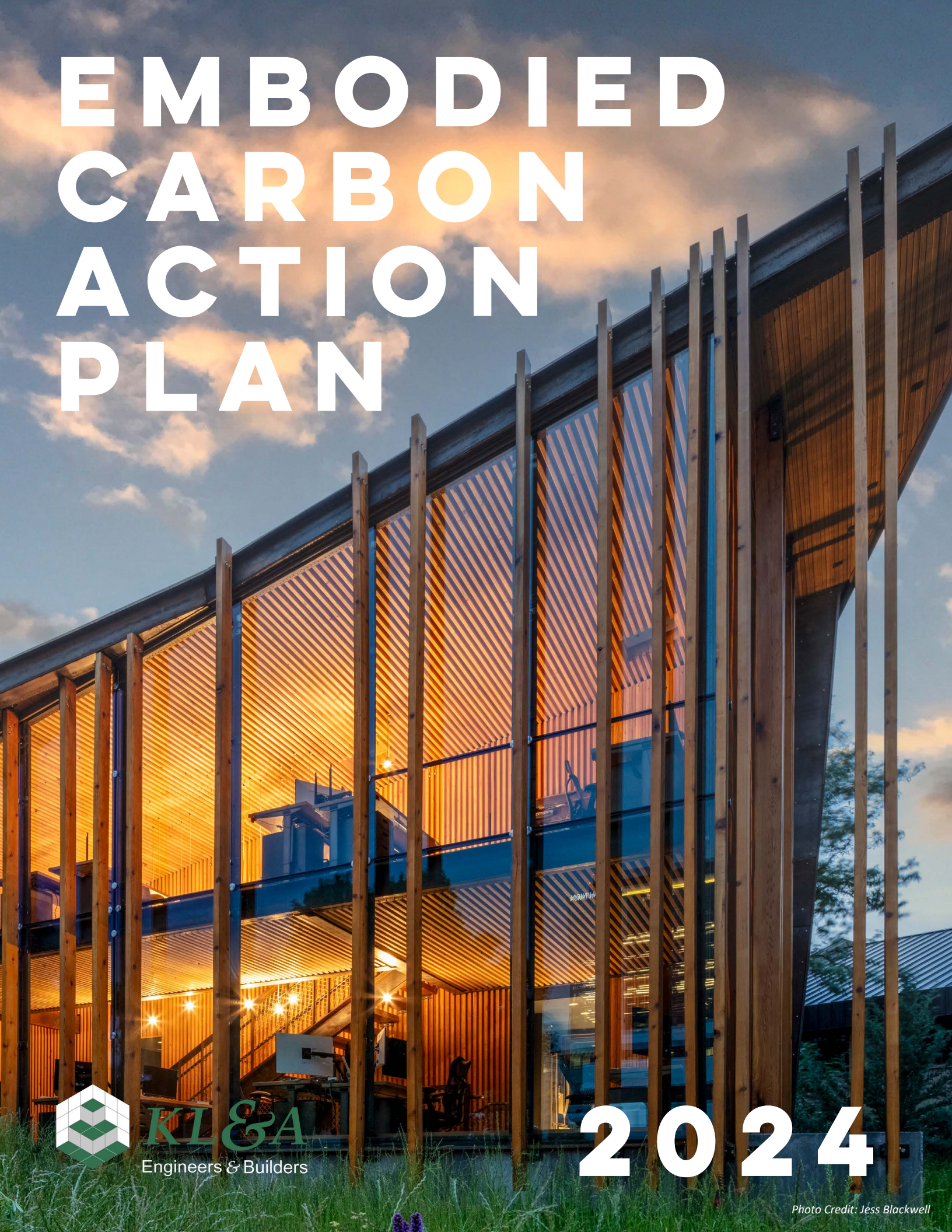
# EMBODIED CARBON ACTION PLAN



KL&A
Engineers & Builders

2024

*Photo Credit: Jess Blackwell*

Photo Credit: JC Buck

# INTRODUCTION

We are an integrated structural engineering and construction firm, based in Golden, Colorado with four offices throughout the Rocky Mountain Region, with over 100 employees. We are a firm built around the idea that structural engineers should return to a master builder role by taking ownership of the design of structural systems, cost estimating, at-risk construction, and now – embodied carbon impacts. Our corporate vision is “We make a difference”. This is exactly why we have prioritized the modernization of our practice to address the climate and environmental impacts of our design and construction. Structural engineers are stepping into leadership roles and educating our architect and owner clients to create new avenues and priorities for decision making in our design practice.

We became a signatory to the SE2050 commitment in 2020 because we wanted to express publicly our commitment to reducing the embodied carbon in the built environment, and our recognition that the impact of our values and processes in our design and construction practice dramatically outweigh any of our ability to make a difference as individuals. To further multiply that impact, we recognized that it was essential to join the collective industry effort around innovation and accountability. Through our shared efforts, knowledge, and learning, the challenge of reducing our industry’s contribution has, from the inception of KL&A’s “Team Carbon”, been an “open source” effort, which is necessary to have a real and timely effect on climate change.

KL&A’s Team Carbon is an internal group focused solely on embodied carbon and its reduction. Team Carbon acts as KL&A’s embodied carbon experts, consulting internally and externally, educating, reporting, advocating, and reducing embodied carbon in the built environment. In 2023, three new members joined Team Carbon. They were trained in the language and processes of EPDs, LCAs, and the unique impacts and reduction strategies around the structural materials we use. The growth of Team Carbon, and ongoing development to maximize its involvement and engagement with every KL&A project in design and construction has palpably advanced KL&A’s ability to support company, project, and client embodied carbon goals.

Realigning with the SE2050 pledge, KL&A’s Team Carbon has defined both short-term and long-term embodied carbon reduction goals with specific scope and schedules allowing for an objective evaluation of our progress. KL&A’s embodied carbon action plan (ECAP) is organized by the approach we share with SE2050 to EDUCATE our company, REDUCE embodied carbon in our projects, REPORT our data, and ADVOCATE for embodied carbon-conscious design choices.

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SE2050
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# TEAM CARBON

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# EDUCATE

KL&A's Team Carbon provides company training on embodied carbon and how to integrate reduction strategies into structural design and project processes. Every member of Team Carbon is trained to execute and interpret Life Cycle Assessments using TallyLCA as well as schematic design Global Warming Potential (GWP) estimates using internally developed, specialized tools that align with corporate design practice.

## OFFICE ENGAGEMENT (REQUIRED):

KL&A is a growing company, and one goal of 2023 was to refine ongoing practices that bring awareness to all employees of KL&A, from senior leadership to summer interns, of the goals and processes of Team Carbon and how they should expect to fold them into their work. This includes both early-state carbon accounting facilitated by Team Carbon during conceptual design and Whole Building Life Cycle Assessments (WBLCA) executed by Team Carbon members.

Educating the whole company, at different levels of experience, requires a multifaceted approach. In 2024 we will continue to refine and present our Team Carbon 101 technical training session covering structural material quantification, technical Life Cycle Assessments, Tally 101, and the carbon impacts of structural materials and their unique reduction opportunities. This training, as well as onboarding training for each new employee, is expected to become a standard part of KL&A project manager training and new engineer training in 2024 and will be updated annually.

## WEBINARS (REQUIRED):

In 2023 KL&A's Team Carbon made 23 carbon focused presentations to architectural clients and industry and trade groups. Seventeen of those were in-person presentations, and the remaining six were webinars. In 2024, KL&A has presented in ten conferences or webinars as of this writing, most notably at the Deconstruction + Reuse Conference in Savannah, Georgia, the NASCC Steel Conference on direct Steel Reuse and at the International Mass Timber Conference (IMTC) on a Mass Timber Building Study Series with WoodWorks. Five more presentations are planned for the remainder of 2024, with additional opportunities anticipated.

*Photo Credit: Alexis Feitel*

## ONBOARDING:

Team Carbon has established a New 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. New members of Team Carbon are educated more deeply through a formal system that includes a combination of directed reading, internally recorded training sessions, face-to-face mentoring, and rapid integration into real projects.

## LOCAL POLICIES:

KL&A's Team Carbon is advising and guiding project teams on requirements associated with critical aspects of the Buy Clean Colorado (BCCO) Act which went into effect January 1, 2024. State public projects exceeding $500,000 must meet maximum acceptable global warming potential (GWP) limits for asphalt, cement and concrete mixtures, glass, post-tensioned, reinforcing, and structural steel, as well as wood structural elements. Starting July 1, 2024, privately funded projects may be eligible for tax credits based on the same material GWP limits. Team Carbon is actively working with the Office of the State Architect (OSA), and through them the Colorado Department of Revenue to establish what the required procedures, documentation, scope boundary, etc is for this tax credit. Additionally, Team Carbon is working with the OSA to include mass timber products in embodied carbon policies to ensure that low carbon systems such as mass timber are effectively incentively.

## ENGAGEMENT:

Members of KL&A's Team Carbon are actively engaged in the 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) Colorado Energy and Climate Change Committee, in addition to educating and participating in state and local climate change legislation.

*Photo Credit: KL&A*

# REDUCE

KL&A's Team Carbon has been focused on education and developing GWP quantification processes, documentation, and data collection internally since we committed to SE2050 in 2020. The foundational process standards and data tracking we developed have allowed us to accurately benchmark embodied carbon quantities per building type, structural system, and material type for KL&A projects - and we've gotten good at it. Until refined benchmarks are understood, internal and external to KL&A such as SE2050, we will focus on embodied carbon reductions on individual projects and set appropriate and ambitious goals for each.

We have incorporated an Embodied Carbon Reduction Criteria section into our template schematic design narrative to start the conversation early with Architects and Ownership groups. This will also be included in our standard proposals by the second quarter of 2024 where we're hopeful these intentional early conversations will help educate external partners and identify opportunities for collaborative embodied carbon reductions.

CIRCULAR ECONOMY NARRATIVE (LONG TERM):

KL&A completed a circular economy project with the City of Boulder in 2023 and will publish this work formally in 2024. This project was a sustainable deconstruction project, which recovered, stockpiled, and reused structural steel members. 584 structural steel pieces, weighing 160 tons, were salvaged and overall, the whole building's deconstruction diverted 94% of its materials, by weight, from the landfill exceeding the City's ordinance diversion requirement of 75%. Projects throughout Colorado could claim structural steel members to be reused in new construction. Additionally, KL&A designed a new fire station, Boulder Fire Station 3, which has successfully directly reused 90 of these salvaged pieces. This project was the first in the U.S. to incorporate the deconstruction, recovery, and reuse of structural steel members at scale.

*Photo Credit: Matthew Millman*

## TECHNICAL SPECIFICATION UPDATE (SHORT TERM):

Updating KL&A's technical specifications and general notes regarding embodied carbon requirements and GWP limits is a priority for Team Carbon and will be complete by Q3 of 2024.

## CONCRETE SUPPLIER COLLABORATION (LONG TERM):

KL&A's Team Carbon plans to work with at least one concrete supplier to reduce the embodied carbon in a mix design below the NRMCA regional baseline value. This work is expected to occur simultaneously with concrete specification revisions.

## EMBODIED CARBON VISUALIZATION (SHORT TERM):

Team Carbon's goal is to compare at least two (2) structural options on at least four KL&A projects and share the embodied carbon impacts of different design options with clients using creative data visualization.

## EMBODIED CARBON DASHBOARD (SHORT TERM):

KL&A did not achieve a firm average benchmark for projects in 2023. KL&A has developed an in-house LCA database, which tracks project type and system type benchmarks. This was an ambitious goal and moving forward, a short-term goal is to use Revit to quantify concrete volume at project milestones and track volume history over time. This simplified first step will show up on our firm's Revit welcome page and act as both a passive reminder of concrete's impact as well as a historical record of reduction with the goal of raising awareness to all KL&A's engineers and drive down material quantity.

*Photo Credit: KL&A*

# REPORT

Carbon accounting is an essential component of reducing the embodied carbon impact of structures. It helps us understand and identify hot spots, understand the impact and effectiveness of modifications and innovations, and guide us to make informed decisions related to mitigation strategies. KL&A provides GWP estimates at the schematic design phase of projects to aid in material and system selections, as well as complete LCAs, including recommendations and pathways to embodied carbon reductions, via design strategies and material strategies. We have a robust library of product and industry EPDs, including comparisons and running GWP averages across our library.

## SE2050 DATABASE SUBMISSIONS (REQUIRED):

In 2023 KL&A's Team Carbon submitted 5 Structural LCAs to the SE2050 database. While we are only required to submit 2 structural LCA's we will continue to exceed this as we increase the number of LCA's conducted. KL&A's Team Carbon can easily submit at least 5 projects to the SE2050 database in 2024.

## FIRM WIDE PROJECT COMPARISONS:

In 2024 KL&A's Team Carbon plans to refine our internal KL&A database and increase project quantities to better understand our embodied carbon impacts, reductions, and trends across building types, systems, materials, and design teams. Findings will be shared across our firm and help to establish firmwide benchmarks for project types and reduction goals.


*Photo Credit: Alexis Feitel*

# ADVOCATE

We believe in knowledge and experience sharing, and advocacy through education. Accessibility of information is critical for widespread adoption and implementation across the industry. We are collaborating with our architectural clients through education and encouragement of embodied carbon reductions in our projects. We see client and contractor collaboration as a key component of our success in reducing the impacts of our designs – through efficiency of program layouts, system selection, product selection, collaborative LCAs, and owner/developer education. KL&A continues to present on the topic of embodied carbon at industry conferences, seminars, and client offices both locally and nationally. Our presentations intend to address embodied carbon reduction strategies, associated costs, and the GWP background data – with the goal to share our perspective of practical and actionable solutions.

## SE2050 VALUE (REQUIRED):

In 2023 KL&A's Team Carbon made 23 carbon focused presentations to architectural clients and industry and trade groups. The intent of our Team Carbon presentations in 2024 is to share how KL&A's design teams collaborate to reduce our project's embodied carbon. From early schematic design embodied carbon quantification guiding material and geometry choices to detailed whole building LCA's documenting measurable and certifiable reductions, KL&A's commitment to SE2050, and it's resulting ECAP and roadmap to reduction, means our clients will be presented with the timely and rational embodied carbon information whether they ask for it or not.

## PUBLIC DECLARATION (REQUIRED):

Each KL&A Team Carbon presentation publicly declares our firm's commitment to SE2050. Our early Signatory status and embodied carbon action plan are featured on our firm website along with our published case studies. KL&A has included our SE2050 commitment language, and a dedicated carbon reduction section, into our standard project proposal templates. In 2024, our website will be refreshed to feature our continued commitment to SE2050 more prominently, and our firm's mission "make a difference" by EDUCATING our company, REDUCING embodied carbon in our projects, REPORTING our data, and ADVOCATING for embodied carbon-conscious design choices.

*Photo Credit: CCY*

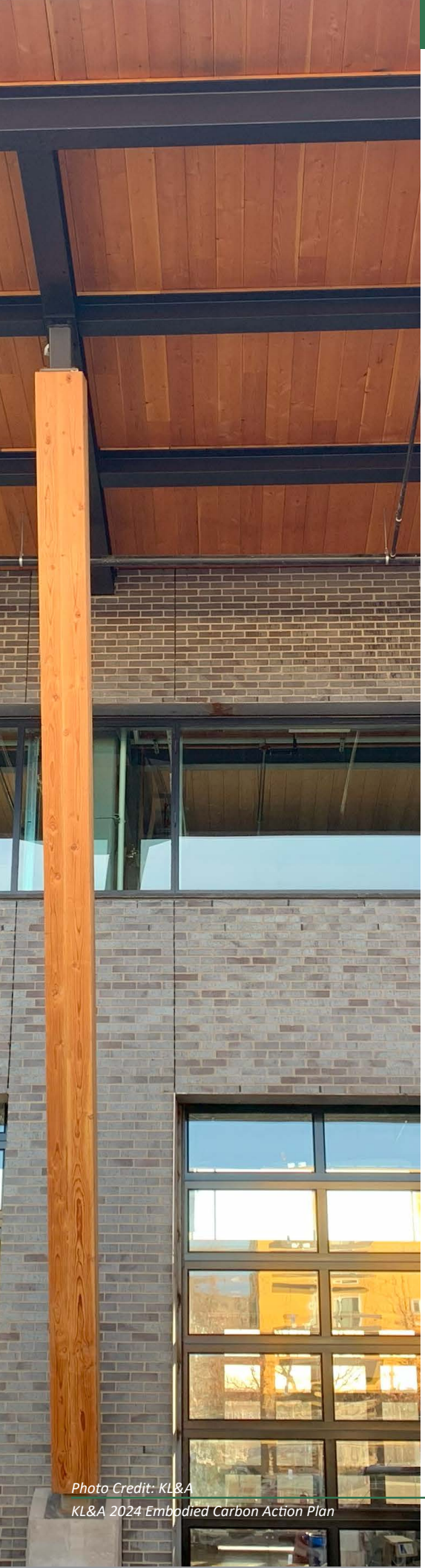

Photo Credit: KL&A

## EXTERNAL PRESENTATIONS:

KL&A's Team Carbon will give external presentations demonstrating project success and lessons learned and will work with our CFL regional hub to post at least one of our external embodied carbon presentations advocating for SE2050 and embodied carbon reduction.

## GOVERNMENT ENGAGEMENT:

KL&A's Team Carbon continues its engagement with local, state, and federal government entities to communicate the importance of low-embodied carbon design, procurement, and construction policies. Engagement includes the City of Boulder's Sustainable Deconstruction Ordinance and direct steel reuse, the State of Colorado's Buy Clean Colorado Act and recommending mass timber threshold limits, the General Services Administration (GSA) pilot Land Port of Entry (LPOE) project and it's scoring low embodied carbon construction materials. KL&A's Team Carbon is also a member of the Executive Committee of the Colorado Mass Timber Coalition, supported by the Gates Family Foundation, whose mission is to accelerate the adoption of mass timber products manufactured and used in Colorado projects. The Coalition hopes to influence policy like how KL&A spearheaded the City of Denver's early adoption of the tall wood provisions of the 2021 International Building Code.

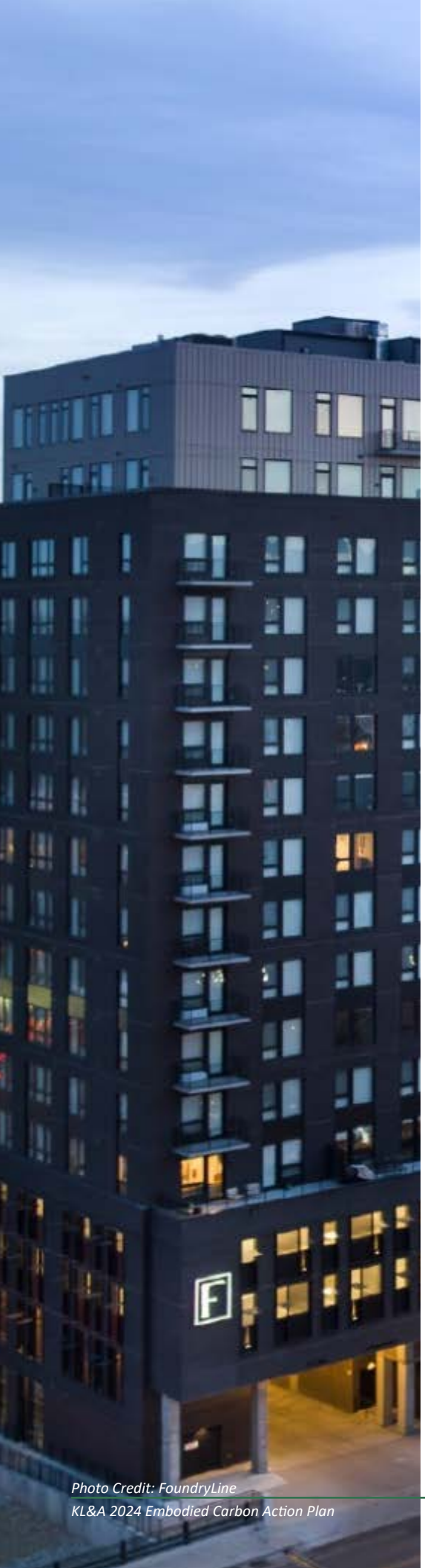

*Photo Credit: FoundryLine*

# INSIGHTS

Throughout 2023 KL&A reaffirmed that embodied carbon reduction is a team sport and collaboration is the key to success in reducing the embodied carbon in our projects. The following lessons learned informed us and influenced our ECAP strategies for 2024.

E D U C A T E :

Not all of KL&A's architectural and developer clients are interested in embodied carbon reduction. Regardless, the embodied carbon landscape is changing quickly as Federal, State and Local Legislation enact policy related to GWP limits and KL&A's Team Carbon has a responsibility to continue educating our engineers and clients about new embodied carbon limits. The best way to do this is to meet our clients and owners where they are and present embodied carbon reduction in terms of a value proposition.

R E D U C E :

Integrating embodied carbon reduction strategies into KL&A's engineering workflow, specifically through the implementation of general notes and technical specifications, has taken more time and coordination than anticipated. Just wanting to reduce embodied carbon isn't enough, so our general notes and technical specifications are being systematically updated and coordinated to start measuring and defining acceptable levels of embodied carbon in our built projects.

R E P O R T :

Mass timber is a strategy to reduce embodied carbon on certain projects, however cost is perceived to be prohibitive for many. KL&A's case study series with WoodWorks and the USDA aims to address the pros and cons of mass timber across different project types, compared to alternate systems and answer questions about embodied carbon, dollar cost, and schedule.

A D V O C A T E :

In the presentations KL&A completed in 2023, the most common question was “what will this cost”. Background data about reduction strategies and material choices needs to be accompanied with realistic cost data so project teams can make more informed and timely decisions.

We are experiencing more projects that require concrete mix design consulting, which is facilitated by our material and Team Carbon experts. Mix designs are addressed in collaboration with design teams, contractors, and suppliers to consider material availability, cost, construction sequencing and schedule, and architectural objectives. Initiating these conversations early in the design process across the entire project team is key to increasing the likelihood that a project realizes the reduction potential of concrete mix designs.

*Photo Credit: Colorado State University*

# WE MAKE A DIFFERENCE.

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