



S E 2 0 5 0

EMBODIED CARBON **ACTION PLAN**

2 0 2 3

INTRODUCTION

“There is a rapidly closing window of opportunity to secure a **liveable and sustainable future for all...** The choices and actions implemented in this decade will have impacts now and for thousands of years.”

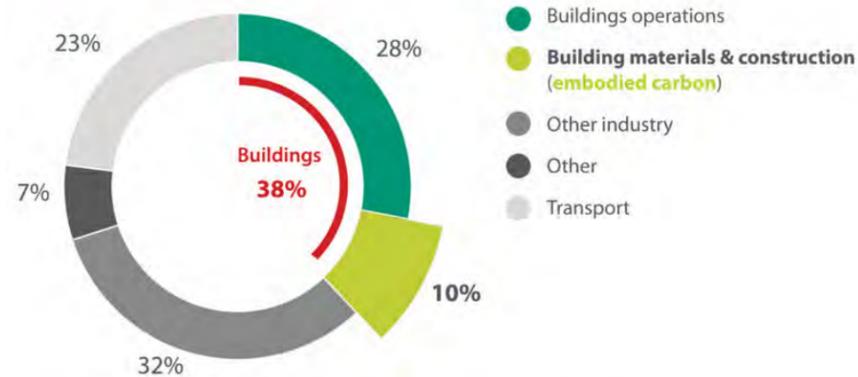
– IPCC, 2023 Summary for Policymakers

IPCC, 2023: Summary for Policymakers. In: Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, H. Lee and J. Romero (eds.)]. IPCC, Geneva, Switzerland, pp. 1-34, doi: 10.59327/IPCC/AR6-9789291691647.001

In 2023, it is ever clearer that rapid, deep reductions in global greenhouse gas emissions are needed across all industries to secure a safe future for generations to come. At our core, Degenkolb's purpose is to **engineer the future for our clients and communities**, and we are committed to being part of the climate solution. Since signing onto the SE 2050 Commitment in 2021, we have been actively working to reduce the environmental impacts of our projects by extending structures' service lives, designing efficient systems, procuring lower-carbon products, and tracking our impacts by conducting life cycle assessments. In the next year, our primary focuses are firm-wide education and resource sharing, and publicizing our in-house Embodied Carbon Accounting Tool.

▶ **SE 2050 Mission Statement:** All structural engineers shall understand, reduce and ultimately eliminate embodied carbon in their projects by 2050.

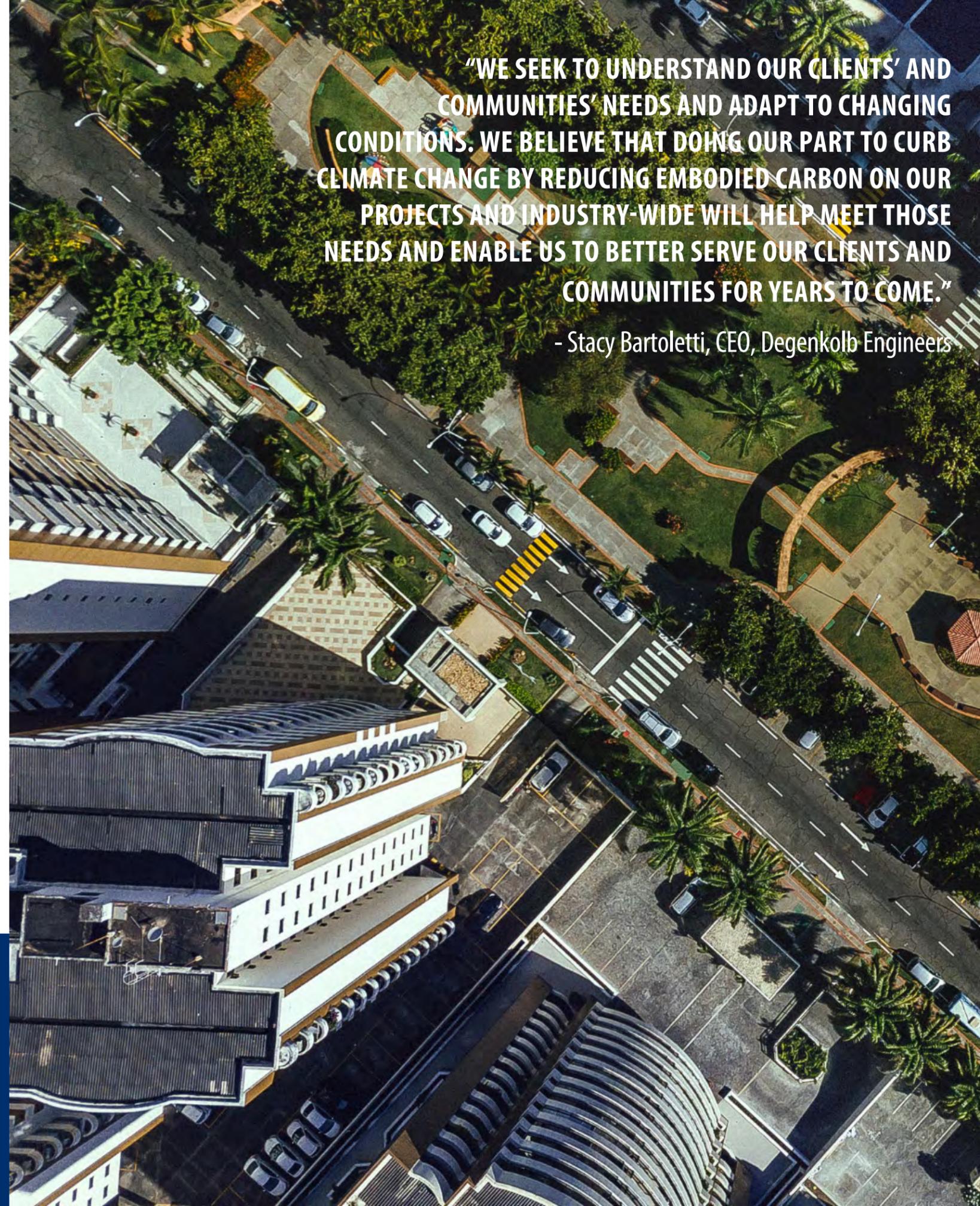
Annual Global Energy Emissions



Source: "Net-zero Buildings: Where Do We Stand?" World Business Council for Sustainable Development. <https://www.wbcsd.org/content/wbcsd/download/12446/185553/1>. Accessed 13 Sept. 2021.

2023 MAIN ACTIONS

- ▶ **Commit to firm-wide education**
 - ▶ Connect and engage every office
 - ▶ Equip project teams with embodied carbon reduction resources for all major structural materials, and workflows specific to each practice area
- ▶ **Publicize Embodied Carbon Accounting Tool**



PEOPLE



ELENA GOOD
Embodied Carbon Reduction Champion
Project Engineer, Oakland



ARIANE ROSARIO
Reduction Team Lead
Project Engineer, San Francisco



COREY BECK
Reporting Team Lead
Designer, Oakland



RYAN WHITE
Education Team Lead
Design Engineer, San Francisco



VINCENT WENZEL
Advocacy Team Lead
Design Engineer, San Francisco



MORGAN MICHNA
Marketing Specialist, San Francisco



KYLE STEUCK
Principal, Seattle



EVELYN LI
Design Engineer, Los Angeles



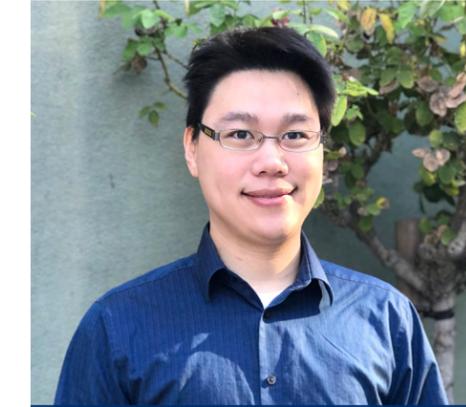
RAY PUGLIESI
Senior Principal, San Francisco



BRENDIN RANDALL
Designer, Oakland



CLAUDIA ZAPATA-KRAFT
Designer, Orange County



CHARLIE CHI
Project Engineer, Sacramento



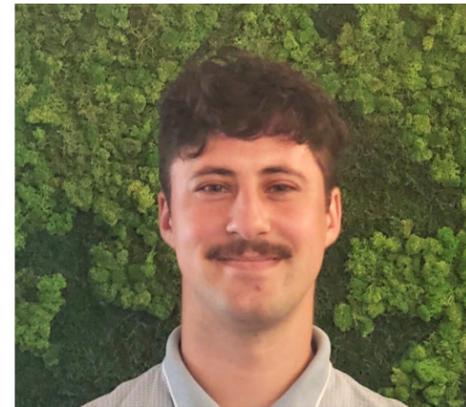
CLAIRE KILLIAN
Designer, San Francisco



BENJAMIN TERRY
Designer, Seattle



JOSEPH RODGERS
Designer, San Francisco



AUSTIN ANDERSON
Designer, Seattle

► **Degenkolb's Sustainable Design Committee** manages the firm's involvement in SE 2050 by leading our firm-wide embodied carbon education program, developing our LCA capabilities, updating our specifications and standard design practices, and advocating for embodied carbon reduction.

EDUCATION

Degenkolb is making it a top priority to **educate employees across all offices and experience levels** about embodied carbon. While we have made strides in our firm-wide education thus far, we aim to create a more **connected and organized** knowledge base across our company.

- We plan to meet our goal of better connecting all our offices by **nominating a representative** from each office to act as a local expert for their office.
- A big part of our firm-wide education is through our **Embodied Carbon Interest Group (ECIG)**. We aim to increase attendance in our ECIG meetings, particularly among our project managers. This will allow us to better connect with clients about sustainability and increase our impact.
- We are revamping our **internal database of embodied carbon resources** into a resource hub and directory. It contains presentations, an event calendar, webinars, spreadsheets, and other tools.
- It is also important to educate our new engineers about embodied carbon. Last year, we added embodied carbon education to our **onboarding training**. We will continue to expand this training to our embodied carbon accounting tools, previous presentations, and more.
- Embodied carbon education extends outside of our own organization. We aim to increase **representation in external sustainability committees** such as the Carbon Leadership Forum and SEAOC around each of our office regions.

ACTIONS

2022

- ✓ Hosted firm-wide Embodied Carbon Interest Group (ECIG)
- ✓ Shared webinars and presentations
- ✓ Added onboarding embodied carbon training

2023

- ▶ Increase engagement in ECIG
- ▶ Grow firm-wide connectivity and representation
- ▶ Build out internal resource and event hub
- ▶ Expand onboarding education

BEYOND

- ★ Provide every Degenkolber with baseline knowledge and access to resources for embodied carbon reduction on every project
- ★ Engage in industry sustainability committees in all of our geographic regions

DEGENKOLB HOSTS AN ANNUAL INTERNAL TECHNICAL CONFERENCE FOR ALL STAFF MEMBERS, WITH PRESENTATIONS FEATURING PROJECTS AND INTERNAL COMMITTEE WORK, INCLUDING THE SUSTAINABLE DESIGN COMMITTEE.



REPORTING

Degenkolb understands the **importance of quantifying the embodied carbon in our designs**. As we continue to conduct and collect data related to life cycle analysis (LCA), Degenkolb is focused on better understanding, in both a new-design and retrofit setting, the leading contributors to these emissions. By refining our understanding, we can set targeted, proactive goals focused on reducing our environmental impact.

In 2023, Degenkolb has three major reporting goals:

1. Last year Degenkolb developed an in-house embodied carbon accounting tool that supports typical structural engineering workflows. Degenkolb realizes we are not alone in this battle against climate change. In 2023, we plan to **release this tool to the public domain** to serve as a resource for other firms looking to become involved in SE2050.
2. Conducting an LCA is half the challenge. Understanding what components of the design have the largest contribution to the overall embodied carbon is the other half. Building out **visualizations and conducting regression analysis** for these LCAs will allow us to strategically identify areas where we can make the largest impact.
3. A large portion of Degenkolb's work is in the retrofit space. Retrofitting a building is inherently more sustainable than developing a new replacement building. Nevertheless, having the ability to quantify embodied carbon impact for varying retrofit schemes will continue to push us toward net-zero embodied carbon designs. We also aim to understand how these retrofits affect the building's **environmental impact over the remaining life of the structure**.

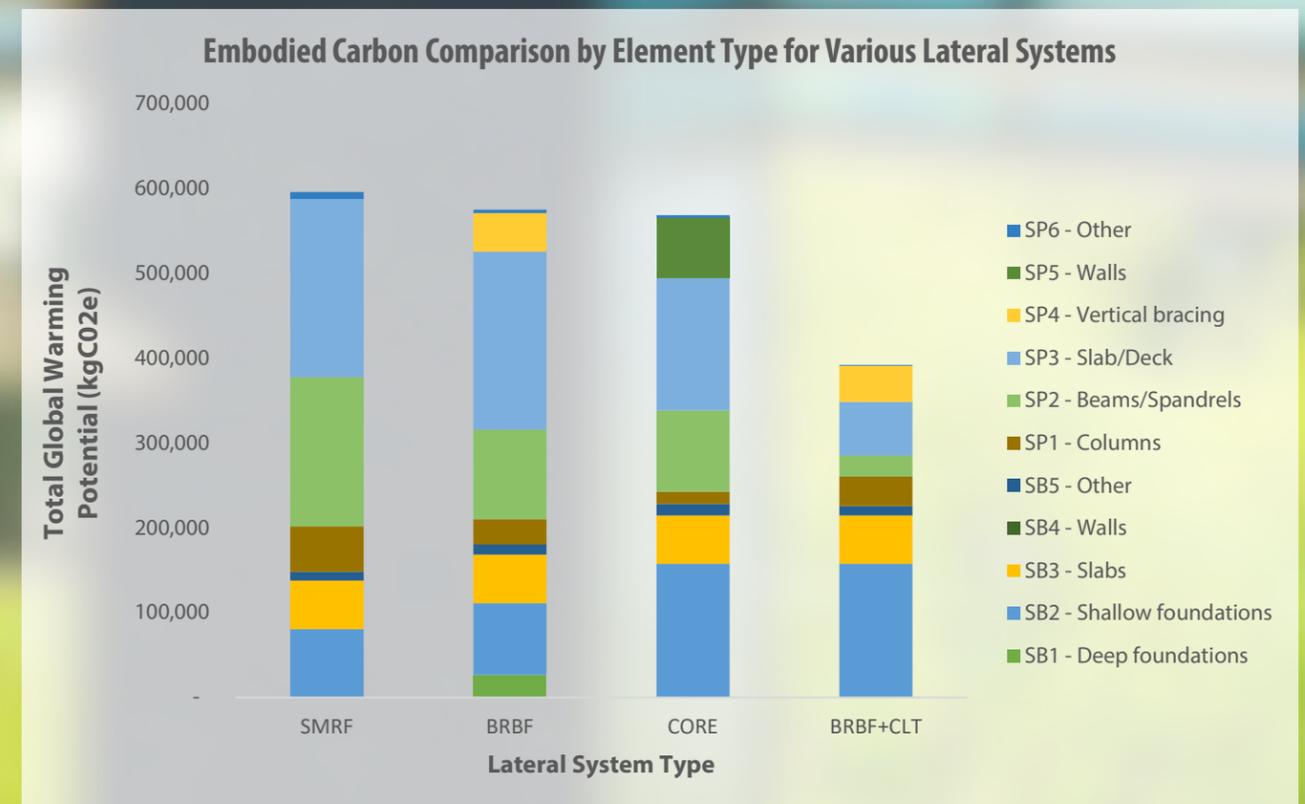
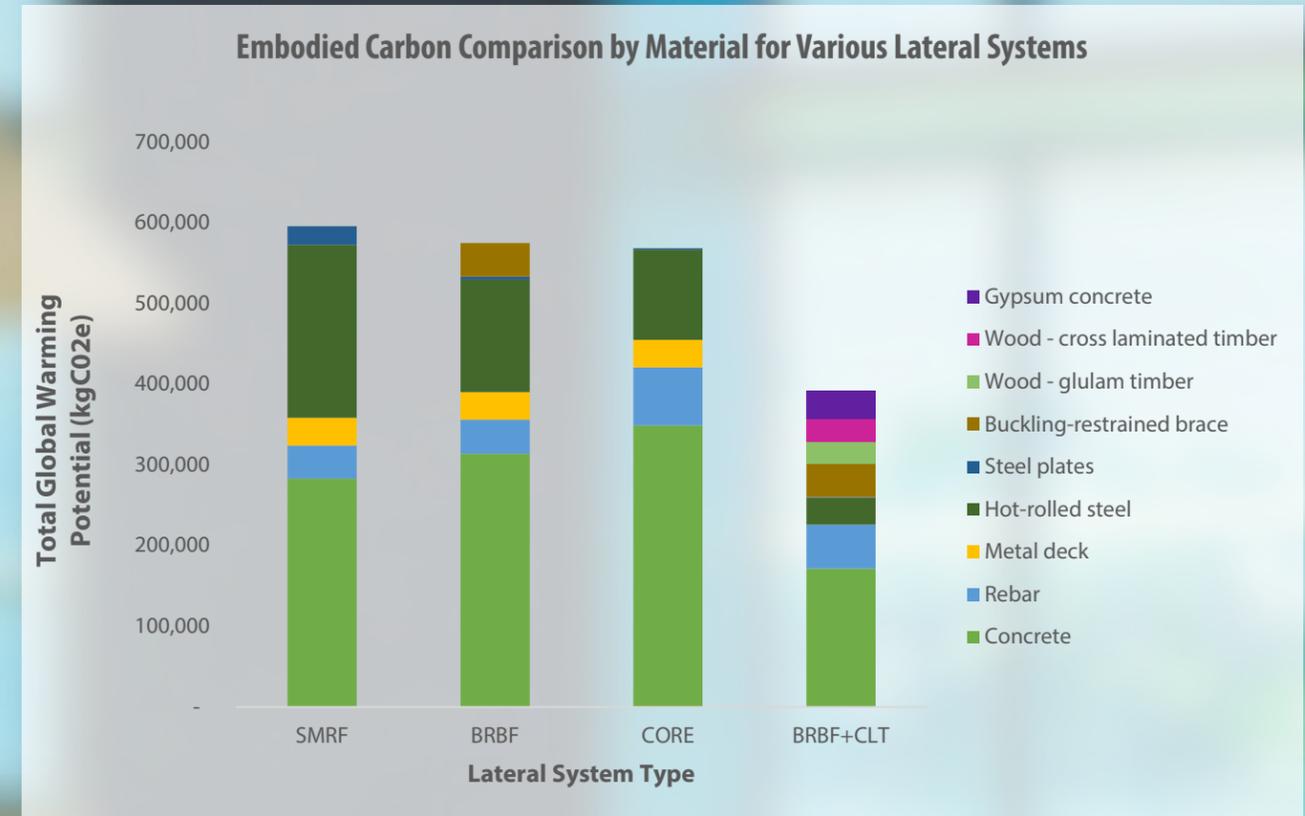
ACTIONS

- ✓ Submitted 10 projects (1+ per US office) to the SE2050 database
- ✓ Developed in-house EC tracking tool
- ▶ Submit 15 projects (2+ per US office + MEX) to the SE2050 database
- ▶ Publicize EC tracking tool
- ▶ Visualize data to facilitate decision-making
- ▶ Quantify embodied carbon savings from existing building retrofit
- ★ Perform LCAs for all significant Degenkolb projects
- ★ Use database to set EC targets on each project
- ★ Advise clients on potential EC savings for different structural schemes or retrofits

2022

2023

BEYOND



DEGENKOLB USED OUR IN-HOUSE EMBODIED CARBON ESTIMATION TOOL TO COMPARE LATERAL SYSTEM TYPES IN THE SCHEMATIC DESIGN PHASE FOR A THREE-STORY HEALTHCARE ADMINISTRATION BUILDING. THE LOWER EMBODIED CARBON WAS A FACTOR IN MOVING FORWARD WITH A MASS TIMBER DIAPHRAGM AND GRAVITY SYSTEM.

REDUCTION

Degenkolb is **committed to reducing embodied carbon in the built environment**. By prioritizing the implementation of carbon accounting and comparison tools, standardizing reduction workflows and language in work products, connecting with industry leaders and suppliers, and educating staff, we continue to work on embodied carbon reduction strategies within our projects and the industry.

- In the past two years, Degenkolb has implemented **standard embodied carbon reduction language** into our concrete, steel, and rough sawn lumber specifications. In 2023, the Sustainability Committee will research and implement similar updates for our shotcrete specifications.
- We have **developed management tools to standardize reduction workflows**. We will continue to develop these resources on a per project type basis, as well as incorporate these guidelines into existing project management tools.
- Degenkolb has developed **several case studies for embodied carbon comparison** studies. In 2023, we would like to organize and present these studies to serve as an organized resource for staff.
- Degenkolb will continue to explore **specific material reduction strategies**. In 2023, we aim to understand and set embodied carbon standards for mass timber and masonry projects.

ACTIONS

2022

- ✓ Updated specifications (concrete and steel)
- ✓ Compiled EC comparison studies

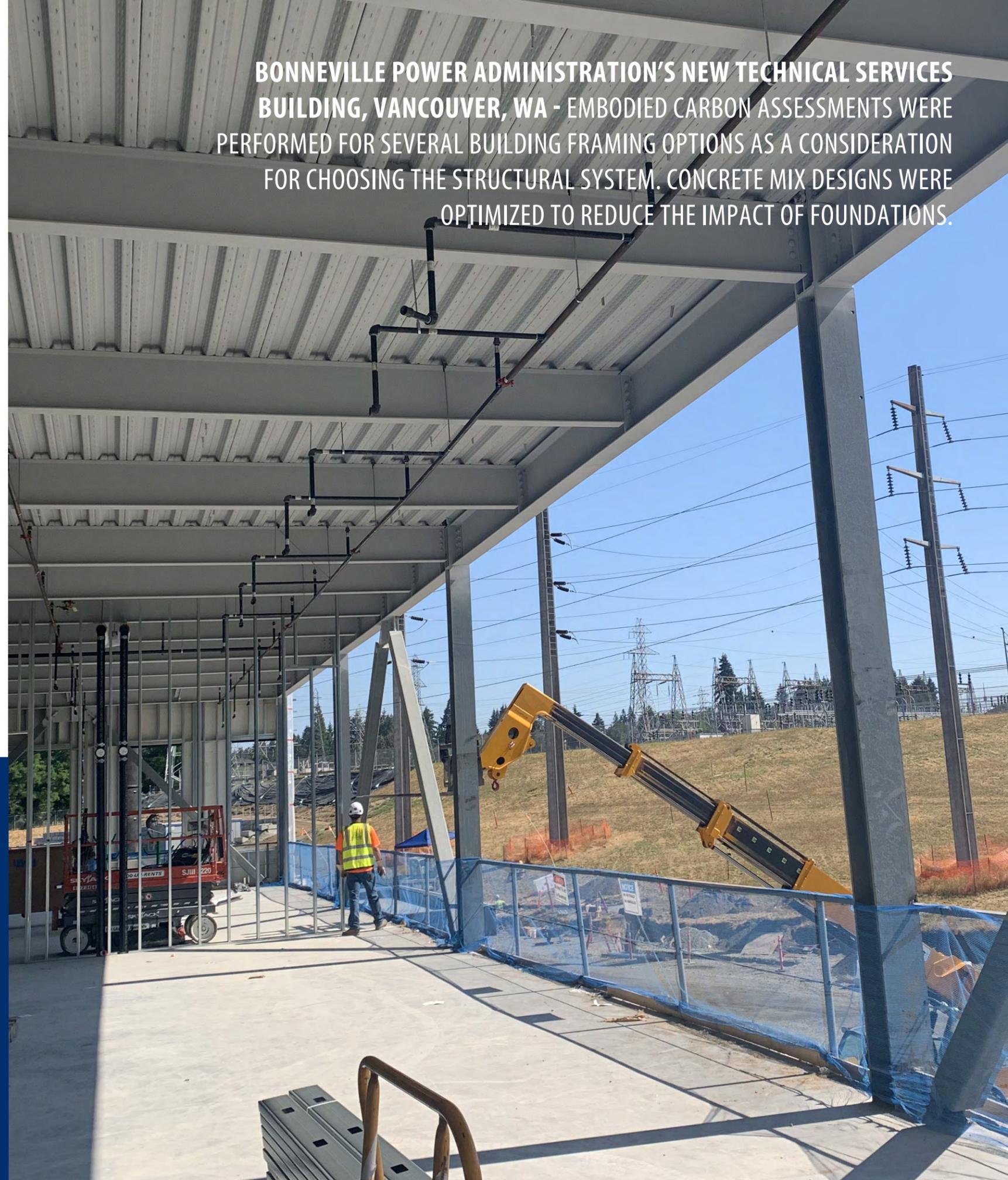
2023

- ▶ Continue specifications updates (shotcrete)
- ▶ Refine EC reduction flow chart
- ▶ Share EC comparison studies
- ▶ Grow mass timber and masonry expertise

BEYOND

- ★ Set EC reduction targets for all major projects
- ★ Perform LCA comparisons as standard practice
- ★ Specify lower-carbon materials as the norm

BONNEVILLE POWER ADMINISTRATION'S NEW TECHNICAL SERVICES BUILDING, VANCOUVER, WA - EMBODIED CARBON ASSESSMENTS WERE PERFORMED FOR SEVERAL BUILDING FRAMING OPTIONS AS A CONSIDERATION FOR CHOOSING THE STRUCTURAL SYSTEM. CONCRETE MIX DESIGNS WERE OPTIMIZED TO REDUCE THE IMPACT OF FOUNDATIONS.



ADVOCACY

KNOWLEDGE SHARING

Advocating for the reduction of embodied carbon to coworkers, industry peers, and policy makers is essential in fighting climate change. Structural engineers have the expertise and responsibility to be effective **advocates**.

The sustainability committee provides project managers with the ability to track and reduce embodied carbon on their projects within project constraints.

- Last year we **created a document outlining important conversations** at each stage of a new design project and a corresponding **slide deck** for use during project interviews. Next year we will expand these to include recommendations tailored to individual practice areas.
- This year we continued **publishing social media content** such as Sustainability Chats series. As in previous years, we will share our ECAP on the Degenkolb company website and distribute copies to our offices to promote readership.
- Per the reporting section, we will **publicize our in-house embodied carbon accounting tool for public use**. Concurrently with release of this tool, we will submit abstracts to conferences to present it and associated project case studies to spread awareness. Publication of this tool will lower the barrier to entry for embodied carbon tracking for other companies and will improve the quality and quantity of embodied carbon submissions to SE2050.
- Our Embodied Carbon Champion, Elena Good, will be speaking at the NCSEA conference in Anaheim, CA, this November about embodied carbon reduction at all project phases.
- Long term, we aim to push the industry forward. We will leverage our existing involvement in building material codes to **contribute to development of sustainable code language tailored to each material**. Eventually, we hope Degenkolb sustainability experts build a relationship with local policy makers to **inform policies which reduce embodied carbon**.

ACTIONS

2022

- ✓ Developed resources for project managers
- ✓ Posted blogs and interviews

2023

- ▶ Update PM resources for each practice area
- ▶ Continue to post media
- ▶ Present at conferences
- ▶ Engage in policy and material standards development

BEYOND

- ★ Advocate for EC reduction on projects with clients and in our communities
- ★ Maintain a PM Sustainability Toolbox of resources relevant to EC advocacy
- ★ Contribute to the wider body of knowledge about EC
- ★ Work with government bodies and policy makers

UC IRVINE HEALTH, NEW ACUTE CARE HOSPITAL - MEMBERS OF THE DEGENKOLB PROJECT TEAM ATTEND THE TOPPING OUT CEREMONY OF UCI'S NEW STATE-OF-THE-ART HOSPITAL THAT, ONCE OPENED, WILL BE THE FIRST ALL-ELECTRIC HOSPITAL IN THE COUNTRY.





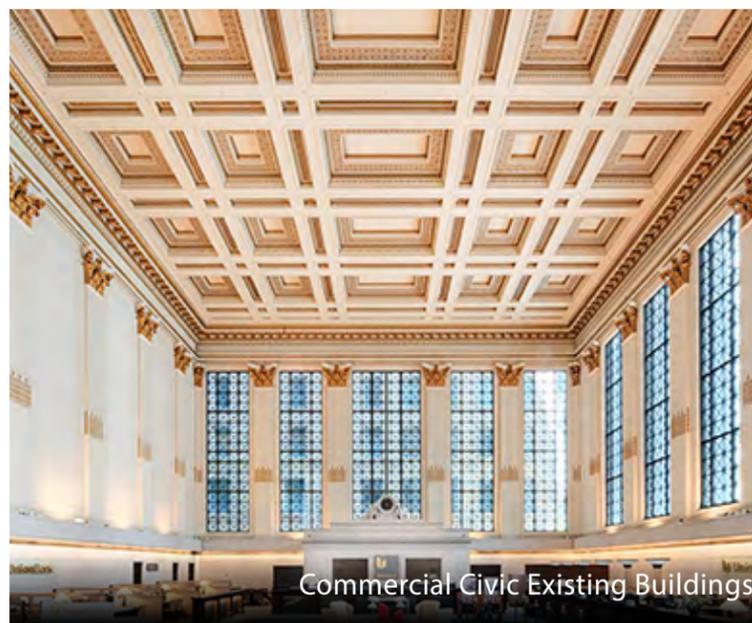
CONTACT US & GET INVOLVED!

Degenkolb aims to be a model for structural engineers advocating for embodied carbon reduction within the industry and with the public. We look forward to collaborating with our excellent peers in SE2050 to fight climate change.

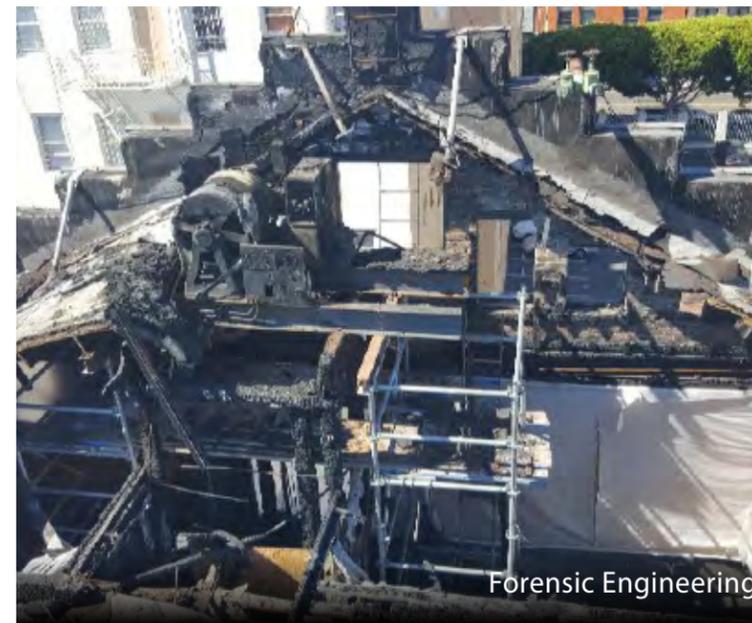
- ▶ Email us at sustainability@degenkolb.com
- ▶ Look us up at degenkolb.com/se2050/
- ▶ Follow us on Instagram [@degenkolbengineers](https://www.instagram.com/degenkolbengineers)
- ▶ Add us on [LinkedIn](#)
- ▶ Learn more about SE2050 at se2050.org/



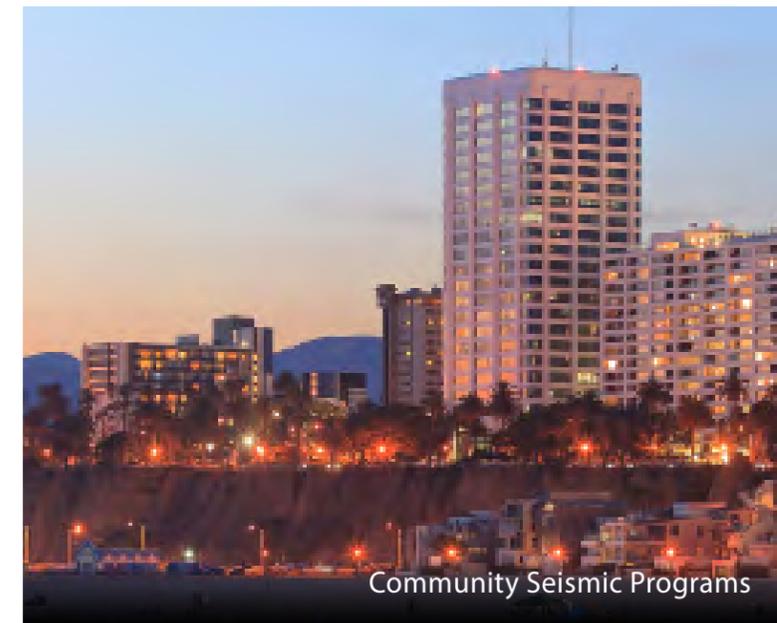
Healthcare



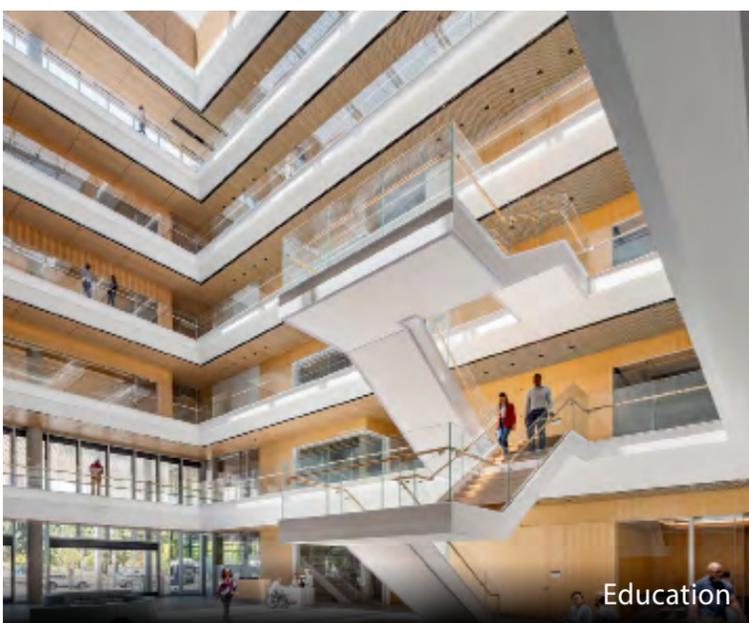
Commercial Civic Existing Buildings



Forensic Engineering



Community Seismic Programs



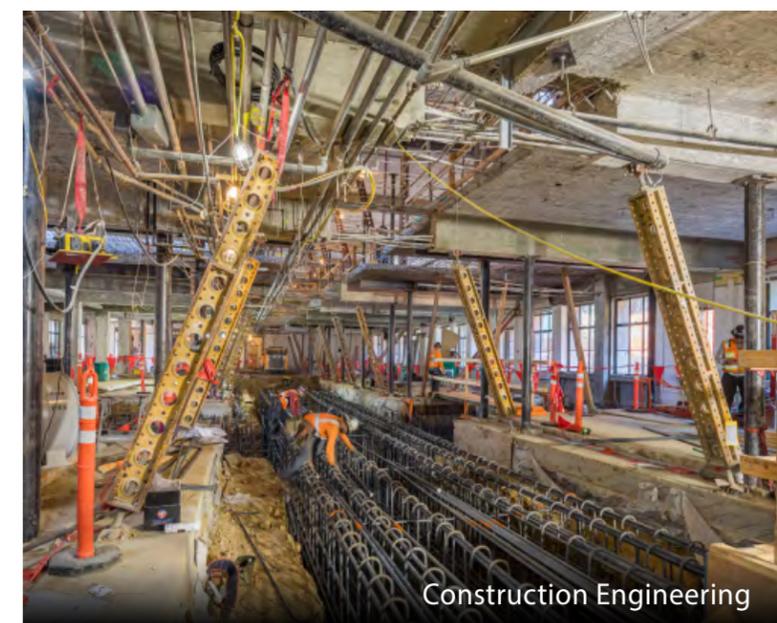
Education



Science & Technology



Department of Veterans Affairs



Construction Engineering