

EMBODIED CARBON ACTION PLAN

2025
5TH YEAR



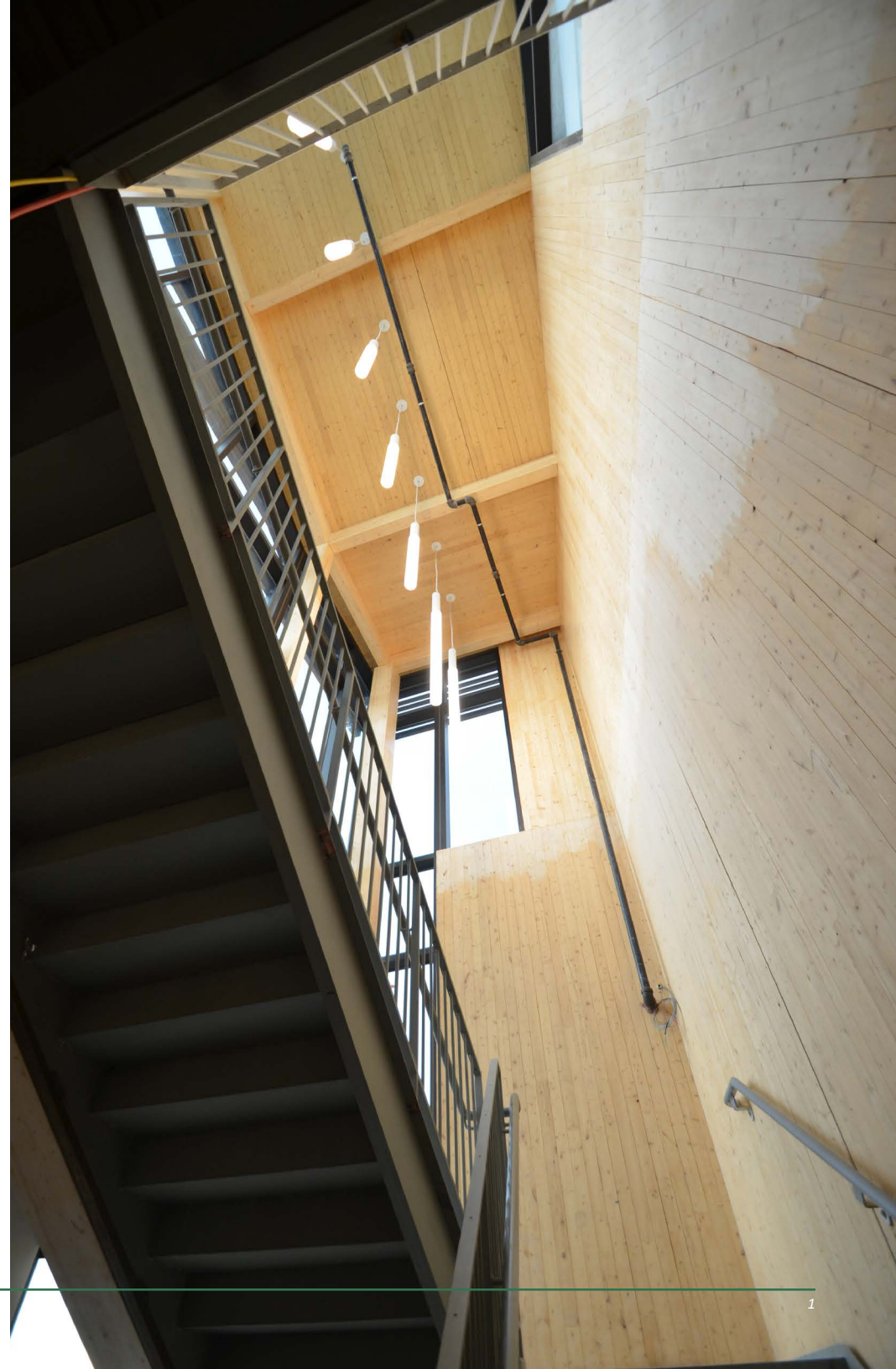
KL&A
Engineers & Builders

INTRODUCTION

KL&A's corporate vision is "We Make a Difference". As engineers and builders, we occupy a pivotal role in addressing climate change. The construction industry contributes nearly 40% of total U.S. anthropogenic carbon emissions, with a significant portion arising from the embodied carbon in building materials and processes. While individual actions like biking more, eating less meat, and using efficient appliances are valuable, our professional decisions have the potential to drive more substantial reductions in greenhouse gas emissions on a global scale.

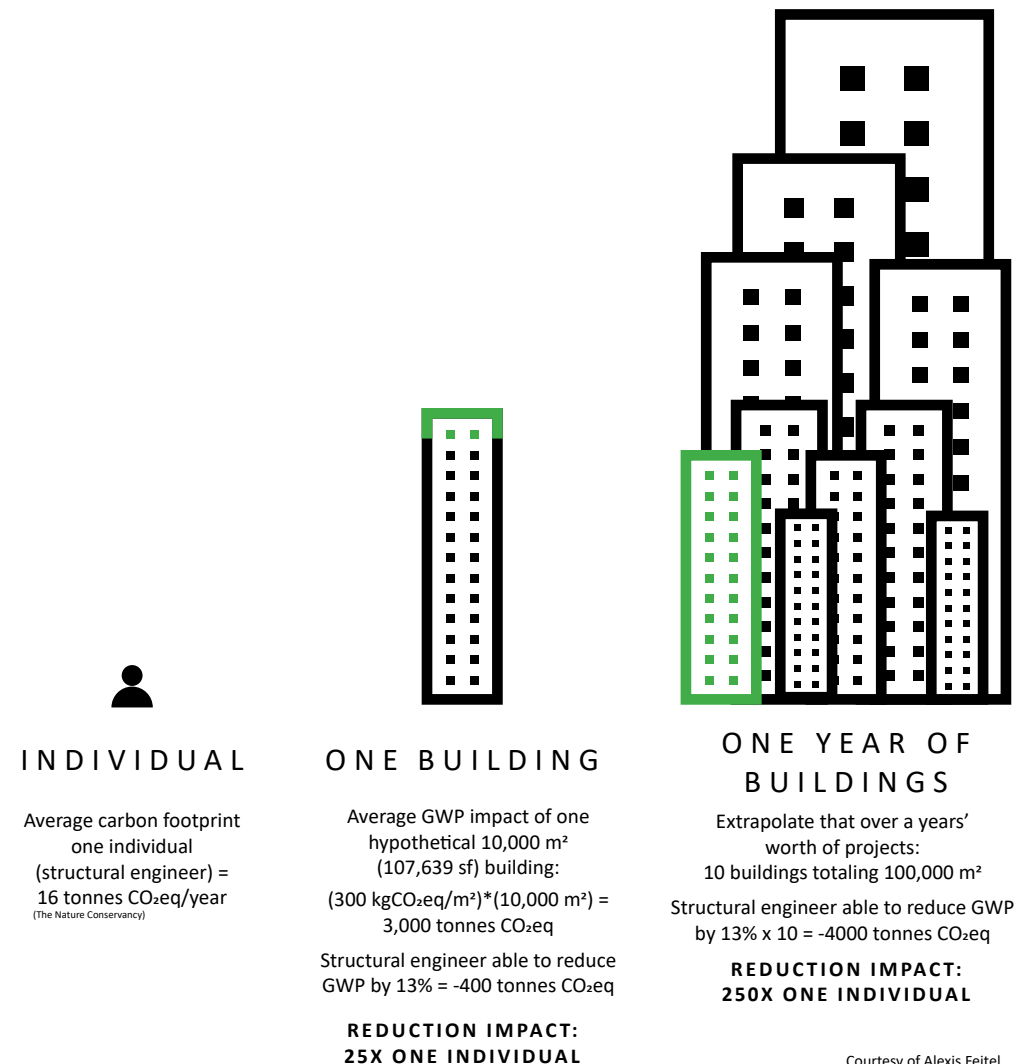
Our influence extends from the materials we select to the systems we design and the efficiencies we implement. By making informed choices and designing efficient structures, we can significantly reduce the total emissions associated with the construction industry. This encompasses not only operational energy use but also the embodied carbon inherent in structural materials and construction practices.

Through innovative design, strategic material selection, and sustainable construction practices, we have the power—and the obligation—to drive meaningful reductions in global warming potential (GWP). Each project we undertake is an opportunity to lower carbon footprints, enhance energy efficiency, and contribute to a more sustainable future.



DESIGN PROFESSIONALS HAVE THE POWER TO REDUCE EMISSIONS AT A SCALE HUNDREDS OF TIMES GREATER THAN INDIVIDUAL ACTIONS ALONE

The graphic below compares an individual's carbon emissions to those of a hypothetical 10,000 m² building and the cumulative impact of a year's worth of projects. The difference is striking—design professionals have the power to reduce emissions at a scale hundreds of times greater than individual actions alone. In 2024, KL&A's 120+ employees designed or built 1,072 projects, underscoring the immense potential for impact. This is the purpose behind Team Carbon—KL&A's dedicated team of engineers focused on reducing embodied carbon in the built environment—and a key reason why KL&A is a proud signatory of the SE2050 Commitment.



Courtesy of Alexis Feitel

TEAM CARBON



ROBBIE CAMANN, PE

EMBODIED CARBON
OPERATIONS MANAGER

Principal and Senior Project Manager with 20 years of experience. Provides vision and leadership for the holistic integration of embodied carbon expertise across all KL&A operations.



BRENT KEHOE, SE

EMBODIED CARBON SPECIALIST

Chair of KL&A's Concrete Materials Committee. Active in local chapters of ACI and the Structural Engineers Association of Colorado Sustainable Design Committee. Leads updates to KL&A's concrete master specification.



ALEXIS FIETEL, PE

EMBODIED CARBON INNOVATION &
TECHNICAL DIRECTOR

Nationally recognized expert in embodied carbon advocacy, life cycle assessment (LCA), mass timber biogenic carbon methodologies, and salvaged steel reuse. Leads efforts in project management, QA/QC, service and standards development, master specifications, and R&D initiatives. Frequently engages in educational speaking events and fosters partnerships to advance embodied carbon awareness and impact.



ANLI NI

EMBODIED CARBON SPECIALIST

Focuses on local and national policy, including Buy Clean Colorado (BCCO). Leads efforts such as the Boulder Hospital salvaged steel stockpile and contributes to the Building study series through comparative design work.



GREG KINGSLEY, PHD, PE

KL&A DIRECTOR OF
RESEARCH & DEVELOPMENT

Founder and President Emeritus of KL&A; recognized authority on innovative structures, with a focus on tall mass timber construction and novel structural solutions. Advocate for mass timber as a means to combine carbon sequestration with environmental responsibility.



JILL PORRETTA

EMBODIED CARBON SPECIALIST

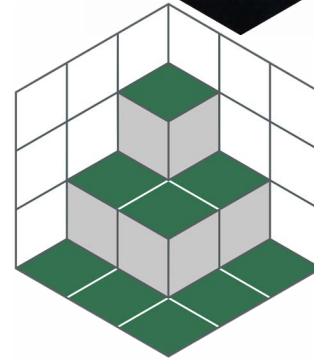
Developer of KL&A's in-house Revit plug-in for graphical GWP quantification. Contributor to the Building study series with comparative design analysis.



RACHAEL DOBOSIEWICZ, PE

EMBODIED CARBON SPECIALIST

SE2050 Embodied Carbon Champion and leader of new hire orientation. Maintains and develops KL&A's internal embodied carbon database and standard LCA practices.



KL&A

teamcarbon@klaa.com

EDUCATION

- ✓ Embodied Carbon reduction is not an effort that one person can easily champion and requires a dispersed or grassroots effort. Simply hearing the word “sustainability” on a project can mean many different things to many different people. Part of KL&A’s 2025 focus is to engage and foster an “Embodied Carbon Liaison” role within all offices and teams. This role engages engineers and construction managers of all experience levels who are passionate about reduction strategies without requiring an LCA or even a revision of material specifications.
- ✓ In 2024, KL&A made 27 carbon focused presentations to architectural clients and industry and trade groups. This amount and frequency have increased annually since 2020. Twenty of those were in-person presentations, and the remaining seven were webinars.
- Team Carbon established an Employee Onboarding introduction session which educates all new KL&A employees about Team Carbon’s history, KL&A’s SE2050 commitment and ECAP, internal technical carbon resources, and how they can make a difference. This introduction session serves the dual purpose of education and identifying potential Team Liaisons new to KL&A.
- At the time of this writing in 2025, KL&A continues to present and participate on panels at national conferences such as NASCC Steel Conference, the International Mass Timber Conference (IMTC), and USGBC Greenbuild as well as contributing to industry groups.



EDUCATION

Members of KL&A's Team Carbon are actively engaged in:

- Carbon Leadership Forum (CLF) Rocky Mountain Hub
- ASCE SEI Sustainability Committee
- Structural Engineers Association of Colorado (SEAC) Sustainability Committee
- American Council of Engineering Companies (ACEC) Energy Forum
- ACEC Colorado Energy and Climate Change Committee
- Colorado Mass Timber Coalition
- Educating and participating in state and local climate change legislation

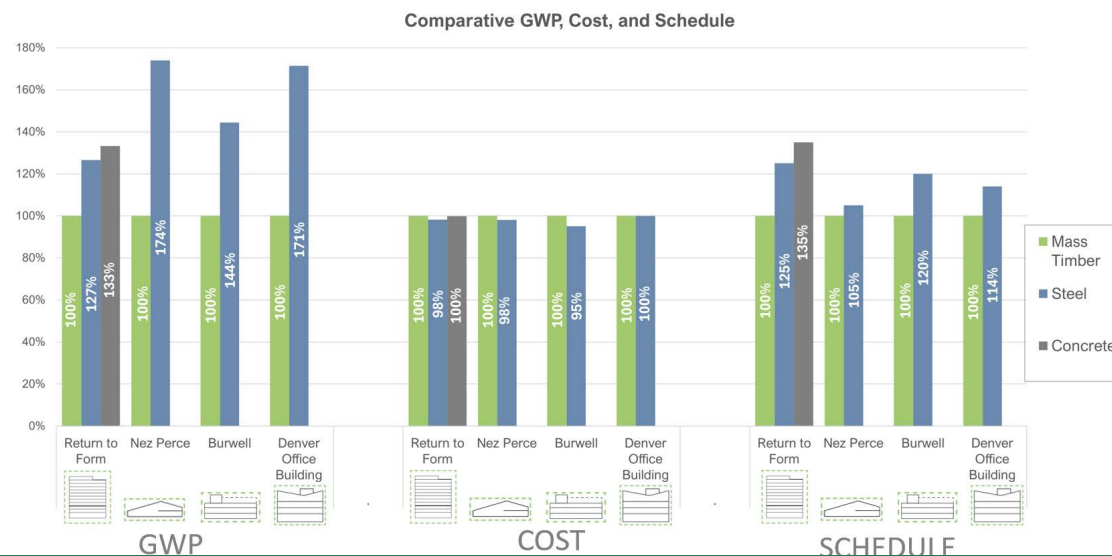


REPORTING

✓ In 2024 KL&A's Team Carbon submitted 5 Structural LCAs to the SE2050 database and will continue to do so in 2025 and beyond.

WOODWORKS AND KL&A COMPARATIVE CASE STUDY SERIES

- In collaboration with WoodWorks with funding from the USDA U.S. Forest Service and the Softwood Lumber Board, KL&A has published a comparative LCA building study series.
- The series compiles four comparative studies of U.S. mass timber buildings, analyzing embodied carbon, cost, and construction speed against functionally equivalent concrete and steel systems, with the goal of providing transparency in process and data to support informed decision-making and the broader adoption of mass timber as a low-carbon building solution.
- The four buildings studied are: Return to Form, Nez Perce-Clearwater Forest Service Supervisor's Office, Burwell Center for Career Achievement, and Denver Office Building.
- KL&A is proud to see these comparative case studies serve as a valuable resource for the building industry—offering a roadmap for targeting GWP reductions through informed system selection. By presenting a holistic view of cost that includes speed of construction and other practical considerations, highlighting the potential of biogenic carbon storage, and demonstrating how carbon and cost can be balanced, we hope to inspire future projects to prioritize lower-carbon solutions as a basis of design.
- Some key trends:
 - The total GWP savings of the mass timber reference buildings range from 21% to 43%, and average 32% savings, compared to their alternate steel and concrete buildings. The average GWP savings across the four building studies is 88 kgCO₂eq/m².
 - A comparison of the whole building construction costs, considering construction schedule differences, shows a premium for the mass timber reference buildings ranging from 0% to 6%, with an average 1.8% when compared to their alternate steel and concrete buildings.



REDUCTION

- ✓ Since committing to SE2050 in 2020, KL&A's Team Carbon has refined GWP quantification, documentation, and data tracking. Until industry-wide benchmarks are clearer, we remain focused on reducing embodied carbon in each project while setting ambitious, data-driven goals.

QUANTIFYING EMBODIED CARBON AT EARLY DESIGN

- On numerous recent projects, KL&A has been engaged by owners and architects early on in a project's design to provide early embodied carbon estimates. This process differs from whole building life cycle assessment's in many ways, and focuses on individual systems, such as foundation system selection, enclosure or typical floor assemblies, determining optimal column and framing spacings, evaluating different transfer podium options, and many others.
- This way of approaching collaborative design allows embodied carbon metrics to inform decision making alongside cost and schedule.
- These early, schematic calculations can also be used to understand a building's carbon intensity for baselining or goal setting for a project, creating a design parameter and allowing for realistic embodied carbon reduction targets as design advances.

LESS IS BETTER

- This is a simple credo that engineers at KL&A strive for, no matter their familiarity with the concepts of embodied carbon or not. Simply by targeting efficient design without compromising performance or safety can go a long way in reducing the GWP impact of buildings.
- Some examples from projects of this optimization are working with geotechnical engineers to increase soil parameters through additional testing. This can reduce foundation sizes, and therefore concrete volume, which are typically a large contributor to a building's total GWP impact, while being "hidden" underground from the end user.
- KL&A also has multiple, large-scale existing building projects that were renovated in lieu of demolition and new construction. These projects all have owners or clients that are interested and motivated by embodied carbon reduction. KL&A has provided comparative GWP estimates of functionally equivalent new construction compared to their existing building.
- One multi-story concrete adaptive reuse office project saved the equivalent of 697 metric tons of CO₂eq. The owner was excited to hear this equivalent in terms of 163 gasoline powered passenger vehicles, 94 homes' electricity, or 774,673 pounds of coal burned to





DECONSTRUCTION AND CIRCULAR ECONOMY

- In the Boulder Community Hospital (BCH) project, KL&A successfully completed North America's first major commercial building deconstruction and structural steel reuse project, diverting 93.5% of all materials from landfill. The team recovered 584 steel wide flange and HSS members for reuse, creating a digital inventory for future transactions. This effort saved an estimated 167,300 kgCO₂eq.
- To date, 487 pieces have already been reclaimed by other projects, including 89 steel members used at Boulder Fire Station 3, saving the project 36,344 kgCO₂eq.
- 12 projects have made claims on the salvaged steel, which is being repurposed for houses, offices, art sculptures, landscaping structures, a factory, and more.
- By successfully completing this complex and first-of-its-kind project at this scale, KL&A not only achieved a significant milestone in contributing to building circularity, but also reinforced the notion that engineers have a critical role to play in climate solutions.

ADVOCACY

- ✓ KL&A advocates for a proactive approach to embodied carbon, recognizing that reducing GWP is more than just conducting LCAs—it's about integrating carbon-conscious decision-making and design from the start. As signatories of SE 2050, we help clients understand and quantify the value of early engagement, ensuring that carbon impacts are considered alongside cost, performance, and constructability. As structural engineers, we serve as trusted consultants across diverse project types and scales, collaborating with design teams to implement practical, high-impact strategies for reducing embodied carbon.
- ✓ KL&A's website, LinkedIn, and social media platforms help educate clients, students, potential design partners, and the broader community about our SE 2050 commitment, as well as our continued efforts in speaking, publishing, and designing sustainable buildings.
- KL&A guided the Office of the State Architect to expand the Buy Clean Colorado Act's tax incentive to include cross-laminated timber (CLT), initially excluded from the program. By providing Environmental Product Declarations, we helped establish a reasonable GWP limit for CLT.
- KL&A is assisting several large, privately funded projects in applying for low embodied carbon material tax credits, potentially becoming the program's first successful applicants.
- KL&A actively participates in state and local policy development focused on embodied carbon and sustainable building practices.
- Alexis Feitel engages with university students and serves as a circularity mentor, helping to shape the next generation of sustainability-minded designers.
- KL&A contributes to project proposals that emphasize early goal-setting and strategies to reduce embodied carbon from the outset.
- KL&A advocates for the use of mass timber as a tool for improving forest health, mitigating wildfire risk, and supporting watershed resilience.
- KL&A took part in the review of the Colorado Model Green Code on behalf of the Colorado Energy Office, bringing a structural perspective to statewide sustainability efforts.

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LESSONS LEARNED

- Over the past year, KL&A's Team Carbon has focused on direct local policy guidance for engineering teams and providing early embodied carbon estimates to support schematic design efforts. While the plan to create a digital Carbon Notebook in OneNote remains a priority, our immediate efforts have been directed toward high-impact initiatives that directly support project teams and carbon reductions.
- Updating KL&A's material specifications to incorporate embodied carbon requirements and GWP limits remains a priority for Team Carbon. While our General Notes and Revit template tables have been updated, the broader specification goal was delayed as KL&A undertook a comprehensive master specification rewrite across all materials. Completion is now targeted for Q2 2025. In the meantime, Team Carbon continues to provide project-specific specification guidance to ensure embodied carbon considerations, documentation, and tracking are integrated into the design and build.
- The growing number of speaking and education requests KL&A receives reflects rising industry awareness of embodied carbon. Many presentations introduce the topic to firms just beginning the journey, underscoring the effort required to educate both internally and externally. As awareness grows, our role extends beyond education—we guide teams toward meaningful, low-carbon strategies that embed embodied carbon into core design decisions.
- Raising awareness about embodied carbon is only the starting point—meaningful impact requires sustained education, internal alignment, and proactive guidance to integrate embodied carbon into core design strategies, moving beyond surface-level sustainability efforts.



WE MAKE A DIFFERENCE

We are a firm built around the idea that structural engineers should return to a master builder role by taking ownership of structural systems. A collaborative approach and project centric behaviors are our differentiators, facilitating a more engaging design and construction process. Our philosophy of personal responsibility has generated a corporate culture of problem solving and innovation. We are engineers first and foremost, which we leverage on our steel detailing and steel construction projects. While we're proud of our sustainability leadership—offering Life Cycle Assessments and utilizing low-carbon materials like mass timber—our impact goes beyond any single service. KL&A is shaping a more integrated, informed, and responsible future for structural engineering.



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