



Embodied Carbon Action Plan



SCHEMMER'S APPROACH TO SUSTAINABILITY

We believe it is our responsibility, and our duty, to serve clients with sustainability in mind. Whether it's energy savings through advanced heating and air conditioning systems or low-impact landscaping, we aim to engineer solutions that provide the maximum return on investment for our clients and the lowest possible impact on the environment.

Sustainable building designs have come a long way in the past few decades, and the industry still has quite a distance to cover in the next few years. Similarly, Schemmer's design practices are becoming more sustainable as the years go on, yet we have a vision for a future that requires acceleration in the status quo rather than just keeping up with trends.

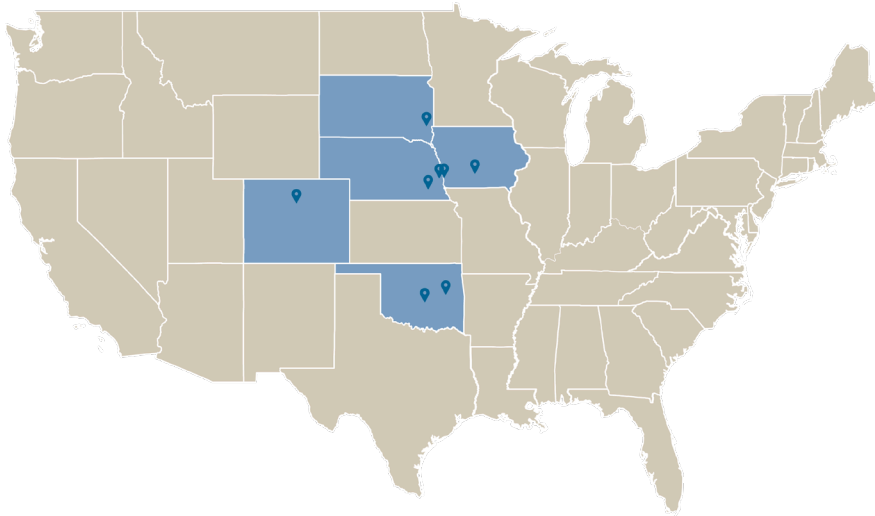
Schemmer is driven by knowledge and experience, and is committed to studying and implementing improved technology, best practices and proven solutions that provide the greatest benefit to the communities we serve. We know this is a work in process, and we have a lot of room to grow. Which is why we are seeking opportunities to join like-minded organizations who are along for the same journey.

We look forward to working with our clients to utilize our sustainable design knowledge and deliver excellent and holistic project designs to meet their needs.

WHO WE ARE AND WHAT WE DO

Design with Purpose. Build with Confidence. There is no rule - unwritten or otherwise - that says the creation of something that is unique, yet functional, need be problematic and stressful. Which is why the men and women of Schemmer take the opposite tact, infusing the design and construction process with a collaborative spirit that forges a unified sense of purpose and confidence among all involved. It begins with designing a project that meets our client's goals before a single shovel of dirt is turned over, and doesn't end until what's been put to paper is included in the final build. So when you engage the Schemmer team, you know we'll work harder and smarter to ensure that when all is said and done, your vision has become a reality.

Schemmer is a full-service architecture, engineering and construction field services consultant, providing responsible solutions for complex design and construction-related challenges. Founded in 1959, we are grounded in our past but remain fully committed to the future. Located in five states and eight offices throughout the Midwest, Schemmer is providing services to clients from coast-to-coast and border-to-border across the United States.



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FULL-SERVICE FIRM



Our **full-service firm** offers the benefit of a single point of contact and a highly coordinated project. Through a collaborative, **Integrated Design Process**, we provide the following services:

- Architectural Design
- Feasibility Studies
- Facility Assessments
- 3D Scanning
- Master Planning
- Facility Programming
- Interior Design
- Structural Engineering
- Mechanical Engineering
- Electrical Engineering
- Civil/Site Engineering
- Transportation Engineering
- Water/Wastewater Engineering
- Survey
- Geotechnical Engineering and Materials Testing
- Construction Phase Services
- Drone Photogrammetry and Surveying

SCHEMMER TEAM

Schemmer's Embodied Carbon Champion is Elena Hoff, PE



Elena Hoff, PE

Elena has nine years of experience as a structural engineer and has worked on many commercial, industrial, education, and multi-family facilities. She is licensed in Colorado, Nebraska and Iowa, and has design experience across 16 states. Elena recently relocated to Denver to establish Schemmer as a premier design firm in the mountain region and better serve clients who value sustainable design. She is committed to learning as much as possible about sustainable design and implementing new technologies and design practices into her projects.

Education

B.A. Physics

M.S. Architectural Engineering, Emphasis in Sustainable Structures

Licensure

Professional Engineer - NE, IA, CO

Affiliations

Carbon Leadership Forum Member

Schemmer's Embodied Carbon Champion for SE 2050 Commitment

Schemmer's Sustainability Committee Chair

LAUNCH Leadership Foundation

Structural Engineering Association of Colorado (SEAC)

"We firmly believe that reducing embodied carbon and other environmental impacts from our designs is the engineering problem of our generation. We know that it is our responsibility as stewards of the built environment to ensure we do not leave severe unintended consequences future designers cannot solve. It is our hope that we can leave a legacy of continuously improving the quality of our designs and minimizing the impact we leave." – Elena Hoff, P.E.

Structural Design Team



Elena Hoff, PE



Jason Heinze, SE,
PE, LEED AP



Kevin Wenninghoff,
SE



Joshua Pearce, PE



Tyler Schmidt, PE



Nathan Schmidt, PE



Nick Williams, PE



Ben Idler, EI



Matt Wissing, EI

ABOUT SE2050



Embodied Carbon

Manufacture, transport and installation of construction materials

Operational Carbon

Building energy consumption

source - architectmagazine.com

The mission of the SE 2050 Commitment is to transform the practice of structural engineering in a way that is holistic, firm-wide, project-based, and data-driven. By prioritizing the reduction of embodied carbon, through the use of less impactful structural materials, participating firms can more easily work toward net-zero embodied carbon structural systems by 2050.

What is SE 2050?

SE 2050 stands for the Structural Engineers 2050 Commitment Program which is in response to the SE 2050 Challenge issued in 2019 by the Sustainability Committee of the Structural Engineering Institute of the American Society of Civil Engineers. This comprehensive program has been designed to ensure substantive embodied carbon reductions in the design and construction of structural systems by the collective structural engineering profession.

The hope is that through small changes in our design practice every year, we will be much better positioned to consistently reach net zero embodied carbon designs by the year 2050.

EDUCATION PLAN



Schemmer has already taken its first step by educating our entire staff on what sustainability can mean to Schemmer and how embodied carbon affects all our designs. Our sustainability committee hosted an all-company Lunch and Learn in February 2023 to start the education process and gain momentum as we unveil future sustainability goals. Another Lunch and Learn was hosted in May 2023 to highlight the LEED, WELL, Green Globes and Energy Star rating systems.

Elena hosted a “Knosh & Know” session for the Structural department in January 2024, which was a deeper dive into embodied carbon. This allowed structural engineers and designers opportunities to discuss ways we could immediately update our standard design practices to reduce “pre-baked” carbon from our project templates. In February 2024, the structural department attended a webinar about “Innovations in Concrete” and how the industry has been working to reduce embodied carbon in cementitious materials.



The plan is to continue this educational series for the structural department with ten one-hour long sustainability sessions throughout the year. The next one planned will be a “show and tell,” walking through how our Life Cycle Assessments (LCAs) were conducted to fulfill the SE2050 requirements. The structural team will discuss key takeaways for improving our design practices before we bring this topic to the whole company later this year.

KNOWLEDGE SHARING NARRATIVE

Schemmer plans to publish this Embodied Carbon Action Plan (ECAP) in a blog post and host it to our website to draw attention to our firm's commitment to reduce the Global Warming Potential (GWP) of our projects.

Additionally, in 2024, we are publishing quarterly blog posts that highlight methods architects and engineers can use to "save" an existing building, which will dramatically reduce the carbon footprint of a project.

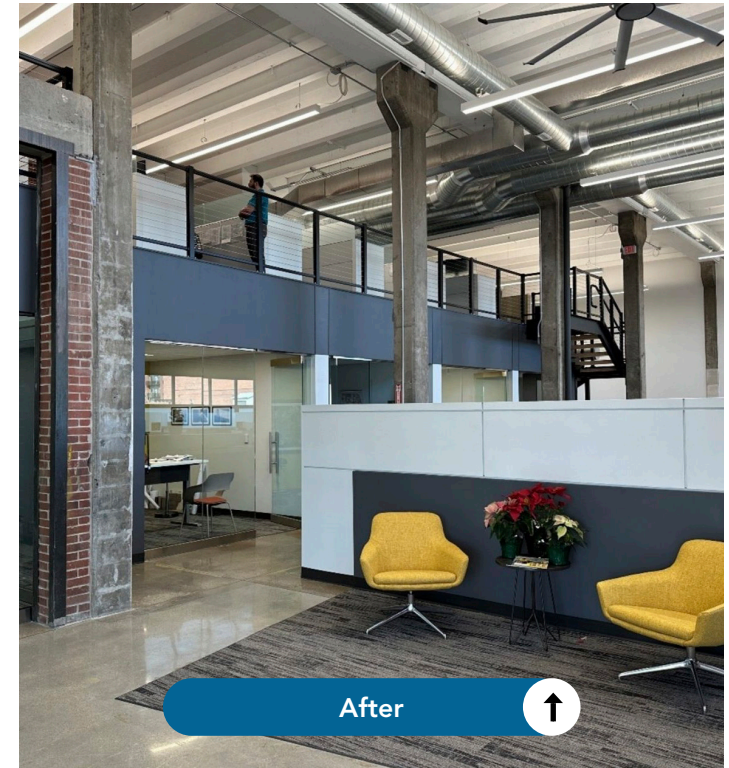
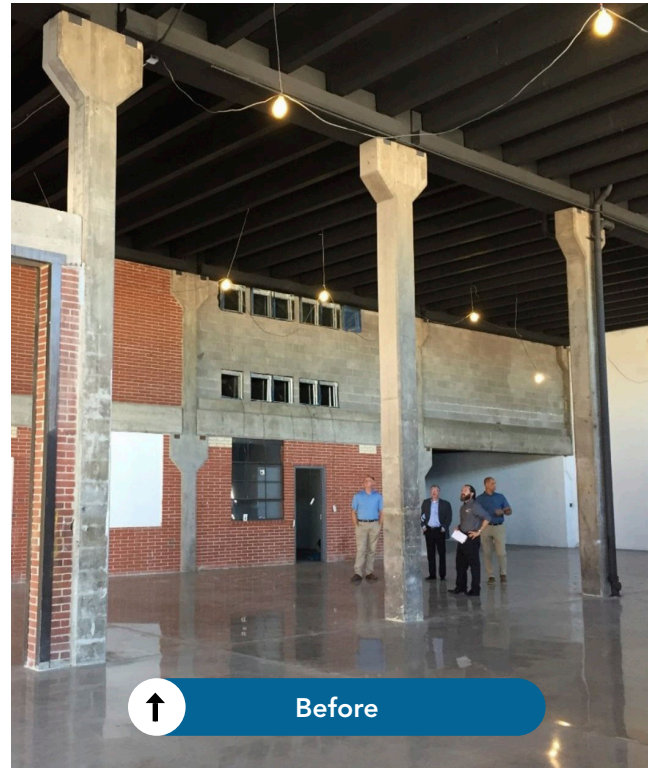
Q1: What is Adaptive Reuse?

Q2: Types of Adaptive Reuse

Q3: Advantages of Adaptive reuse

Q4: Limitations of Adaptive reuse

As we are beginning to conduct LCAs on select projects every year, we will report those results to the design team and the client along with an executive summary outlining successful methods of carbon reduction and opportunities for carbon reduction on future projects.



REDUCTION STRATEGY

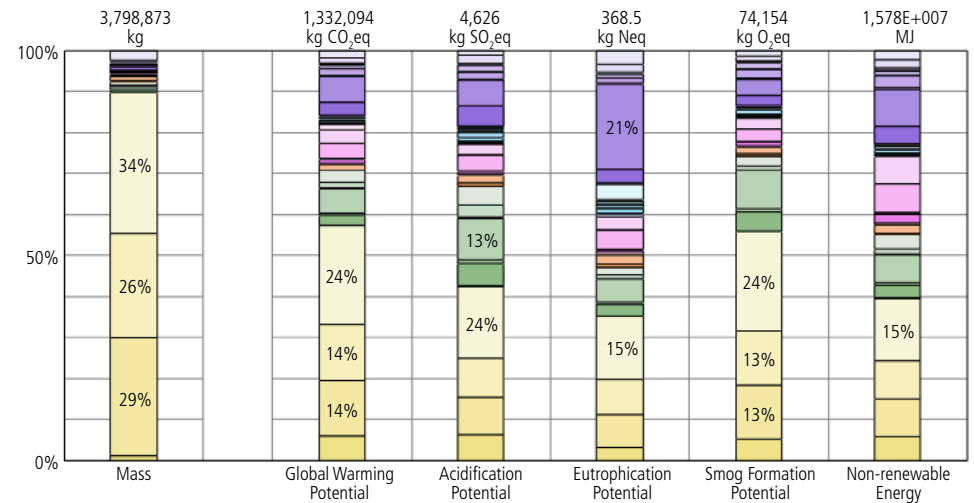
As designers, our approach to sustainable design involves optimizing materials for strength and quantity to reduce unnecessary raw material extraction. This saves clients both time and money while reducing our impact on natural resources.

Short Term Goals:

In the next year, our structural team will move beyond simply providing performance based concrete specs that state minimum requirements across multiple uses of concrete. We will rewrite them to be clear and concise about strength and durability requirements for each type of concrete on the project. This will be done in table format and there will be a column for GWP intensity targets for each mix design. Additionally, as we begin to receive Environmental Product Disclosure (EPD) on concrete mix designs for public projects, we will adjust these targets to be in line with what local concrete suppliers have been able to provide.

The structural designers at Schemmer will also make a concerted effort to prioritize structural member selection with lower embodied carbon where possible compared to traditional design practices without diminishing the integrity of the design or increasing cost to the client. We plan to replace many cold-formed structural steel products such as hollow structural section (HSS) columns with hot-rolled wide flange columns where the unbrace length is that of a typical single-story low-rise structure ~ 15-foot HSS Tubes have an average of 1.6 times the embodied carbon as hot-rolled structural steel sections do when comparing on a basis on tons.

(Source: STI - Optimizing Sustainable Structures with HSS: A Comprehensive Guide)



source - LCA on a 2024 Schemmer project

REDUCTION STRATEGY

Long Term Goals:

Schemmer currently only has internal capacity to run LCAs on a few projects each year and these projects are selected based on client requests or design team curiosity. It would be ideal to begin running assessments on a larger selection of projects, aiming for at least 10 per year, such that we may begin to identify trends across market sectors and engage more designers in the process.

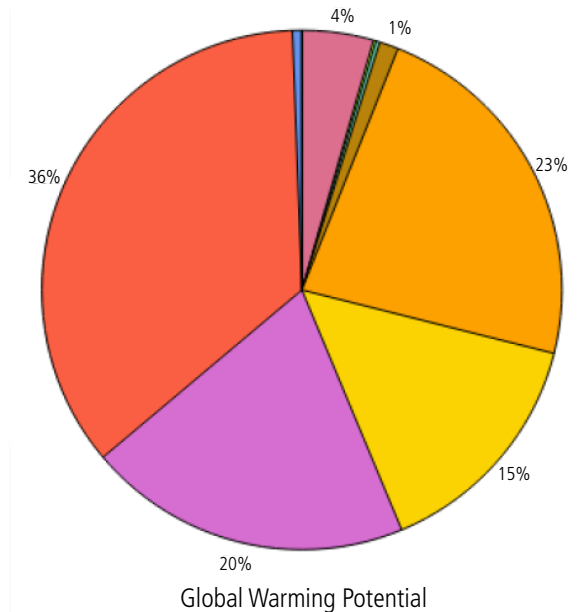
To assist the goal of running more LCAs per year, we are actively training a handful of architects and engineers on conducting LCAs and will be exploring options to add more Tally licenses as project demand increases. The goal is to spend one full-time equivalent (FTE) per year working on planning, training and documenting sustainable initiatives within Schemmer by 2028.

Change does not happen overnight - but we are moving in the right direction. The hope is that through small changes in our design practice every year, we will be much better positioned to consistently reach net zero embodied carbon designs by the year 2050.

Legend

Revit Categories

- Ceilings
- Curtainwall Mullions
- Curtainwall Panels
- Doors
- Floors
- Roofs
- Structure
- Walls
- Windows

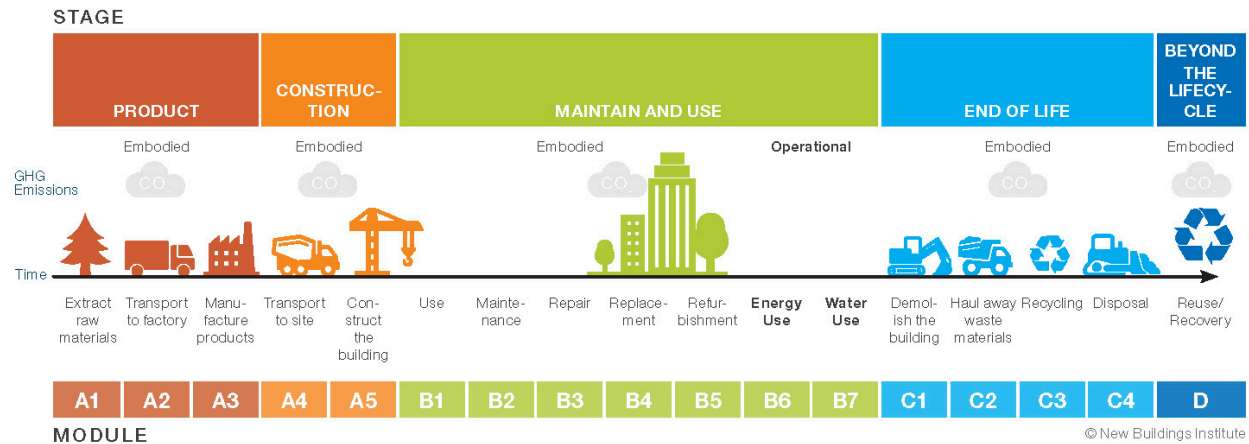


source - LCA on a 2024 Schemmer project

REPORTING PLAN

FIGURE 1: LIFECYCLE STAGES

Data source: BS EN 15978:2011



Schemmer uses Tally (a Revit Plugin) to run LCAs on our BIM model for both the architecture and the structural disciplines at the point of completion of Construction Documents. The scope of our life cycle assessments include:

- Product Stage [A1-A3]
- Construction Stage [A4]
- Maintenance Stage [B2-B5]
- End of Life Stage [C2-C4]
- Module D

Following is a summary of the building components that are often included in the scope of our assessments.

INCLUDED IN SCOPE:

- Foundations
- Floor slabs
- Exterior ramps and stairs
- Steel framing (beams, joists and columns)
- Metal roof deck
- Roofing
- Insulation
- Doors and windows
- Ceilings
- Floor and wall finishes

NOT INCLUDED IN SCOPE:

- Equipment foundations
- Exterior pavement
- Demo of existing building elements
- Credits for use of existing building elements (i.e., existing foundations)
- New paint on existing walls
- Mechanical and Electrical Equipment

In addition to Tally, Schemmer requests EPDs for concrete mix designs and structural steel in our specifications on public projects. This information is being collected for use in setting reduction targets on future projects.

ELECTIVE DOCUMENTATION

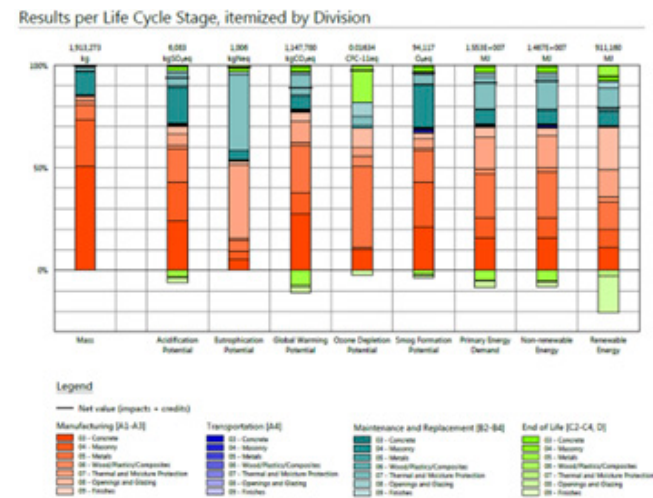


EDUCATION

1. Elena Hoff, Schemmer's ECRC, will engage the entire structural team in embodied carbon reduction on all projects. The topic of reducing use of carbon intensive materials, shapes and processes will be widely discussed at our weekly department meetings with specific examples of alternative approaches provided for reference. Elena will also engage project managers and Architects at Schemmer in discussion on methods of introducing carbon reduction strategies early in the design phase by provide tools to communicating our firm's goals with our clients.
2. Schemmer will present at least one webinar on embodied carbon reduction every year and document best practices within our internal process documentation system. Our current standard practices will be included in the new employee onboarding training to catch all designers up to speed on how we design our structures.
3. Schemmer will conduct a LCA how-to session annually that will broaden our internal knowledge on measuring, reducing and reporting embodied carbon in our designs. The goal is to train at least three employees within the structural, architectural or BIM department.

REPORTING

1. Schemmer intends to submit a minimum of two projects to the SE2050 database in our first year, and four in subsequent years. This item is complete for 2024.
2. Schemmer will write an executive summary highlighting the findings of each LCA performed and share it with the design team and client (if requested by the project manager.)



ELECTIVE DOCUMENTATION

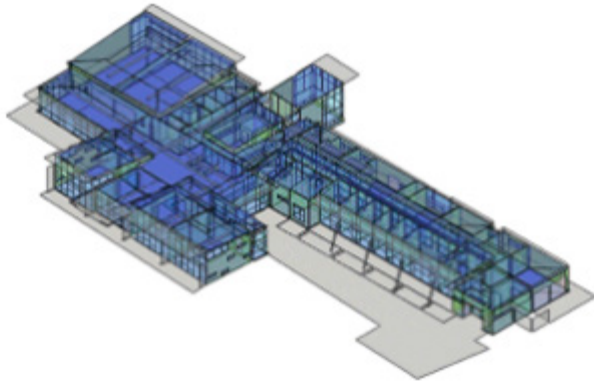


REDUCTION

1. Set Targets:
 - a. Short-term reduction (< 1 year)
 - i. Reduce Embodied Carbon Intensity on specified concrete by at least 10 percent below the National Ready Mixed Concrete Association (NRMCA) regional baseline.
 - b. Long-term reduction (> 5 years)
 - i. State targets in the specifications that reduce Embodied Carbon Intensity on specified concrete by at least 20 percent below the NRMCA regional baseline.
2. Schemmer will rewrite our concrete specs to be clear and concise about strength and durability requirements for each type of concrete on a typical project. This will be done in table format and there will be a column for GWP intensity targets for each mix design.

ADVOCACY

1. Schemmer has publicly declared our firm as a member of the SE2050 commitment via blog post published on March 30, 2023 (shown in Appendix B). Schemmer also has a website page dedicated to sustainable design and at the top of the page (<https://www.schemmer.com/sustainability/>), we highlight our commitment to SE2050.
2. Schemmer sends out quarterly newsletters to our clients and, in an upcoming issue, we will describe how our SE2050 commitment is not only a pledge to our industry, but also to our clients, that we are actively pursuing design alternatives that will reduce their project's environmental impact while respecting their bottom line.



source - Autodesk Insight

LESSONS LEARNED

Schemmer strives to facilitate excellent design for our clients - but it takes a village. Relying on one Embodied Carbon Reduction Champion will only get us so far. It is up to our Sustainability Committee to drive education, to our Project Managers to thoroughly review design options with clients, and to the entire firm to embrace a culture of sustainability. It's a long road ahead, and we are excited to travel it.



COMMITMENT LETTER

INTERNAL ANNOUNCEMENT

SCHEMMER

RE: LETTER OF COMMITMENT TO THE SE 2050 PROGRAM

February 10, 2023

To: Laura Champion
Director, Structural Engineering Institute

From: The Schemmer Associates, Inc.
1044 N. 115th St. Suite 300
Omaha, NE 68514

Dear Laura:

Schemmer, a 150-person firm located in the Midwest and headquartered in Omaha, Nebraska, is hereby signing on to the SE 2050 Commitment Program. We support the vision that all structural engineers must understand, reduce, and ultimately eliminate embodied carbon in our projects by 2050.


Reducing embodied carbon and other environmental impacts from our designs is the engineering problem of our generation. We firmly believe that it is our responsibility as stewards of the built environment to ensure we do not leave severe unintended consequences future designers cannot solve. It is our hope that we can leave a legacy of continuously improving the quality of our designs and minimizing the impact we leave.

We therefore commit Schemmer to take the following steps which are part of the SE 2050 Commitment Program:

- Within six months and annually henceforth, we commit to reporting an Embodied Carbon Action Plan (ECAP) and permit the ECAP document or form to be made public on the SE 2050 website.
- Within one year and annually henceforth, we commit to submit data to the SE 2050 project database in a collaborative effort to understand embodied carbon in structural engineering projects and to set attainable targets for future projects.

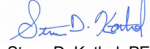
We look forward to joining this coalition and industry effort to achieve the goals of the SE 2050 Program.

Sincerely,


Elena Hoff, PE
Structural Engineer
Embodied Carbon Champion


Kevin Wenninghoff, SE
Structural Engineering Manager


Jason Heinze, PE, SE, LEED AP
Executive Vice President


Steve D. Kathol, PE, SE
President & CEO



On March 30, 2023, Schemmer announced that we had joined the SE2050 initiative to transform the practice of structural engineering in order to work toward net-zero embodied carbon structural systems by 2050. This announcement was made on both Schemmer's internal communications portal and on our website.