceed (5) total projects for the firm to the SE 2050 Database.

Keast & Hood uploaded two projects to the SE2050 Database in the fall of 2021. As this was our first year, the projects submitted were new construction that had complete structural Revit models. During the next year, we hope to upload additional projects with at least one having a major renovation aspect.

☑ Describe the internal training for embodied carbon measurement you provided or will provide.

Keast & Hood's Sustainability Committee has developed a sustainability section to be included in our mentoring and onboarding program. The section introduces mentees to the concept of embodied carbon by watching the introductory webinars and calculation articles. Our hope is to encourage more conversations about embodied carbon reduction strategies with the fresh perspective of new team members. We have also developed a checklist for embodied carbon calculations in our internal work processes.

New Electives

01 Report a greater percentage of projects than you did the previous year.

Keast & Hood will upload at least three projects to the SE2050 database during the fall of 2022.

02 For a project submitted to the database, ask the Architect or Owner if the project has a carbon budget or if there are established project sustainability goals at the project kickoff meeting.

Keast & Hood will work closely with architects and owners during the early phases of a project to discuss embodied carbon and develop a carbon budget. When a carbon budget has been established, we will share the project in our annual uploads to the database.

Keast & Hood

Reduction

Reporting Plan

Keast & Hood's strategy to reduce carbon on our project includes several areas of focus: early project conversations, collaboration with suppliers, specification updates, and focus on reuse.

Decisions make in the early phases of the project often have the largest effect on project size, cost, and embodied carbon. We think that the architect and owner should be aware of the differences of embodied carbon between proposed systems, even if this is not the ultimate driver of decisions. To facilitate the conversation, Keast & Hood developed a Bay-Study Alternative spreadsheet which can be used to quickly present the Global Warming Potential of three different framing materials for a typical bay – concrete, steel, and wood. By creating this resource to discuss embodied carbon during the earliest phases of a project, we hope to encourage more conversations regarding sustainability.

A significant portion of Keast & Hood work involves the renovation and adaptive reuse of structures, and the embodied carbon savings for renovation projects are significant. One of our goals for the coming year is to better understand how to quantify the GWP for renovations projects and demonstrate the value of "carbon saved" by renovating rather than demolishing & rebuilding. We plan to explore some of the tools available for this purpose.

Finally, we plan to continue updating our standard specifications to incorporate sustainability information, such as the submission of EPD's and potential GWP targets for performance-specified concrete mixes.

Previous Electives Ongoing

Update your specifications & incorporate embodied carbon performance. Include embodied carbon in your submittal review requirements.

Keast & Hood added embodied carbon performance sections to our specifications on select projects. We are working to incorporate these sections in our template specifications so they may be included on all projects. We will be adding the embodied carbon performance and submittal requirements to our concrete and steel sections this year, followed by other material sections.

Collaborate with your concrete supplier to reduce embodied carbon in a mix design.

We have started conversations with local general contractors and concrete suppliers to understand current capabilities with respect to low-carbon mix designs. We have had conversations on several projects with concrete suppliers and contractors about performance - specified mixes, and delayed times to reach design strength, and impact on construction schedules.

Integrate embodied carbon mitigation strategies in your General Notes.

Keast & Hood has included embodied carbon mitigation strategies in our general notes for select projects. We are working to add these to our template general notes for use on all projects. This information will be added to the concrete and steel sections to correspond with the updated specification sections by the end of the year with the remaining sections to follow.

New Electives

01

Complete an embodied carbon comparison study during the project concept phase.

Keast & Hood's Sustainability Committee has created a Bay-Study Alternative spreadsheet to compare the global warming potential of a typical bay when constructed of different materials. The spreadsheet will be used during the concept and schematic design phases to facilitate discussions of embodied carbon.

02

Incorporate biogenic materials on at least one project annually.

Keast & Hood regularly uses wood and timber on renovation projects. We will continue to advocate for biogenic materials in new construction through the use of timber framing or other innovative materials.

Keast & Hood

Advocacy

KNOWLEDGE SHARING

Keast & Hood is proud to be a signatory firm of the SE2050 commitment, as displayed our website as well as our social media pages. As part of our work, we have been reaching out to local manufacturers to encourage development of EPD's and discuss embodied carbon requirements as we add them to our specifications. Members of the Keast & Hood Sustainability Committee have joined local chapters of national organizations in creating and launching sustainability subcommittees. These subcommittees have been actively advocating for embodied carbon requirements on public projects within the City of Philadelphia. We hope to use our knowledge to encourage sustainable construction and design practices.

Advocacy

Previous Electives Completed & Ongoing

☑ Describe the value of SE 2050 to clients. How can your design teams collaborate to reduce embodied carbon?

Keast & Hood has shared our commitment to SE2050 with our clients on our website, social media pages, and at various networking events. We continue to discuss our carbon reduction goals with clients, and this has created opportunities to share knowledge about new products and processes with other design professionals pursing similar goals. In April 2022, we gave an informal lunchtime presentation to a regional architectural firm about our current efforts and ways that architects and engineers can work together to reduce a project's carbon footprint. We continue to look for opportunities to have similar conversations with Owners as well.

☑ Share your commitment to SE 2050 on your company website.

We announced our commitment to SE2050 on our website and social media pages in March of 2021, and we've included a statement on our website of our commitment to achieving net-zero embodied carbon structural systems.

☑ Discuss with the Owner / Client the option of requiring that some of the structural materials come with facility-specific or product-specific EPDs.

We participated in sustainability discussions during the early phases of several current projects. This included discussions with the owner about embodied carbon reduction strategies and the encouragement of suppliers to develop EPD's for concrete mixes. With the development of our Bay-Study Alternative spreadsheet, we plan to have these conversations more frequently in the early design phases to help steer projects towards lower-carbon options.

Declare your firm as a member of the SE 2050 commitment on boilerplate proposal language.

Over the past year, we have included language emphasizing our commitment to SE2050 on select projects. Proposals including this language have often been focused on large projects for new construction. Going forward, we will continue developing this language so it can be included in proposals for projects of all sizes. .

Advocacy

New Electives

01 Start an embodied carbon community of practice or mentorship program in your office.

Keast & Hood is proud of our mentorship and onboarding program to review essential topics of structural engineering in practice. Over the last year, we have integrated a new sustainability section in the program to introduce new employees to our areas of focus and to encourage conversations among employees. The section includes review of embodied carbon materials such as Top 10 Carbon Reducing Actions for Structural Engineers and How to Calculate Embodied Carbon. For current employees, we provide regular updates on new materials and research as well as regular discussions of how to include sustainable practices in our projects.

02 Give an external presentation on embodied carbon that demonstrates a project success or lessons learned.

On April 22, 2022 Denise Richards, P.E., participated in a panel discussion at the ASCE National Structures Congress titled Embodied Carbon and the Coming Revolution in Structural Engineering Practice. On May 6, 2022 she presented at the Green Building United 2022 Sustainability Symposium along with the Carbon Leadership Form Philadelphia, Skanska, and Silvi Concrete. The joint presentation was titled “Opportunities for Stakeholders in Embodied Carbon Reduction on Projects” and was a cross-discipline collaboration between a contractor, material supplier, and structural engineer.

Keast & Hood will continue participating in these types of presentations to promote the reduction of embodied carbon and provide the perspective of a structural engineer as it relates to the reduction.

03 Encourage industry & policy change by promoting & using low-carbon & carbon- sequestering materials.

Two of our Sustainability Committee members established the Sustainable Design subcommittee of the local NCSEA chapter (DVASE). The subcommittee meets monthly with the goal of encouraging sustainable design throughout the industry and specifically the Philadelphia region. As part of this leadership role, Keast & Hood is the liaison to the National NCSEA Sustainable Design Committee.

In addition to being active in our local structural engineering organizations, Keast & Hood is also collaborating with the local AIA chapter. Denise Richards actively participates with Philadelphia AIA’s Committee on the Environment (COTE)’s Policy & Advocacy subcommittee. In October 2021, she joined the subcommittee in presenting a talk about Policies Affecting Carbon Reduction to Philadelphia’s COTE group. This subcommittee also presented this information to City of Philadelphia Councilwoman Catherine Gilmore-Richardson, chair of the Committee on the Environment.

As the Sustainable Design subcommittee of DVASE continues to grow, Keast & Hood is always looking for ways to engage with other organizations and government organizations on embodied carbon reduction strategies. We will continue to advocate for new policies that encourage those strategies throughout the region.

Keast & Hood’s

Lessons Learned

During our first year of the SE2050 Commitment, Keast & Hood’s primary focus was learning.

We are at the beginning of our carbon-reduction journey, and our first task for our newly-formed Sustainability Committee to educate ourselves about sustainability with respect to structural materials, embodied carbon calculation methods, and ways to incorporate these calculations into our process to understand our baseline as a firm. As we enter the second year of the program, we plan to expand our efforts to calculate embodied carbon on more of our projects internally, with a focus on renovation projects in addition to new construction.

Along the way, we have encountered resistance and skepticism from some in the industry, but also changing attitudes about the need to develop EPD’s and consider embodied carbon from others. We have learned that project teams are receptive to structural engineers participating in sustainability conversations, and we have also learned that if we do not raise the issue of embodied carbon in structural materials on projects, it is often not discussed at all.

Most importantly, we have learned that is critical for structural engineers to share our voices in the ongoing conversations about carbon reduction. Decisions will be made with or without us that affect structural design, so we need to engage!

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