Flad Structural Engineers

SE 2050 Embodied Carbon Action Plan

Flad Structural Engineers is pleased to submit this Embodied Carbon Action Plan. This plan outlines our ongoing strategies to advance our commitment to achieve net-zero embodied carbon in structures by the year 2050.

As outlined in the guidance documents provided by the SE 2050 committee, there are five components to our plan:

Education | **Knowledge Sharing** | **Reduction** | **Reporting** | **Lessons Learned**

Education

Provide a narrative of how the Embodied Carbon Reduction Champion(s) will engage embodied carbon reduction at your office.

Flad has three public commitments, the AIA 2030 Commitment, the AIA Architecture and Design Materials Pledge, and the SE 2050 commitment featured prominently in our marketing materials, in internal communications and in our client proposal response messaging. Flad has committed to utilizing embodied carbon evaluation tools and training staff to understand how the material choices that they make impact the embodied carbon of our buildings, with the greatest opportunity for reduction currently coming from structural materials.

Present at least (1) webinar focused on embodied carbon and make a recording available to employees.

Our embodied carbon reduction champions, highlighted below, in partnership with others at the firm, have integrated life-cycle analysis into our project design process. Earlier this year we launched an internal tool, the Design Impact Toolkit, to help teams make informed choices to reduce the embodied carbon in our buildings as an integral part of our design process. A recording of the training was shared with staff and coordinated with our human resources department, ensuring that it is included in our staff on-boarding.

Train all of your firm's structural engineers on the core concepts and skills required to measure, reduce, and report embodied carbon.

In addition to introducing and socializing the Design Impact Toolkit, the importance of embodied carbon has been emphasized within our structural engineering department. Training and updates continue as a part of department meetings and continuing education as well as incorporation into our firm's annual Sustainable September lecture series.

Incorporate embodied carbon education in your on-boarding process for all new employees.

Educating our employees about the importance of embodied carbon analysis, as we add staff to our firm, is vital. We must ensure that they have an understanding of where we are and were we are headed on our sustainability journey. Educating them about use of our Design Impact Toolkit in addition to other sustainability tools during their on-boarding process is critical to Flad's future success.

Engage with a CLF Regional Hub.

In partnership with several other AEC community members, the Wisconsin Hub of the Carbon Leadership Forum (CLF) was formed in the Fall of 2022. Flad has been instrumental in building the capacity, growth and reach of the Hub. Our embodied carbon reduction champions have presented, organized, and led engagement sessions to bring learning, awareness, and advocacy to the region. Focus has been on engaging the AEC community in Wisconsin as well as manufacturing partners to help them understand their role in reducing the embodied carbon in our buildings.

Propose other actions promoting embodied carbon education and describe their value.

The SE 2050 library of resources is available to all technical staff through our internal sustainability intranet page. We continue to promote our SE 2050 resources via all-staff and structural group meetings. Trainings are scheduled throughout 2024 to enhance the knowledge of technical staff and lessons learned are shared with the firm.

Embodied Carbon Reduction Champions

Tim Liebhold PE, SE, LEED AP
Structural Engineer

Tim has 18 years of engineering experience working on new and existing facilities in corporate, research, healthcare, and academic markets. Tim is dedicated to improving sustainability in structural design and leads Flad's SE 2050 efforts.

Kimberly Reddin AIA, LEED AP BD+C, WELL AP
Principal - Director of Sustainability

Kimberly has 18 years of design experience spanning the academic, science and technology, corporate, and healthcare markets. The driving force behind Kimberly's work is her belief that good design improves communities and helps both current and future generations to flourish.

Knowledge Sharing

Describe the value of SE 2050 to clients. How can your design teams collaborate to reduce embodied carbon? Please attach any associated marketing materials. Publicly declare your firm as a member of the SE 2050 Commitment however you see fit.

Flad shares its three public commitments on our website, in our external marketing materials and in our internal education opportunities. We explain to our clients how our participation in SE 2050 influences our approach to structural design on their projects.

We also promote our SE 2050 Commitment through our feeds on several social media channels:

www.flad.com

https://www.linkedin.com/company/flad-architects/

https://www.instagram.com/fladarchitects/

https://www.facebook.com/fladarchitects/

In addition, Flad's staff promote CLF Wisconsin Hub events and promote these events on our social media channels as well.

Give an external presentation on embodied carbon that demonstrates a project success or lessons learned. Get connected to a CLF regional hub near you are be sure to post the recording.

Flad's Carbon Reduction Champions have presented case studies and lessons learned at AIA Wisconsin, CLF Wisconsin, and USGBC Wisconsin events. CLF Wisconsin posted the case study presentation recording to their regional hub website. We continue to seek additional opportunities to present our experiences, lessons learned and share our expertise gained over the years since joining the SE 2050 Commitment.

Reduction

Develop and implement a workflow that makes it easier to make early design decisions based on embodied carbon.

Flad introduced the Design Impact Toolkit in March of 2024. As we socialize and implement this workflow on all projects over 10,000 gsf, teams will be engaged in understanding the impact of material decisions on the embodied carbon of our buildings. The Design Impact Toolkit workflow encourages teams to reduce their overall embodied carbon, work with manufacturers to specify low carbon structural materials, and create baselines for commonly specified materials to find ways to reduce the embodied carbon in our building designs.

Communicate the embodied carbon impacts of different design options to clients with create and effective data visualization.

Flad has updated our internal library of bay study estimates with embodied carbon data to support early phase decision making, helping our teams understand the impact of our structural designs.

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

On several projects this year, team members discussed embodied carbon as a part their project's LEED design charrette. Discussions revolved around material reuse, reduction of high-carbon materials for the enclosure and right-sizing the structure to reduced the overall embodied carbon in the designs.

Have an Environmental Product Declaration (EPD) created for a project.

We have successfully worked with our manufacturing partners to create EPDs for two projects in the past and are actively working with a contracting partner to create mix design EPDs with concrete suppliers in an area of Wisconsin previously without EPDs.

Reporting

Submit a minimum of (2) projects per U.S. office with structural engineering services to the SE 2050 Database.

Flad's structural department is located in our office in Madison, Wisconsin. This year, three projects have been identified to be submitted by March of 2024 from Flad's portfolio of projects in design. When deciding what projects to report, we seek to submit projects of significance with valuable data to add to the SE 2050 collection of knowledge.

Describe how different project teams or managers are measuring and reporting embodied carbon.

Flad is utilizing OneClick LCA for our embodied carbon analysis. Our goal is to review at least the structure and enclosure for all of our projects over 10,000 gsf. We are building our capacity through staff training on OneClick LCA software. Two staff members recently attended a OneClick LCA Bootcamp and we seek to train at least five additional staff members in the coming year.

Compare the embodied carbon emissions from multiple projects across your firm. Analyze and document what data or pieces of information are most important and communicate findings to your firm.

In updating Flad's bay study estimates, we will be able to better support early phase decision making on the team with a deeper understand of the carbon impact of the structure on the proposed design. With this early information available, there is an opportunity for the team to discuss embodied carbon reduction strategies with the team from the start of the project.

Reporting Plan

Measure

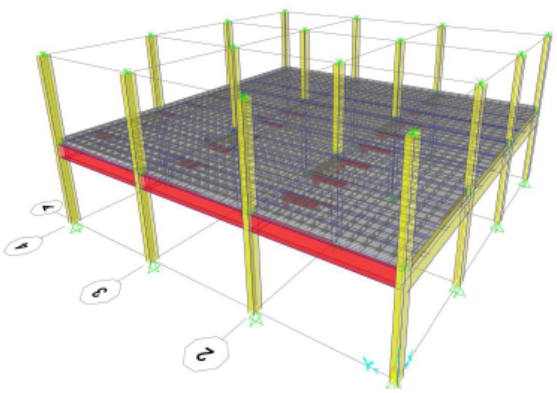
Flad Structural utilizes our BIM models with One Click LCA to calculate embodied carbon for structural materials. Wherever possible, we ask for and utilize product-specific EPDs. Where this is not possible, we look for industry or regional average EPDs. We calculate at least stages A1-A3, and C1-C4 for our projects. In early design, our goal is to compare materials and bay studies. We strive to capture baseline carbon quantities during schematic design when there is time to make material choices that can reduce the embodied carbon of the design. We conclude our measurement process by calculating the complete building material quantities at the end of construction documentation.

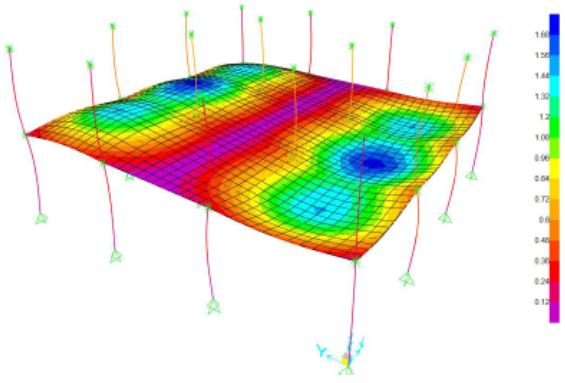
Track

Flad has an internal project database where we track whole-building embodied carbon for AIA 2030 Commitment reporting. We currently keep a separate data sheet for SE 2050 reporting, but with the next update to our database, will look to incorporate structural embodied carbon data for tracking and ease of reporting.

Report

Project reporting will be uploaded to the SE 2050 in March of 2024. Flad's sustainability team is seeking synergies between projects reported for embodied carbon in SE 2050 and projects reported with embodied carbon information in the AIA DDx to fulfill our AIA 2030 Commitment.





Lessons Learned

A summary of what you have learned as a firm over the previous year of embodied carbon reduction. Use this to inform your strategies for the coming year.

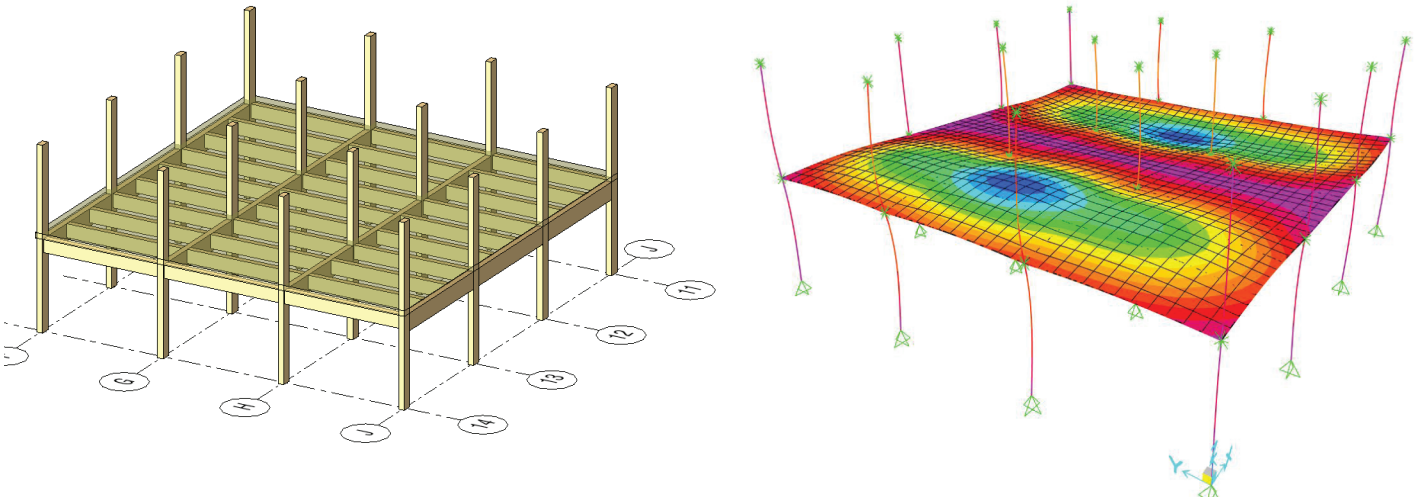
Flad has three key take-aways from our participation in the SE 2050 Commitment.

1. This is hard.
   Materials that drastically lower embodied carbon are not yet available in the marketplace. By utilizing tools, like the Design Impact Toolkit, we can help increase our teams awareness of what materials are needed and start material discussions early in the project. With awareness, teams can discuss the importance of low carbon materials with our clients, increasing awareness and the need for carbon positive materials to help drive changes in the industry. Business as usual will not help us meet our carbon goals.

2. We cannot do it alone.
   We learned the importance of reaching out to manufacturers to understand regional market options early. Low-carbon technologies have been adopted at different rates and scales in different regions, so understanding what is already available and where there are gaps, helps the team understand what can be done in design and where there are limitations. We discovered that some concrete plants will create EPDs if given adequate advance notice, and the best way to ensure that manufacturers have enough time is to call early in design to talk about embodied carbon and product-specific EPDs. Even if that conversation does not ultimately provide us with the ability to specify a mix-specific EPD from that manufacturer, it helps us advocate for advancing low-carbon concrete.

3. There is nuance and complexity to solving the challenge of reducing carbon in our buildings.
   We learned that whole-building design studies are too time-consuming to be reasonable for most projects in early design. Flad is working to establish a toolkit of benchmarked projects, benchmark comparisons for concrete mix designs, to use in concert with our completed bay study comparisons, to help us understand the impact of structural design choices in concept and schematic design phases.

In addition to our key take-aways, we have been talking to manufacturers, peers, and industry leaders about how to best write our specifications to encourage transparency and carbon reduction without limiting project schedule or impacting budget.



Images: Anticipated floor frequencies and mode shapes for various configuration of Mass Timber flooring systems in high performance applications.