

Embodied Carbon Action Plan V5.0

SE 2050 COMMITMENT



Executive Summary

This document intends to outline Datum's Embodied Carbon Action Plan (ECAP) summarizing the internal practices for the year 2025 to continue our efforts for the SEI SE 2050 goals through the following:

- Education: Understanding how building materials contribute to greenhouse gas emissions. and how we as structural engineers can help reduce these emissions associated with structural systems.
- Reporting Strategies: Developing in-house tools and methodologies to create databases compatible with SE 2050 database
- Embodied Carbon Reduction Strategies: Developing key actions and laying out design strategies to reduce embodied carbon.
- Advocacy: Developing educational opportunities to share the value of EC reduction with our clients and share the knowledge to accelerate the adoption of SE 2050 commitment.

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Introduction

DATUM ENGINEERS, INC.

Founded in 1937, Datum has grown into a regional leader in structural engineering and to this day, Datum remains committed to building on our legacy of design excellence, cultivating a passion for architecture and practicing the Art of Structural Engineering.

Datum has an experienced team, many of whom have worked together for more than 20 years. We are dedicated professionals who are committed to our clients and to excellence in our work. We employ over 30 licensed engineers and other professionals in four offices throughout Texas and Chicago to work on signature projects nationwide.

Datum recognizes its responsibility in helping the building design community address the climate change issues and the impacts that our structural systems have on the environment. Datum supports the SE 2050 initiative by Structural Engineering Institute and Carbon Leadership Forum and will work toward the goal of the net-zero embodied carbon by 2050.

Overview

Over the past four years, Datum Engineers has steadily advanced its embodied carbon capabilities:

- **2022:** Built foundational knowledge of embodied carbon concepts and tools
- **2023:** Integrated life-cycle assessment (LCA) services into project proposals for sustainability-driven projects
- **2024:** Contributed to industry-wide strategy development and policy discussions, and continued to volunteer in SE2050 program efforts ([See Exhibit H](#))
- **2025:** Supported the development of American Institute of Steel Construction (AISC) Sustainability Design Guide through peer review of the guidance, contributing technical expertise and practitioner insight. Internally, Datum conducted sustainability workshops for interns to perform LCA. In parallel, the firm revamped its internal Sustainability Chapter ([See Exhibit I](#)), formalizing workflows, and education pathways.

This evolution reflects a shift from learning and awareness to implementation, standardization, and accountability.

FY 2025 Reflections

Low Carbon Technologies

In 2025, Datum expanded its evaluation of emerging low-carbon concrete technologies, including ground-glass pozzolan (ASTM C1866) and blended cements such as Type IS. While ACI 318-19 does not list ground-glass pozzolan as a prescriptive cement type, it allows alternative cementitious materials when supported by performance evidence; therefore, Datum's approach is to consider GGP only on a performance basis, with particular attention to alkali-aggregate reaction (ASR) mitigation, recognizing that pozzolanic reactivity can vary with glass source and fineness. Where appropriate, these materials will be advanced as approved alternates contingent on project-specific testing and documented durability performance, rather than being mandated as a one-size-fits-all specification.

Another technology we evaluated was C-Crete, which is positioned as a cement-free, ultra-low-carbon concrete intended to be cost-comparable to conventional concrete while maintaining (or improving) performance. They claim the binder uses natural rocks or industrial by-products (no Portland cement) and can be supplied through local ready-mix partners for standard placement methods. A webinar on C-Crete's cement-free binder approach was particularly insightful and

informed our intent to explore pilot feasibility on an appropriate project, subject to EPD availability, performance validation, and stakeholder alignment

On impact and feasibility, C-Crete highlights potential carbon reductions (“up to 1 ton CO₂ saved per ton of C-Crete binder used”), ~15% lower water demand, and compliance with ASTM C1157 plus multiple durability tests (freeze-thaw, shrinkage, ASR, chloride/acid resistance). They also cite benefits like lower heat of hydration (~95°F) for mass concrete use, lower energy synthesis temperatures than Portland cement production, and early adoption signals such as 3,000+ tons placed since 2023 and major grant recognition.

Project LCA Insights

Intensity ranges widely (≈ 146 to $344 \text{ kgCO}_2\text{e/m}^2$) across the projects, which is expected given differences in structural system, size, and where each project sits in design/construction maturity.

- The highest reported intensity is the Education Building ($\sim 344 \text{ kgCO}_2\text{e/m}^2$) (concrete PT framing + CIP + shear walls, reported at Construction phase). More comprehensive quantities and reinforcement-heavy systems at later phases typically drive higher captured impacts.
- The steel/composite projects fall in the mid-range: City Hal Project ($\sim 202 \text{ kgCO}_2\text{e/m}^2$) (steel + composite deck) and a Library project ($\sim 146 \text{ kgCO}_2\text{e/m}^2$ excluding biogenic; $\sim 115 \text{ kgCO}_2\text{e/m}^2$ including biogenic) (steel + wood framing)
 - This suggests steel/composite systems in this dataset are trending lower than the concrete PT/shear-wall project, though conclusions should remain directional given small sample size.
 - Biogenic accounting can materially change intensity where reported (Drops from ~ 146 to $\sim 115 \text{ kgCO}_2\text{e/m}^2$ when “including biogenic carbon”), so it’s important to keep “excluding vs including biogenic” consistent when benchmarking across projects

Education

As part of the first year commitment requirements, Datum sent an internal email announcing Datum's commitment to SEI SE 2050. (See Exhibit A) and also sent a newsletter to our clients announcing the commitment. Swarna Karuppiah, located within Austin office, is the current embodied carbon reduction champion for Datum (See Exhibit B for profile). For our education efforts, webinars by external organizations like NRMCA, CLF etc are attended by the sustainability EC point of contact. As required, more webinars will be presented on EC and its measurement tools to broaden our understanding on embodied carbon practices by structural community. There is ongoing work on Internal Guide to develop LCA study tally tool for PMs who are looking for guidance on LCA proposal and for engineers who are looking for guidance on using Tally.

Electives

- ✓ Provide a narrative of how the Embodied Carbon Reduction Champion will engage embodied carbon reduction at each office. See Exhibit C
- ✓ Present at least (1) webinar focused on embodied carbon and make a recording available to employees. This could be created internally, pulled from an external source (with permission), or pulled from a publicly available source such as the Boston Society for Architecture. Include this resource in your orientation and on-boarding program. Completed
- ☐ Train all of your firm's structural engineers on the core concepts and skills required to measure, reduce, and report embodied carbon. (Ref. SE 2050 Resources)
- ✓ Incorporate embodied carbon education in your onboarding process for all new employees.
- ☐ Initiate an embodied carbon interest group within your firm and outline their goals. This group may more broadly address sustainability, but they must include embodied carbon. See Exhibit D
- ✓ Engage with a CLF Regional Hub. This could mean:
 - Attending presentations or working sessions and reporting back to the firm
 - Co-chairing a hub
- ☐ Provide narrative outlining plans for minimum (2) firm-wide presentations per year on the topic of embodied carbon.
- ☐ Propose other actions promoting embodied carbon education and describe their value.
- ☐ Other actions you feel appropriate and a narrative for why.

Reporting

Requirements

- Provide a narrative on how your firm plans to measure, track, and report embodied carbon data.

Datum is calculating EC for structural materials using the Tally LCA tool as it allows us to easily coordinate with our clients who use similar tools. We extract quantities through Revit model using Tally during the DD and/or CD phase as needed. Datum focuses on performing preliminary LCA for the phases A1 to A3 using manual take-off and for LEED requirements, we focus on performing comparative analysis using Tally for all the stages from product to end of life. An internal white paper on EC measurement using Tally has been developed published.

- Describe the internal training for embodied carbon measurement you provided or will provide.

Datum's internal sustainability team has presented a white paper on Scorekeeping and LCA tools. The LCA tool, Tally basic license, is available internally for EC measurement. A webinar on Tally was presented to the staff to develop a basic understanding of the tool to perform LCA on different types of projects depending on the building functions and materials.

- Submit an annual minimum of (2) projects per US structural office but need not exceed (5) total projects for the firm to the SE 2050 Database

Datum performed LCAs on 2 additional projects this past year and submitting its data to the SE2050 database in 2026 submission window

Electives

- ☐ For multi-office firms, describe how each office is measuring and reporting embodied carbon. For single-office firms, describe how different project teams or managers are measuring and reporting embodied carbon.
- ☐ 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 the findings to your firm.
- ☐ Include structural material quantities in all of your firm's submissions to the SE 2050 database.
- ☐ Other actions you feel appropriate and a narrative for why.

Embodied Carbon Reduction Strategies

While we are committed to advancing embodied carbon reduction in alignment with the SE 2050 Commitment Program, our immediate priority is to build a reliable and representative dataset across our project portfolio before setting targets. We recognize that premature target setting without sufficient data may not yield meaningful or achievable outcomes.

Short-Term (<1 year):

In the near term, we are focused on:

- Expanding adoption of internal LCA tools across applicable projects
- Increasing the number of projects tracked and submitted to the SE 2050 database
- Standardizing workflows for embodied carbon evaluation and documentation
- Enhancing team education and alignment on low-carbon design strategies

Long-Term (>5 years):

As data consistency and coverage improve, we intend to establish reduction targets that are data-driven, measurable, and aligned with projects within our portfolio. As part of the first year commitment, the goal was to educate ourselves on what EC is, how to measure it, the tools available and how to apply those tools in our projects. For second year of commitment, we introduced LCA services as part of the proposal for LEED specific projects. With few data points currently available to quantify embodied carbon reduction, we are referencing carbon budget based on CLF and NRMCA baselines for implementation of EC reduction. For the third year of commitment, see the section 'LCA Services' as part of our V4 version of ECAP for the narrative on the key learnings.

At the end of each year of commitment, updates will be made to the ECAP to incorporate the learnings and improve the methodology to approach the carbon neutrality goals.

From the list of electives below, the current elective chosen is to improve our standard specifications to incorporate ways to reduce EC reduction. The improvement in the specifications will be ongoing throughout the commitment program as we come across newer technologies and materials. We are working on implementing workflows that makes it easier to compare the carbon estimates across preliminary bay studies that help us make early design decisions based on embodied carbon. More electives will be chosen as we layout goals and we aim to add one additional elective each year moving forward.

Electives

- ☐ 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.
- ☒ Develop and implement a workflow that makes it easier to make early design decisions based on embodied carbon. [In Progress](#)
- ☒ Update your specifications to incorporate embodied carbon performance. Include embodied carbon in your submittal review requirements.
- ☐ Communicate the embodied carbon impacts of different design options to clients with creative and effective data visualization. You are welcome to include these visualizations in your Elective Documentation, though it is not required if your firm would prefer to keep marketing materials private.
- ☐ Compare different design options with embodied carbon as a performance metric during the project concept phase. Explain what you did and what the results changed (if anything).
- ☐ Participate in a LEED, ILFI Zero Carbon, or similar project design charrette and speak to potential design considerations impacting embodied carbon.
- ☒ Collaborate with your concrete supplier to reduce embodied carbon in a mix design below an acceptable baseline (e.g. NRMCA regional baseline values). Discuss what you found and what it means in your market. (See the [Overview](#) section)
- ☐ Have an Environmental Product Declaration (EPD) created for a project. Get a project or client to require the creation of an Environmental Product Declaration (EPD) that did not exist before.
- ☐ Incorporate sustainably harvested biogenic materials in at least one project.
- ☐ Submit a Case Study to the SE 2050 Website
- ☐ Quantify construction waste reduction on a project and the impact to embodied carbon.
- ☐ Integrate embodied carbon mitigation strategies in your General Notes.
- ☐ Other actions you feel appropriate and a narrative for why.

Advocacy

As part of our advocacy efforts, we have shared our commitment through a Dallas newspaper publication to encourage the structural firms in Texas to come forward and take part in changing the trajectory of building design and shared on LinkedIn to accelerate the adoption of the commitment program. We have also presented as one of the speakers of NCSEA Webinar on the topic of Net-zero carbon (See Exhibit E). Datum has presented the SE2050 commitment to UTAustin ArchE Community on Earth Day April 22nd, 2022 (See Exhibit F). Datum's EC champion organized a few webinars for CLF Austin Hub as a co-chair of the Hub to share SE2050 commitment in Austin, and, also guided AEC Solar Decathlon team at UT Austin for incorporating few sustainable practices besides guiding on the structural framing of the challenge.

Datum will continue to engage in EC reduction conversations with sustainability advisors from various client firms and collaborate with their AIA 2030 goals and will also engage in conversations with MEP consultants to achieve their commitment towards MEP 2040 goals and other stakeholders involved to achieve this collective goal of net zero carbon emissions. We will seek more opportunities to organize presentations on the value of the SE2050 commitment to clients who are working towards the same mission of improving building design and construction practices to tackle climate change impacts. We have been working with clients and owners to find more opportunities to address the reduction of embodied carbon and make decisions keeping in mind the sustainability goals of the projects. We have shared our commitment to SE 2050 on our company website (See Exhibit G).

Electives

- ☐ Give an external presentation on embodied carbon that demonstrates a project success or lessons learned. Get connected at a CLF regional hub near you and be sure to post the recording.
- ☐ Have a firm leader participate in one or more SE 2050 Quarterly Signatory Call
- ☐ Mentor a firm new to the embodied carbon space. Describe how you identified their needs and what improvements were made.
- ☐ Engage with structural material suppliers in your region to communicate the importance of Environmental Product Declarations (EPDs) and low-carbon material options.
- ☐ Engage with local, state, and federal governments to communicate the importance of low-embodied carbon procurement and construction policies, and provide expert testimony to this effect.
- ☐ Other action you feel appropriate and a narrative for why.

Appendix

Exhibit A

I'm thrilled to announce that we have officially named Swarna Karuppiah, PE, as Datum's Sustainability Champion.

This is an area of our practice and our industry that is growing in importance – and for good reason. Swarna played an important role in our successful Sustainability 1.0 efforts, and is actively working on version 2.0 to raise our game in being able to execute Life Cycle Cost Assessments on our projects to measure performance and help our clients achieve sustainability goals.

Swarna also took the initiative and prompted us to sign on to the [SE2050 Commitment](#) in its first full year, pledging to work collaboratively in our industry to reduce embodied carbon in our projects to net-zero by the year 2050. This is a big deal. It's ambitious, and it's the right thing to do as stewards of the world we live in. Swarna will be sharing more about what this means for us at the Engineering Roundtable meeting (everyone is invited) on Monday, November 8 at noon.

We will be making an announcement for the world outside our walls, but I wanted you to hear it here first.

Thanks, Swarna, for your initiative and efforts.



Exhibit B

Associate

✉ swarna@datumengineers.com

Swarna joined Datum in 2016 and was recently promoted to Associate. She has a can-do attitude and is dedicated to her profession and her role in the firm. She has gained valuable experience in the design of cultural buildings, office, healthcare, and research facilities. Her project experience includes: The Dallas Holocaust Museum, Highland Park Presbyterian Church, BSA Harrington Cancer Center, and Texas A&M University MREB 2. She has been very active in several professional organizations including: Leadership Collective, Austin Chapter of AIA, Sustainability and SE 2050 Committee Member, ASCE, and awarded the NCSEA Young Member Summit Scholarship.

Swarna received her Bachelor of Science in Civil Engineering from Indian Institute of Technology, and her Master's in Structural Engineering at the University of Southern California.

Exhibit C

Roles & Responsibilities of Embodied Carbon Champion:

- Keep track of education on embodied carbon – attend webinars/seminars, workshops or conferences.
- Conduct focussed group discussions on EC strategies.
- Develop in-house tools with the Datum's sustainability chapter to strategize reporting.
- Share all resources from SE 2050 website firm-wide.
- Coordinate ECAP progress between all the three offices and make annual updates to the ECAP documentation.
- Develop a feedback system on the commitment program to address any improvements if needed.
- Identify and promote advocacy opportunities within our AEC community and universities.

Exhibit D

Goals of Datum's Sustainability Chapter:

- The internal chapter will engage in education efforts and strategize on resource developments like White Paper, Tally Learning and other resource tools.
- Review of ECAP documentation for annual updates and address any improvements if needed.
- Coordinate advocacy efforts within the interest group to reach out their respective project teams.

Exhibit E

▼

The Structural Engineer's Role in Getting to Net Zero ⓘ

Overview

HAVE AN ATTENDANCE CODE? [SIGN IN](#) TO ENTER IT.

This live web event has ended. Thank you for attending.

DESCRIPTION

Embodied carbon has become a major topic of conversation within the A/E/C industry. Low-carbon construction is entering our design conversations and building codes with structural engineers being looked at to reduce their project's embodied carbon and with the first low-carbon concrete code in the US adopted in Marin County, California. Additionally, through the SE 2050 commitment program, structural engineering firms like Holmes and Datum Engineers are committing to reach net zero embodied carbon structures by 2050. With the push for lower embodied carbon structures, structural engineers play a vital role in getting to net zero. This presentation will explore advances the structural engineering profession is making toward net zero embodied carbon structures, discuss the top actions structural engineers can take to reduce the embodied carbon in their projects, and discuss how structural engineers can make wiser design choices to reduce emissions.

- Course will award 1.5 hours of continuing education
- This course is Diamond Review approved in 49 states. New York does not accept hours from recordings.

CONTRIBUTORS



Megan Stringer, S.E., LEED AP BD+C

Megan Stringer, S.E., LEED AP BD+C, is an Associate Principal with Holmes. Motivated by our impact on the built environment, Megan is at the forefront of reducing structural embodied carbon. She champions Holmes' SE 2050 commitment and gets sustainable structures built at impressive scales. Megan has overseen North America's largest mass timber project at the Microsoft Silicon Valley Campus, utilized low-carbon concrete pours at Intuit, and performed many life cycle assessments. She also serves as Vice President of the Structural Engineers Association of Northern California.



Swarna Karuppiah, P.E.

Swarna Karuppiah, P.E., is an Associate with Datum Engineers, Inc. in Austin, Texas. She has gained valuable experience in the design of cultural buildings, offices, healthcare, and research facilities and currently, serves on the SEI Sustainability and SE 2050 Committee to study the overall embodied environmental impacts of building materials and systems.

January 18, 2022

Tue 12:00 PM CST ⓘ

DURATION 1H 30M

This live web event has ended.

\$250.00 - \$300.00

Add to Cart

NCSEA Office
ncsea@ncsea.com
312-649-4600
ext. 200

Exhibit F



Exhibit G



[WORK](#)[APPROACH](#)[ABOUT](#)[CAREERS](#)[CONNECT](#)

[THE ART OF STRUCTURAL ENGINEERING](#)[SPECIALTIES](#)[CAPABILITIES](#)

Capabilities

Sustainability and the Race to Net Zero

Datum Engineers supports the SE 2050 commitment initiative developed by the Structural Engineering Institute and the Carbon Leadership Forum and will work towards the goal of transforming the practice of structural engineering to achieve net-zero embodied carbon by 2050.



We are Engaged

Datum proudly supports the mission of the SE 2050 commitment as envisioned by the Structural Engineering Institute of the American Society of Civil Engineers. As one of the first 70 engineering firms nationwide to take on this bold challenge, we are committed to transforming the practice of structural engineering by prioritizing the reduction of embodied carbon through the use of less impactful structural materials. Our approach is holistic, firm-wide, project based, and data-driven.

Exhibit H



Luke Lombardi ✓ • 1st
Structural Engineer and Sustainability Consultant
1yr •

Shoutout and thank you to **Swarna Karuppiah, PE** who has been an indispensable member of the SE 2050 Program Mechanics Team!

In addition to her leadership as **Datum Engineers** Embodied Carbon Champion, Swarna has supported the Program volunteer effort by managing tracking of the now nearly 140 firms committed (see here: <https://lnkd.in/gRwT92A>)! She is a great example of the positive impact you can have on your projects and in the industry.

More of her work and actions by Datum in their ECAP! <https://lnkd.in/dGqpvfz5>

If you're interested in contributing to the SE 2050 Program or interested in joining one of our working groups (<https://lnkd.in/d-ZchdB4>), please email us at contact@se2050.org.

And keep an eye out for the SE 2050 Annual Report--coming soon!!

Annabel Shephard, PE Martin Torres, PE Luke Bastian Genevieve Graham

SE 2050 Commitment Program Team

SE 2050 was developed and is managed by a dedicated group of volunteers. All members of the team are members of the SE 2050 subcommittee of the SEI Sustainability Committee and bring each a unique perspective and level of expertise to SE 2050. The team is broken down into subgroups managed by a subgroup leader and the Leadership Group. The different subgroup areas of focus are:



Exhibit I



ADAM KIRK, PE
Associate Principal, Project Manager



DANIEL RODRIGUEZ
Graduate Engineer



EDWIN THOMAS, PE
Senior Associate, Project Engineer



JIENAN ZHANG, SE, LEED AP
Associate, Project Manager



TONY PEREZ
Associate, Senior BIM Technician



SWARNA KARUPPIYAH, PE
Senior Associate, Project Engineer



JIM PAWLIKOWSKI, SE
Principal



MICHAEL L. BRACK, PE
President

SUSTAINABILITY CHAPTER

