



ideas engineered | visions realized



Buehler's Embodied Carbon Action Plan 2024
SE2050

Buehler's Embodied Carbon Action Plan | SE 2050

1. Education

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

An email announcement was distributed to all staff on July 20, 2021.

- Provide a brief narrative describing how your firm is promoting a firm-wide education program for embodied carbon reduction and the firm's commitment to SE 2050.

Buehler will promote embodied carbon reduction within the firm through a series of webinars presented on a regular schedule. The webinars will utilize existing available recordings from BSA and similar sources, or will be prepared by our internal Sustainable Design Committee. We also plan to have periodic highlights from our projects that have measured embodied carbon and the strategies that were employed to reduce embodied carbon.

In 2022 Buehler watched a presentation by BSA on embodied carbon, and the sustainable design committee presented on the topic of Life Cycle Assessment at our annual training day event. We also requested projects from staff to be included in the LCA database.

In 2023 the firm promoted embodied carbon education through our new hire training program by providing pre-recorded videos for staff to watch. We continued to gather projects for LCA studies.

- Nominate an Embodied Carbon Reduction Champion for your firm. Include a brief profile in your ECAP:

Ryan Miller, SE, LEED AP | Associate Principal

Sacramento

Over the past 18 years, Ryan has been active within the structural engineering community. He is actively involved in the SEA OCC Sustainable Design Committee and the lead for Buehler's Sustainable Design Committee. Ryan manages the embodied carbon tracking for Buehler's projects that will contribute data to the SE 2050 Commitment. As a strong advocate for sustainable design practices, Ryan became an early adopter of mass timber systems for the materials' inherent carbon sequestration and biophilic effects. He also acknowledges the adaptive reuse of existing buildings as an excellent way to reduce carbon emissions.

- Set a date within the first year to present the "Embodied Carbon 101" Webinar to your firm. Incorporate this information into your orientation/on-boarding programs.

Buehler watched BSA's Embodied Carbon 101 – Structure on January 25, 2022. This webinar has also been included in our New Hire Training manual that all new employees receive on their first day. A link to the video is provided on the company intranet page.

- Electives - (2) required, recommended to achieve (4) per year. See below and insert the letter(s) corresponding to selected electives: A, B, D, G, J

Potential Education Electives

- A. Distribute ECAP within your firm upon publishing. (required)
2023 ECAP has been distributed.
- B. Make (1) webinar focused on embodied carbon available to employees. (required)
The embodied carbon webinar viewed on January 25, 2022 is posted to the company intranet.
- C. Have one representative of your firm (any employee) attend quarterly external education programs (e.g. webinar, workshop) provided by SE 2050, Carbon Leadership Forum (CLF), or other embodied carbon resources.
- D. Share the SE 2050 library of resources with technical staff.
The website link to the SE 2050 library of resources was included in the firm-wide email announcement. Staff will be reminded of this resource during our internal education events.
- E. Share embodied carbon reduction strategies with your firm as outlined in Top10 Carbon Reducing Actions for Structural Engineers document produced by SE 2050.
- F. Nominate a minimum of (1) employee per office to participate in a CLF Community Hub and/or task force.
- G. Provide narrative outlining plans for minimum (2) firm-wide presentations per year on the topic of embodied carbon.
Buehler holds annual training day in the fall, and a topic related to embodied carbon or sustainability will be presented at each event. In January of each year the entire staff will watch recorded webinars on embodied carbon.
- H. Present the document, "How to calculate embodied carbon" to all technical staff.
- I. Minimum (1) employee attends a presentation or demo of an LCA-based tool used to calculate embodied carbon, such as Tally, Athena IEB, or One Click LCA.
- J. Initiate an embodied carbon interest group within your firm and outline their goals.
Buehler formed a Sustainable Design Committee when we joined SE 2050. This committee is focused on reviewing aspects of embodied carbon and fulfilling the requirements of the SE 2050 Commitment. Goals of the committee include updating all specifications to prioritize sustainable practices.
- K. Provide a narrative of how the Embodied Carbon Reduction Champion will engage embodied carbon reduction at each office. (intended for multi-office firms).
- L. Propose other actions promoting embodied carbon education and describe their value.

2. Reporting

- Provide a narrative on how your firm plans to measure, track, and report embodied carbon data. Here are some considerations to include:
- » How will you calculate embodied carbon for structural materials?
 - » Do you have access to product- or region-specific EPDs?
 - » What commercially available LCA software will you be using to quantify embodied carbon?
 - » What life cycle analysis (LCA) methodology will you use? Define where you plan to delineate scope (e.g. A1-A5, A-C, A-D), communicate inherent assumptions, etc.

- » How will you calculate material quantities and how often?

Buehler intends to use Athena and the ECOM tool by SE 2050 to measure embodied carbon in selected projects. We will compare the output obtained from these two platforms to evaluate the consistency and sensitivity of the data. Material quantities will be obtained using modeled elements in Revit including some manual modifications where necessary when structural elements are not explicitly modeled in Revit. Quantities may be obtained at major project milestones as appropriate for the project, such as Schematic Design, Design Development, Construction Documents, and/or Material Procurement phases. Local or regional EPD's will be used when feasible depending on the project location, but will otherwise make rational assumptions on the use of EPD's. The life cycle analysis will focus on stages A1-A5, however we will evaluate each project to determine if an analysis beyond these stages is warranted.

A goal for 2024 is to study how the EC3 tool can be incorporated into the LCA process. We are also investigating the Tally software for performing LCA.

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

We intend to present webinars and internal training to staff using the data that is collected on projects that have measured embodied carbon, as outlined in the Education section of the ECAP.

- Submit a minimum of (2) projects per U.S office with structural engineering services to the SE 2050 Database. It is not required to submit more than (5) total projects across the firm.

Seven projects were uploaded to the SE 2050 database in July 2023. We will continue to upload at least five each year.

- Electives - (1) required, recommended to achieve (2) per year. See below and insert the letter(s) corresponding to selected electives: **A, C**

Potential Reporting Electives

- A. Submit projects to SE 2050 Database. See checkbox and description above. (required)
- B. Submit all projects to the SE 2050 Database.
- C. Report a greater percentage of projects than the previous year.
2023 Submitted two more projects than 2022.
- D. 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.
- E. Propose other actions that promote the reporting of embodied carbon data and describe their value.

3. Embodied Carbon Reduction Strategies

- Set an EC reduction goal for the coming year and an implementation narrative. Qualitative goals focused on education are appropriate for the first year.

Our goal for 2024 is to review LCA data from our projects and look for patterns in the

data which would inform areas where carbon reduction can most likely be achieved.

- For second year's ECAP and beyond, provide a narrative about what you have learned about embodied carbon reduction in the past year. Describe successes and misses to help the program improve.

Our intent of reviewing data to find areas of improvement has not yet begun, however is something we would like to do once a number of LCA's are performed. Another goal is to update specification language to make sustainable practices a priority for all projects. The specification language has been difficult to approach.

- Electives - (1) required, recommended to achieve (4) per year. See below and insert the letter(s) corresponding to selected electives: **K**

Potential Embodied Carbon Reduction Strategy Electives

- A. Incorporate data visualization into your ECAP. How are you looking at data to make informed design decisions and communicate design options to your clients?
- B. Provide a project case study in your ECAP sharing embodied carbon successes and lessons learned.
- C. Create a project-specific embodied carbon reduction plan.
- D. Complete an embodied carbon comparison study during the project concept phase.
- E. Participate in a LEED, ILFI Zero Carbon, or similar project design charrette and speak to potential design considerations impacting embodied carbon.
- F. Calculate your firm average benchmark for embodied carbon.
- G. Update your specifications and incorporate embodied carbon performance. Include embodied carbon in your submittal review requirements.
- H. Collaborate with your concrete supplier to reduce embodied carbon in a mix design.
- I. Work with a contractor during material procurement to meet an embodied carbon performance criteria on at least (1) project.
- J. Have an Environmental Product Declaration (EPD) created as a result of a project.
- K. Incorporate biogenic materials on at least one project annually.
We have incorporated mass timber on at least one project, and many projects use traditional wood framed construction. 2023 included a couple more mass timber projects and design pursuits.
- L. Provide a narrative of how circular economy has been used on your projects. This can be done by incorporating re-use or design for deconstruction into at least one project.
- M. Report weight and method of transportation of structural material. Track how much is processed for recycling/salvage and sent to landfill, including material generated during demolition and construction activity. Include at least four material streams (e.g. concrete, metal, wood, gypsum wallboard, paper and cardboard, plastic).
- N. Integrate embodied carbon mitigation strategies in your General Notes.
- O. Propose other embodied carbon reduction strategies and describe their value.

4. Knowledge Sharing Narrative (Advocacy)

- Provide a narrative about how you plan to share knowledge and data to accelerate adoption of embodied carbon reduction.

Buehler's initial approach to advocating for sustainable structures will be very similar

to our own internal education. We can advocate for reduced embodied carbon simply by having conversations with clients about our efforts. We can share the data that we have collected on past projects, explain how carbon was reduced or could be further reduced, and show how much or how little that effort is different than “business as usual.” By sharing our knowledge with our internal staff, it equips each of us with the information needed to start a conversation with our clients, and hopefully the importance of reducing embodied carbon will be embraced by the design and construction team.

We have a mass timber presentation that we have been presenting to architect clients a few times per year, which has a component of sustainability in using the timber material. This helps architects to become more familiar with mass timber.

- Describe the value of SE 2050 to clients. How can we collaborate to drive adoption? At your option, attach any associated marketing materials.

As described above, the value of SE 2050 and carbon reduction starts with a conversation. Many of our clients may find a flier, case study, or other information material helpful to their understanding of carbon reduction. Buehler has prepared a one page summary of our intentions and capability as a signatory from to SE 2050 that can be used in project pursuits. This will not only be useful for advocating to our clients, but also to our own staff.

- Electives – (2) required, recommended to achieve (4) per year. See below and insert the letter(s) corresponding to selected electives: **A, B**

Potential Advocacy Electives

- A. Describe the value of SE 2050 to clients. See checkbox and description above. (required)
- B. Publicly declare firm as a member of SE 2050. See checkbox and description above. (required)
- C. Give an external presentation on embodied carbon that demonstrates a project success or lessons learned (Tip: Get connected at a CLF local hub near you!).
- D. Mentor a firm new to the embodied carbon space.
- E. Engage with structural material suppliers in your region to communicate the importance of Environmental Product Declarations (EPDs) and low-carbon material options.
- F. Engage with local, state, and federal governments to communicate the importance of low-embodied carbon procurement and construction policies, and provide expert testimony to this effect.
- G. Propose alternative methods for advocacy and describe their value.

5. Lessons Learned

Provide a summary of what the firm has learned over the previous year of embodied carbon reduction. Use this to inform strategies for the coming year.

From the time of our commitment in July of 2021 until the time of writing this ECAP update in March 2024, our main focus has been learning about embodied carbon and how to measure it using an LCA tool. The time invested in running an LCA can vary greatly depending on the project and how well the building was modeled in Revit. At some point it would be best to update Revit best practices to better facilitate the data

output for material quantities. We have also found that it can be a slow process to grasp the concepts of embodied carbon.

Our approach for the 2024 year will be to continue to run LCA's on projects and also get started on trying to better understand the data. We will look for methods to streamline the data export and manipulation process with the end goal that all engineers in our office can run an LCA on their projects. We are beginning to use Tally for LCA whereas we have previously relied on Athena or ECOM.

We are hoping to set up a process where people can discuss projects that have sustainability aspects so we can learn from each other. It would be beneficial to understand what discussions lead to decisions about specifications and project detailing.

We will continue to look for opportunities for learning and educating our staff and advocating with our clients. 2023 did not result in many internal education opportunities, however we will make an effort in 2024 on this topic.