



EMBODIED CARBON ACTION PLAN

2023



A LOOK BACK AT 2022

Below is a summary of the accomplishments and progress we made in the past year. We are happy to report that we met the measurable goals of our **2022 Embodied Carbon Action Plan (ECAP)** with the following highlights:

- **MKA partnered with Hines to develop the Hines Embodied Carbon Reduction Guide**, which was published for public access on Earth Day. This document provides an overview of the built environment's role in climate change, how to measure carbon, and ways to reduce embodied carbon. Not only does the guide set the standard for Hines projects, but it also helps educate the larger AEC industry. Since its release, the guide has been referenced and used by project clients, architects, and general contractors.
- **We crafted a forest sourcing disclosure questionnaire** and began implementing it on projects involving timber materials. The questionnaire assists in a comparative and competitive bid evaluation of the climate smart and ecological impact characteristics of the timber sources.
- **MKA's standard general notes were updated to prioritize performance-oriented concrete specifications**, which results in more cost-effective and carbon-efficient mix designs.
- Using Whole Building Life Cycle Analysis (WBLCA) data from several projects, **we developed a WBLCA basis of analysis template**, which establishes guidelines and assumptions made during the analysis. This standard template will inform the methodology for future WBLCA and ensure metrics between projects can be compared consistently.
- MKA's ECAP champion (Catherine Cai) and ECAP mentor (Don Davies) **reviewed and provided feedback for Buy Clean and Buy Fair policy and Build Clean policy**, which is proposed legislation in Washington state promoting the use of materials manufactured with high environmental and labor standards.
- **We advocated for the use of EPDs during concrete procurement and recommended our projects also consider Global Warming Potential (GWP) when selecting suppliers** rather than cost only. MKA worked directly with contractors and suppliers to develop low-carbon mixes that met the structural performance requirements.
- **The MKA Foundation provided Building Transparency (BT) with \$50,000 to further fund LCA and embodied carbon estimation tools.** This "Carbon Results Framework" project will create a framework for advanced embodied carbon results visualization, including viewing results as a range rather than a single deterministic value. This framework will be utilized by BT's suite of tools, including EC3 and tallyCAT.
- **MKA co-authored or contributed to various articles in support of prioritizing sustainable construction.**
 - Holding Back the Tide (*Civil Quarterly*, published March 2022)
 - Throwing Down the Gauntlet (*Engineering News-Record*, published Dec. 26, 2022 to Jan. 2, 2023)
 - Why Wood Isn't Enough (*Engineering News-Record*, published Jan. 3-17, 2022)





LESSONS LEARNED

MKA believes reflecting on and sharing lessons learned is essential to the industry's continued advancement. Below are some of our learnings:

- To help clients decide on an embodied carbon reduction strategy, it is helpful to simplify the alternatives down to a few specific options (e.g., a low-reduction and high-reduction option). Presenting strategies in terms of no- to low-cost versus added cost options can be beneficial for evaluating cost benefits.
- Motivating change in certain, well-established material industries will take time. To effect impactful industry-wide change, multiple strategies and material types will need to be engaged.
- Construction means and methods play a role in embodied carbon reduction, especially for concrete. Forming, shoring, and/or high early strength requirements can drive the mix design requirements. Therefore, participation from the contractor and their construction means and methods input is important to the embodied carbon strategy.
- Few projects are measuring A4-A5 embodied carbon. In some cases, that contribution to total embodied carbon can be non-trivial. As there are limitations in current measurements, comparisons at this stage may not be accurate.
- Project quantities and GWP data must be tracked using the same set of assumptions for it to yield consistent comparisons.
- Requesting performance-based metrics for concrete mixes may be a more effective embodied carbon reduction strategy than specifying GWP targets.
- Defaulting to mass timber is not always the most sustainable solution; choosing the right material from the right source for the right element can result in even greater embodied carbon reduction.



OUR APPROACH TO EDUCATION

MKA is committed to increasing our internal engagement and understanding of embodied carbon. Our daily design decisions and actions have significant downstream impacts on the carbon footprint outcomes of our work. It is imperative that MKA's engineers are all individually aware of these impacts and work to responsibly reduce them where possible.

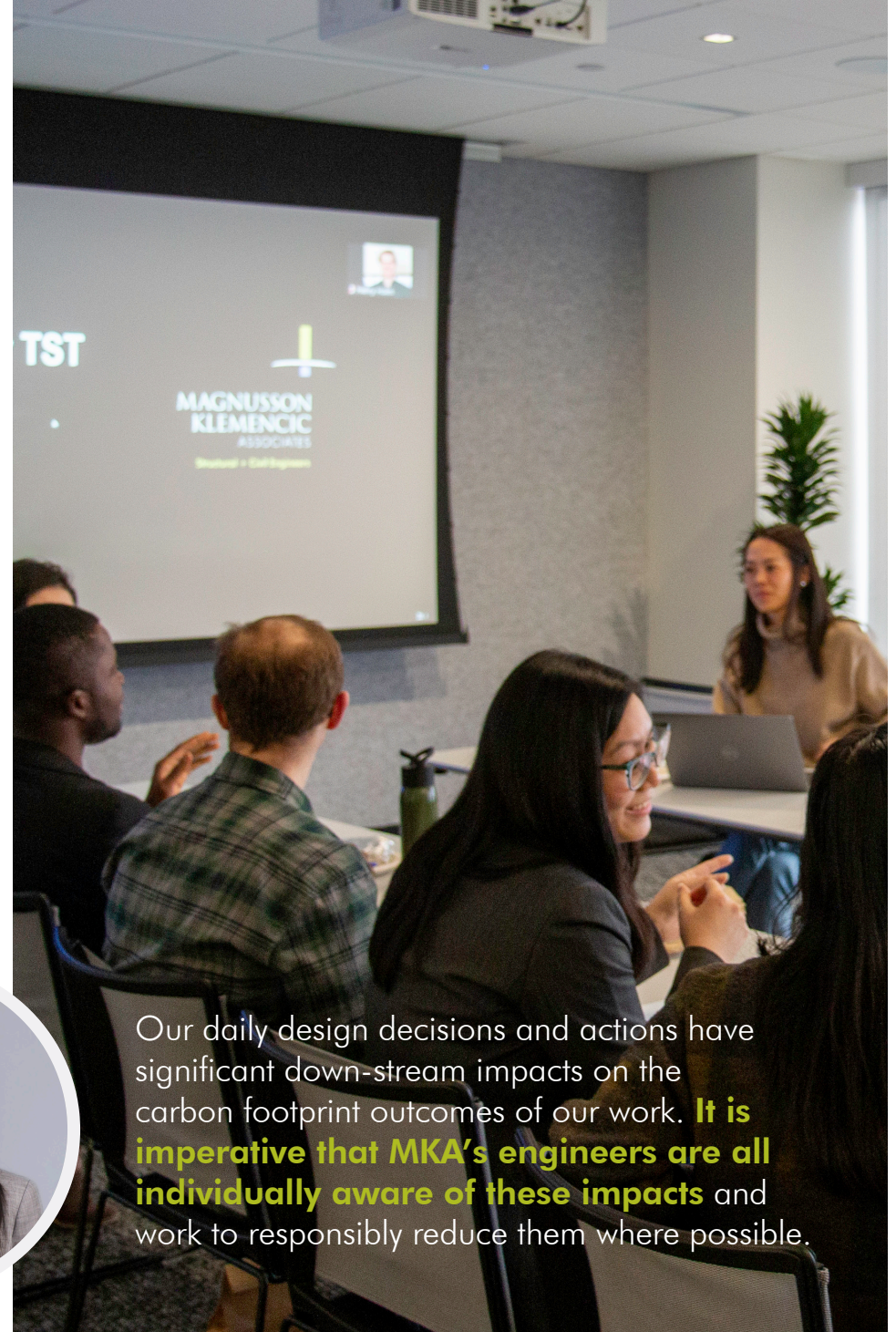
With that commitment in mind, **MKA operates a Sustainability Technical Specialist Team (TST)**, led by Catherine Cai, our Sustainability Champion. Catherine is an experienced resource and advocate for embodied carbon education and reduction. In her project work, she helps clients identify embodied carbon reduction opportunities and coaches teams through best practices in tracking and reporting embodied carbon.

Under Catherine's leadership, the TST's main initiatives are to share industry- and firm-wide innovations, advance embodied carbon reduction strategies, discuss case study lessons learned, and be a resource for project teams and the rest of the firm for MKA's sustainability initiatives. The TST also leads the development of an internal workshop focused on embodied carbon tracking, management, and reduction, which will become an essential part of MKA's technical development training.

Catherine also extends her expertise beyond MKA, as she is actively involved in the **Carbon Leadership Forum**, serves as a committee member of **SE 2050**, and contributes to larger discussions involving developers, architects, contractors, and engineers through the **Seattle Carbon Coalition**.



Catherine Cai, PE, SE
MKA's Sustainability Champion



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Research being conducted at UC Berkeley on structural materials and structural systems, funded by the MKA Foundation.

ENGAGING OUR COMMUNITY

The commitment to embodied carbon reduction requires industry-wide collaboration. **To be most effective in our commitments, MKA believes we should begin with client education.** As part of this, we are actively developing presentations and other resources to inform clients on project- and material-specific embodied carbon reduction strategies that can bring added value to our buildings.

Beyond our project work, **MKA is also committed to providing financial sponsorship and collaborative, in-kind structural and civil engineering support for research** that leads to non-proprietary and collective-action industry advancements. We also provide technical support and engagement in city and state legislation and building code development related to embodied carbon strategies.



CONSTANT REDUCTION

As we set our sights on net zero carbon projects, **MKA is implementing strategies to progressively reduce embodied carbon on our projects.** Within the Sustainability TST, material-specific champions will stay current on the latest low-carbon innovations and advocate for the use of these innovations on specific projects. Standard specifications are being updated frequently to implement state-of-the-art reporting requirements and embodied carbon reduction strategies, which allows continuous improvement in carbon reductions.

MKA recognizes that early consideration of carbon can significantly impact specific projects. For this reason, MKA will add a sustainability component to our quality control review during early project stages. Input from the Sustainability TST and material-specific champions will be leveraged, and carbon reduction strategies will be shared with the broader design team. MKA will also lead design charrettes on select projects to help architects and contractors identify carbon reduction opportunities.

MEASURABLE PROGRESS

Measuring material quantities accurately from early design through construction is an integral step in implementing carbon reduction strategies. Over many decades, MKA has maintained a detailed database of structural material quantities that helps the firm evaluate the impact of carbon reduction strategies based on real project data.

For select projects, the project team conducts structural material quantity take-off and embodied carbon tracking at the end of each major project phase, concluding in as-builts. The A1 to A3 product stage tracking uses industry-average Environmental Product Declaration (EPD) data, for establishing project embodied carbon baselines during design. As material suppliers join the project, the tracking incorporates EPDs specific to products and regions.

**MKA
BELIEVES:
“If you can’t
measure it,
you can’t
manage it.”**



MKA engineers from the Wood and Sustainability TST participate in a site tour to observe mass timber construction at an eight-story residential project.

Over the past several years, **MKA has standardized embodied carbon tracking and reporting, which has led to the development of in-house tools and formulation of MKA's Whole Building Life Cycle Analysis template.** The template will be used as a basis of design for MKA's embodied carbon studies to ensure the consistent comparison between projects. Furthermore, the template is a resource for MKA engineers to better understand embodied carbon tracking and reporting methodologies.



ELECTIVES



MKA's Juliette Peyroux, PE, SE, presents "Raising the Bar by Lowering the Carbon" during the Airport Consultants Council, Planning Design & Construction Symposium in Anaheim, CA.

EDUCATION

- Develop an internal workshop focusing on embodied carbon education, management, and reduction.
- Provide educational opportunities to employees by offering quarterly presentations from external sustainability experts.
- Designate an Embodied Carbon Reduction Champion and material-specific experts.
- Continue to operate a Sustainability Technical Specialty Team.

REPORTING

- Implement material quantity tracking, carbon measuring, and reporting through the design phases on select MKA projects. At least four projects will be submitted to SE 2050 for inclusion within their database. To ensure the quality and integrity of the data, MKA will submit A1 to A3 Product stage data on built projects only.

- Continue in-kind support and/or fund the advancement and development of non-proprietary open-source embodied carbon and LCA tracking tools such as EC3, EPIC, UpStream, and tallyCAT.

REDUCTION

- Lead sustainability design charrettes on select projects and explore different design options with embodied carbon as a performance metric, to help clients identify carbon reduction opportunities.
- Add a sustainability component to our standard quality control review process to make it easier to make early design decisions based on embodied carbon.
- Continue to review our standard specifications to incorporate up-to-date embodied carbon performance requirements.
- Continue to support performance-based design seismic, wind, and fire standards which help reduce material usage by allowing optimized designs.
- Advocate for the use of a forest sourcing/disclosure questionnaire on mass timber projects.

ADVOCACY

- Describe the value of SE 2050 to clients and develop creative marketing materials with effective data visualization that educate them on project- and material-specific embodied carbon reduction strategies.
- Advocate the use of EPDs within the procurement process for all material types.
- Maintain MKA's active involvement in our community by showing in-kind and/or financial support to embodied carbon organizations and providing feedback for city and state legislation and building code development.
- Continue to declare MKA as a member of the SE 2050 Commitment on our website and in proposal language.





Magnusson Klemencic Associates

1301 Fifth Avenue, Suite 3200 | Seattle, WA | 98101

www.mka.com | T: 206-292-1200