SE2050

EMBODIED CARBON ACTION PLAN

June 2024

COFFMAN ENGINEERS

photo courtesy of Gensler
PAC MESA AMENITY

1 INTRODUCTION

Connect with us on social media.

www.coffman.com

EXECUTIVE SUMMARY

Founded as a structural office in Seattle amongst the misty forests of the Pacific Northwest, followed by an expansion that would grow to be the largest engineering company in Anchorage, Alaska - the frontier spirit is embedded deep in the cultural seeds of Coffman Engineers. It follows that a love and reverence for nature is also part of our culture. This is a driving force in setting and achieving our sustainability goals for SE2050. The following Action Plan outlines our year three steps in the approach to achieving the goal of the SE2050 commitment and to ultimately designing net-zero embodied carbon structures by 2050.

The approach to Education, Reporting, Reduction, and Advocacy we aim to achieve in this third year of the SE2050 Building Challenge is outlined in the following pages. Our Sustainable Design Production Group oversees the implementation of our goals and is a guiding force to educate our staff on the structural engineer's role in sustainable design. Quarterly presentations continue to anchor the education of our engineers and we expanded the group of engineers familiar with reporting by exceeding our goal of 5 projects - posting 6 to the SE2050 database. In the Reduction area, we were also excited to work with our fellow design team members documenting over 10% carbon reduction in pursuit of the LEED Whole Building LCA credit for our UCR School of Business and Pac Mesa projects. Pac Mesa also included our first Mass Timber project for the Amenity Building on the campus, a major contributor to the carbon savings over a baseline steel building. Our Advocacy for carbon reducing strategies, particularly for the use of Type 1L cement in our concrete projects, lead to use of the material in a number of our buildings.

The coming year looks to greatly ramp up our Reporting and Reduction opportunities, especially with our California offices and the implementation of CalGreen requirements for carbon reduction starting July 1st. For commercial buildings over 100,000 sf, and education buildings over 50,000 sf, CalGreen will require building structures that meet certain embodied carbon reduction requirements. We are excited and well prepared to implement strategies to meet these code requirements for our Clients.

We invite you to continue with us on this journey that aims to grow into a vibrant structural design philosophy of sustainability, that becomes as inherent to the choices we make for materials, systems, resilience, and safety of the buildings we are honored to design.

James R. Conley, SE, Embodied Carbon Reduction Champion, Coffman Engineers, Inc.

THOMAS JEFFERSON SCHOOL OF LAW
LEED GOLD CERTIFIED

2 EDUCATION | OUR EXPERTS

Sustainability has always been important to our Coffman team. Starting with our San Diego office in 2021, we have been working diligently to develop a plan to help us achieve a more sustainable built environment. This culminated with the formation of our own internal Sustainable Design Production Group and our commitment to SE2050 in 2021. Since then, this dedicated group of engineers and technicians has continued to develop, organize, and implement the tools and best practices required for our team to achieve net-zero structural systems.

Major highlights of the past year on the Education front included hosting a presentation for our local structural engineers association on Sustainable Forestry, Biophilia, and Sustainable Building Rating Systems by Woodworks member, Mike Romanowski. We also had Cory Scriverner of SmartLam present on Mass Timber and CLT framing and design options. Simpson came to our San Diego office to demonstrate hands on attachment methods for wood. Presentations on sustainable concrete mixes, and steel also help round out our education.

For 2024, one of our education goals is to bring our ECAP presentation to all of our structural departments across the company. This will further advancement in educating our structural peers on the commitments and practices of Coffman toward structural sustainability.

EMBODIED CARBON REDUCTION CHAMPION

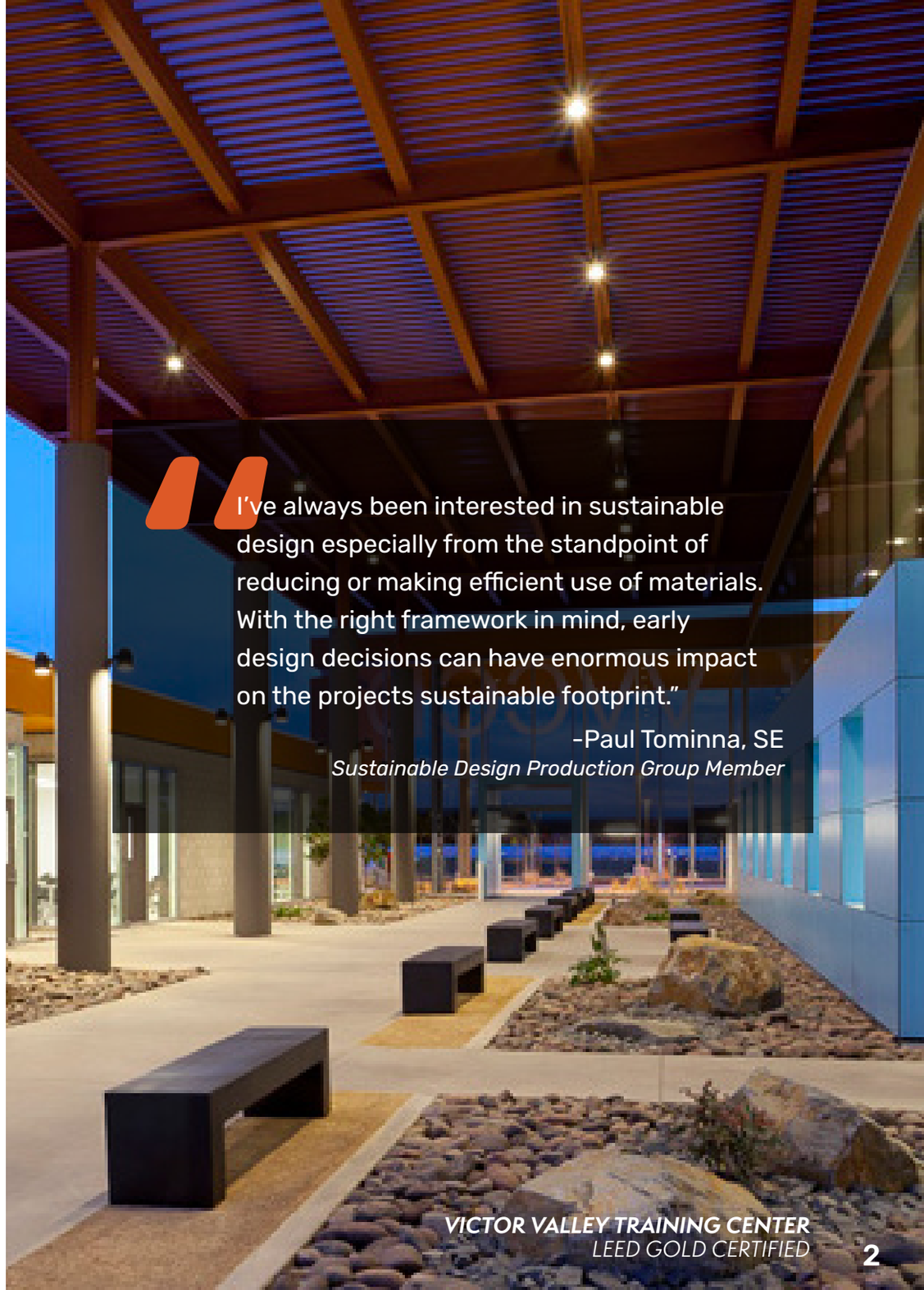
James "Jim" Conley, SE, DBIA

Jim Conley is a Senior Discipline Manager in our San Diego office and has extensive knowledge and experience with structural engineering design. He enthusiastically took on the role of Embodied Carbon Reduction Champion for Coffman and is our structural lead on sustainability design. His involvement in organizations such as the Structural Engineers Association of San Diego and the Post-Tensioning Institute, coupled with his passion for sustainability, make him a strong advocate and leader of SE2050. Jim will serve as the main advocate of implementing practices to reach SE2050 goals across Coffman's structural engineering departments companywide.

STRUCTURAL ENGINEERING PRINCIPAL

Casey Whitsett, SE

Casey Whitsett is a Structural Engineering Principal in our San Diego office. As a past president and current member of the Board of Directors of the Structural Engineers Association of San Diego, Casey's leadership and involvement in the structural engineering community gives him multiple outlets to spread the word about SE2050 and teach sustainable design practices to younger engineers.



"I've always been interested in sustainable design especially from the standpoint of reducing or making efficient use of materials. With the right framework in mind, early design decisions can have enormous impact on the projects sustainable footprint."

-Paul Tominna, SE

Sustainable Design Production Group Member

VICTOR VALLEY TRAINING CENTER
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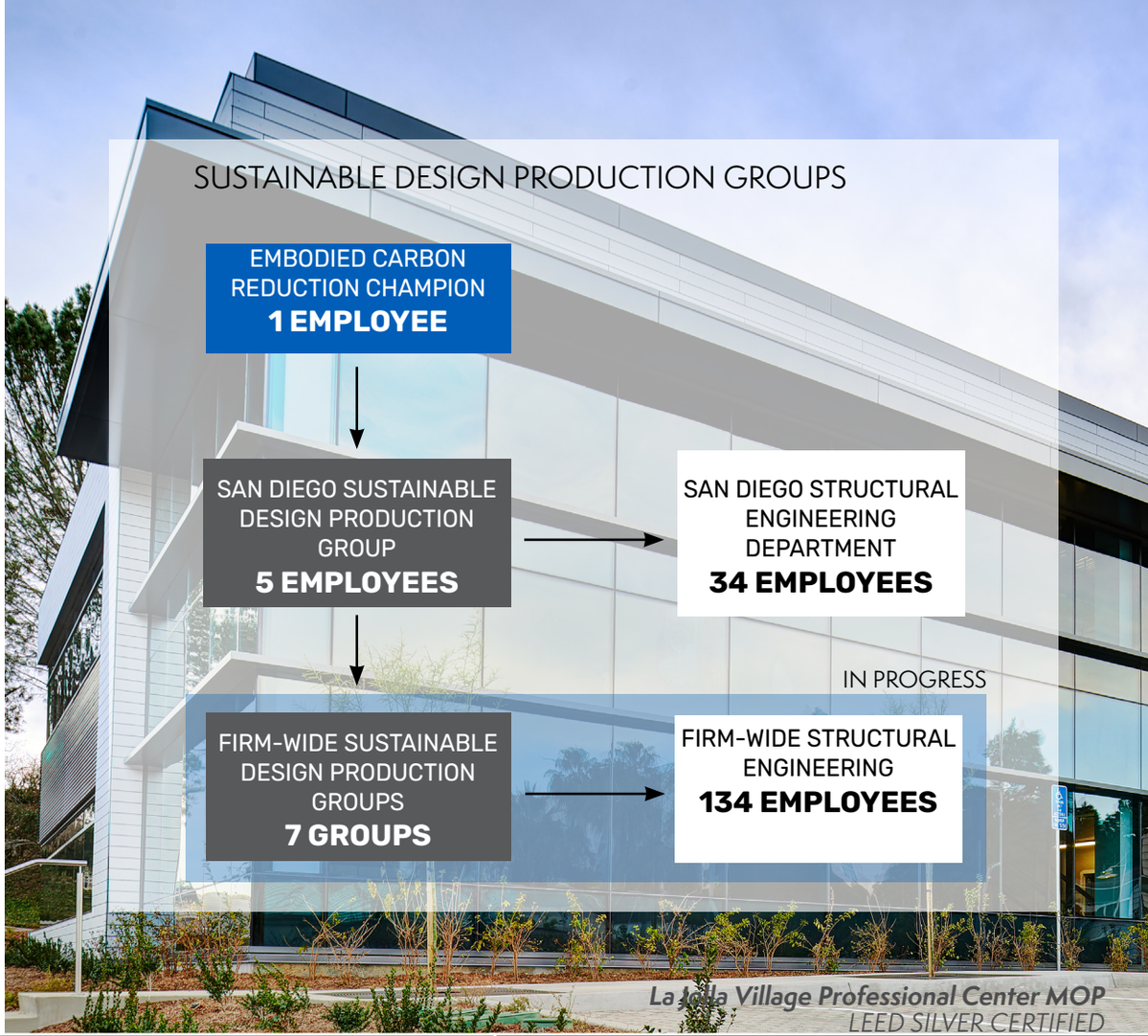
2 EDUCATION | OUR STRATEGY

Achieving net-zero structural systems begins by educating our team on current carbon reduction strategies and resources and continuing to seek opportunities to learn in the future. We have developed a plan for teaching and empowering our staff which includes:

- In-House Presentations from Subject Matter Experts on Material-Specific Carbon Reduction Strategies
- Distributing Regular Email Updates to Highlight Carbon Reducing Strategies
- Making LCA Tools, Documents, and Presentations Available on Internal Company Networks
- Maintaining an SE2050 Onboarding Procedure for New Hires

In addition to our Embodied Carbon Reduction Champion, we will empower our employees to take leadership in this initiative by organizing a Sustainable Design Production Group who will:

- Prioritize and Implement our SE2050 Goals
- Review and Share Tools and Other Educational Content
- Continue to Present SE2050 to Other Coffman Structural Department Leadership
- Continue to Present Work to Establish Sustainable Design Production Groups in Our Larger Coffman Structural Department



Q1 2024

- CONTINUE TO INTRODUCE LCA ANALYSIS TO NEW PROJECTS WITH FOCUS ON CALIFORNIA PROJECTS THAT WILL SUBMIT FOR PERMITTING AFTER JULY 1ST CALGREEN REQUIREMENTS BECOME ACTIVE.

Q2 2024

- ISSUE 2024 ECAP

Q3 2024

- START IMPLEMENTING CALGREEN PRESCRIPTIVE OR PERFORMANCE EMBODIED CARBON MEASURES ON COMMERCIAL PROJECTS OVER 100,000 SF AND EDUCATIONAL PROJECTS OVER 50,000 SF.

**for our California offices*

Q4 2024

- UPLOAD PROJECT LCA DATA TO SE2050 DATABASE

COFFMAN REPRESENTATIVE ATTENDS QUARTERLY EXTERNAL EDUCATION PROGRAMS

PERIODIC EMAIL DISTRIBUTIONS TO STAFF SHARING THE TOP 10 CARBON REDUCING ACTIONS FOR STRUCTURAL ENGINEERS

- CONTINUE TO INCORPORATE SE2050 ONBOARDING PROCEDURE FOR NEW HIRES
- REPLAY THE JOINT AIA/SEAOSD PRESENTATION: CALGREEN EMBODIED CARBON SERIES!
- COMPLETE INTENDED LCA PROJECT ASSESSMENTS
- REVIEW 2024 ACCOMPLISHMENTS AND ESTABLISH 2025 GOALS

3 REPORTING

MEASURE

Our committee was proud to exceed our goal of measuring and posting 5 buildings to the SE2050 database. The results captured a wide range in building use, materials and sizes. The table below shows the project names, square footage, brief description, LCA software used, GWP and GWP Intensity. We will continue to track & collect data to help our teams identify where we can have the biggest impact in implementing strategies to make reductions & meet our 2050 goal of Net Zero carbon structures.

EDUCATE

Education is the foundation for meeting the goals set out in SE2050. Coffman will provide quarterly training sessions with our engineers focused on identifying embodied carbon in design, tracking its prevalence in our structures, and discussing techniques for reduction.

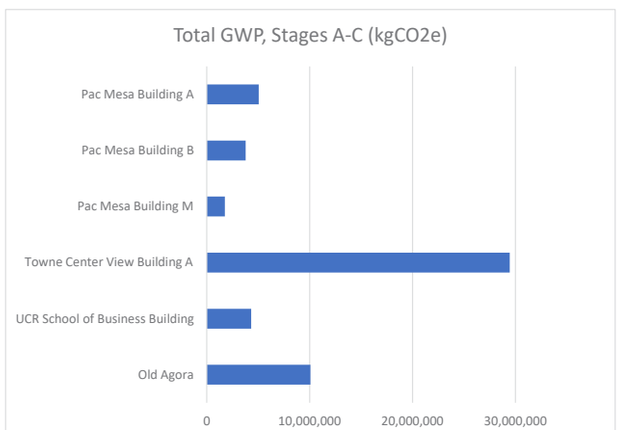
PLAN

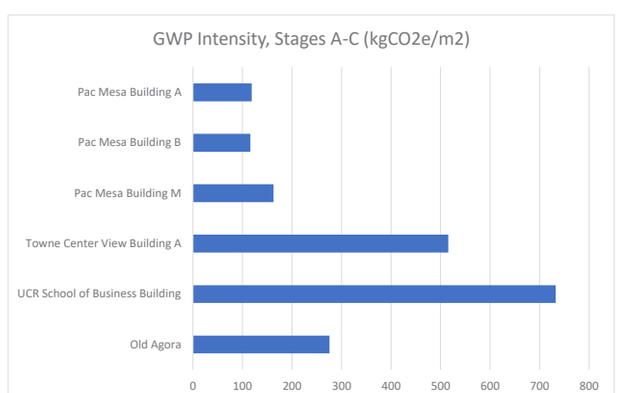
Coffman is actively engaging with architects and owners on establishing project sustainability goals beginning at project initiation and implementing them through the life of the project.

TRACK

By the end of 2024, Coffman will submit 10 LCA tracked projects, doubling our goal from last year, and have multiple offices participate in the SE2050 database uploads.

Project	Description	Gross Square Footage (ft2)	LCA Tool	Total GWP, Stages A-C (kgCO2e)	GWP Intensity, Stages A-C (kgCO2e/m2)
Old Agora	Two 4-story steel buidlings with steel moment frames, one level subteranean and deep foudnations.	393,231	Tally	10,079,000	276
UCR School of Business Building	4-story mild reinfroced concrete building with shear walls, partially subteraean and conventional foudnations.	63,403	Athena IE	4,314,700	733
Towne Center View Building A	6-story mild reinfroced concrete building with shear walls, 5-story subteraean and conventional foudnations.	614,522	Tally	29,442,096	516
Pac Mesa Building M	1-story mass timber building with steel BRBF, mild reinfroced concrete podium with shear walls, partially subteraean and conventional foudnations.	117,036	One Click	1,769,780	163
Pac Mesa Building B	5-story mild reinfroced concrete building with shear walls, one level subteraean and conventional foudnations.	350,348	One Click	3,777,638	116
Pac Mesa Building A	6-story steel buidling with steel moment frames, and conventional foudnations.	457,554	One Click	5,049,706	119
				Average Intensity	320

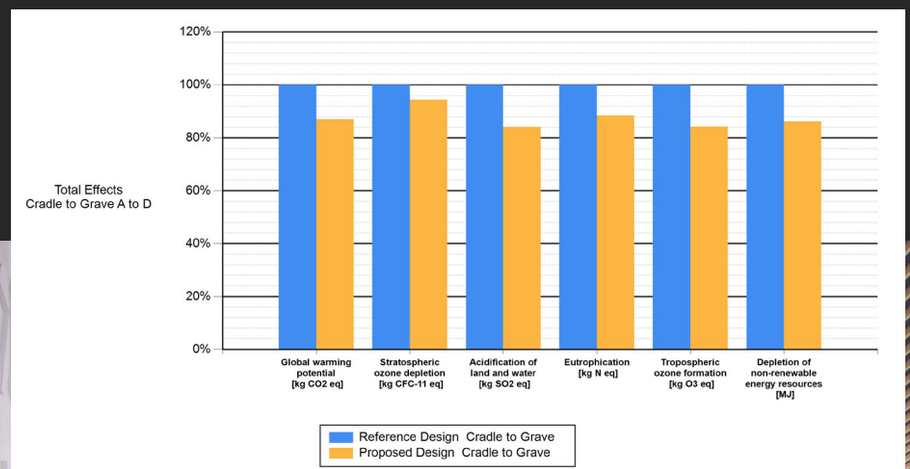




4 REDUCTION

PROJECT HIGHLIGHT

School of Business (UCR SBB) is an approximately 65,000 sf teaching and administration building at the south-east end of the University of California, Riverside campus. The University encouraged the team to target LEED Platinum certification for the building. As part of that effort, the team is pursuing the Whole Building Life Cycle Assessment (WBLCA) credit, showing the building has achieved a minimum of 10% reduction in Global Warming Potential (GWP) measured in kilograms of carbon dioxide equivalent (kg CO2e), and at least 10% reduction in two additional impact categories. Since this LEED credit is focused on the entire building enclosure, optimizing the structural elements was critical in achieving the goal.



The structural system of the building is a two-way flat plate concrete slab system, vertically supported by concrete columns. The columns are in turn supported by conventional foundations. Special reinforced concrete shear walls provide lateral resistance for the building. The walls are supported by concrete mat slab foundations and grade beams. UCR SBB team used the Athena Impact Estimator (Athena) as the Life Cycle Analysis (LCA) software. Per Athena, the project has a total embodied carbon impact of 9,105,080 lb CO2e (4,130,000 kg CO2e), with an embodied carbon intensity of 154 lb CO2e/ft2 (754 kg CO2e/m2). The team was able to achieve a 13% reduction over the baseline building by using drop panel slabs, implementing Type 1L cement, specifying 56 day concrete strengths, and use of a thin brick veneer enclosure.

An irregular grid pattern was required to accommodate the various different programming needs for the lower floors (classroom and laboratory space), compared to the upper floors (office and administrative space). A typical concrete building configuration would necessitate flat slabs with a 15" thickness. The team implemented a drop panel system at the longer span areas to reduce the typical slab thickness to 12". This directly resulted in a 15% reduction in concrete with savings in concrete material, reinforcement, foundations and lateral elements due to the decreased mass of the structure. Additionally, we implemented supplemental cementitious materials into our foundations, slab-on-grade, and decks using up to 15% slag to replace cement. The cement used for exposed concrete was Type 1L, providing a 10% embodied carbon savings over typical regional cements. Finally, we specified a 56-day 6,000 psi strength concrete for our lateral elements. This further contributed to reducing the embodied carbon in the building over a more typical 28-day strength 6,000 psi concrete.

For the envelope side of the building savings, the University had specified use of full brick to match the campus design standards. The team presented an alternative of using thin brick veneer in lieu of the full brick cladding. The reduction in mass of the system was approximately 43% where brick occurred, which was a substantial reduction given about 60% of the facade was brick covered.

The resulting comparisons are shown in the graph. We are certain that we demonstrated the necessary requirements to achieve the WBLCA credit, and are optimistic this will help the team achieve a LEED Platinum certification for the project.

4 REDUCTION

PROJECT HIGHLIGHT

Pac Mesa Building M is an amenity building over a concrete parking structure located in San Diego, CA. The total area is approximately 117,000 sf. The project is a combination of BRBF and concrete shear walls with mass timber columns, girders, purlins, and CLT deck gravity framing at the amenity and cast-in-place concrete at the garage. The mass timber amenity and concrete garage each have a green deck located at the top level. The Life Cycle Analysis is completed using One-Click software. Per One-Click, the project has a total embodied carbon impact of 1,549,000 kg CO2e. This project has a carbon reduction of 35% compared to the baseline condition.

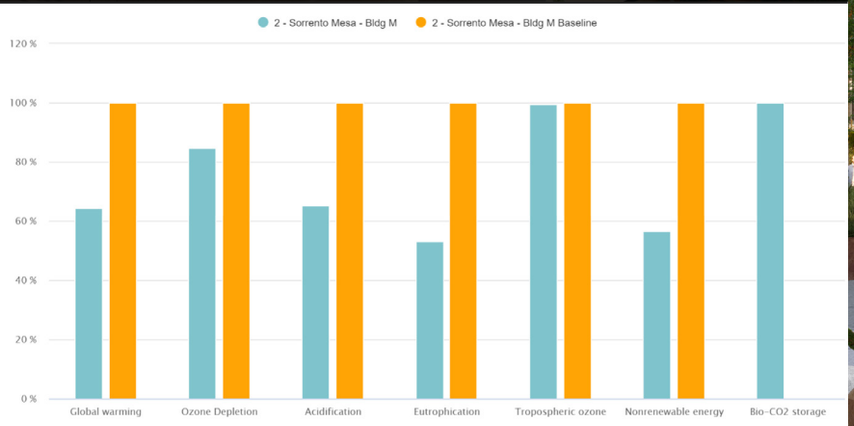


photo courtesy of Gensler
PAC MESA AMENITY

FOR OUR THIRD YEAR COMMITTING TO SE2050, COFFMAN WILL FOCUS PRIMARILY ON

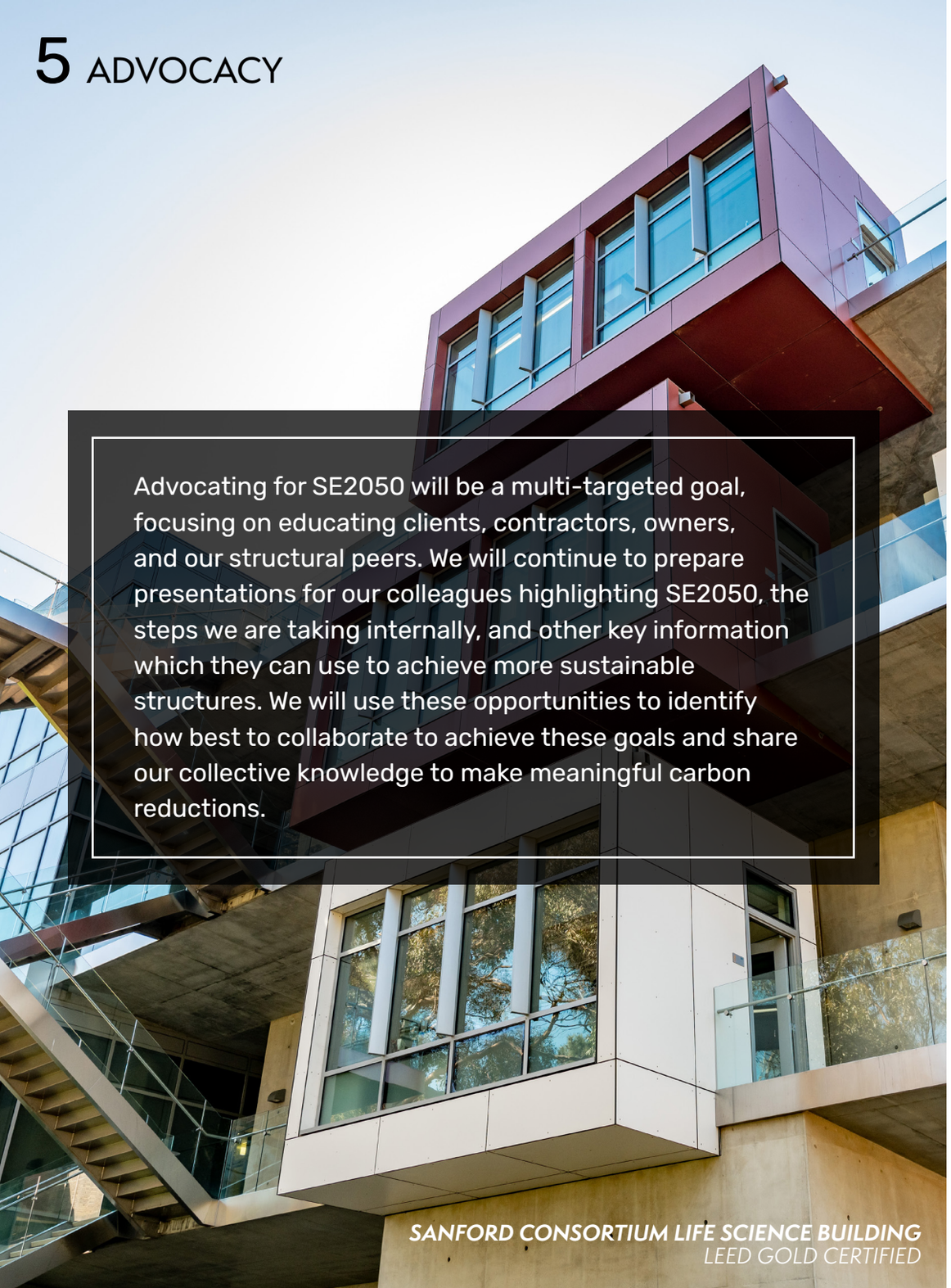
DATA GATHERING + CALGREEN REQUIREMENTS*

OF EMBODIED CARBON IN EXISTING AND NEW PROJECTS.

**for our California offices*

- By the end of 2024, we will identify and implement our revised project specific embodied carbon reduction plan, collaborating with the design and construction teams to set achievable targets.
- By the end of 2024, we will leverage our embodied carbon comparison study to assess the impacts and efficiencies of different materials and share these results with our clients and staff.
- We will update our current specifications and structural notes to incorporate CalGreen requirements to either 1) reuse more than 50% of an existing structure, 2) provide specifications for EPD documentation for building materials not exceeding 175% of industry baselines, or 3) show a minimum 10% reduction in embodied carbon over a baseline building of similar use and location.
- Our staff will continue to work with concrete suppliers to identify and implement reduced embodied carbon mix designs which meet the project design and sustainability goals.
- Coffman will continue to incorporate biogenic materials in our structural designs and seek opportunities to incorporate new or alternative biogenic materials into our designs.
- We will advocate for the use of domestic steel for its high recycled content and reduced shipping.

5 ADVOCACY



Advocating for SE2050 will be a multi-targeted goal, focusing on educating clients, contractors, owners, and our structural peers. We will continue to prepare presentations for our colleagues highlighting SE2050, the steps we are taking internally, and other key information which they can use to achieve more sustainable structures. We will use these opportunities to identify how best to collaborate to achieve these goals and share our collective knowledge to make meaningful carbon reductions.

SANFORD CONSORTIUM LIFE SCIENCE BUILDING
LEED GOLD CERTIFIED

AT COFFMAN, WE ARE PROUD AND EXCITED TO BE COMMITTED TO THE SE2050 CARBON NEUTRAL PROGRAM. WE WILL CONTINUE TO SPREAD THE WORD TO OUR COMMUNITY BY:

ACTIVELY ENGAGING CLIENTS AND OWNERS TO INCORPORATE STRUCTURAL MATERIALS WITH ENVIRONMENTAL PRODUCT DECLARATIONS (EPDS) IN THE DESIGN PROCESS.

INCORPORATING OUR SE2050 COMMITMENT INTO OUR STANDARD PROPOSAL LANGUAGE.

COMMUNICATING OUR SE2050 COMMITMENT AND DETAILS ABOUT THE PROGRAM ON OUR WEBSITE AND SOCIAL MEDIA.

Check out our SE2050 Commitment Announcement!
www.coffman.com/news/coffman-commits-to-se-2050

www.coffman.com