



Flad

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/Advocacy | 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 multiple public commitments including 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.

Flad developed and presented a webinar titled "Structural and Environmental Impact Analysis of Mass Timber" which identified the benefits and limitations of utilizing mass timber in healthcare and laboratory settings. The presentation, based on a study that analyzed the environmental impacts of mass timber, included the reduced embodied carbon of mass timber compared to steel and concrete. Additionally, the study analyzed the strict vibration criteria of laboratories and hospitals. It looked at how a mass timber bay would need to be constructed in order to meet the criteria and how the mass timber bay influenced the environmental impacts. The study was published internally and Flad is looking for opportunities to publish it externally.

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

Our embodied carbon reduction champions, highlighted below, in partnership with others at the firm, have trained staff on life-cycle analysis and incorporated it into our project design process. Flad has developed 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. In addition to 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, as well as continuing education, and sessions during our firm's annual Sustainable September lecture series. Additionally, staff is trained on our basis of design library which includes embodied carbon data.

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 where we are headed on our sustainability journey. Educating them about the 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.

Embodied Carbon Reduction Champions



Tim Liebhold PE, SE, LEED AP
Structural Engineer

Tim has 20 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 20 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 and Advocacy

Describe the value of SE 2050 to clients. How can your design teams collaborate to reduce embodied carbon? Please attach any associated marketing materials.

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.

Publicly declare your firm as a member of the SE 2050 Commitment however you see fit.

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 participate in CLF Wisconsin Hub events and promote these events on our social media channels.

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 recording for Flad's Veterinary Medicine project case study presentation 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

Set clearly stated, firm-wide reduction target in the short-term (<1 year) and long-term (>5 years).

For short-term reduction targets, Flad is making it standard for projects to complete an LCA, helping our designers better understand how their decisions impact the embodied carbon of their designs. This analysis enables material selections focused on reducing embodied carbon. Additionally, we have incorporated ACI 323 as a minimum reduction standard in our concrete specifications (15%) and recommend 20% as the target. For the long-term, Flad commits to working with design teams and contractors to achieve a 20% average reduction in embodied carbon as reflected in our specifications and LCAs

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, finding ways to reduce the embodied carbon in our building designs.

Communicate the embodied carbon impacts of different design options to clients with creative 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.

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, four projects have been identified to be submitted by March of 2026 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 database.

Describe how each office is measuring and reporting embodied carbon.

Flad utilizes OneClick LCA for our embodied carbon analysis. Our goal is to review the structure and enclosure for all of our projects over 10,000 gsf, at a minimum. We are building our capacity through staff training across all offices on OneClick LCA software and incorporating analysis into our design process. Additionally, if a project has an LCA, Flad staff report the embodied carbon annually to the AIA 2030 DDx.

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 with a deeper understanding 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 from the start of the project.

Reporting Plan

Measure

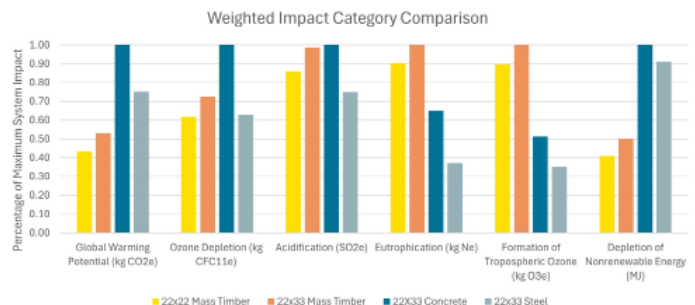
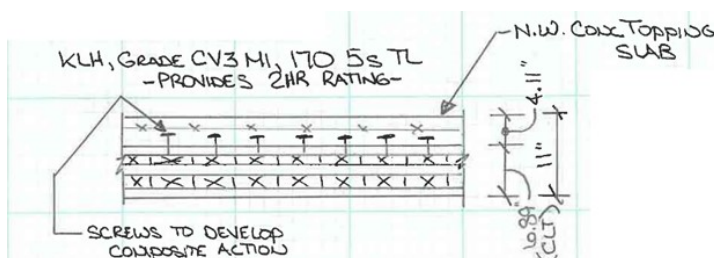
Flad Structural utilizes our BIM models with One Click LCA to calculate embodied carbon for structural materials. Wherever possible, we ask for and utilize product-specific EPDs. Where this is not possible, we look for industry or regional average EPDs. We calculate at least stages A1-A3, and C1-C4 for 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 2026. 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.

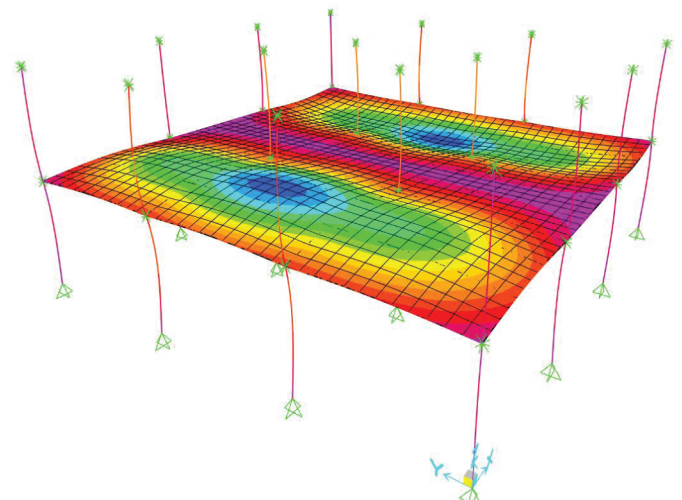
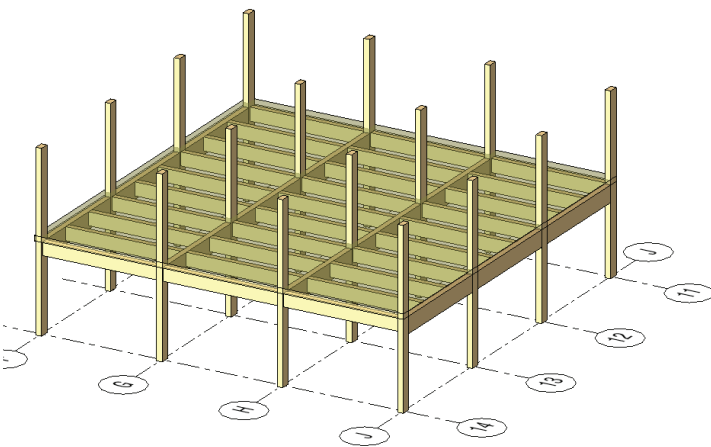
2. We cannot do it alone.

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 in the marketplace.

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, and benchmark comparisons for concrete mix designs, to use in concert with our completed bay study comparisons, helping 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.