# Embodied Carbon Action Plan

wsp

SE 2050 | Commitment to Net Zero



# Introduction

*As one of the world's largest professional services firms, the greatest benefit WSP can provide in reducing carbon emissions is through our design and advisory services.*

WSP USA is the U.S. operating company of WSP, one of the world's leading engineering and professional services firms. Dedicated to serving local communities, we are engineers, planners, technical experts, strategic advisors and construction management professionals. WSP designs lasting solutions in the buildings, transportation, energy, water and environment markets. With more than 12,000 employees in over 200 offices across the U.S., we partner with our clients to help communities prosper.

The urgency of addressing climate change cannot be overstated. WSP has been actively managing our operational carbon footprint for many years and has achieved carbon neutrality in our business operations since 2019[1]. As one of the world's largest professional services firms, the greatest benefit WSP can provide in reducing carbon emissions is through our design and advisory services. While significant progress has been made in reducing operational carbon emissions within the built environment, more work is needed to understand and reduce embodied carbon emissions.

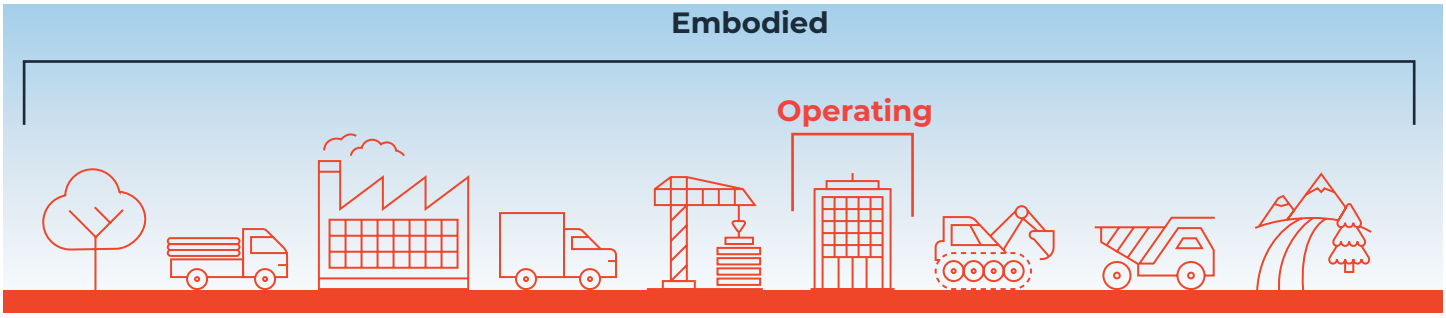
WSP is committed to reduce, and ultimately eliminate, embodied carbon in its structural system projects by 2050 as a signatory to the Structural Engineers 2050 Commitment (SE 2050) Program. Concrete and steel, two of the most common structural materials, represent approximately 21% of global carbon emissions. "While significant progress has been made toward reducing operational carbon emissions within the built environment, more work is needed to understand and reduce embodied carbon emissions," said Lou Cornell, WSP USA CEO. "We look forward to partnering with our clients to develop **Future Ready®** solutions to address embodied carbon."

WSP's specialty teams focused on climate, resilience and sustainability have been helping clients measure and reduce life cycle carbon emissions for more than two decades. We conduct rigorous analyses for clients to quantify embodied carbon and other environmental impacts of their projects and buildings—from data centers and commercial buildings, to transportation infrastructure and multi-family housing.

The focus of the SE 2050 program to date has been on building structures. This ECAP, in addition to including building structures, will also extend to WSP's structural transportation and infrastructure projects.

By creating a baseline for bridges and other infrastructure, we hope to support other transportation design firms in understanding how to measure and reduce embodied carbon.

[1] Refers to WSP's scope 1, scope 2 and scope 3 business travel GHG emissions




## Life cycle assessment and carbon footprints

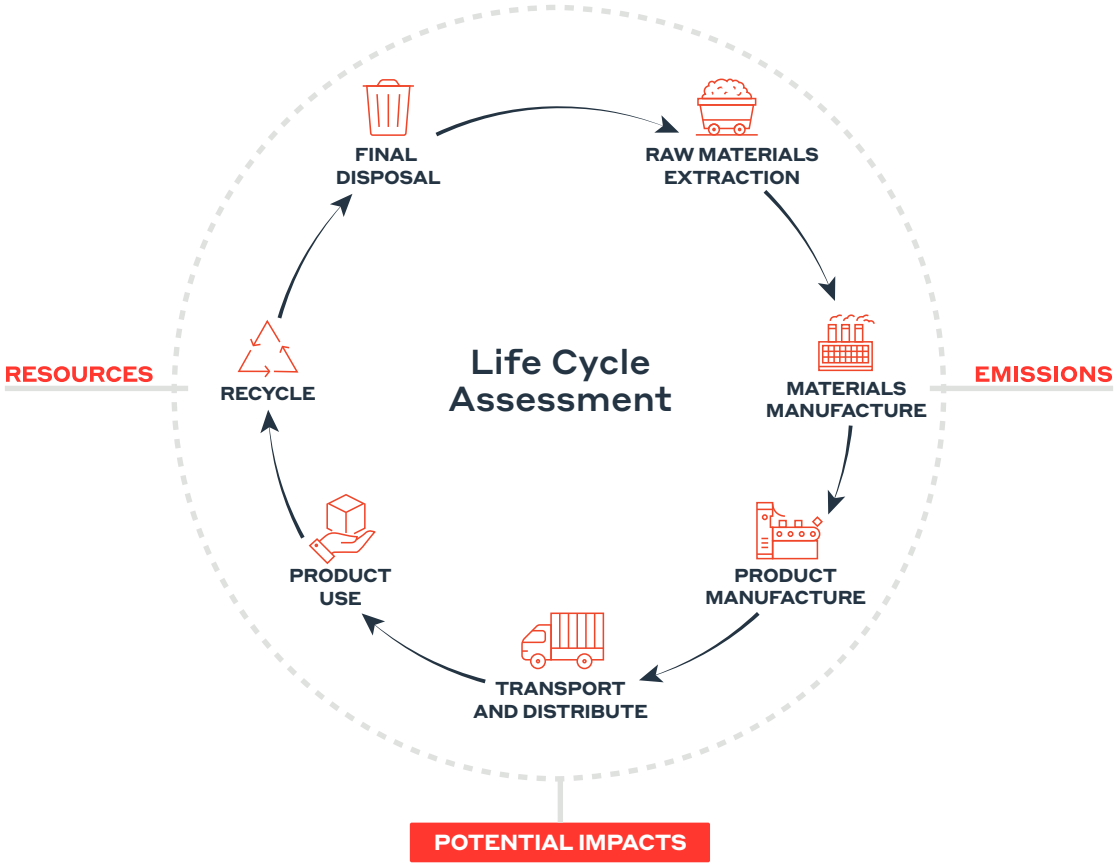
Life cycle assessments (LCA) offer insight into product and service environmental impact drivers by conducting rigorous and in-depth analyses. This technique guides product design innovation and improves sustainability throughout the value chain. An LCA does not tell you what is better or best, it tells you what is.

A carbon footprint is an LCA that only quantifies GHG emissions in kg CO2 equivalents for all GHG emissions, including refrigerants. Carbon footprints of products follow ISO standard 14067.

At WSP, we guide clients through the LCA and carbon footprint process to help derive valuable insights, drive strategic decision-making and substantiate external communications based on the results. We use LCA as a practical and cost-effective business solution to evaluate carbon, water and other impacts from cradle-to-grave.

We help clients differentiate products in the marketplace, enhance brand, identify cost savings, increase stakeholder engagement and validate product certifications and environmental claims. We also identify hot spots in the supply chain or design of a product to improve sustainability.

## *What is LCA?*



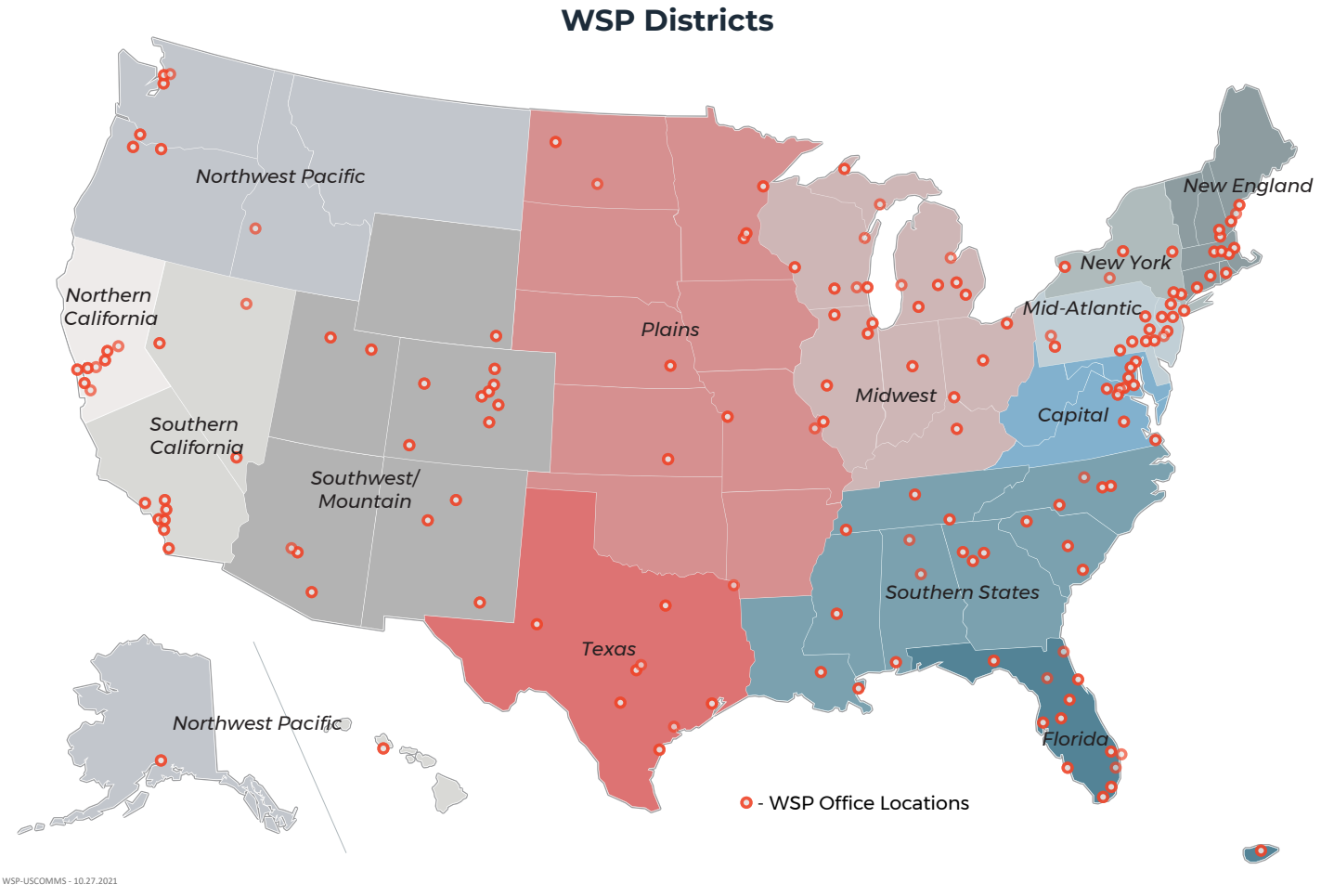
# Education

To educate our employees around SE 2050 and embodied carbon, WSP distributed a firmwide announcement regarding our commitment to SE 2050 and held a series of three embodied carbon webinars in 2021 open to all employees. WSP is a sponsor of the Carbon Leadership Forum (CLF) and participates in monthly meetings.

WSP launched an Embodied Carbon Task Force in October 2021, chaired by our two SE 2050 champions. The full task force consists of 13 embodied carbon champions from each WSP district representing the building and transportation markets. The task force meets monthly to support knowledge transfer, measurement and reporting of embodied carbon. Information developed and collected by the task force will be shared on an internal Embodied Carbon SharePoint site which was launched concurrently with the task force.

Embodied carbon champions:

- Must be knowledgeable about calculating embodied carbon to assist and support project teams and answer questions on embodied carbon;
- Provide guidance to design teams regarding embodied carbon and spot check work;
- Share regular posts on SharePoint Embodied Carbon channel to educate staff about strategies used within an office or district;
- Provide feedback to the SE 2050 leadership team.



# SE 2050 Champions



**Teresa Vangeli** is a director of structures and sustainability at WSP USA. She resides in the Boston area. Vangeli is passionate about bringing sustainable design integration into building and infrastructure design. As a licensed professional engineer, structural discipline, project manager, Envision verifier and LEED AP, she encourages all engineers to get involved in sustainability. She has worked on all types of projects from airport facilities to tunnels to development masterplans across the United States. Vangeli believes that every project can be more sustainable.



**Sarah Buffaloe** is an associate for Built Ecology at WSP USA. She joined the firm in November 2014 and resides in Washington, D.C. She applies holistic thinking and quantified metrics to implement solutions that address the wide range of performance goals every project faces. Her five years specializing in sustainable materials at the U.S. Green Building Council, combined with her three years of architectural design experience and academic pursuits in material research and LCA, give her a unique perspective on building materials and their life cycle and durability.

# Reporting

Our goal is to make embodied carbon a routine part of engineering delivery from reduction considerations to reporting.

## Buildings

**Year 1**
Collect and analyze

**Year 2**
Educate and empower

**Year 3**
Reduction targets

## Transportation

**Year 1**
Learn

**Year 2**
Collect and analyze

**Year 3**
Educate and empower

For some projects, WSP will use LCA as the basis of measuring embodied carbon for structural designs. Assessments will use national and regionally applicable life cycle inventory databases and environmental product declarations (EPDs). In other cases we will focus only on measuring the project's carbon footprint. We plan to assess different existing and custom developed tools, including Building Transparency's EC3 tool, which we are using for select projects. For most projects, we plan to initially focus on cradle to gate emissions (A1 – A3). For projects seeking certain types of sustainability certifications (e.g., LEED, ILBC and Envision), we will evaluate additional phases.

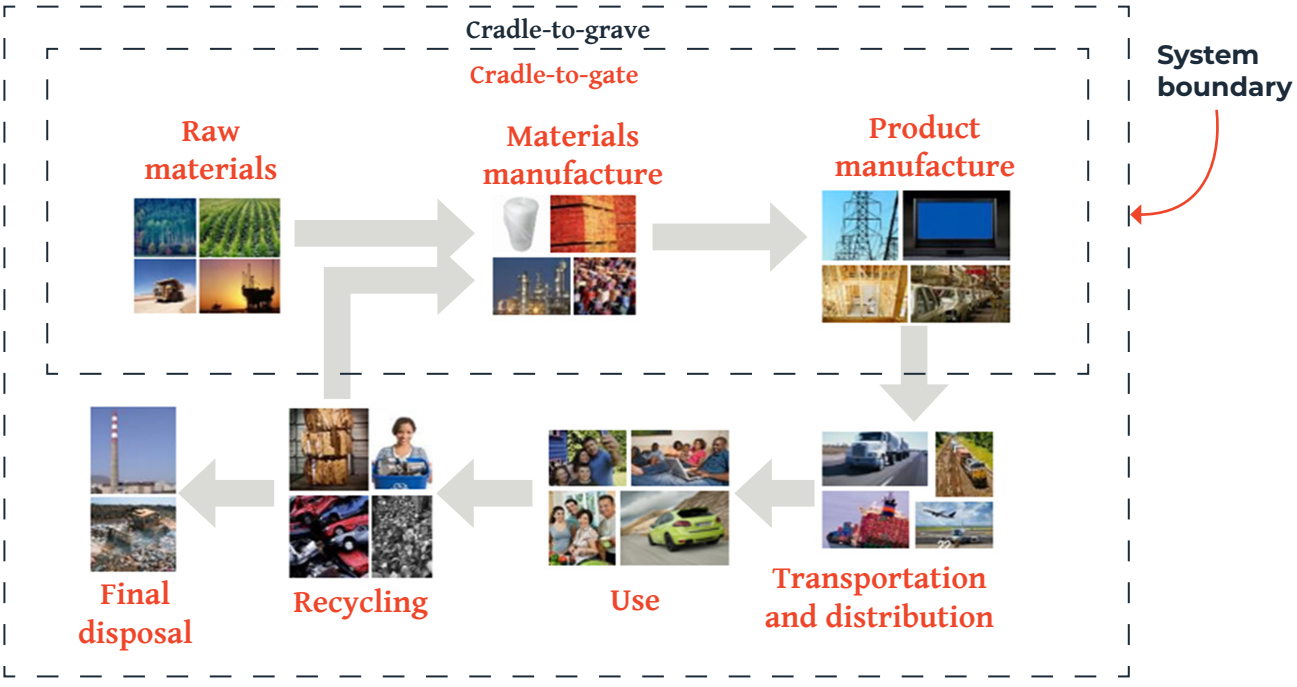
A project information database for WSP projects is in development to compile results in a format compatible with the SE 2050 database. We plan to use building integrated modeling (e.g., Revit) to extract building quantities. We will endeavor to conduct an LCA or carbon footprint twice for each assessed project. The first estimate will occur after conceptual development or 30% design to support discussion on embodied carbon reduction strategies.

The second estimate will follow 100% design in order to report the total embodied carbon of the project.

We are focused on scaling/institutionalizing practices over time. We commit to reporting on both buildings and transportation projects but will focus on buildings initially.

- For buildings, we will report a minimum of five projects in year one, ten to fifteen projects in year two and 50 percent of all building projects in year three. By year four we will endeavor to report on all building projects.
- For transportation, we will report a minimum of five projects across WSP starting in year two and develop a plan to increase this number over time.

## System boundary




**System boundary**
Set of criteria specifying which unit processes are part of a product system

### Embodied carbon training

Our goal is to increase the level of knowledge of embodied carbon across WSP by starting with regional embodied carbon champions and growing the group of LCA practitioners through strategic interconnections.

This year, WSP will recommend and encourage all structural engineers firmwide to take at least one hour of embodied carbon training. This training will provide an overview of embodied carbon, EPDs, identify significant contributors within the built environment and detail what it takes to measure embodied carbon.

A specific deep dive training for embodied carbon champions will be developed to support their local efforts to disseminate information and change practices. Select embodied carbon champions will serve as power users who provide technical support for team members engaging with analysis and reporting.

# Embodied carbon reduction strategies

WSP's embodied carbon reduction strategy focuses on innovations that impact multiple sectors—including buildings, roads, transportation, bridges and other infrastructure. The embodied carbon task force will set embodied carbon reduction goals and targets, and accelerate the adoption of carbon reducing products, technologies and methods in the built environment. Through a process of innovation discovery, application research and implementation, WSP works to achieve engineering leadership in embodied carbon reduction.

### Embodied carbon strategic reduction goals

In year one, we intend to identify and train all regional embodied carbon task force champions and at least 30% of all structural engineers.

For building structures, we intend to develop an embodied carbon reduction goal by year two. In year three the goals set in year two will be measured to evaluate success.

For transportation and infrastructure structures, we intend to establish embodied carbon reduction goals by year three. As there is not an established benchmark for these disciplines, the goals set are intended to improve on the benchmarks reported in year two.

### Embodied carbon innovation strategy

The innovation discovery task includes ongoing identification of new technologies, products and construction methods that reduce embodied carbon. The current focus of the group is structural materials such as concrete and mass timber.

The application research task implements ideas and technologies and test their application in WSP projects. Questions about the product are asked to test for safety, durability and compatibility to the WSP quality standard. The vetting process is rigorous and will vary based on use case. In addition to multi-sector carbon reducing strategies there are single-sector strategies specific to either buildings (human occupied) vs. infrastructure. Specific strategies for buildings include innovative moment framing, air floor systems, radiant heating and cooling.

To implement innovative embodied carbon reduction strategies and bring novel products, technologies and methods to the full WSP engineering practice, the task force will collect and develop educational tools. In year one, factsheets will be developed for the Buildings and Bridges and Highways sectors. In year two, we will develop a comprehensive Embodied Carbon Manual.

### Emerge Partnership Program

WSP selected UK-based Sphera (Sphera UK) as a partner through its emerge partnership program. Sphera UK is pioneering sustainable, sicence-led materials development to move the construction industry toward net zero. The company makes a carbon negative aggregate for use in lightweight concrete in a variety of concrete products. Sphera UK has used the aggregate to create the world's first potentially carbon negative and carbon zero concrete. Sphera UK's products offer an alternative for WSP's design solutions that has the potential to create a substantial net reduction in the carbon footprint of infrastructure and buildings.

# Advocacy

By committing to SE 2050, WSP is supporting our industry in substantively reducing embodied carbon in structural systems. WSP is advocating this commitment to other firms, with clients and with the architecture, engineering and construction industry.

WSP has publicly announced the SE 2050 commitment by issuing a press release.

Joining the SE 2050 Commitment aligns with WSP's climate action strategy. We have achieved carbon neutrality in the U.S. in our business operations since 2019[2]. Globally, WSP has established an ambitious commitment to achieve net zero emissions across our value chain by 2040, supported by greenhouse gas emissions reduction targets approved by the Science-Based Targets Initiative (SBTi). WSP has further committed to measuring and reducing GHG emissions from our designs and advice.

In addition to committing to SE 2050 and sponsoring CLF, WSP is active with the ASCE Sustainability Committee and the Structural Engineering Institute. WSP regularly engages in presentations and knowledge sharing, including a recently published article through CLF. In January 2022, WSP's members of the Chicago CLF Hub organized an introduction to SE 2050 for the January 2022 meeting.

WSP commits to delivering at least two external presentations focused on embodied carbon reduction in structural systems per year. These presentations will be either local professional chapters or national conferences.

Realizing the important role our clients play, WSP has made a point of providing informal educational opportunities to clients through the presentation of case studies, lunch and learns and collaborative workshops. We are committed to continuing this tradition with at least two topics per year that include the reduction of embodied carbon, operational emissions and eliminating roadblocks to sustainability.

WSP is advocating reduction of embodied carbon in all project types. Our firm has been offering whole-building life-cycle analysis services for many years. As part of advocating to our public clients, WSP will provide case studies and baselines of embodied carbon reduction on common infrastructure project types, starting with a bridge.

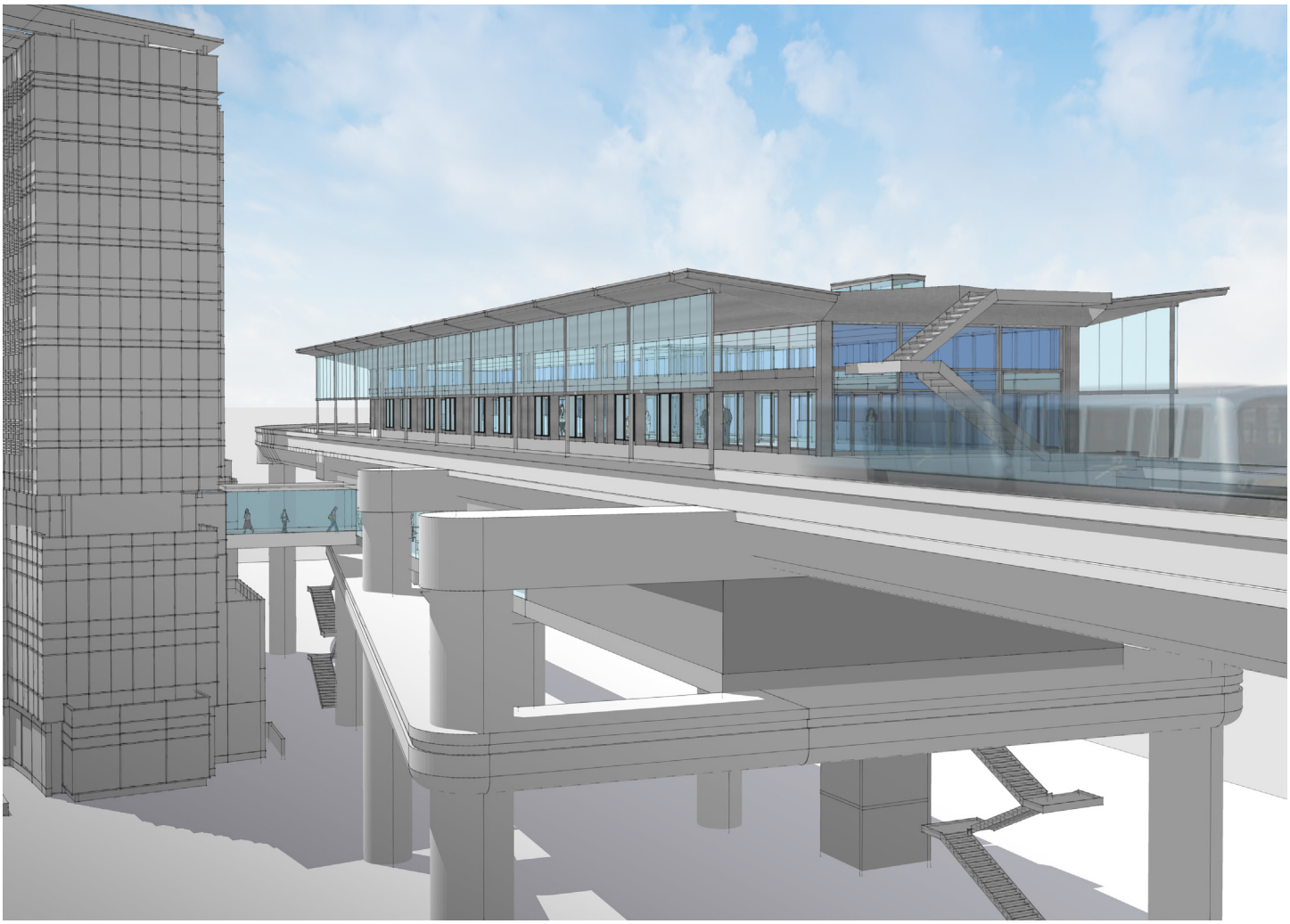
WSP will continue to document sustainable practices, share best practices and monitor performance. WSP will collaborate with manufacturers, research institutions and public officials. Encouraging open discussion and sharing of data will support positive innovation across all project types and bring more firms to the table.

Recognizing that other countries have already been engaged in reducing embodied carbon, WSP is advocating a global view and is leveraging its internal global employee network for disseminating data and lessons learned.

There is an opportunity for every type of project to reduce embodied carbon and possibly sequester carbon. WSP encourages every project team to measure embodied carbon and implement reduction strategies.

[2]Refers to WSP's scope 1, scope 2 and scope 3 business travel GHG emissions

# Case Study



## WSP project example: Train stations at San Francisco International Airport

In 2021, SFO Airport received LEED v4 Gold certification for two new rail stations. WSP was engaged in the embodied carbon aspect of the project during the early design development phase to analyze and provide recommendation for lowering the embodied carbon footprint of construction.

WSP's recommendation to the project team was to increase the fly ash content to a minimum of 15%. The analysis showed that increasing the fly ash had the potential to reduce the embodied impact of the project by 10% in global warming potential and several other impact measures.

Working with the structural engineers and SFO team, changes to the concrete design were implemented, and the final concrete design included 25% fly ash. WSP then did a final comparative whole building life cycle study comparing earlier iterations of the design to the final; with the concrete design changes, changing several glass canopies to metal, and changes to the skylight design, the project had a 9.6% reduction in GWP, 12.6% reduction in acidification, and 11% reduction in ozone formation.

## SE 2050 Program Requirements

| Action | Required/ elective | Status |
|---|---|---|
| **Education** | | |
| Distribute firmwide announcement of your firms pledge to join the SE 2050 Commitment | Required | Announcement distributed in January 2022 |
| Provide a brief narrative describing how your firm is promoting a firm-wide education program for embodied carbon reduction and the firm's commitment to SE 2050 | Required | See Education section |
| Nominate an Embodied Carbon Reduction Champion | Required | See Education section |
| Set a date within the first year to present an "Embodied Carbon 101" webinar to your firm | Required | A 3-part embodied carbon webinar series was held in 2021 following WSP's sponsorship of the CLF |
| Have one representative of your firm attend quarterly external education programs provided by SE 2050, CLF or other embodied carbon resources | Elective | WSP is a sponsor of CLF and attends monthly meetings. Several employees also participate in local chapters. |
| Developed an Embodied Carbon SharePoint page to share resources on how to measure and reduce embodied carbon | Elective | SharePoint page developed in December 2021 |
| **Reporting** | | |
| Provide narrative of how WSP plans to measure, track and report embodied carbon data | Required | See Reporting section |
| Describe the internal training for embodied carbon measurement you provided or will provide | Required | Three embodied carbon webinars were held in 2021. Additional training is planned for all structural engineers in 2022 and more in-depth training for embodied carbon champions, as described in the Reporting section. |
| Report 5 recent projects to SE 2050 Database | Required | Will be completed by the end of 2022 |
| **Embodied carbon reduction strategies** | | |
| Set an EC reduction goal for the coming year and an implementation narrative. | Required | Year 1 goals are to identify and train Embodied Carbon Champions. See the Embodied Carbon Reduction Strategies section for goals for following years. |
| Collaborate with a supplier to reduce embodied carbon | Elective | WSP has partnered with UK Sphera, a firm pioneering sustainable, science-led materials development to move the construction industry toward net zero as part of our inaugural emerging growth partnership program. |

| Action | Required/ elective | Status |
|---|---|---|
| **Advocacy** | | |
| Provide a narrative on how WSP shares knowledge and data to accelerate EC reduction. | Required | See Advocacy section |
| Describe value of SE 2050 to clients. | Required | See Advocacy section |
| Declare WSP is a member of SE 2050 commitment on boilerplate proposal language. | Required | Boilerplate proposal language was developed in February 2022 |
| Share your commitment to SE 2050 on your company website | Elective | See press release |
| Share embodied carbon case studies | Elective | Case studies developed for one project |

*To learn more about ECAP 2050 please contact*

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## ABOUT US

WSP USA is the U.S. operating company of one of the world's leading engineering and professional services firms. Dedicated to serving local communities, we are engineers, planners, technical experts, strategic advisors and environmental compliance professionals. WSP designs lasting solutions in the buildings, transportation, energy, water, environment and federal sectors. With more than 12,000 people in 200 offices across the U.S., we partner with our clients to help communities prosper.

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