

ASCE / SEI SE 2050 Commitment Program

Embodied Carbon Action Plan 2026



Maffei Structural Engineering

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Our firm

At Maffei Structural Engineering, we enjoy a collaborative work culture and are committed to growing a practice that embraces both design and research.

Founded in 2013, we are a small and growing firm located in downtown San Francisco, and we love to investigate, ask questions, and re-think challenging issues in structural engineering, leading to efficient solutions and resilient structures and communities. We strive to do interesting work in a collegial environment that encourages learning and teaching.

Our work is a balance of seismic evaluation, new building and retrofit design, expert review, and engineering research. We are industry leaders in advanced seismic analysis, performance-based design, tall buildings, and renewable energy structures. We use innovative methods to develop efficient, targeted structural design solutions. We have designed structures for architects, owners, universities, institutions, and corporations.

With our pioneering work in solar energy structures, and as signatories to the SE 2050 pledge, we are committed to environmentally sustainable design and construction.

Values and vision

Maffei Structural Engineering takes pride in finding creative and successful solutions to challenging structural engineering projects. The challenges typically come from multiple constraints, and the best designs tend to be “win-win-win” across a diversity of constraints and objectives. As a firm, we welcome sustainability and carbon reduction as objectives in our projects.

Environmental sustainability is one of the core values of our firm, and we are eager to support the SE 2050 initiative. SE 2050’s commitments for the reduction of atmospheric carbon are synergistic with the other dimensions of environmental sustainability, including clean air and water, protection of wilderness and species, and the health of the land and its vulnerable populations.

Working together with a focus on sustainable design and carbon reduction, we can help make our planet a better place for the generations to come.

- Joe Maffei, SE, PhD, LEED AP
Founding Principal



Our commitment

Maffei Structural Engineering joined the SE 2050 Commitment in 2022, and we have been proud active signatories every year since. We present here our annual Embodied Carbon Action Plan (ECAP). We summarize below our goals and our planned and completed activities, following the outline provided in the SE 2050 Program Requirements Guidance Document, version 2024.0.

Embodied carbon reduction champion



Sarah Chen, PE, LEED Green Associate, is our embodied carbon reduction champion. Sarah works as a Project Engineer in our San Francisco office.

Sarah has an educational background in Sustainable Design and has experience with life-cycle assessment and integrative design processes.

Sarah has a strong interest in finding, vetting, and promoting materials and methods that reduce greenhouse gas emissions. She dives deep into the issues around the embodied carbon emissions of buildings and continues to lead Maffei’s efforts toward mitigating them.

Education plan

We continue to build our internal knowledge base to improve the company's proficiency in embodied carbon. As a baseline, Maffei maintains the following goals every year:

- That all technical staff at Maffei understand the framework and methods for building emissions life-cycle assessment and embodied carbon measurement.
- That a minimum of 5 technical staff are trained to calculate embodied carbon, using the EC3 tool and other sources of certified EPDs.

To achieve this, every year our carbon champion Sarah invites a new staff member to participate in the SE 2050 Program Requirements submission process. Each invited individual gets to closely learn about the SE 2050 initiative, what embodied carbon is in the context of our work, and how to perform a basic LCA. Sarah is also our point of contact for new employees regarding embodied carbon resources. Every month, Sarah shares news happening in the green building space in our company-wide chat space, keeping all employees current on the latest innovations.

This year, we are employing the following **education electives**:

- Provide a narrative of how the Embodied Carbon Reduction Champion will engage embodied carbon reduction at each office. *[Required]*
- Present at least one webinar focused on embodied carbon and make a recording available to employees. Include this resource in our orientation and on-boarding program. *[Required]*
- Train all of our firm's structural engineers on the core concepts and skills required to measure, reduce, and report embodied carbon.
- Engage with the CLF San Francisco Bay Area Hub by attending presentations or working sessions and reporting back to the firm.

Additionally:

- We continue to use the company-wide chat space for informally sharing information and ideas related to embodied carbon.
- We continue to update and build upon our in-house digital library for reference materials, templates, and other tools.

In 2025, we accomplished the following from our previous ECAP:

- Our carbon champion attended quarterly SE 2050 signatory calls alongside other external webinars throughout the year.
- We shared the SE 2050 library of resources with all staff.
- Our carbon champion signed up for the San Francisco Bay Area CLF Community Hub.
- Our carbon champion attended an online training workshop for One Click LCA.

Knowledge sharing narrative

We will continue to share our experiences with calculating and reducing embodied carbon with our clients and colleagues. We have dedicated a page on our company website about LCAs and their uses. We also share our SE 2050 signatory status on our company LinkedIn to bring attention to the movement.

Eliminating embodied carbon from our projects is of benefit to all stakeholders on a project and comes at no loss. The goal of SE 2050 is to achieve the same performance and value, while also reducing harm to our planet. This requires a collaborative effort that needs buy-in from the entire design team. Change will not happen without a dedicated team willing to innovate and lead the industry to a better future. We have found that owner involvement is the most effective in getting the whole team involved in embodied

carbon reduction. When the owner has specific goals, the design team can set baselines and gain support to explore reduction strategies. Early conversations allow structural engineers more flexibility to mold the building shape and explore different structural systems.

We have the following **advocacy electives**:

- Describe the value of SE 2050 to clients. *[Required]*
- Publicly declare our firm as a member of the SE 2050 Commitment. *[Required]*
- Alternative methods: We will identify opportunities to present on embodied carbon reduction at local institutions or to potential clients. We will also participate in any opportunities to advocate to local, state, and federal governments.

In 2025, we accomplished the following from our previous ECAP:

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

Reduction strategy

Over the past few years, we have conducted a number of LCAs that can be used to develop a benchmark of our firm's average embodied carbon. In the short term, our goal is for our 2027 submitted projects to have embodied carbon intensities no more than the averages reported in the SE 2050 Database, based on primary lateral system. In the long term, we will aim to trend downward alongside the industry, reducing our average embodied carbon by about 3%-5% every year.

As a small structural firm that specializes in seismic work, we mainly seek and work on structural renovation or retrofit projects. These types of projects extend an existing building's life expectancy, allowing for whole building re-use and adaptation. This saves a project from the more carbon-intensive alternative of demolition and rebuilding and reduces the vulnerability of older building stock being unusable after an earthquake.

This year, we plan to work on the following **reduction electives**:

- Set clearly stated, firm-wide reduction targets in the short-term (<1 year) and long-term (>5 years). *[Required]*
- Submit a Circular Economy Narrative describing how a project supports the circular economy. This can be done by incorporating re-use or design for deconstruction into at least one project.
- Update our specifications to incorporate embodied carbon performance. Include embodied carbon in our submittal review requirements.
- Collaborate with a project's concrete supplier to reduce embodied carbon in a mix design below an acceptable baseline.

In 2025, we accomplished the following from our previous ECAP:

- Update our specifications and incorporate embodied carbon performance. Include embodied carbon in our submittal requirements.
- Collaborate with a concrete supplier to reduce embodied carbon in a mix design.
- Have an Environmental Product Declaration (EPD) created as a result of a project.

Reporting plan

Every year, we use the EC3 tool to measure cradle-to-gate (A1-A3) embodied carbon for at least 2 projects, calculating structural material quantities by hand using the structural drawings. If a BIM model is readily available from the project, we use Tally to help streamline the material quantity calculations into EC3. When applicable, we begin measuring embodied carbon in the SD phase, updating our calculations

through the DD and CD phases. For projects in design, we select EPDs by either using industry-wide EPDs or by using a pool of EPDs from local suppliers with similar material properties. Our standard specifications require EPDs of main structural materials (i.e. concrete, steel, rebar). During the construction phase, we store all submitted EPDs in a company database to be used to refine our GWP numbers and our knowledge of local embodied carbon values. This process is consistent across all reported projects from Maffei.

We have the following **reporting electives**:

- Submit embodied carbon data for two projects to the SE 2050 database. *[Required]*
- Describe how different project teams or managers are measuring and reporting embodied carbon.
- Compare the embodied carbon emissions from multiple projects across our firm. Analyze and document what data or pieces of information are most important and communicate the findings to our firm.
- Include all structural material quantities in our submissions to the SE 2050 database.

In 2025, we accomplished the following from our previous ECAP:

- Submit the required minimum of two projects to the SE 2050 Database.

Lessons learned

Each section above highlights electives we achieved from last year's ECAP. One observation is that many of our goals are either still in progress or were not fulfilled. We learned that it is difficult to apply embodied carbon reduction strategies on smaller scope retrofit projects because of constraints from the existing conditions. Since much of our work does not involve new building design, we have had less opportunities to collect EPDs and baseline data for our projects. Based on these lessons learned, we plan to focus 2026 on internal education and advocacy. We want to hone our skills so that we are more prepared when the right opportunities arise.