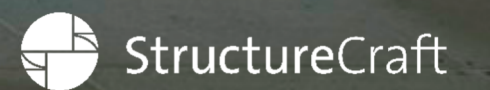




# Embodied Carbon Action Plan

2024



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Magdalena Hotel, photo: Casey Dunn

# 1. Introduction

StructureCraft is an Engineer-Build firm with a portfolio covering efficiently designed and built mass timber and hybrid steel-timber structures across North America and Asia. We understand our roles as stewards and the impact our work has on the world and the built environment.

The following Embodied Carbon Action Plan (ECAP) outlines our strategy to provide education and resources on embodied carbon to our internal staff, to track the embodied carbon of our current and past projects, to reduce the embodied carbon on future projects through efficient structural design, sourcing, and procurement, and to present options for lower carbon designs to clients. As a continuation of our first ECAP, submitted in 2021, this Embodied Carbon Action Plan summarizes the initiatives we are pursuing in the upcoming year and reflects on the previous year.



*Tianfu Agricultural Expo*



*The Nancy Pauw Bridge, photo: Paul Zizka*

# 2. Education Plan

As part of the goal to encourage sustainable design using the latest tools and resources, the StructureCraft sustainability group has created and distributed resources and guidelines within the company and attended workshops and demonstrations throughout the year. The group is responsible for creating and updating an internal intranet sustainability page that is accessible to all employees and includes resources for life cycle assessments (LCAs), supplier specific environmental product declarations (EPDs), sustainability certification systems, forest management and chain-of-custody, and innovative lower carbon building materials.

Joining SE2050 was distributed through an email and was followed by a presentation in a weekly engineering meeting. The company will distribute this presentation to all new engineering members and distribute an updated yearly announcement.

### 3. Knowledge Sharing Narrative

As a mass timber engineering, manufacturing, and installation company, StructureCraft is promoting the use of timber across different building and infrastructure typologies.

Working closely together with Architects & Owners, the sourcing of wood is a common topic and often given as a project requirement. As a design-build company, StructureCraft assists both the Architect and Owner in determining sustainable pathways of procurement. We have also made improvements to our internal carbon reporting tools to present structural embodied carbon data clearly to our Architects and Owners.

StructureCraft presents each year at a conference where sustainability is a topic. Last year, Leif Johnson presented the embodied carbon savings from our 619 Ponce project in Atlanta, Georgia at the 2023 AIA/ASCA Materials Economics Conference at the University of Massachusetts Amherst. This year, Leif is presenting an update to the LCA for 619 Ponce at the Mass Timber Summit. We are continuously open to speaking opportunities that allow us to share our carbon studies and findings to the broader AEC community.



### 4. Embodied Carbon Reduction Strategies

As engineer of record on structures which often already contain significant timber elements as well as concrete/steel, StructureCraft's focus in pushing forward sustainable construction techniques must go beyond simply recommending mass timber as a lower carbon construction material. Our focus is thus two-fold: reducing total material consumption by designing the entire structure efficiently, regardless of material choice; and lowering the carbon content of the materials we do specify via regional sourcing, and specification of low-carbon materials where possible.

Short-term Strategies (<1 year):

1. Revising project specifications to allow for the use of lower carbon building materials such as supplementary cementitious materials and carbon dioxide mineralization in concrete.
2. Amending specifications to require suppliers to submit EPDs and adhere to project carbon reduction goals.

Long-term Strategies (5+ years):

1. Remain active in groups such as the Carbon Leadership Forum and Seattle2030 to stay up to date on carbon reduction strategies in the building industry.
2. Continue to design efficient structures to cut down on the volume of new building materials.
3. Research and stay up to date on innovative lower carbon alternative building materials for use in our buildings.
4. Add to our internal database of LCAs performed on our projects.
5. Use our St Elizabeth's retail pavilion project, which was completed last year and is intended to be disassembled and moved in the future, to build our experience with projects that are designed for disassembly.

### 5. Reporting Plan

StructureCraft has designed a carbon reporting template for visual reporting and communication with clients. The report is focussing on early design considerations for LCA stages (A1-A5) and covers the listed structural elements:

- Substructure: Foundations, Slabs on Grade, Basement Walls, Pile Caps
- Superstructure: Columns, Beams, Floor Plates, Stairs, Walls, Bracing Elements

StructureCraft is committed to analysing the design efficiency of our buildings against international performance targets provided by SCORS, RIBA, and LETI by using a variety of LCA software and tools available online as well as our in-house carbon accounting tool. Depending on the stage of the project when the LCA is performed, material quantities are taken from design estimates based on prior project experience or, in later stages of the project, from the actual structural design.

The sustainability group at StructureCraft is tasked with collecting EPDs from suppliers for use in our LCAs. Where supplier specific EPDs are not available, we rely on industry averages supplied by organizations such as the National Ready Mixed Concrete Association (NRMCA) and American Institute of Steel Construction (AISC).

At minimum, StructureCraft performs a full building (A1-A4) LCA for two projects each year to fulfill the commitment to SE2050. Additionally, we deliver LCAs for our clients as requested during early phases of a project to help inform design decisions. For example, StructureCraft recently performed four LCAs for a building on the east coast to help our client understand the relative carbon impact of the following schemes for a given building footprint: three levels of mass timber over two levels of concrete, four levels of mass timber of two levels of concrete, an all mass timber scheme, and an all concrete scheme. StructureCraft is committed to providing these kinds of studies for clients on future building projects to encourage carbon-reducing design decisions.

## 6. Elective Documentation

The following list summarizes StructureCraft's electives for our 2024 ECAP:

Category	SE 2050 Requirement	Actions
Education	Provide a narrative of how the Embodied Carbon Reduction Champion will engage embodied carbon education at each office.	Our Embodied Carbon Reduction Champion is responsible for attending all CLF and SE2050 meetings and reporting back to the sustainability group with action items. They, along with any other member of the group, may organize updates (via email blast or company meetings) to the wider engineering office.
	Present at least (1) webinar focused on embodied carbon and make recording available to employees.	On the company internal intranet page for sustainability, a list of videos on the topics of LCA assessments, sustainable forestry, and carbon neutral construction is now available. On the same page, the SE 2050 library of resources is linked and explained in more detail.
	Initiate an embodied carbon interest group within your firm and outline their goals.	StructureCraft has created a sustainability group which meets quarterly. The primary goal of the group is to ensure progress towards achieving the commitment and company's sustainability goals. As the group has grown throughout the year, it has enabled us to structure and grow our internal resources around embodied carbon.
	Create an embodied carbon digital resource forum on your firm's internal website.	A sustainability page has been created on our company's intranet to be a resource for anything related to carbon accounting and reduction strategies.
	Engage with a CLF regional hub.	Members of our sustainability group regularly attend CLF Seattle's monthly meetings and report relevant information back to the company.
Reporting	Submit a minimum of (2) projects to the SE 2050 database.	Two projects have been submitted to the SE 2050 Database for 2024. This data is also used internally to benchmark and improve future projects.
Reduction	Set clearly stated, firm-wide reduction targets in the short-term and long-term.	See section 4 of this report for our stated short-term and long-term goals.
	Update your specifications to incorporate embodied carbon performance. Include embodied carbon in your submittal review requirements.	We have revised our concrete specifications to include requirements for including EPDs in the submittal process, to select mixes that align with the project's overall carbon goals, and to allow lower-carbon substitutions for Portland cement.
	Compare different design options with embodied carbon as a performance metric during the project concept phase.	StructureCraft has completed multiple LCAs for a project on the east coast to compare carbon impacts of wood vs concrete schemes on embodied carbon. See section 5 of this report for additional information regarding this exercise.
Advocacy	Describe the value of SE2050 to clients.	Our involvement in SE2050 helps our engineers become more aware of options to design efficiently and sustainably with the earth's limited resources and focus on using natural and renewable materials. This in turn helps owners and designers become aware of their responsibility to wisely steward natural resources and provides options for them to do so. Our design teams create early massing design studies to benchmark carbon for design options. Our engineers include manufacturers early in the design process. This allows them to evaluate the feasibility of different transportation modes and supplier capacities in the early project design. Further, we promote sourcing material from regional forests where possible.
	Publicly declare your firm as a member of the SE2050 commitment.	Along with the submission of our ECAP 2023, the company is releasing its commitment to the SE 2050 program on the website.

## 7. Lessons Learned

As in previous years, StructureCraft remains committed to optimizing our building designs and to assisting owners and architects in setting and achieving carbon reduction goals. Over the last year, we have increasingly received questions from clients interested in comparing carbon emissions of timber structures to equivalent concrete buildings. We find it encouraging that carbon emissions are starting to play more of a role in design choices and are committed to collecting enough data from our carbon studies to be able to give our clients accurate answers to these kinds of questions.

As in previous years, we continue to see that one of the best things we can do as structural engineers to reduce the carbon footprint in our projects is to design efficient structural systems that are well suited to the structural material being used. We find this to be especially true when advising our clients on appropriate bay sizing and column spacing for a mass timber building vs. a steel or concrete building. Once this structural efficiency is achieved, we can assist our client with additional carbon saving measures like regional sourcing of materials and using innovative low-carbon materials where possible.



KF Aerospace Spiral Stair, photo: Shawn Talbot

