SE2050
COMMITTING TO NET ZERO

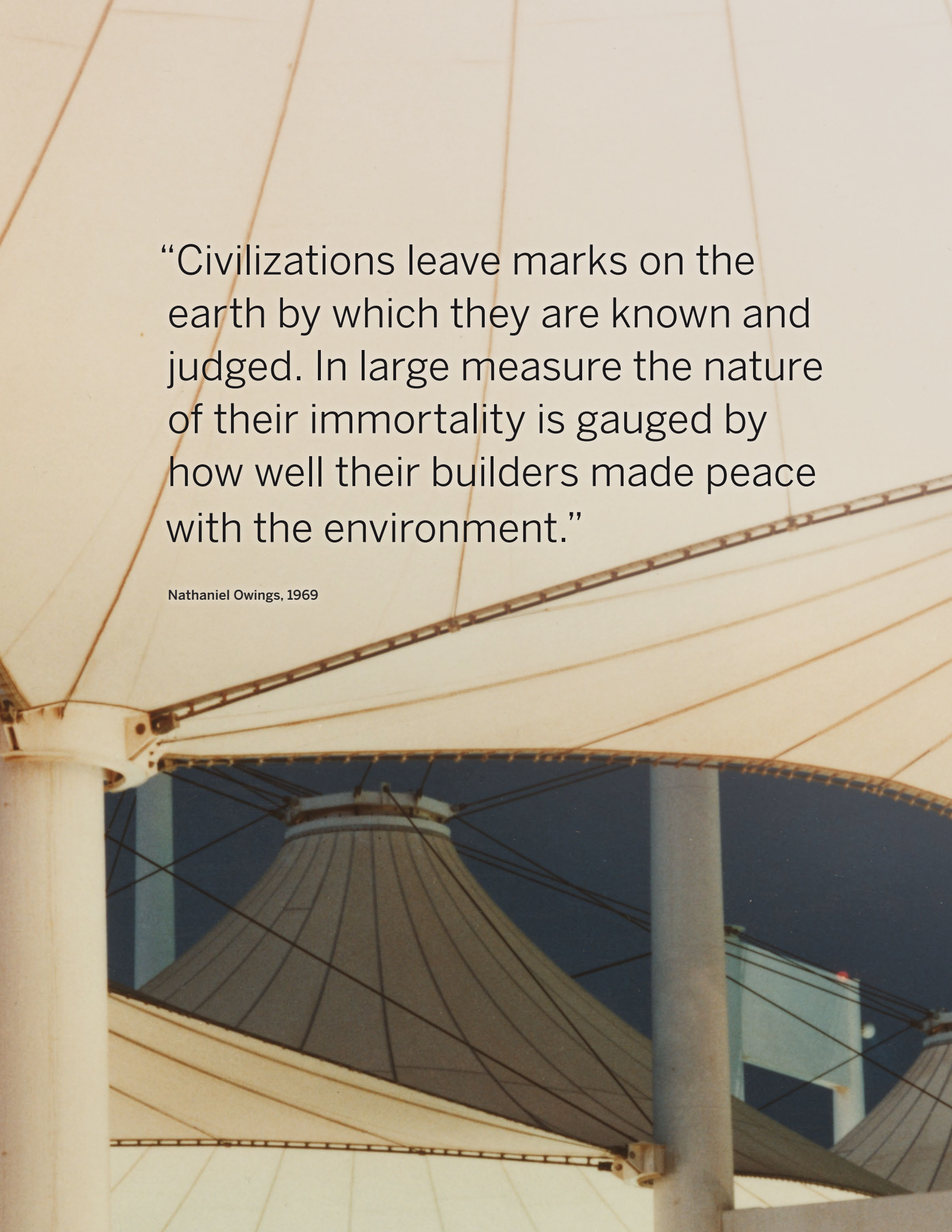
SOM

Commitment to Net Zero
September 9, 2021

We’re Rising to the Challenge

SOM Joins SE2050

Structural engineers have an important role to play in mitigating climate change by reducing the impact the built environment has on our planet. SOM is proud to join leading engineers as a member of the SE2050 Commitment, leveraging our deep bench of expertise in research and design to bring more sustainable building systems, materials, and technologies to the forefront. Working collaboratively, we’re ready to play our part to drive the transition to a net zero carbon built environment.



“Civilizations leave marks on the earth by which they are known and judged. In large measure the nature of their immortality is gauged by how well their builders made peace with the environment.”

Nathaniel Owings, 1969

Our Commitment

5/28/21
PRESS RELEASES

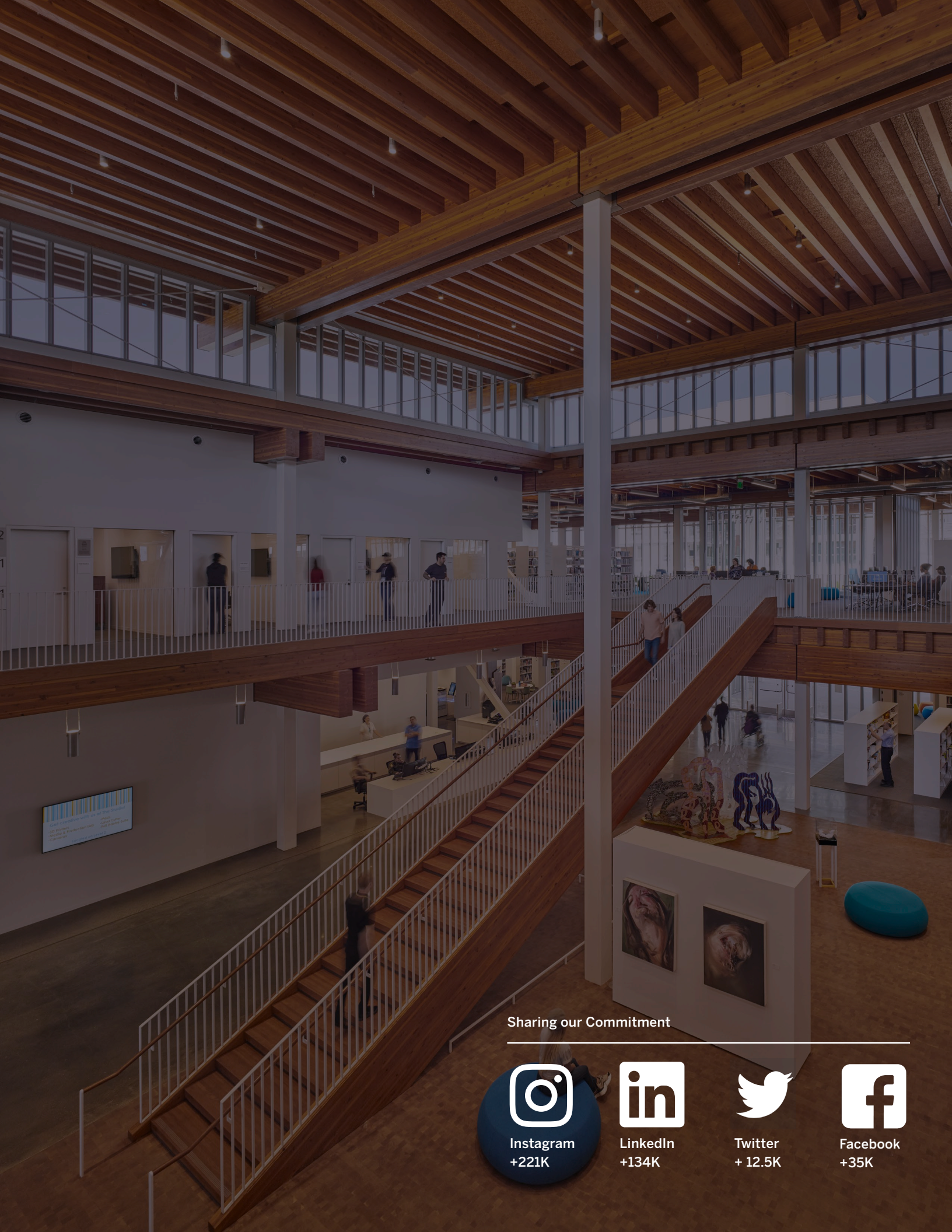
SOM Joins SE2050 Commitment to Carbon Neutral Structural Systems

SOM has joined leading structural engineering firms in signing the Structural Engineering Institute's (SEI) Structural Engineers 2050 (SE2050) Commitment. The initiative sets measurable goals to eliminate embodied carbon in structural systems by 2050. SOM is among the first architecture and engineering firms to commit to achieving substantive embodied carbon reductions within structural systems.

Making the SE2050 commitment further advances SOM's response to the most urgent challenge of our time: protecting the Earth's resources and leading the transition to a zero-carbon economy.

Strategies to reach net-zero embodied carbon include reducing and eliminating emissions from extracting, manufacturing, and transporting construction materials, all of which contribute immensely to global warming. The SE2050 program provides engineers with a platform to play an integral role in carbon reduction. The SE2050 committee will be sharing professional resources and educational opportunities to benchmark embodied carbon metrics, set targets, and track progress for firms that pledge to the program.

SE2050 adds to the list of climate action commitments that SOM has already made, including the AIA 2030 Commitment, the Architecture 2030 China Accord, and World Green Building Council Bringing Embodied Carbon Upfront.



Sharing our Commitment

Instagram
+221K

LinkedIn
+134K

Twitter
+ 12.5K

Facebook
+35K

SOM SE2050

September 9, 2021

Introduction

Holistic Design Approach

Pearl River Tower in Guangzhou, China was the first supertall building certified LEED® Platinum by the U.S. Green Building Council. The building redefines what is possible in sustainable design by incorporating the latest green technology, architecture, and engineering advancements. A feature of the project are the wind turbines located at openings up the height of the structure that reduce wind lateral loads and generate clean power.

Skidmore, Owings & Merrill

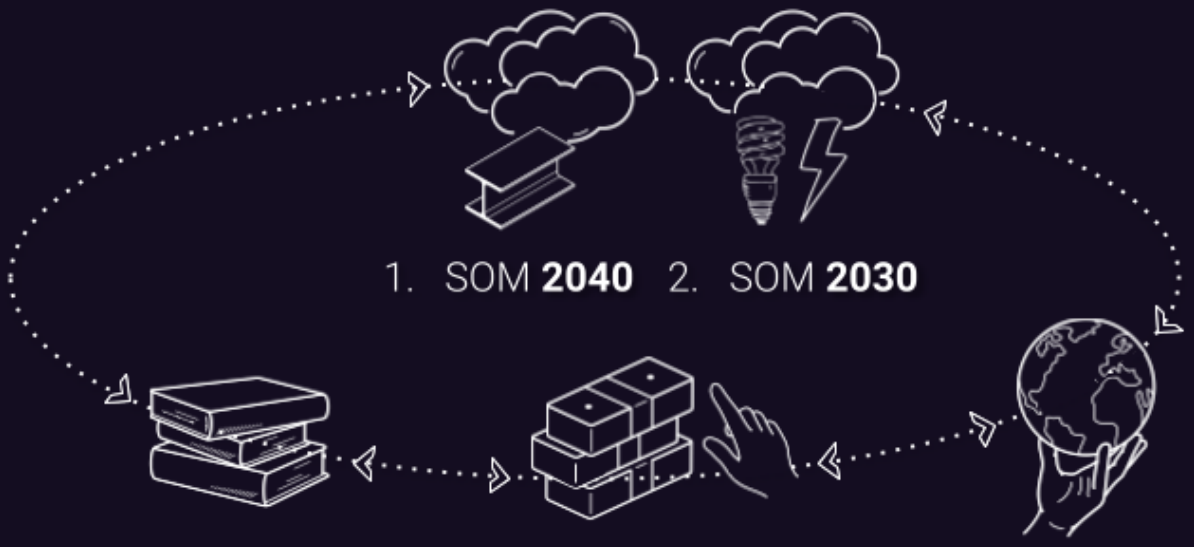
We are driven to answer the most urgent challenge of our time—to protect the Earth's resources and support the transition to a zero-carbon economy. We must take responsibility, individually and collectively, for the future of our planet. As architects, engineers, and planners, we are positioned to lead the charge by shaping buildings and cities to advance sustainable development.

SOM Climate Action Group

A collective of architects, designers, engineers and planners shaping a better future for our planet, by combating climate change and accelerating our actions for a sustainable low carbon future.

through

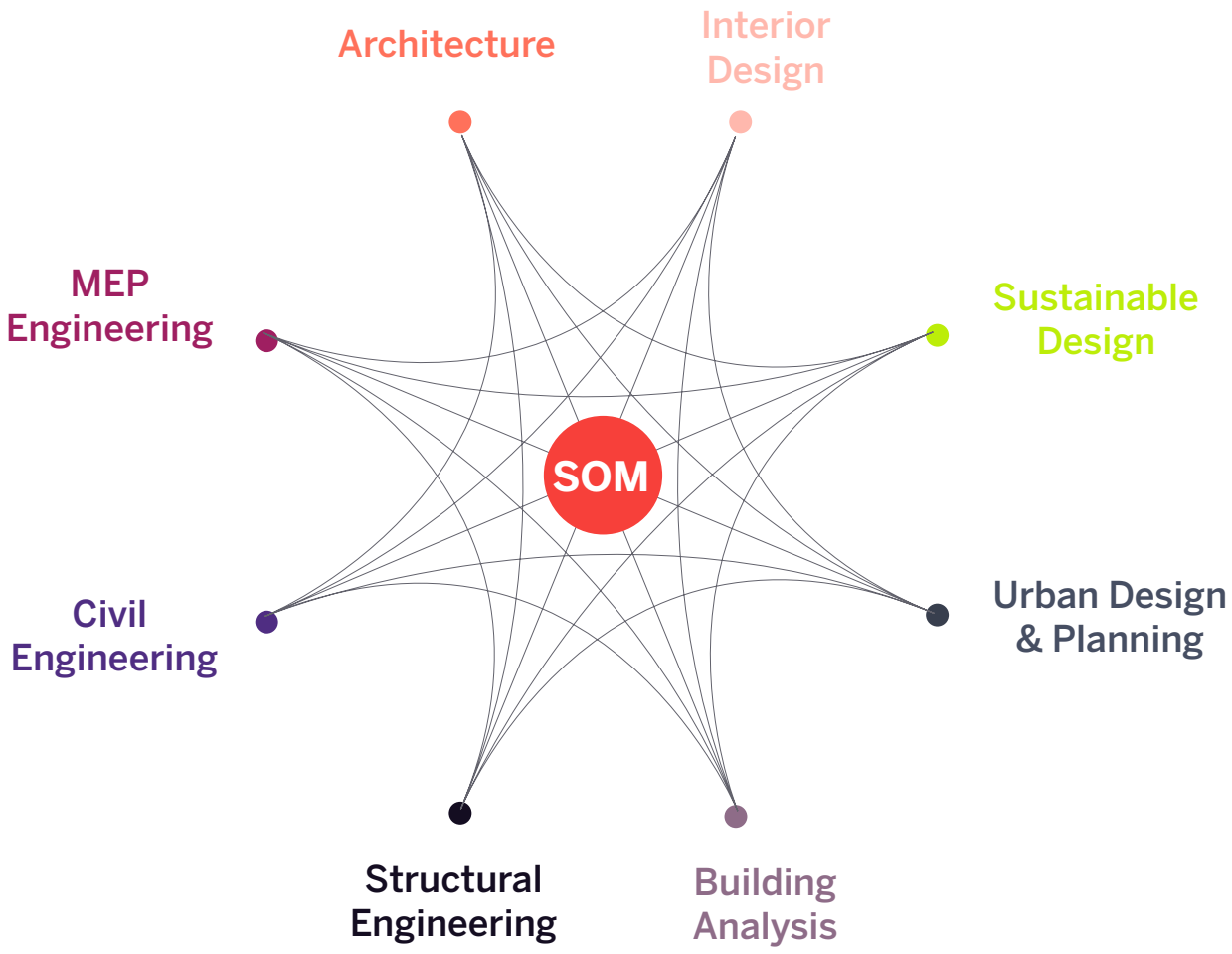
5 interconnected initiatives



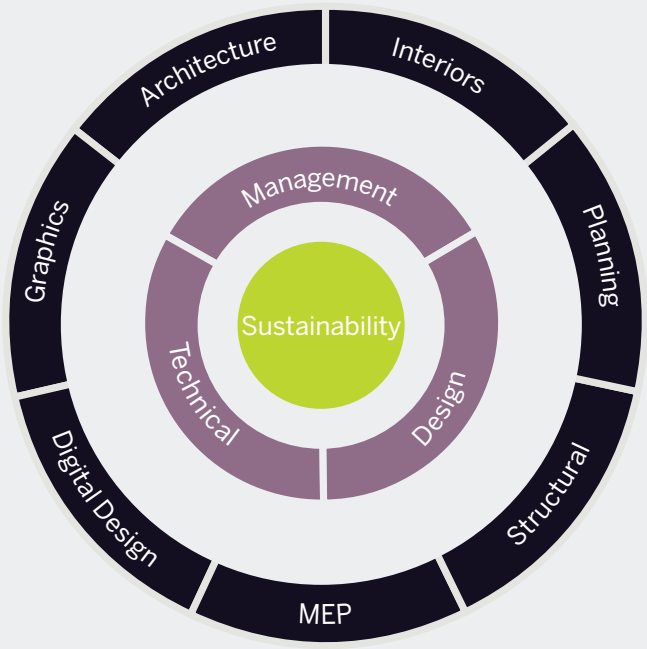
1. **SOM 2040:** Commitment to net zero embodied carbon in the designs of our wider portfolio by the year 2040
2. **SOM 2030:** Commitment to net zero operational carbon in our designs by the year 2030
3. **Green Materials:** Commitment to investing time and resources to the pursuit of new sustainable building materials
4. **D-Spec:** Commitment on improving our sustainable performance from a materials and construction standpoint
5. **10 Principals:** Underpinned by the UN Sustainable Development Goals for 2030, our design principles for sustainability and wellbeing (see page 14 for more details)

A Holistic Approach

As an integrated design practice, SOM is committed to evaluating and improving on embodied carbon performance not only across the firm's structural design group, but within the architectural, interior, urban planning and MEP design studios. Through this integrated approach we leverage our embodied carbon calculation methodology and reduction strategies across all disciplines and work collaboratively to further a common goal of net embodied carbon reduction in the built environment.

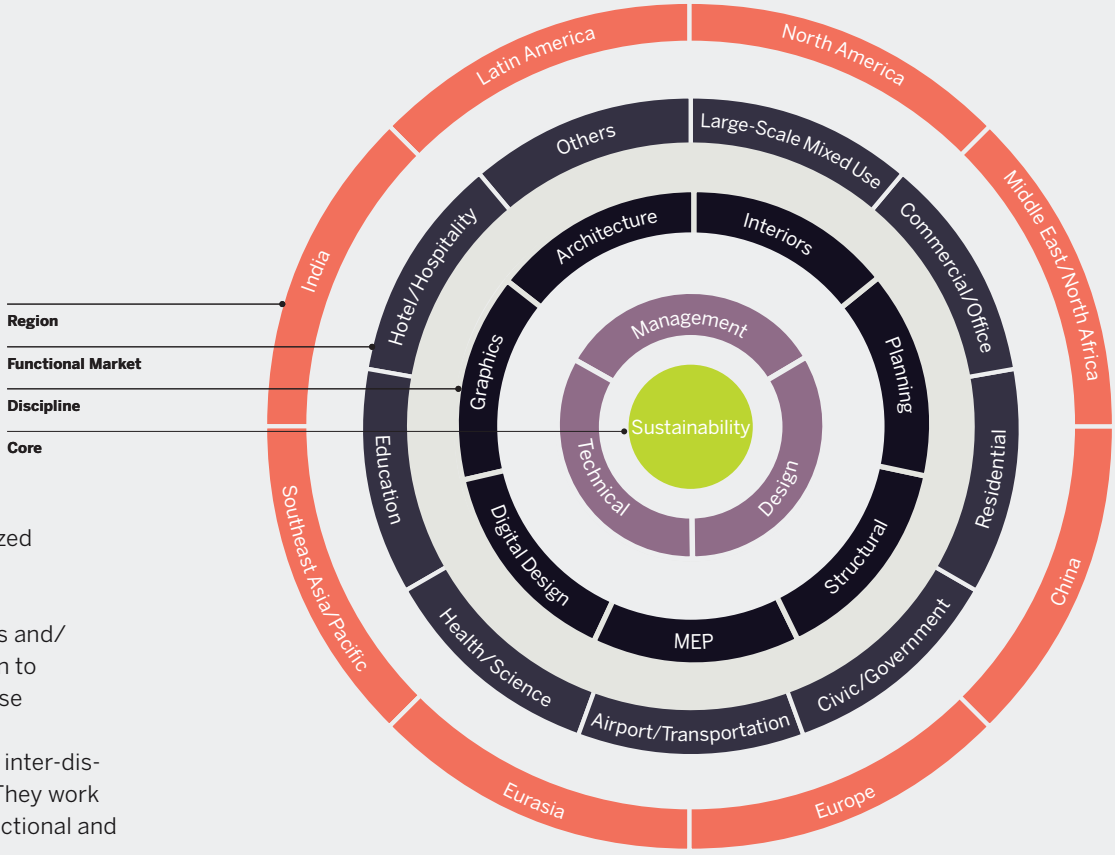


21st Century Staff Structure
Disciplines and Talent Accessible Firmwide



SOM's current structure is based upon the assembly of the best available firmwide international talent with specific functional expertise applied to highly program-driven projects. Enabled by advances in computational systems, digital communications and a "one-firm" partnership culture, this structure provides depth in specialist expertise; and breadth in intellectual cross-fertilization across diverse project typologies and geographies. The firm's core values in design, technical and management are applied to each discipline, firmwide, to promote consistent quality. The visual manifestation of the firm's overall design ethos, as established by the partners, is an important measure of the level of a project's success.

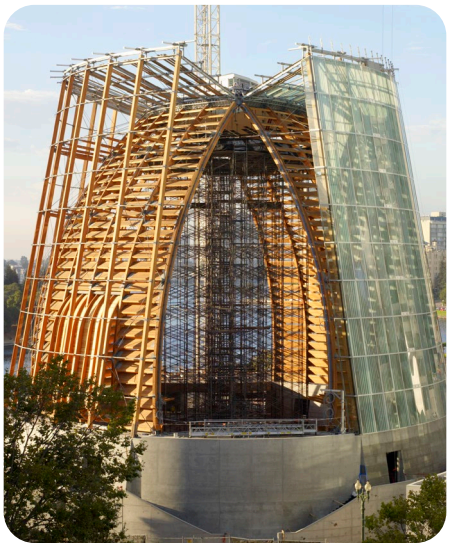
21st Century Project Organization

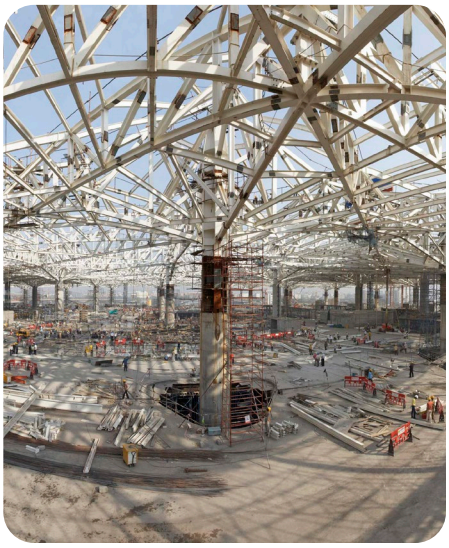


Each project is organized around a core team of Design, Technical and Management directors and/or partners. In addition to overall leadership, these individuals encourage cross-fertilization and inter-disciplinary innovation. They work across disciplines, functional and geographic markets.

Our 10 Design Principles

SOM is committed to developing sustainable built environments, and it recognizes the limitations of our planet's collective resources. Grounded in building and planning science, SOM's integrated environmental design approach is embedded in projects through rational and informed design decisions. Through research, analysis and innovation, we aim to create built environments that prioritize the wellbeing of our planet and people.



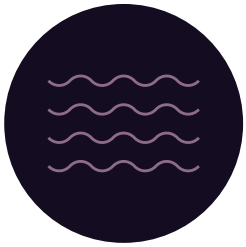


10 Design Principles for Sustainability and Wellbeing

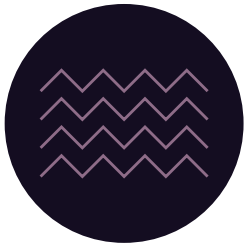
ECOLOGY
Leverage and Protect Nature

ECONOMY + EQUITY
Provide Low Carbon Urbanism for All

ENERGY + CARBON
Design and Deliver Net Zero Carbon Built Environments

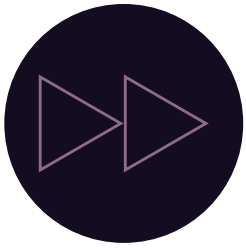


WATER
Value Every Drop



RESILIENCY
Adapt for Climate Change

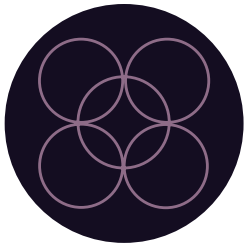
LIVABILITY + WELLBEING
Design Places where People Thrive



MOBILITY
Promote Sustainable Connectivity

MATERIALS + RESOURCES
Specify Responsibly and Prioritize Efficiency

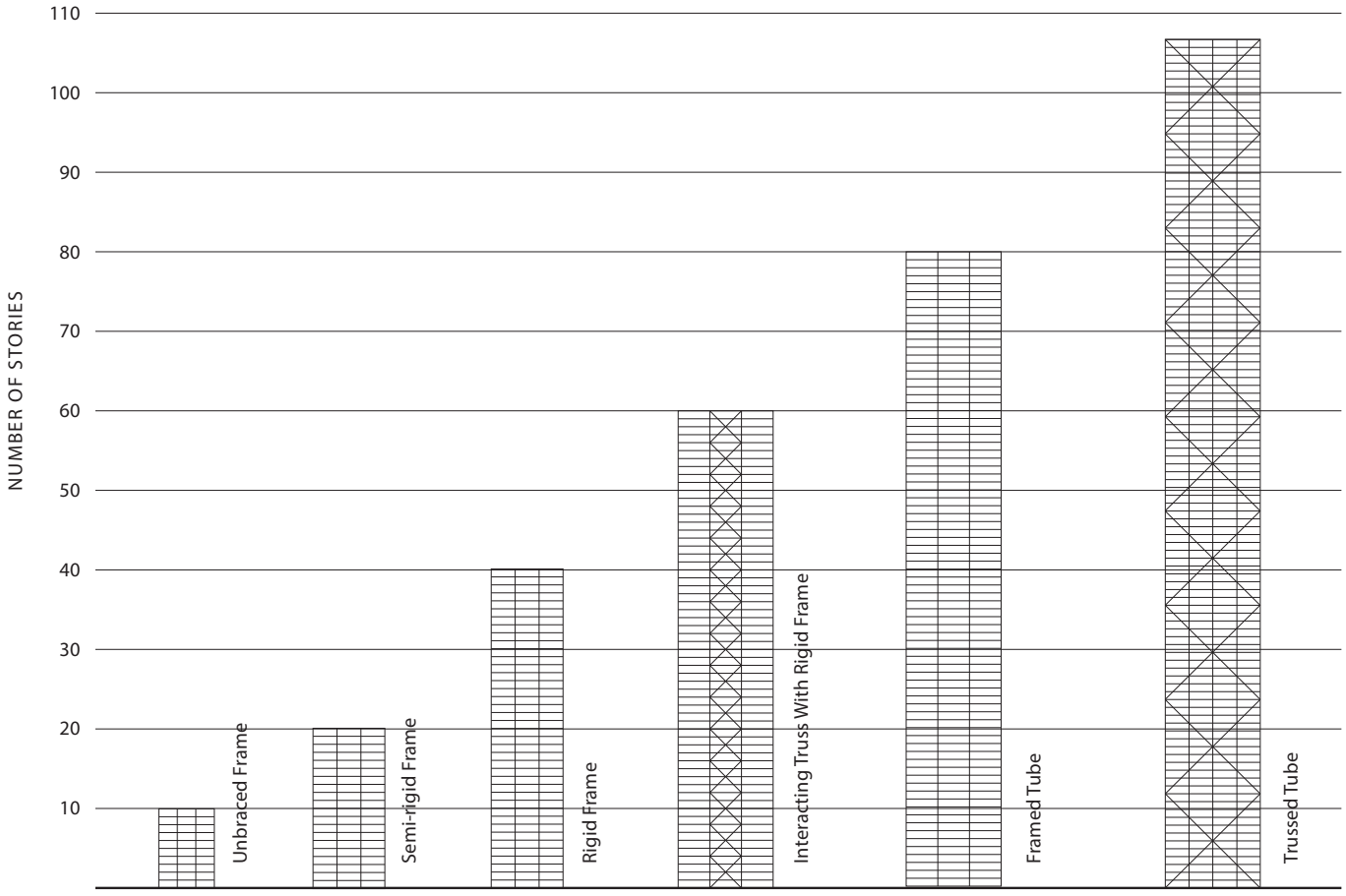
WASTE
Do more with Less



HERITAGE + IDENTITY
Cultivate Authentic Connections

Legacy of Structural Sustainability

Structural optimization has been a core means by which SOM has achieved sustainable buildings. This is seen in the pioneering work of Fazlur Khan in the 1960's and 1970's. The braced tube system of 875 North Michigan Avenue (formerly John Hancock Center) and the bundled tube system of the Willis Tower allowed incredible heights to be reached with remarkable material efficiency.



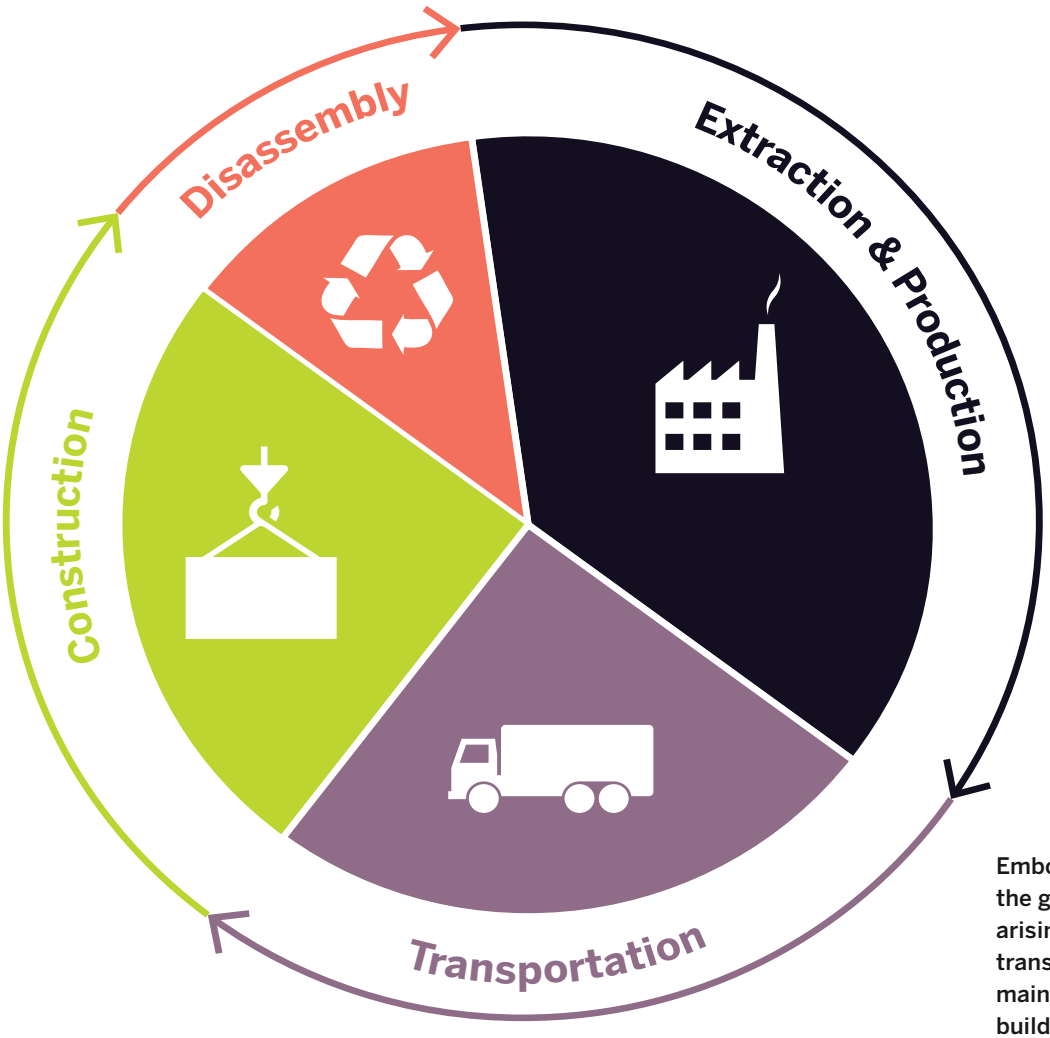
A historic collaboration between architects and structural engineers, the 100-story 875 North Michigan Avenue (formerly John Hancock Center) represents the first use of the exterior diagonalized tube structural system.

In 1969, one of SOM's founders, Nathaniel Owings, said "*Civilizations leave marks on the Earth by which they are known and judged. In large measure, the nature of their immortality is gauged by how well their builders made peace with the environment.*" As an environmental activist as well as a business leader, he spoke of the responsibility that our firm has to protect our planet's limited resources. Our work has been guided by this conviction for decades.

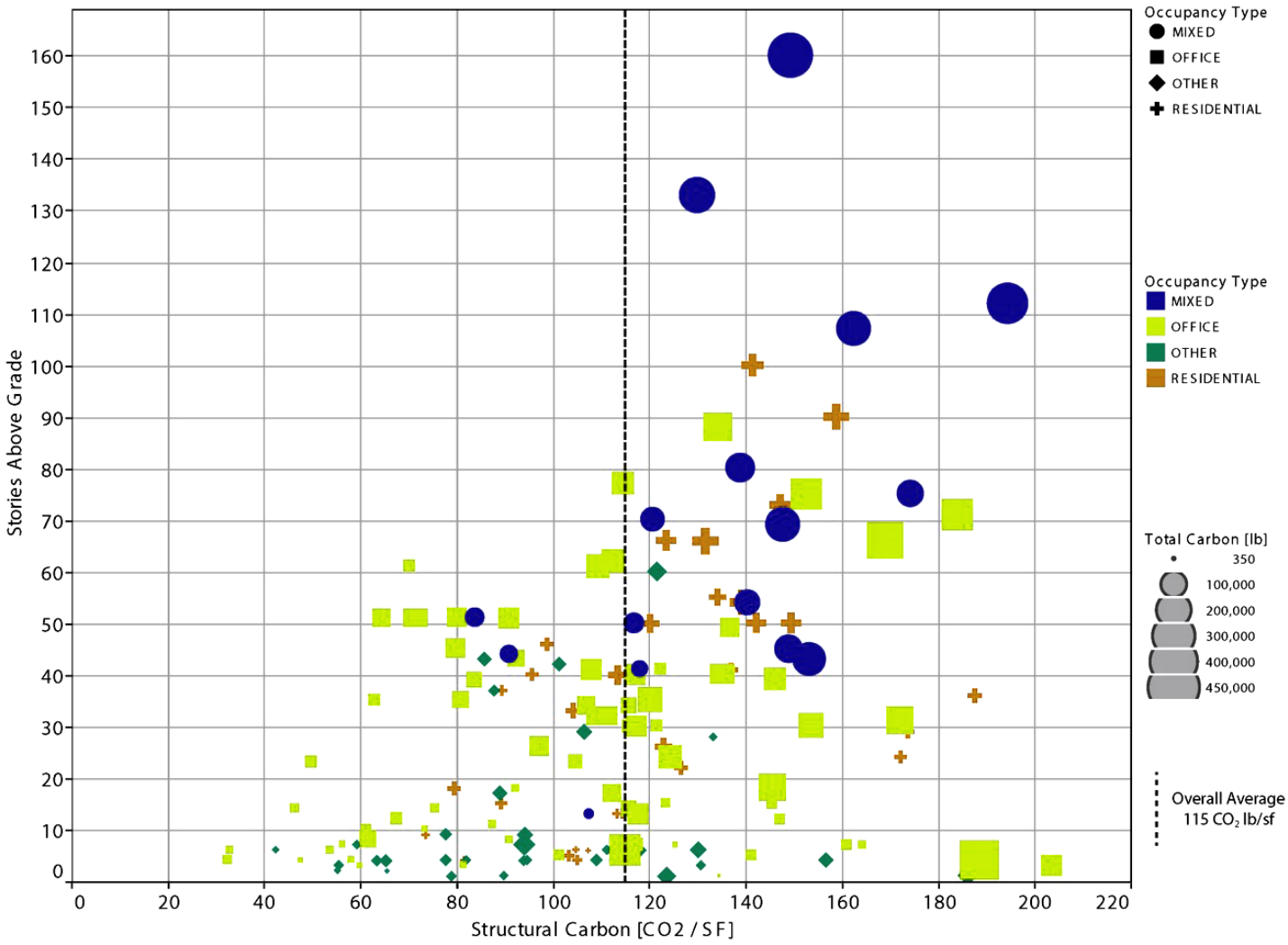
We believe that great buildings come through a dialogue between engineers and architects, working as a design collective with the shared aspiration of achieving simplicity, structural clarity, and sustainability. The incorporation and commitment to sustainable building ideas has been an integral part of SOM's design approach. Today, we are staffed with 270 LEED® accredited professionals who have extensive knowledge of the industry's progressive efficiency design solutions and strategies.

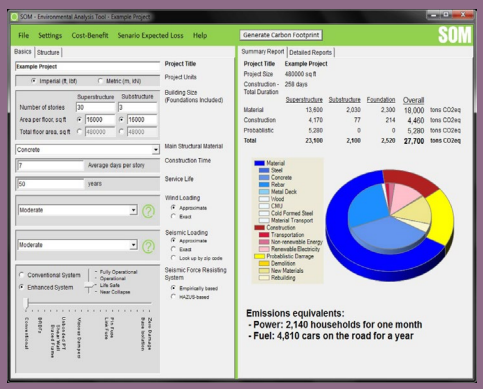
Efficiency & Optimization Tools

Embodied carbon is a significant percentage of global emissions. As engineers and designers it is urgent for us to take action. In our contemporary work we use a range of optimization tools and techniques that capitalize on modern computing to conceive new forms and efficient material placement.



Embodied carbon refers to the greenhouse gas emissions arising from the manufacturing, transportation, installation, maintenance, and disposal of building materials.

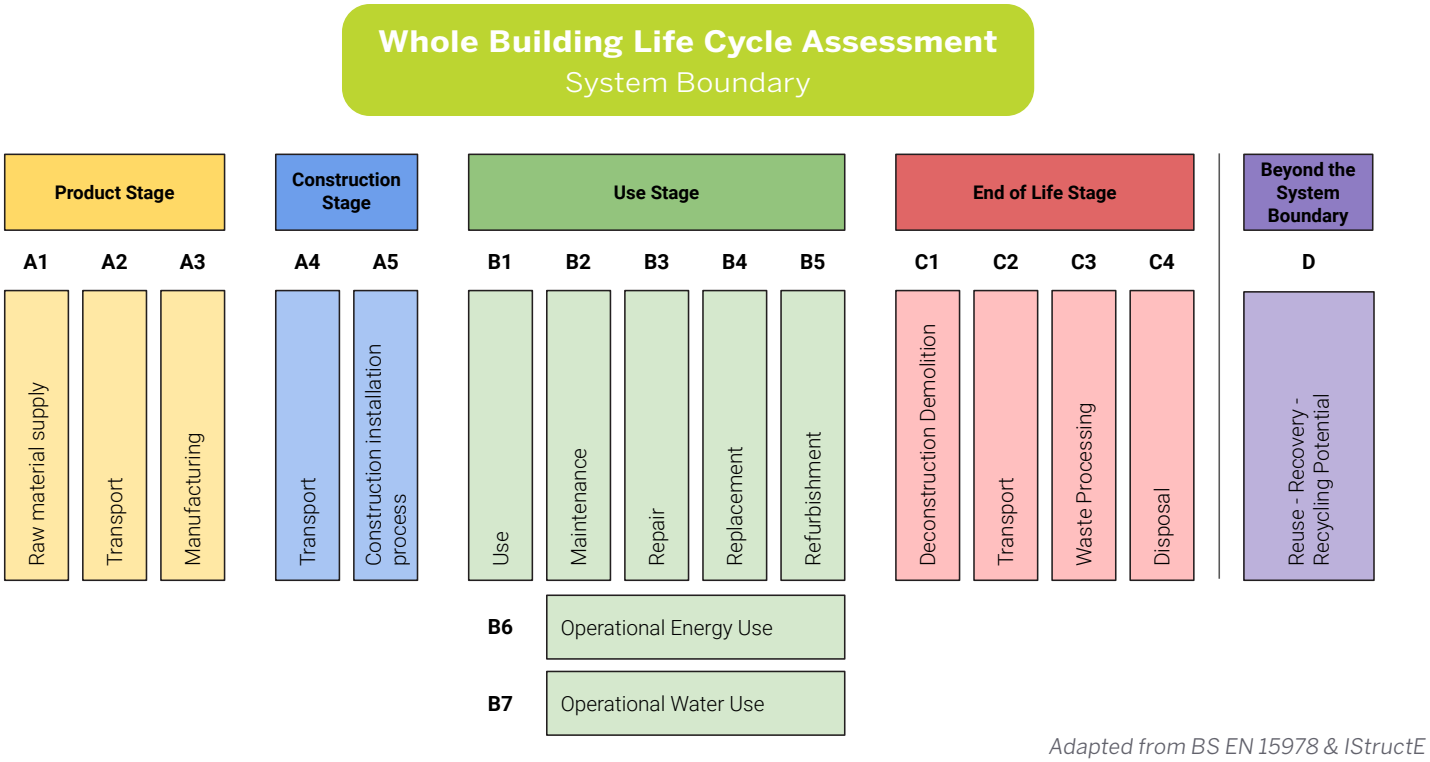




SOM has kept detailed records of the structural material quantities of our projects for many years. This provides useful benchmarks for efficiency based on project types, structural systems, and location. As the theories of embodied carbon and project life cycles have become better understood, we have developed tools that help us track and evaluate these in our projects. The EA Tool is a simple yet robust software program, created by structural engineers at SOM, that has been available as a free resource for the industry for over a decade. The program allows designers to estimate embodied carbon starting with a very minimal amount of information about a building.

Structural Life Cycle Group

Leading the sustainability efforts for our firmwide structural engineering teams is the Structural Life Cycle Group. The group aims to advance our sustainable design principles over the entire lifespan of a structure. The Group's mission is to advance environmental performance of structural systems, advocating for more integrated design solutions, the implementation of innovative materials and construction practices.



Adapted from BS EN 15978 & IStructE

SOM

STRUCTURAL LIFE CYCLE

EMBODIED CARBON + HIGH PERFORMANCE DESIGN

SOM SE2050 Champions

Effective results starts with a realistic and detailed work plan that is proactively managed throughout the process. We have assembled a team of experts that bring extensive experience with sustainability, material efficiency, and environmentally responsible structural systems.

David Horos, LEED® AP, SE, PE
Director of Structural Engineering

Jeremy Kirk, PE, SE
Structural Engineering Associate

Matthew Streeter, PE
Structural Engineering Associate

Nicole Wang, PE
Structural Engineering Associate

Christopher Horiuchi, SE
Structural Engineering Associate

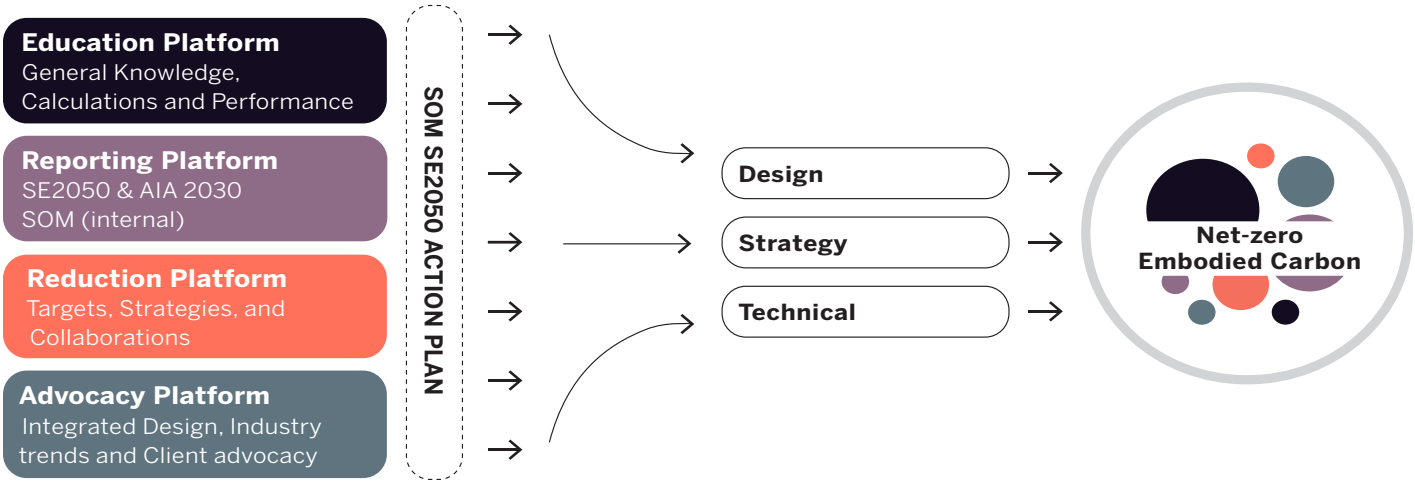
Karl Micallef
Structural Engineering Associate

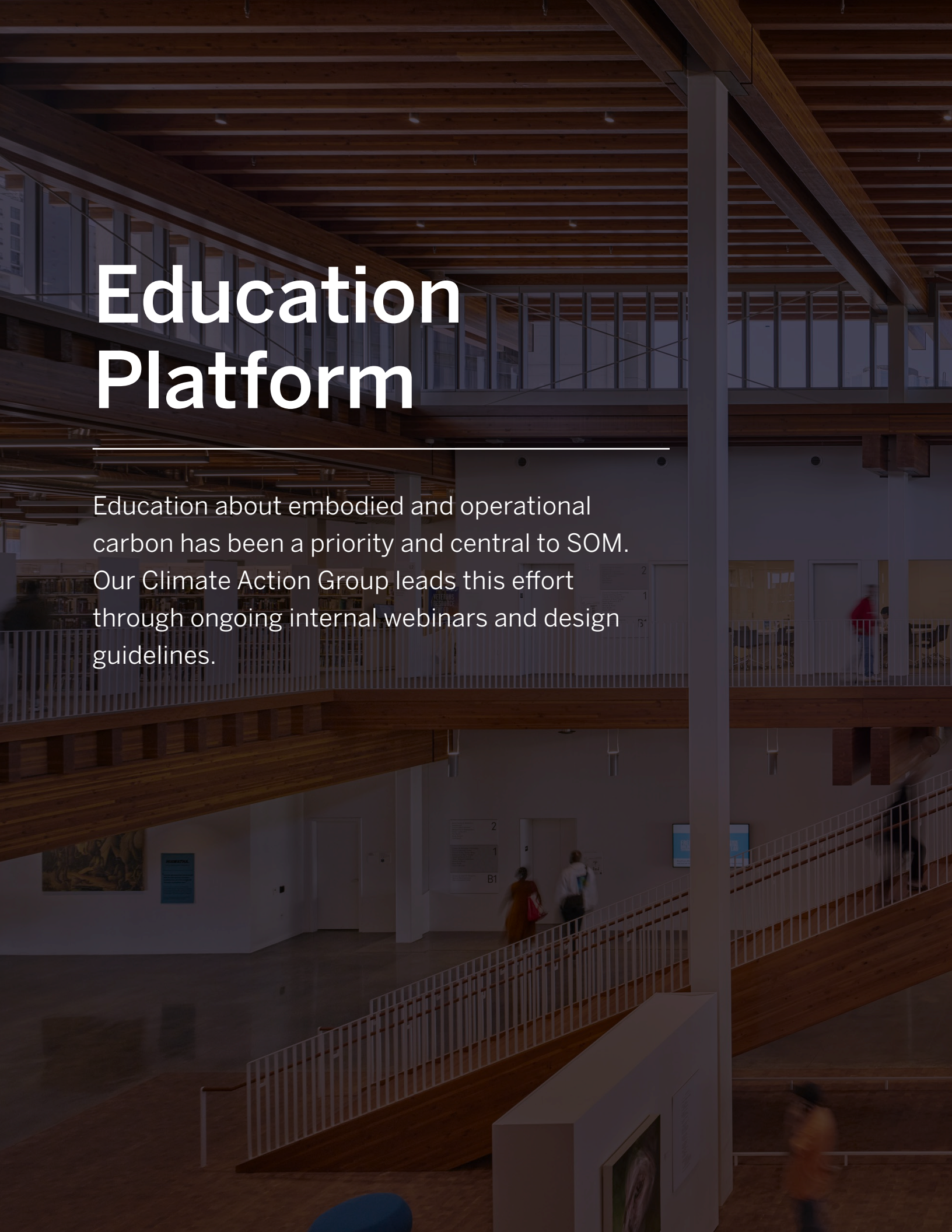
Eunice Leung, PE
Structural Engineering Professional

SOM SE2050 Action Plan

Our commitment for the coming years is to formalize SOM's embodied carbon reduction strategies within the structural engineering practice in several ways. Here we present the general layout of each platform that will help inform and guide our action plan and commitment.

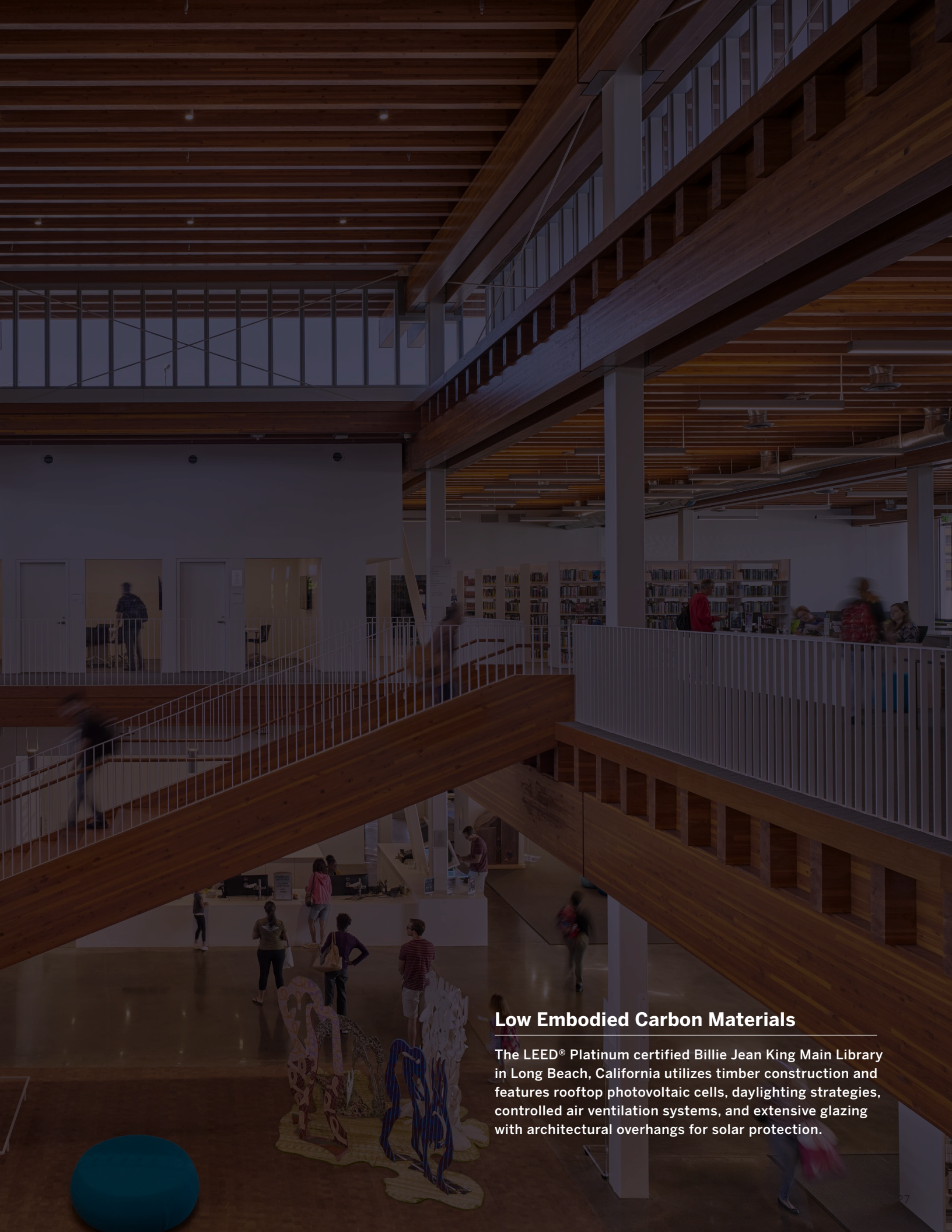
This Action Plan documents ongoing as well as new efforts within our firm to reduce the carbon footprint of our work. Additionally, this Action Plan will be used as a firmwide aid to guide our design practice towards more sustainable design solutions to achieve our goal of net zero embodied carbon by 2050.





Education Platform

Education about embodied and operational carbon has been a priority and central to SOM. Our Climate Action Group leads this effort through ongoing internal webinars and design guidelines.



Low Embodied Carbon Materials

The LEED® Platinum certified Billie Jean King Main Library in Long Beach, California utilizes timber construction and features rooftop photovoltaic cells, daylighting strategies, controlled air ventilation systems, and extensive glazing with architectural overhangs for solar protection.

Education Platform

Our commitment for the coming years is to formalize our Action Plan within the structural engineering practice:

1. We will create and present our own "Embodied Carbon 101" webinar.
2. We will create a document of guidelines for considering and calculating embodied carbon, to be followed for all of our projects.
3. We will develop, track and share embodied carbon reduction strategies throughout the firm to allow us to maximize our potential reduction on every project.

These 3 pillars make up the basis of the education platform for our embodied carbon action plan.

General Knowledge

Objectives:
In this pillar we focus on general knowledge required to understand what contributes to embodied carbon within a structural system. This platform provides clear definitions of parameters used to calculate embodied carbon throughout the lifecycle of a structure.

Internal Deliverables:
We will create and present our own "Embodied Carbon 101" webinar on a an annual basis to all designers within the firm. The purpose of this webinar will be to provide an outline for performing the LCA process as well as highlighting any developments that have been made in the materials science/ design/construction industry which may have an impact on our sustainable design practices.

Calculations

Objectives:
To provide detailed guidance on calculating embodied carbon on a given project at all stages throughout the design process. This will include guidelines on regional carbon factors for various materials as well as best practices for estimating quantities. These calculation processes will be in line with industry accepted standard practices for calculating embodied carbon for a given LCA module.

Tool Evaluation & Internal Deliverables:
SOM will periodically monitor and evaluate commercially available LCA calculation tools to ensure accuracy and efficiency in our EC calculation processes. Additionally, SOM has been and will continue to develop internal tools for calculating embodied carbon to be used to make informed design decisions. As part of this development, we will provide educational presentations and user guides to inform SOM designers on how to implement both internal and commercially available tools for LCA calculations.

Performance and Reduction

Objectives:
To inform designers on the leading reduction strategies being implemented on various projects across the firm. This platform will also be utilized to educate teams on lessons learned from past projects, whether it be to highlight structural systems which were successful in reducing embodied carbon compared to traditional systems, or to identify projects which fall short of there EC goals and what aspects of the design led to this shortcoming.

Internal Deliverables:
Webinars relating to reduction strategies and EC performance as it relates to internal and industry wide EC benchmarks will be incorporated in the quarterly "Embodied Carbon 101" described in the General Knowledge platform.


The Institution of StructuralEngineers
How to calculate embodied carbon
IStructE Guide
Life Cycle Assessment of Buildings: A Practice Guide
Published by:
The Carbon Leadership Forum
Funded by:
CHARLES PANKOW FOUNDATION
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SKANSKA
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FOR THE STRUCTURAL ENGINEER
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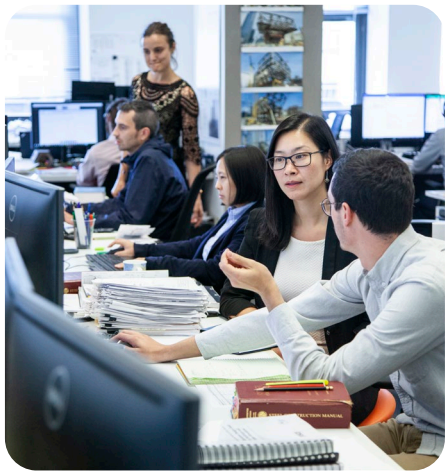
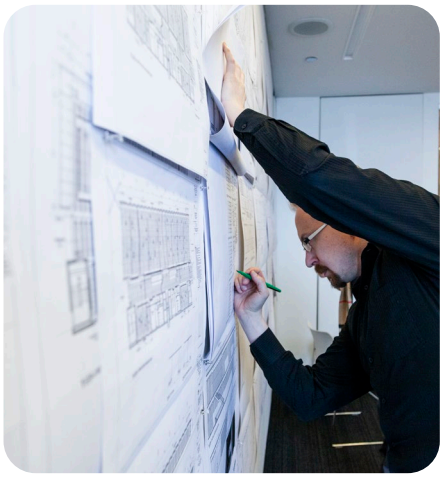
ASCE
SEI
Structural Materials and Global Climate
A Primer on Carbon Emissions for Structural Engineers
ASCE






PLUMBING
FP

Reporting Platform

Tracking and reporting of embodied carbon is critical for both internal design optimization and for the industry as a whole, to understand how we can make the most effective reductions that impact the built environment.

Reporting Platform

We have created internal spreadsheet tools for calculating Embodied Carbon (EC). These tools are used by the structural engineering teams on each project both for comparing embodied carbon schematic options as well as for documenting embodied carbon at major milestones. SOM has also developed the EC 101 tool that informs design decisions not only for structural systems, but for other design considerations, to achieve a holistic approach to embodied carbon reduction.

SE 2050

Scope:
SOM will report embodied carbon quantities from a minimum of 5 projects from each office in the first year of reporting. We will aim to exceed this target, but may be limited based on available EPD data, project location or project phase. Our initial reporting will focus on project locations for which reliable EPD values are available. Our aim is to build our understanding of EPD values across all global regions and monitor how these values are improved as new materials and manufacturing processes become available. SOM will also limit reporting to projects which have progressed up to, or beyond the schematic design phase.

Strategy:
As part of our SE 2050 reporting strategy, SOM will establish structural system component categories which are consistent with SE 2050 reporting guidelines. Establishing a consistent component categorization strategy, will allow for easier data interpretation and comparison across the industry. After the first round of reporting, SOM hopes to receive feedback from SEI regarding reporting categories which can be refined moving forward to improve data aggregation processes. Prior to reporting, SOM will plot all results against select building metrics to identify any potential outliers and understand the cause of this deviation.

Tools:
SOM will utilize commercially available tools which are LEED verified to perform embodied carbon calculations for SE2050 reporting. SOM will also use internally developed EC calculation tools, however internal tools must be verified using commercially available software accepted by industry peers.

AIA 2030

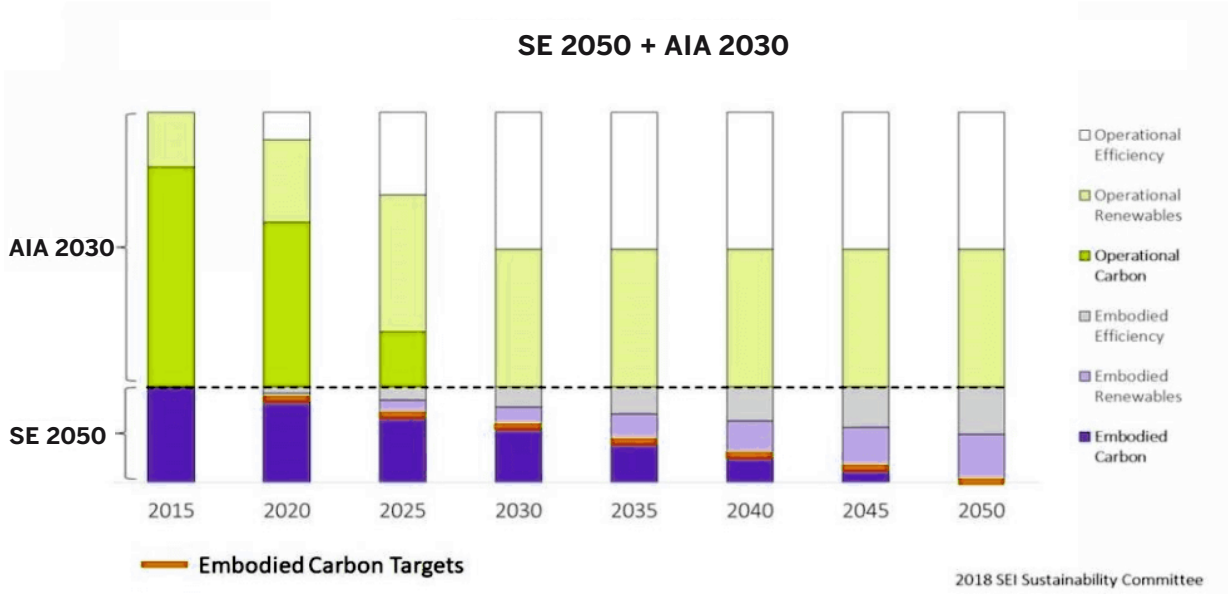
Scope:
As part of SOM's commitment to AIA2030, embodied carbon information on various projects shall be provided during the AIA2030 reporting process. SOM structures contributed for the first time to the reporting process during the year 2020 reporting cycle, during which we calculated embodied carbon for 45 projects across 4 different offices. Structural system components categories for AIA2030 reporting will not be broken down into as much detail as will be done for SE2050 reporting. AIA2030 reporting currently focuses on identifying the scope of the project included in the calculation. SOM will continue on this path until more detailed reporting is required/ requested.

Strategy:
Similar to EC Reporting Pillar, AIA 2030 reporting will also include a back check prior to issuance to ensure outliers are identified. Quantities for AIA 2030 will be subdivided into three main categories (Foundation, Substructure & superstructure).

SOM - Internal Evaluations

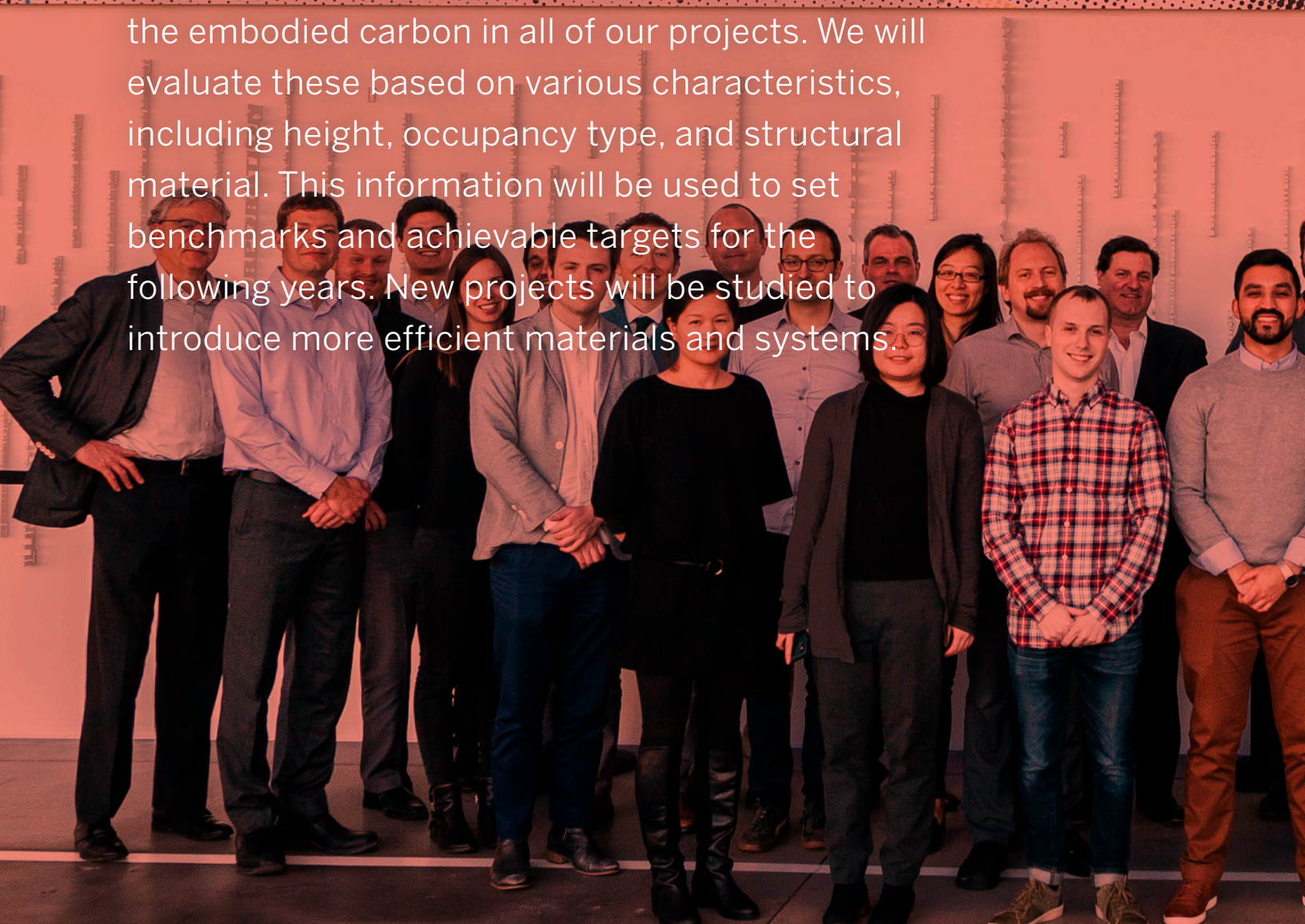
Scope:
To ensure SOM is making progress towards our embodied carbon targets we will engage in periodic embodied carbon tracking at the internal level. Our goal is to have design teams calculate embodied carbon at the end of each phase for all active projects within the structures group. By doing so, we can evaluate a given project's embodied carbon progression from the concept phase to the construction document deliverable to ensure reduction strategies are being implemented and overall reductions are being achieved. This internal tracking program also allows us to compare a given project's EC performance at a certain stage with past projects as well as measure it against objective EC targets. Further, we have been, and will continue to use these internal tracking mechanisms to identify which aspects of various structural systems are successful at reducing EC in our design, and to inform our reduction strategies moving forward.

Strategy:
SOM will continue to utilize internally developed tools to track embodied carbon over the duration of a project. These tools will feed into a larger database of all projects that will allow for rapid visualization EC performance across all offices/projects. This parent database will also serve as an educational tool to highlight embodied carbon success stories as well as give designers a clear reference of reasonable embodied carbon targets for a given project typology.



Reduction Platform

In this first year of SOM's commitment to SE 2050, we will undertake a comprehensive study of the embodied carbon in all of our projects. We will evaluate these based on various characteristics, including height, occupancy type, and structural material. This information will be used to set benchmarks and achievable targets for the following years. New projects will be studied to introduce more efficient materials and systems.




ne future
today.

Reduction Platform

Benchmarking & Targets

Objectives:
The goal of establishing embodied carbon benchmarks and targets is to establish a reduction roadmap or timeline that allows for EC reductions which are consistent with the reality and constraints that exist within the industry. As a firm we have a history of innovative design resulting in new and increasingly efficient structural systems. We will continue on this path of innovation, however EC reduction targets must be viewed through an objective lense. Therefore, we will establish targets which are consistent with industry wide targets as well as the ultimate goal of net zero structural embodied carbon by 2050.

Internal Deliverables:
Our aim will be to internally publish these structural embodied carbon targets on an annual basis. As part of this publication, we will evaluate our previous years performance against the targets for that same time period to evaluate our success at achieving these goals.

Reduction Strategies

Objectives:
As a group, we are working to define realistic reductions strategies that are consistent with the embodied carbon targets described in the previous section. These strategies will include but are not limited to: new materials research, structural systems optimization, more sustainable material specifications, innovative construction techniques and systems integration. It is our hope that through the combination of these strategies, we can start to achieve our embodied carbon reduction targets.

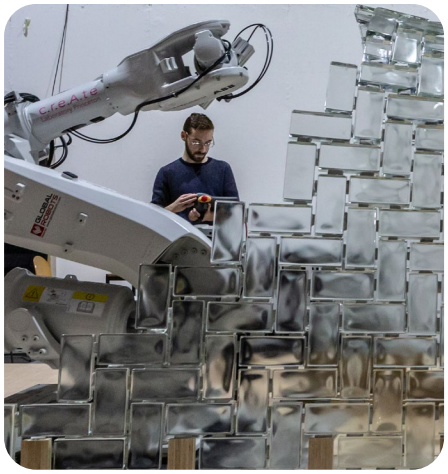
Internal Deliverables:
As part of our Annual Embodied Carbon(EC)101 seminar, will outline the leading embodied carbon reduction strategies for various structural systems and project typologies to ensure all potential reduction practices are available to our project engineers.

Collaborations

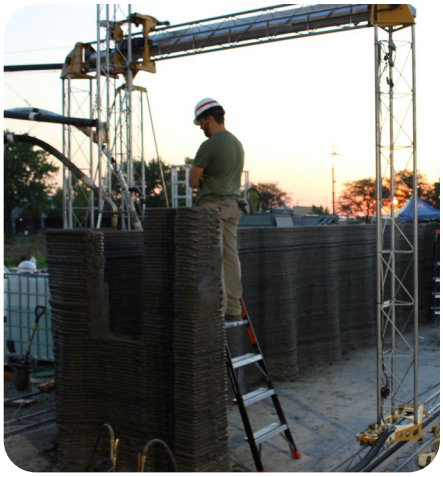
Objectives:
As described in the previous sections, one of SOM's strengths as a design firm is the integrated nature of our practice. Through collaboration across our various design disciplines, we aim to leverage integrated systems as much as possible in future designs to reduce construction waste and raw material usage. Our targets and strategies for embodied carbon reduction will continue to develop in collaboration with the other design disciplines to ensure wholistice embodied carbon reduction is being achieved over the entire scope of a project.

Internal Deliverables:
Internally, SOM has developed our own Climate Action Group which meets regularly to review carbon performance and [potential reductions strategies for both embodied and operational carbon. SOM structures will continue to be involved with and lead discussion within this internal committee as they relate to embodied carbon performance and reduction strategies.

The Additive Manufacturing Integrated Energy (AMIE 1.0) Demonstration Project

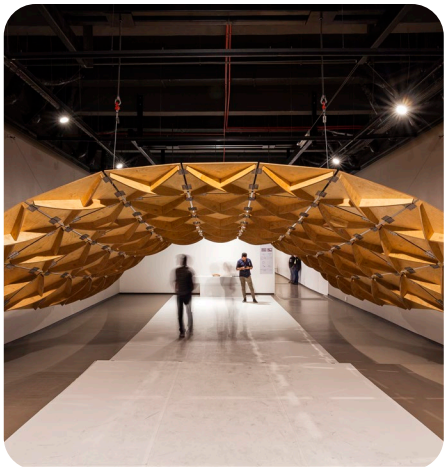


Robotic Construction - The Glass Vault Digital Fabrication, Demonstration Project

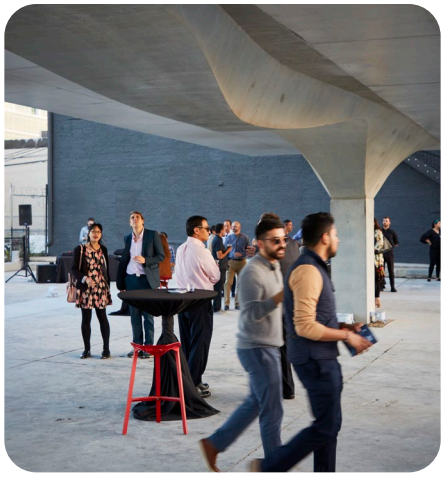


3D-Printed Concrete Barracks U.S. Army Corps of Engineers

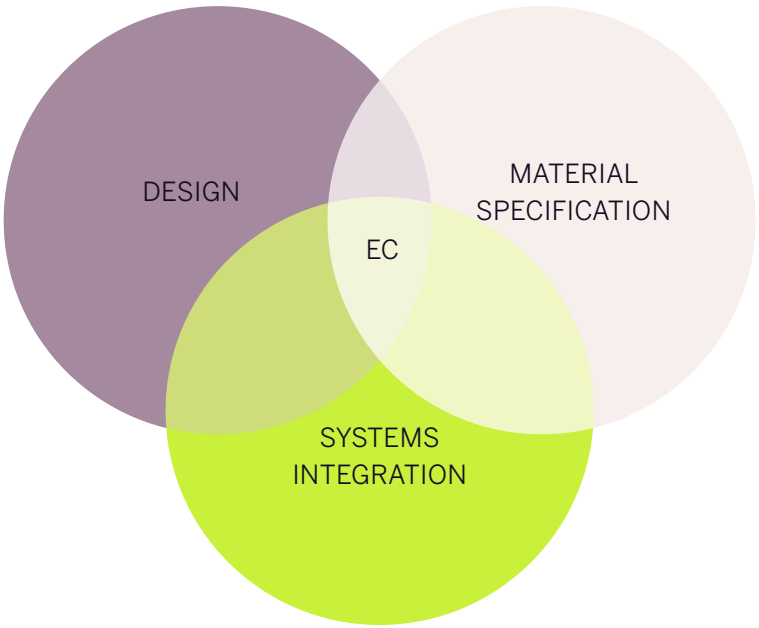
Timber Tower - Research to Minimize the Embodied Carbon Footprint of Buildings



Kinematic Sculpture - Exploring The Relationship Between Force & Motion



Stereoform Slab - Optimized Structure That Reduces Embodied Concrete



As designers our primary influence on the sustainable performance of a building system results from decisions made during the design, materials specification and systems integration processes. It is at the intersections of these processes categories that we have the potential to affect significant embodied carbon reduction in the built environment.


+ Allá del horizonte
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Beyond the horizon
Round table
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Advocacy Platform

SOM is committed to change within our own firm and promoting our goals. Our internal communications reach all of our staff and encourage thoughtful actions. Our commitment to net zero and environmental stewardship are conspicuously shown throughout our external communications, routinely promoting sustainable solutions to our clients. Our goal is to influence and lead the global industry.

Advocacy Platform

Integrated Design Advocacy

Objectives:
Within our firm we constantly engage in conversations with our colleagues in other disciplines to champion and explore the benefits of interdisciplinary design. With each new project, we challenge the traditional processes and design flows, looking for opportunities to improve sustainability.

It is our goal as an integrated design practice to evaluate the potential for integrated design techniques on all new and ongoing projects. As we have seen from past experience, significant embodied carbon savings can be achieved through the integration of building systems, and the potential for savings increases by considering integrated design strategies early in the design process. Through this platform we will also evaluate past integrated design approaches implemented by SOM or other industry leaders to identify which integration strategies result in optimal carbon savings.

Internal Deliverables:
Success stories are presented in office and firm-wide meetings to reinforce this key aspect of our design ethos. Our structural group is highly involved with the firmwide initiatives related to sustainability, and are developing discipline-specific actions that parallel the global ideas (i.e. the Ten Principles).

Client Advocacy

Objectives:
Highlight and strive for economic benefits through sustainable design practices. Our marketing and external communications will make it clear to our clients the high value that SOM places on sustainability and embodied carbon reduction. We seek opportunities to work with like-minded clients, allowing us to to leverage our knowledge and experience in this realm as a resource to assist clients and projects.

Through this pillar we aim to develop consistent sustainable design drivers which are presented to our clients from the earliest stages of the design process to ensure our commitments as a firm are reelected in our client relationships.

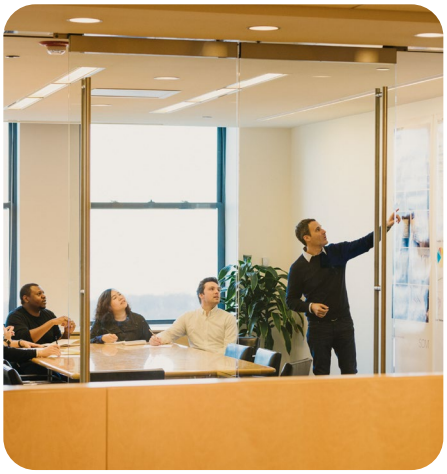
Internal Deliverables:
Provide teams with sustainable design narrative for project specific design criteria and locations that are based on past experience. This will include compiling regional specific information about local construction practices and material availability to ensure our sustainable design drivers are implemented within a context derived from the project location.

Industry Advocacy

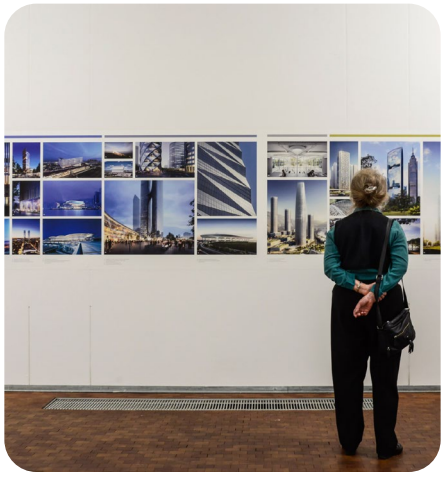
Objectives:
As an industry leader, it is critical that SOM is plugged into the latest sustainable practices from both the design industry as well as the construction industry. By engaging with other design industry leaders, we hope to establish knowledge sharing pipelines to ensure that successful design approaches are being implemented across the broader design community. As part of this effort, structural engineers from SOM have committed to leadership positions on committees in SE2050 and continue to engage in other sustainable design communities such as Carbon Leadership Forum.

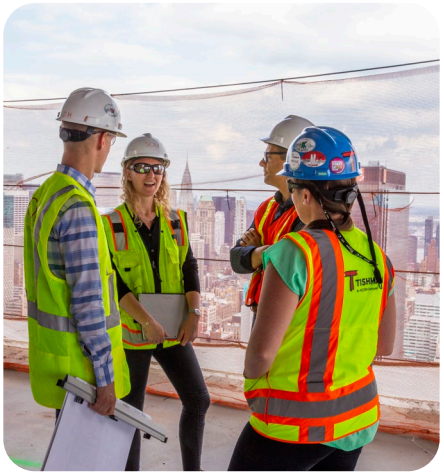
Similarly, it is important that our group engage with general contractors and builders to not only identify new sustainable materials and construction practices, but also to understand the feasibility of implementing sustainable design solutions in practice.

Internal Deliverables:
To achieve the above industry advocacy goals, SOM will continue engaging with the sustainable design communities with the hopes of hosting and/or participating in inter-practice sustainable design workshops that allow knowledge sharing across firms.




The future
today

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