

Embodied Carbon Action Plan



We are compelled by engineering possibilities.

We are open to new ideas and not bound by the rote application of rules.

We strive to bring our inquisitiveness to each project for the benefit of our clients. Holmes is an international design firm with employees around the Pacific Rim and beyond.

We believe projects become great by what you put into them. With inspired practicality, we reconcile the complex, competing interests and constraints, providing not just engineering but optimal solutions. In this way, we create more meaningful, integrated designs as a collaborative process in the vital pursuit of building great things.

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Table of Contents



1.0 INTRODUCTION 4 2.0 EDUCATION 5 3.0 REPORTING 6 4.0 REDUCTION 7 5.0 ADVOCACY 8

1.0 Introduction



A Year of Global Progress

In our fifth year of SE 2050, Holmes has made significant strides in our sustainability journey by establishing clear, science-aligned targets across our global business. We've set ambitious goals to reduce embodied carbon in our projects by 10% by mid-2026 and operational carbon by 10% (scope 1 & 2) and 5% (scope 3) within the same time frame. Beyond just structural engineering, we've expanded our sustainability focus to include our Fire and Infrastructure practices, recognizing the unique contributions each discipline can make. The development of our comprehensive Sustainability Policy reflects our commitment to becoming "Sustainable to the Core" across all regions where we operate - Australia, New Zealand, the United States, and the Netherlands.

Our practical approach has yielded measurable results, with projects like the Seattle Storm Center for Basketball Performance achieving a 20% reduction in carbon emissions through low-carbon concrete specification. We've leveraged our international presence to share expertise, with ANZ leading on operational emissions measurement, while the US contributes embodied carbon calculation methodologies. We're also developing non-carbon sustainability targets to address broader outcomes including climate adaptation, resilience, water management, and biodiversity enhancement—ensuring our sustainability efforts deliver genuine value to clients and communities across all our regions.

Our Targets

2030

- 40% reduction in embodied carbon on our projects*
- 50% reduction in scope 1 & 2 operational carbon, 25% reduction in scope 3 operational carbon*
- Make meaningful and measurable progress on our broader sustainability targets

2050

- Net zero embodied carbon on our projects*
- Net zero operational carbon*

*Reduction from 2023

Our Vision

Sustainable to the Core: to infuse sustainability into the culture of Holmes so it makes a genuine difference for clients and communities. We want to make sustainability inherent in the way we think about and deliver work—prioritizing social, environmental and economic outcomes for the built environment and communities we serve.



Holmes provided structural and fire engineering for the new 42XX commercial campus in Marina del Rey, California.

2.0 Education



Where Curriculum Meets Culture

Holmes is executing a Group-wide Plan for 2024-2025 to continue upskilling our staff while exploring how to best leverage the group and share resources. Our objectives remain:

- Infusing sustainability into our company culture.
- Providing all staff the knowledge and skills to discuss sustainability and carbon reduction fluently on projects.
- Performing LCAs as a service and receiving compensation.
- Securing more sustainable projects based on our expertise.

The Sustainability Targets we have set as a Company will drive the need to make consistent reductions to the embodied carbon in the structures we design, and we are determined to find solutions to achieve this across all projects, not just those with broader sustainability goals. To do so, we acknowledge the need to stay current with the latest research and developments and disseminate this information throughout the company. We are also working on updates to our internal QA/QC protocols which would include Sustainability checks on projects meeting certain thresholds.

To accurately quantify embodied carbon impacts and reductions we are working with our Modelling and Advancement teams to:

- Standardize our modelling practices across the company to create a consistent Structural Material Quantities (SMQ) collection.
- Integrating embodied carbon metrics into our Revit families, allowing for quick calculations of a project embodied carbon at each project milestone.
- Develop tools to calculate embodied carbon of past projects to help define our baseline, which will be used to measure future reductions against.

This year Holmes also launched our internal Embodied Carbon database, which will help us track information on all projects where we perform LCAs. The Sustainability Committee presents to the company each Quarter to discuss recent progress and highlights including:

- Results and any lessons learnt from recent LCAs
- Innovative materials that could be used on projects to reduce embodied carbon, such as the use of C-Crete, which was piloted on our recent 3401 South La Cienega project in Los Angeles.
- Updates on our Corporate sustainability goals (see right).

In 2024 we broadened our scope to include quantifying the impacts from our corporate operations, in addition to the embodied carbon of our projects. These efforts have yielded a deeper understanding of where we should harness our energy to yield the biggest impacts to reduce carbon emissions. Reduction of our operational emissions is also included in our Sustainability Targets. Educating our staff, especially those in the Executive and Management positions, will help guide future business decisions that reduce our carbon footprint. Continuing to track our operational emissions in the future will be important to show meaningful reductions.



Engineers catch up at our Portland office around the International Mass Timber Conference.

3.0 Reporting



SE 2050 Database Contributions

Holmes has reported embodied carbon data on six projects this year. We have included a few mass timber projects, as in years past, but also have two single family projects, as well as three projects that include a significant amount of reuse, while including a seismic retrofit. We undertook this year's assessments by using OneClick LCA with bills of quantities extracted from Revit. Projects do not include any reduction due to biogenic carbon sequestration.

Microsoft Silicon Valley

Microsoft expanded its Silicon Valley location to foster a deeply sustainable workplace. The updated campus houses 2,000 employees across a new office—the largest mass building in North America upon completion (at 345,000 SF) subsuming two retrofit structures. When including the retrofit structures and the full office expansion, the GWP intensity is 320 kgCO2e/m2 which is about average for the office projects we have uploaded to the database. When including biogenic carbon, the GWP intensity drops by 1/3 to 215 kgCO2e/m2.

Seattle Storm Center for Basketball Performance

This WNBA practice facility holds two basketball courts, fitness and therapy rooms, and team offices. It has long-span steel joists, a conventional composite steel-framed floor, and tilt-up concrete walls. It sits on a site that required deep foundations. Last year, the project was in construction with proposed plantspecific concrete mixes as part of our LCA. This year we have final quantities of the various mixes along with the actual plant EPDs used. While Stoneway provided mixes that could be delivered from any of their three batch plants, they mostly provided concrete from their Seattle plant. We found that the Seattle plant had a 10-15% reduction in embodied carbon intensity. We also found the supplier had initially provided a few outdated EPDs that had significantly higher intensity. This was a lesson that the most current EPDs from the actual plant source can make a difference, and outdated EPDs in EC3 and OneClick can cause errors. Last year we reported the concrete portion had a 35% GWP reduction compared to baseline industry mixes. We now can report that the as-build GWP reduction in the concrete was about 50%. This project has won numerous awards for concrete innovation.

High-End Single Family Residential

This year we reported two large residences in the Los Angeles area. One was a retrofit of a 10,000 sf residence using primarily light framed wood construction. The retrofit resulted in around 100 kgCO2e/m2 intensity with a 1/3 reduction when including biogenic carbon sequestration. The other was a 15,000 sf residence made of concrete with shallow foundations. The GWP intensity for this structure was over 600 kgCO2e/m2. This demonstrates that single family residential can have a significant range of embodied carbon.

Clean Water Services

Hillsboro, Oregon's water district is expanding their Springfield Street facility to include an office for various department operations. The new 15,600 sf building is steel-framed with metal deck roofs and a small second story on shallow foundations. The building houses critical services, so it has an occupancy risk category of IV. GWP intensity for this building is 322 kgCO2e/m3, which is comparable to other offices we have assessed. Note that mass timber offices like Microsoft Silicon Valley show a lesser intensity if biogenic carbon is included.

Project	Size (SF)	Usage	Phase LCA Evaluated	# of Stories (Abv Grade)	Vertical Gravity System	GWP Intensity (kgCO2e/m²)
Seattle Storm As-Built	44,000	Athletics Facility	Completed	3	Concrete: CIP	370
Meta Data Center Admin	21,000	Office	Design Development	1	Wood: Mass Timber	140
Microsoft Silicon Valley	460,000	Office	Construction Documents	2	Wood: Mass Timber	321
Clean Water Services	16,000	Other	Schematic	2	Steel: Columns	323
La Mesa Dr. Residence	11,000	Single-Family Residence	Construction Documents	2	Wood: Light Frame	122
Senona Cielo	15,000	Single-Family Residence	Construction Documents	2	Concrete: CIP	664

Table 1: Embodied Carbon Data of 6 Holmes Projects

4.0 Reduction

Higher Standards, Lower Carbon

Holmes lowers embodied carbon on projects through a variety of strategies including:

Specifying Low-Carbon Materials

Over the last two years, Holmes introduced carbon limits into our General Notes Template, which was implemented into projects and coordinated by a variety of teams. We've observed the way in which this information is received and executed by all players in a design team and have developed a strategy in supporting this adjustment in specifying low carbon concrete.

Holmes continues to track the latest in the sustainability world by participating in local groups that monitor code updates and requirements in various jurisdictions. As new publications for material baselines become available from groups like Carbon Leadership Forum (CLF), Holmes continues to ensure our general notes and specifications are aligned with the latest available supporting data.

This year, we've driven down the allowable embodied carbon limits further by not only revising the limits to align with the latest CLF published values, but also by providing an alternative for more ambitious sustainability goals with a 15% reduction on top of those values by complying with ACI 323. We are taking a similar approach as we move on to steel, introducing limits on GWP for different shapes and sections. As the City of Seattle petitions to adopt carbon limits on concrete and steel, Holmes is monitoring this effort to ensure that our criteria are aligned with the jurisdiction's requirements.

Establishing a Baseline

To quantify reduction, we must first establish a baseline for comparison. With the six projects uploaded to the SE2050 database last year, Holmes continues to bolster our database and understand how our carbon emissions stack up. This approach provides us with a baseline or comparison point to reference as we move forward and measure our reductions.

In parallel with developing in-house tracking tools, Holmes has been shifting our focus to better understand where efficiencies lie in quantifying a projects embodied carbon with systems we have in place. More specifically, utilizing Revit models we are already building for the structures we design, but adjusting the way in which materials are identified and how they are modeled so we are able to extract the information with ease and quickly tabulate the project's GWP.



The Seattle Storm Center for Basketball Performance flexes 35% GWP reduction in its concrete mixes. Low-carbon concrete tilt-up walls surround future practice courts.

5.0 Advocacy

Amplifying Our Voices

We initiate climate-conscious conversations and advocate for carbon reduction. Informed by lessons learned from built solutions, we're holding international dialogues with project teams and the broader AEC community. Last year, we spread the word on design for deconstruction and material circularity at Greenbuild and Urban Land Institute conferences. We also are presenting to the industry and the importance of resilience (particularly seismic and wildfire).

Looking to the Past to Better the Future

Holmes has advanced our sustainability assessment capabilities of existing buildings. While standardization is lacking in quantifying and measuring impacts from existing buildings and retrofits, Holmes has successfully completed numerous such projects this year. We are creating frameworks to measure the substantial embodied carbon savings achieved through retrofitting and adaptive reuse compared to new construction, providing clients with clear data on the environmental benefits of preserving existing structures. Our analysis spans a wide range of scales-from MLB stadiums and high-rise towers to single-family residential projects, which represent approximately one-third of our US portfolio. We plan to present these findings to industry peers in the coming months to gather feedback and help develop consensus on practical, data-driven methodologies for quantifying retrofit benefits-moving the industry toward more consistent measurement frameworks that balance environmental impact with business realities.

Spreading the Word

We continue to have a strong record of Holmes speakers at industry events. Regularly, we present to clients at informal lunch and learns on how we progress sustainability benchmarks. Our team members also contribute to building codes, design guidelines, and research projects that expand possibilities for sustainable construction.

BUILDING CODE & DESIGN DEVELOPMENT

- NHERI TallWood-Research
- REACT Consortium
- US Mass Timber Floor Vibration Design Guide
- Project-Specific Testing Including:
 - Long-Span Timber-Timber Composite Floor Cassettes
 - Point-Supported CLT Panel Testing
 - Timber Diagrid System
 - Reclaimed Lumbar Partitions

PROFESSIONAL COMMITTEES

- Carbon Leadership Forum
- NCSEA Sustainable Design Committee
- SEI Sustainability Committee
- SEI SE 2050 Committee
- SEO Code Advisory Committee (Mass Timber)
- SEAOC Board of Directors, Sustainable Design Committee
- SEAONC Board of Directors (Past President), Sustainable Design Committee
- SEAOSC Sustainable Design Committee
- SEAW Sustainable Design Committee
- Seattle AIA Mass Timber Committee Chair
- USGBC California Council of Experts & Los Angeles Chapter

RECENT SPEAKING OPPORTUNITIES

- Cal Poly San Luis Obispo SEAOSC
- International Mass Timber Conference
- Passive House Accelerator Podcast
- Passive House Northwest
- Greenbuild
- NASCC: The Steel Conference
- SEAONC Association Meeting
- Urban Land Institute Fall Meeting
- University of California Berkeley

We're All in on Net Zero.

