SE2050
2026 Embodied Carbon
Action Plan
March 31, 2026

SEI STRUCTURAL ENGINEERING INSTITUTE ASCE | SE2050 COMMITTING TO NET ZERO

JIRSA | Hedrick STRUCTURAL ENGINEERS

DELIVERING COLLECTIVE INGENUITY

JIRSA HEDRICK 2026 EMBODIED CARBON ACTION PLAN

Pt 1. Introduction

The fourth year of Jirsa Hedrick's involvement in SE2050 has been very successful with several milestones and achievements to boast. Jirsa Hedrick performed Life Cycle Assessments (LCA's) on two major projects; presented sustainability focused presentations at multiple architecture firms; participated in the Structural Engineer's Association of Colorado Sustainable Design Committee; joined the SE2050 summit and symposium at CU Boulder, and created and shared sustainable design insight on social media. This ECAP will cover Jirsa Hedrick's SE2050 work from spring of 2025 through Spring of 2026. This ECAP will cover the work that has been done in that time in the four action categories of *Education, Advocacy, Reporting, Reduction.*

Jirsa Hedrick has defined three phases to develop SE2050 information and goals to help define the scope of SE2050 work each year. The three phases established are: knowledge growth, knowledge implementation, and SE2050 target date reduction.

Knowledge Growth

- Perform initial LCA's for multiple project types.
- Learn various LCA software to establish best software for JH specific needs.
- Establish LCA calculation criteria such as waste and surplus increase multipliers.
- Establish baseline embodied carbon values for typical projects of various material types and occupancy.
- Learn about ongoing sustainable technologies including sustainable design strategies, sustainable products and sustanability focused legislation.

Knowledge Implementation

- Perform LCA's using established criteria for consistent LCA comaparison.
- Define standard LCA calculation policy in office LCA process manual.
- Implement various low cost sustainable design strategies into projects to initiate conversations with the design team, project ownership and construction teams to gain understanding of ease of implementation.
- Work with Sustainable Design Committee to establish local sustainable design resources.

SE2050 Target Date Reduction

- Actively work towards 4% baseline embodied Carbon reduction per year in an effort to achieve 0 net embodied Carbon by 2050.
- Use LCA calulations during design to inform design decisions with sustainability as a serious constraint.
- Implement major Carbon reduction strategies and technologies such as Carbon sequestration concrete products, mass timber design, material reuse, recycled materials, etc.
- Advocate for major carbon reduction in local structural designs.

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Pt 2. Education Plan

OVERVIEW:

The Jirsa Hedrick embodied carbon education plan is intended to provide all Jirsa Hedrick employees with the necessary information to make informed embodied carbon design decisions. The embodied carbon education initiative will be accomplished through carbon-focused office technical meetings as well as encouragement for attending outside seminars on sustainable design. Our carbon champion will lead these meetings and provide information from research, webinars, and interaction with other SE2050 signatory firms who have shared their lessons learned. Jirsa Hedrick currently holds technical meetings every Thursday for discussing miscellaneous technical topics; we anticipate the embodied carbon education initiative will take place during these technical meetings.

Goals:

The primary goal of the Jirsa Hedrick embodied carbon education plan is to ensure all engineers have the knowledge necessary to make informed carbon reduction decisions in design. The success of our education initiative will be measured by our ability to achieve the following goals:

1. Inform design team about sustainable design in all major material types (ie wood, steel concrete, masonry, etc)
2. Inform engineers about the Life Cycle Analysis calculation process
3. Inform staff about SE2050 values and goals

Looking back on last year:

1. **Provide a narrative of how the Embodied Carbon Reduction Champion will engage embodied carbon reduction at each office.**

   The Jirsa Hedrick Embodied Carbon Champion has been designated as the leader in finding out about new carbon reduction strategies and getting that information out to the technical design team. The embodied carbon champion attends sustainability focused seminars, including the SE2050 Symposium, and presents any valuable lessons learned to the design team. It is the responsibility of the carbon champion to ensure the design team is aware of trends and new concepts in sustainable design.

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

   This year's internal sustainable design learning session was an in-house presentation discussing the recent LCA results and an overview of the "Prestandard for Assessing the Embodied Carbon of Structural Systems for Buildings".

   The results for the LCA's, included in this report, were discussed and compared with previous years results in an effort to begin establishing trends. The methodology of the LCA process was then discussed in the context of the Prestandard, specifically discussing the assumptions made in past LCA's and how those compare to the guidance provided in the Prestandard. At the closing of the presentation all employees were aware of the provisions of the Prestandard, and how those provisions can help with sustainable design decision making.

Looking Forward to next year:

- Recurring Technical Meetings: There are always new subjects being presented at the Jirsa Hedrick technical meetings and next year we will have an array of new topics to explore including:
  1. Presentations from sustainable material companies
  2. Embodied carbon LCA tools
  3. Carbon reduction in concrete construction
  4. Carbon reduction in steel construction
  5. Carbon offset strategies
  6. Embodied carbon legislation
  7. Local Colorado embodied carbon resources and EPDs

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Part 3. ADVOCACY PLAN

Overview:

Jirsa Hedrick is eager to face the challenge of spreading awareness of embodied carbon reduction initiatives in the local Denver and greater Colorado area. We hope to spread awareness in as many ways possible as outlined below by utilizing face to face client communication, social media posts, business development networking, and policy creation/support.

Goals:

The primary goal of the Jirsa Hedrick embodied carbon knowledge sharing initiative is to grow the awareness and understanding of embodied carbon reduction in the local market with the hope that such awareness spreads nationally. The annual goals for external knowledge sharing are as follows:

1. Spread sustainable design knowledge within the local engineering community
2. Inform and persuade design teams toward sustainable design
3. Spread useful sustainable design information on social media platforms
4. Impact local sustainability focused design code provisions

Looking back on last year:

1) **Participate in SE2050 Symposium.**

   Jirsa Hedrick's Carbon champion attended the SE2050 Symposium and served on the Database committee. Participation in the Symposium committee provided the opportunity to advocate for improvements to the data collection process. Participation in the larger group settings granted the opportunity to advocate for improvements to information sharing and offer ideas and examples of success with embodied carbon accounting.

2) **Describe the value of SE 2050 to clients.**

   All proposals for new projects include an overview of SE2050 values and how Jirsa Hedrick implements various strategies to stay in alignment with the goals of SE2050.

3) **Publicly declare your firm as a member of the SE 2050 Commitment.**

   Jirsa Hedrick has an active social media presence and has used its various platforms to not only announce SE2050 membership, but also discuss sustainable design topics that move the industry forward towards net zero design.

4) **Give an external presentation on embodied carbon that demonstrates lessons learned.**

   Jirsa Hedrick has held various information sessions and presentations to architecture groups that share what we've learned so far. Jirsa Hedrick presented about

"Sustainability in Structural Design" at over a dozen architecture firms around the Denver area with the hope of increasing awareness about adaptive reuse strategies.

5) **Participate in local engineering sustainability committees.**

Jirsa Hedrick's Carbon Champion is a member of the Structural Engineering Association of Colorado Sustainable Design Committee. Tasks of the committee include researching various sustainable design ideas, presenting information to the broader Structural Engineering Association of Colorado member body, developing sustainable design recommendations and where possible interacting with committees in charge of sustainable code creation. Some of the work done by the Jirsa Hedrick Carbon Champion includes review and suggested revisions to the Colorado Model Green Code and development of committee resources.

Looking Forward to next year:

- Client interaction: One of the most impactful means of knowledge sharing is in the early planning stages of a project through persuasion of architects and owners to the value of carbon reduction in material selection. By explaining the possible strategies for embodied carbon reduction early in a project the design team has the best chance of incorporating sustainable design features early on and designing within those constraints. In addition, Jirsa Hedrick will continue presenting about "Sustainable Structural Design" to several local architecture firms to educate architects of structural sustainability strategies.

- Social Media Posts: Jirsa Hedrick typically posts project updates, local building coverage, company events and exciting news on a weekly basis to multiple social media accounts. As part of the SE2050 knowledge sharing initiative, we will post about sustainability related news and products throughout the year.

- Business Development Networking: Jirsa Hedrick typically attends monthly business development meetings with local industry professionals. As part of the SE2050 knowledge sharing initiative, Jirsa Hedrick will engage in embodied carbon reduction discussions and work to grow the knowledgebase in the local market.

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Part 4. Reporting

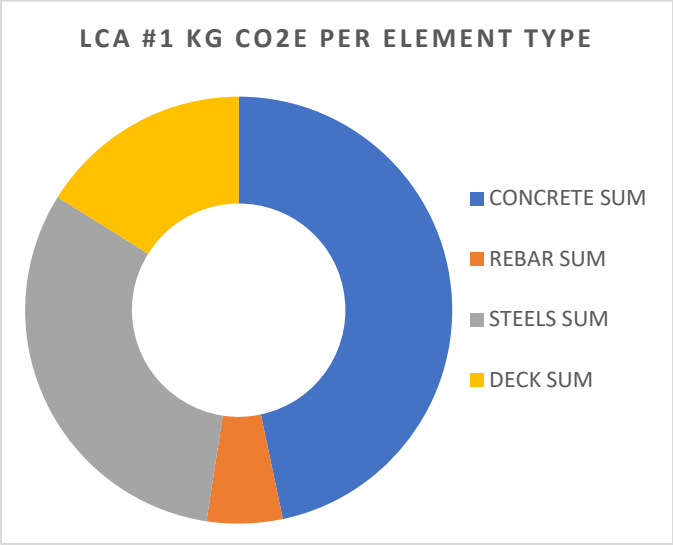
Overview:

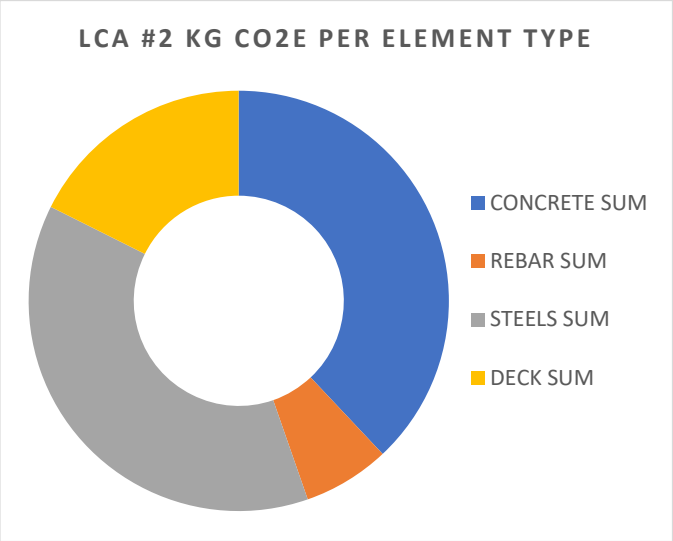
Jirsa Hedrick has completed a handful of life cycle analysis as part of our Phase I stage of embodied carbon reduction. This initial phase of participation is focused towards establishing baseline design values to gain understanding of the embodied carbon associated with typical designs. For this third year of LCA evaluation, we have used the lessons learned from previous LCA's and transitioned to a more manual computation to compare the functionality with what we have used previously (Beacon, TallyCAT). The types of projects and the LCA results are described in further detail below.

Goals:

The current overall goal of our structural life cycle analysis is to establish design baseline values that can be used to inform future decisions. Establishing this baseline embodied carbon value will require several steps including:

1. Perform life cycle analysis for multiple projects that are at or near completed design
2. Establish consistent methodology for LCA calculations
3. Incorporate ASHRAE 240P guidance on waste and surplus 'Material Increase Multipliers'
4. Incorporate 'Prestandard for Assessing the Embodied Carbon of Structural Systems for Buildings' guidance.
5. Compute an office wide average carbon count for projects

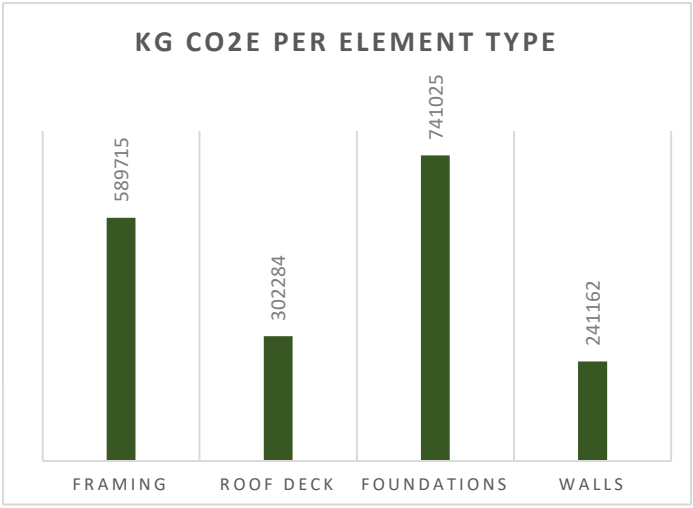




LCA #1 – New Retail Building

Overview:

The first LCA completed by Jirsa Hedrick is for a new retail shopping location for the Outdoor equipment chain 'Bass Pro Shop'. The building is composed of cast in place concrete foundations, cast in place concrete tilt-up wall panels, steel columns, and steel beams and roof joists. This project was selected for the first LCA this year because of the fact the structural design was complete when beginning the LCA, the structure has readily product specific EPD's for the various concrete mixes used, and has a steel framed roof structure. The analysis only included A1-A3 LCA scope and only included structural elements, similar to a Tier 1 analysis as described in the Prestandard for Assessing the Embodied Carbon of Structural Systems for Buildings.



Results:

Bass Pro Shop LCA Results		
Total CO2e	**1,874,187**	kg CO2e
	162	kg CO2e/m²

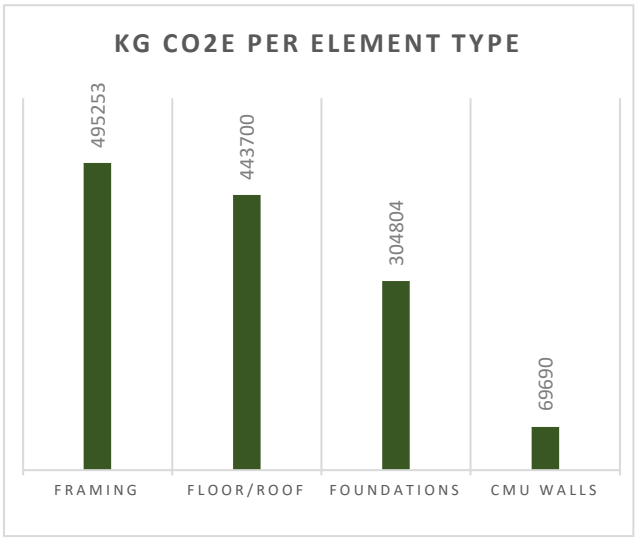
The LCA totals are shown in the table above and element breakdown as shown in the bar chart above. As expected, the bulk of CO2e is from the concrete elements. The quantities of structural elements were obtained directly from the Revit model, processed manually with spreadsheets software and then increased per the table below. A uniform 10% increase was used on all elements. The project has 147 kg CO2e/m² when computed without the 10% increase.

Bass Pro Shop Material Increase Multipliers			
FDN WALL REBAR INCREASE	1.10	FDN WALL CONCRETE INCREASE	1.10
SLAB REBAR INCREASE	1.10	SOG REBAR INCREASE	1.10
FOOTING REBAR INCREASE	1.10	FOOTING CONCRETE INCREASE	1.10
CMU REBAR INCREASE	1.10	CMU INCREASE	1.10
JOIST INCREASE	1.10	TILTUP CONCRETE P CONCRETE	1.10
GIRDER INCREASE	1.10	TILTUP REBAR	1.10
BEAM INCREASE	1.10	SOG INCREASE	1.10
COLUMN INCREASE	1.10	ROOF DECK INCREASE	1.10

LCA #2 – New Elementary School

Overview:

The second LCA submitted to SE2050 this year is for a new elementary school planned for northern Colorado. The building is a 2-story, steel framed structure with deep foundations. This project was selected because of the typical building geometry, the fact the structural design was complete when beginning the LCA, the structure serves as example of a structural steel building, and the availability of product specific EPD's for the various concrete mixes used. The analysis only included A1-A3 LCA scope and only included structural elements similar to a Tier 1 analysis as described in the 'Prestandard for Assessing the Embodied Carbon of Structural Systems for Buildings'.



Results:

New Elementary School		
Total CO2e	**11,125,403**	kg CO2e
	196	kg CO2e/m²

The LCA totals are shown in the table above and element breakdown as shown in the chart above. As expected, the bulk of CO2e is from steel framing elements. The quantities of concrete and steel elements were obtained directly from the Revit model and processed manually with spreadsheets. The material increase multipliers for this project are shown in the table below. A 10% increase was used on all elements other than steel beams which were increased 15% to account for composite studs and connections. This LCA used project specific EPD's for all concrete, and industry wide EPD's for all other elements.

New Elementary School Material Increase Multipliers			
PILASTER REBAR INCREASE	1.10	COLUMN INCREASE	1.10
FDN WALL REBAR INCREASE	1.10	FLOOR DECK INCREASE	1.10
SLAB REBAR INCREASE	1.10	ROOF DECK INCREASE	1.10
PIER REBAR INCREASE	1.10	PILASTER CONCRETE INCREASE	1.10
CMU REBAR INCREASE	1.10	FDN WALL CONCRETE INCREASE	1.10
JOIST INCREASE	1.10	FLOOR CONCRETE INCREASE	1.10
GIRDER INCREASE	1.10	PIER CONCRETE INCREASE	1.10
BEAM INCREASE	1.15	CMU INCREASE	1.10

Pt 5. Reduction

Overview:

Jirsa Hedrick has used the first few years of SE2050 involvement to develop life cycle assessment methodology standards with the goal of producing a baseline understanding of the embodied carbon for typical projects. Jirsa Hedrick focused on concrete structures for the first several life cycle assessments, and this year instead focused on steel framed structures. Rather than utilizing black-box LCA software that reads material from a BIM model, this year's LCA's were manually performed using BIM exports to spreadsheets.

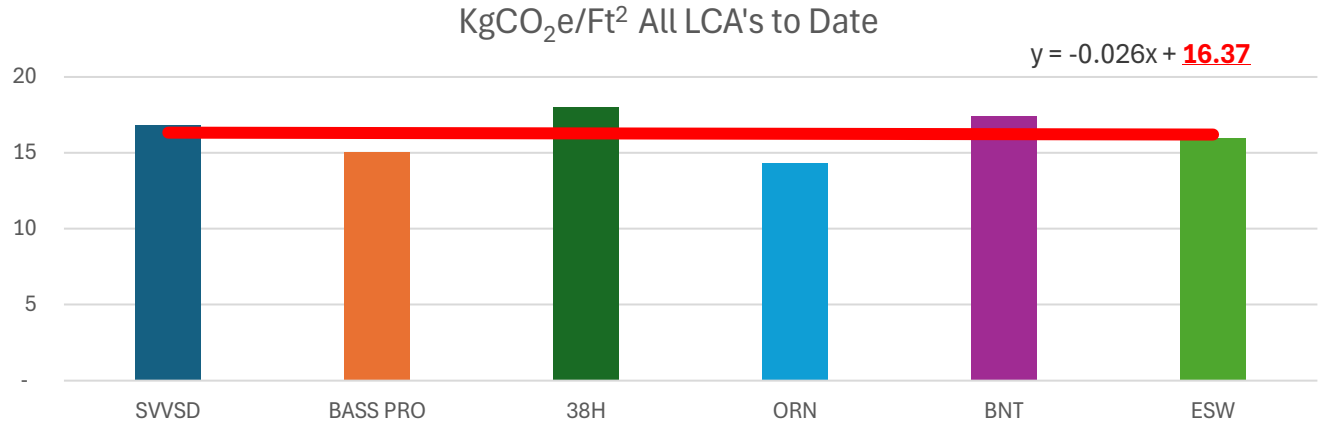
Goals:

The reduction strategy and reporting plan goals for the next year:

1. Implementation of guidance from the Prestandard for Assessing the Embodied Carbon of Structural Systems for Buildings, focusing on Tier one or Tier two analysis types
2. Generate an LCA with embodied carbon data for 2 projects minimum
3. Develop an internal project baseline for embodied carbon
4. Upload embodied carbon LCA data to the SE2050 database
5. Implement embodied carbon reduction strategies during project early design stages

Looking back on last year:

Last year, Jirsa Hedrick produced two LCA's for two recent steel framed structures, the results of those LCA's are shown in the previous section. The average GWP per floor area from those completed LCA's is 172 kg CO2e/m², down from 192 kg CO2e/m² last year. These values were in line with industry average of this building size/type. Normalized to a square foot unit, these projects were at 15 and 17 KGCo2e/Ft² respectively, and to date the completed JH LCA's have an average of 16.3 $KgCO_2e/Ft^2$.



The “Prestandard for Assessing the Embodied Carbon of Structural Systems for Buildings” was not available in time for utilization in this years LCA’s but it may be helpful to compare the recent LCA methodology to that presented in the Prestandard. The LCA’s performed thus far utilize provisions of all three tiers. The figure shown below shows a general summary of the analysis tiers with highlighted provisions that align with Jirsa Hedrick methodology for LCA’s.

Feature	Tier 1 (Simplified)	Tier 2 (Intermediate)	Tier 3 (Detailed)
Component Scope	**Included:** Primary structural components. **Optional:** Accessory and ancillary components [9].	**Included:** Primary and accessory components. **Optional:** Ancillary components [9].	**Included:** Primary, accessory, and ancillary components [9].
Material Quantities	Allows **manual approximations** (e.g., rule-of-thumb, design tables) and early design documentation [10] [11].	Requires **quantity takeoffs** from design documentation; manual approximation is only permitted in limited cases [10] [12].	Requires **as-built data** from contractor submittals or procurement records [10] [13].
System Boundary	**Required:** Modules A1–A3 (Product Stage). All other modules are optional [5].	**Required:** Modules A1–A5 (Upfront Carbon). Use and End-of-Life stages remain optional [5].	**Required:** Modules A, B2–B5 (Use), and C1–C3 (End-of-Life) [5].
Carbon Data Sources (A1–A3)	**Allows global secondary data,** industry-average EPDs, and proxy materials [6].	**Prohibits global secondary data;** permits industry-average EPDs only if more accurate data is missing [6].	**Requires** product-specific EPDs for at least 90% of the material mass [6] [14].

Thus far all LCA’s have been performed at the end of building design and the material sums can include all primary structural elements and many secondary elements – and by increasing the material sums with the material increase factors shown secondary elements such as connections, miscellaneous elements, and construction waste can be included; in line with a Tier 2 analysis. Accessory and ancillary components are largely excluded. In general all concrete EPDs used to date (except LCA#2 from 2025) are project specific, in line with Tier 3 requirements. Elements such as Steel framing, rebar, PT tendons, CMU, metal deck, and all other elements have GWP computed using industry wide EPD’s, in line with a Tier 2 analysis. All analysis to date include A1-A3 stages only, in line with Tier 1.

Looking Forward to next year:

Implementation of the prestandard will provide uniformity going forward, we look forward to guidance from SE2050 that coincides with the provisions of the prestandard to allow for even more consistency in reporting among all participants. With an 176 $KgCO_2e/m^2$ average established for all projects to date we will aim for a 4% reduction to 169 $KgCO_2e/m^2$ next year.

2025 Establish Baseline → **2030** 20% Reduction, 80% of Baseline → **2035** 40% Reduction, 60% of Baseline → **2040** 60% Reduction, 40% of Baseline → **2045** 80% Reduction, 20% of Baseline → **2050** 100% Reduction, 0% of Baseline