



## Education

Distribute firm-wide announcement of your firm's pledge to join the SE 2050 Commitment. After the first year, make an announcement sharing your ECAP from the previous year.

HOK submitted a commitment letter to SE2050 challenge on March 5, 2021. On May 20, 2021 the structural group distributed a firmwide hub post on HOK's intranet system, including sharing the SE2050 challenge website resources.

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.

HOK is promoting a firm-wide education program through internal presentations and the development of an internal "How-To Guide" document.

The "How-To Guide" document is a reference for anyone in the company interested in conducting a LCA within the "HOK Policy LCA". It provides background information to the purpose of LCAs within the framework of SE2050

The internal presentations are given to Project Managers (PMs) and Project Architects (PAs) across all HOK's US offices. It gives background information on the intent of the commitment, how PMs and PAs are to be involved informing/promoting this effort to clients, and what HOK's Structural Engineering group is and can be doing to reduce embodied carbon on projects.

Within the firmwide structural engineering group there is a MS Teams channel exclusively for Embodied Carbon/Life Cycle assessment work. This channel contains resources such as internal presentations, weekly meeting minutes, and general discussions on the topic for engineers to access at any time.

Nominate an Embodied Carbon Reduction Champion for your firm. Include a brief profile (name, office, title, optional picture and bio) in your ECAP.

The Embodied Carbon Reduction Champion for HOK will be Devki Desai of the New York office, and Jaclyn Lee of the San Francisco office.

Devki Desai is a project structural engineer that has led sustainability initiatives related to life-cycle analysis and embodied energy reduction efforts at HOK specifically within the structural group. Her efforts go beyond HOK as she developed a net zero design course for first year engineering students at the University of Michigan.

Jaclyn Lee is an engineer that has been involved with the initiative/working group at HOK from the early stages of development. She is now the champion for the reporting efforts across the firm and leads weekly meetings with the other designated champions of each office/each program requirement of SE2050.





Set a date within the first year to present an “Embodied Carbon 101” Webinar to your firm (present your own or use an existing from BSA or equivalent). Include this resource in your orientation/on-boarding programs.

Throughout the year, HOK’s structural team has been giving internal presentations to various offices, architecture group, and disciplines on embodied carbon. We will include a presentation/resource for new-hires to review during their on-boarding.

Minimum (1) additional elective to educate your firm about embodied carbon and a narrative of its significance.

See below for electives chosen

### **ELECTIVES**

Share the SE 2050 library of resources with technical staff.

Our structural engineering knowledge group page on the HOK hub has a link to the SE2050 website along with copies of internal reference documents for LCA training, baseline determination, and this ECAP. In addition, our Embodied Carbon Teams channel has a links to additional resources, slides and notes from various conferences, and work in progress documents for standards like specifications with updated language for whole building life cycle analysis.

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

By the end of 2021, HOK’s New York, Atlanta and San Francisco will nominate an employee to participate in the CLF Community Hub and/or task force.

Provide narrative outlining plans for minimum (2) firm-wide presentations per year on the topic of embodied carbon

HOK will plan for at least two firm-wide presentations that will include a “Embodied Carbon 101”, HOK’s progress on SE2050’s commitment, structural engineering strategies to reduce carbon intensities, and any general industry-wide updates.

Thus far, these presentations have been given to groups separately within the firm. These groups include HOK’s core board, market specific interdisciplinary groups, project architect group, and 10 regional offices.

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

A group of HOK employees have been given a demonstration of One-Click LCA. This software is the primary tool to conduct LCAs and calculate embodied carbon.

Another presentation that was attended was given by TEKLA. They have an add-in to their structural software suite that can calculate embodied carbon with a feature that can relate demand-capacity ratios of individual members with carbon intensities. This allows users to analyze more closely analyze the effects of optimizing member sizes as a reduction strategy.





Other actions you feel appropriate and a narrative for why.

1) At HOK we have set a goal that every structural engineer is able to implement carbon reduction strategies and that most engineers are able to run an LCA.

2) Attended AIA Georgia COTE presentation "Embodied Carbon and Whole Building Life Cycle Assessment" by Kelly Roberts in March 2021

## Reporting

Provide a narrative on how your firm plans to measure, track, and report embodied carbon data. Here are some considerations you may want to include:

How will you calculate embodied carbon for structural materials? Do you have access to product- or region-specific Environmental Product Declarations (EPDs)?

HOK will be calculating embodied carbon based off the materials that correlate to the project's specifications. If project specifications are not yet finalized, we will use projects of similar size, location and use to compare metrics. Where available, region specific and product specific EPDs will be used.

Initial material baselines for projects without regional specific data will be based from the latest materials Baseline Report from CLF. For materials that are highly region specific, we will be using region specific data from industry organizations. For example, with concrete mixes, initial baseline values for cement or GWP will be based on regional data from the NRMCA unless a better source is available or the NRMCA data is not representative.

What commercially available LCA software(s) will you be using to quantify embodied carbon?

HOK will primarily be using OneClick LCA to analyze/quantify the embodied carbon on projects.

What life cycle analysis (LCA) methodology will you use? Define where you plan to delineate scope (e.g. A1-A5 or whole life cycle), communicate inherent assumptions, etc.

Depending on the rigor of LCA; ie pursuing LEED points or not, at a minimum we plan to delineate the scope to be within the A1-A3

How will you extract material quantities and how often? (currently for internal use and not required in SE 2050 Database)

We intend to extract material quantities from Revit models. If projects are not yet modeled, we will use a project narrative information and/or project that is similar in size and use to estimate quantities. The frequency will depend on the project, however at a minimum, we intend to capture the embodied carbon intensity at the end of Schematic Design so that we can have baseline criteria to propose strategies to reduce the project's intensity as it progresses through design





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

HOK has developed an internal guide, aptly named "How-to-guide" for anyone who wants to run a LCA on a project using OneClick LCA software. We have periodic "office hours" that will be open to anyone interested in trainings, learnings and/or presentations on embodied carbon.

- 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.

HOK will submit 5 projects for the firm to the database.

### **ELECTIVES**

- Other actions you feel appropriate and a narrative for why.

HOK has made a commitment to perform a single point structural system LCA on new construction whole building projects that are over 5000 square feet. While we are not submitting all of them to SE2050 database, it will help inform HOK of their projects embodied carbon across their portfolio of various projects and develop appropriate reductions.

## 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.

For the majority of the first year HOK has focused its efforts on collecting data from its past and current projects to determine current baselines for various types of projects and gather data to develop appropriate reduction strategies.

Starting from 2021, HOK is striving for a 55% reduction of embodied carbon by 2030. In order to meet our goal we have a yearly target of 6-7% reduction of carbon intensity.

- Minimum (1) additional elective you undertook to reduce embodied carbon in your designs, why you chose the elective and its significance.

See below for electives chosen

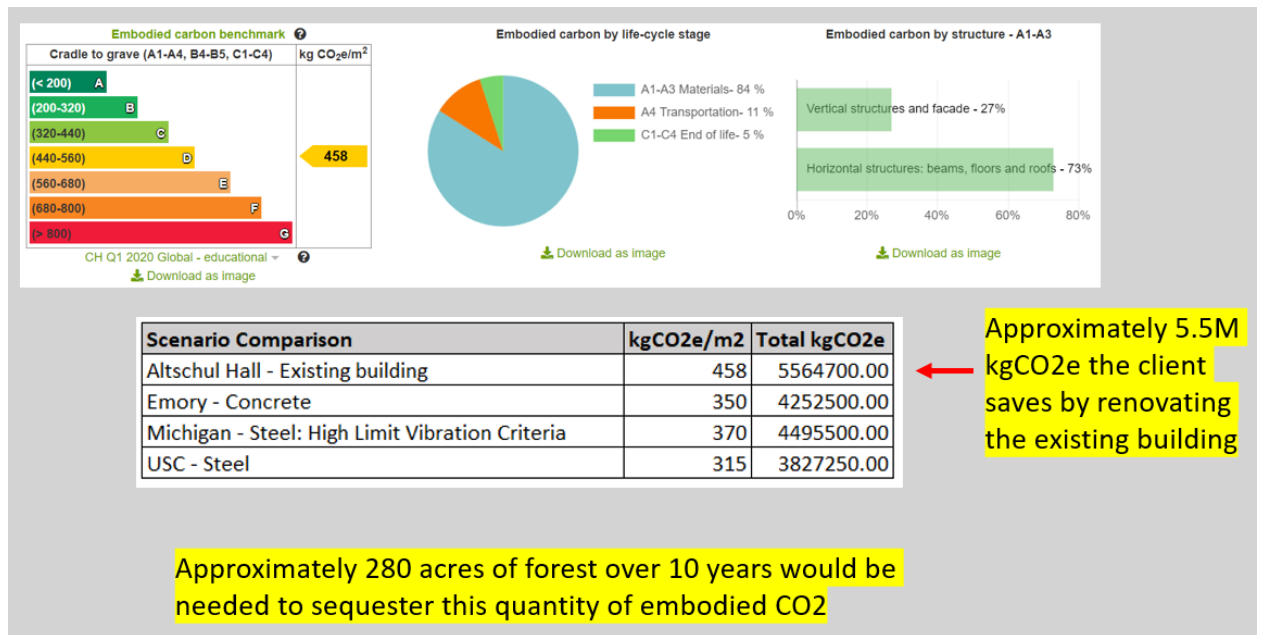


## ELECTIVES

- Provide a project case study in your ECAP sharing embodied carbon lessons learned.

HOK is providing the summary from a LCA that we performed to reveal what one can glean from by running a LCA to compare new construction against keeping an existing structure.

HOK learned that with minimal time and effort valuable information can still be learnt. Only one day was spent on this effort, and the material take-off does not have to be fully comprehensive to get an estimate of the embodied carbon of a structure.



- Create a project-specific embodied carbon reduction plan.

For a particular project HOK developed, what was an initially an internal report, a document that we eventually shared with the project team that lead to client involvement and being on board with developing carbon reduction strategies. The document also helped steer the client to include embodied carbon analysis in HOK's scope of work. While the project did not start with a reduction plan, by educating and involving the client, one was developed.

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

For an academic building a comparative study was conducted comparing the project's concept phase concrete superstructure and substructure with the as-designed steel superstructure and concrete substructure.

Additional comparative LCA's were performed on a large office building to drive a client decision on structural system for the building. Four options were presented from the original precast concrete option to a mass timber building. The building started as a high embodied carbon precast concrete building and is now a structural steel framed building





Participate in a LEED, ILFI Zero Carbon, or similar project design charrette and speak to potential design considerations impacting embodied carbon.

This is in progress for a current project. The project is pursuing LEED credits and proposing a reduction of 25% (as compared to 10% for LEED) less carbon as compared to a baseline building.

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

For a university project the design team worked with the supplier to develop a mix design that had embodied carbon intensity targets more aggressive than during the initial concept.

HOK will foster the relationships with suppliers to implement reductions of embodied carbon in mix designs.

Have an Environmental Product Declaration (EPD) created as a result of a project.

On a large university campus project, HOK worked with the concrete supplier to develop a EPD for a project specific concrete mix. On future projects we anticipate working with the design team to procure EPDs as needed.

Integrate embodied carbon mitigation strategies in your General Notes.

A framework for reducing the embodied carbon footprint has been incorporated into our structural General Notes master file for concrete mixes based off the Marin County Low Carbon Concrete Code and has been implemented on the west coast. Currently, it has been rolled out on two projects in the Bay Area and in Seattle. Additional training on how to determine the appropriate cement and GWP limits based on project location occurs for each project.

Steel specification have also been updated with a framework to reduce its embodied carbon content with requirements for mill specific EPD's and maximum GWP for various steel products based on recommended baselines from CLF and the latest AISC industry wide EPD.

Other actions you feel appropriate and a narrative for why.

HOK has created an internal program called STREAM that is a structural parametric optimization tool that can be utilized to find the most efficient use of material or building geometry. With the commitment to SE2050, we developed a LCA module within STREAM that can output the environmental impact for each solution the solver generates. This allows engineers to assess both the design and environmental impacts that can help guide decisions towards economical and more sustainable outcomes during the early phases of a project.





## Advocacy

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

HOK plans on sharing knowledge through internal and external lectures. To date we have given external lectures to AIA-Committees, I2SL conference, graduate and undergraduate students at several universities and through ASCE student chapters or similar. For internal presentations, we average 1 presentation a month to various departments within HOK.

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

We are currently working with the HOK marketing department on how to succinctly convey the value of SE2050 to clients. We will share the appropriate marketing materials when they become available.

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

HOK will declare its membership to SE2050 commitment in proposals.

### ELECTIVES

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

HOK's commitment was shared on the company's website on May 20, 2021

- 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!).

HOK has given external presentations for at least four projects that discussed both successes and lessons learned.

As HOK completes more LCAs, especially those that are pursuing LEED points, presentations will arise.

- Share education opportunities with clients.

HOK has participated in an Earth Day lecture at a university where the university was the client for a project on the campus.

HOK's portfolio includes higher education, science & technology, and renovation & refurbishment, so we anticipate that as we work with clients in such sectors that we will be sharing education opportunities

- Other actions you feel appropriate and a narrative for why.

Presented at AIA Philadelphia COTE "Embodied Carbon: Tools for Tracking" presented by HOK's Devki Desai on August 9, 2021.

