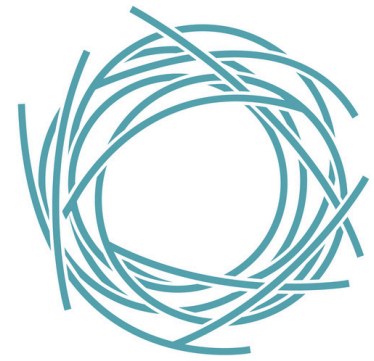




BLUE NEST
STRUCTURAL

Embodied Carbon Action Plan 2024



STRUCTURAL
ENGINEERING
INSTITUTE



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About Us

Established in 2021, Blue Nest is a fresh and growing venture backed by a decade of expertise in structural solutions on projects ranging from stacked shipping containers for a local art gallery to alterations of an existing administration building at the University of Richmond.

We work with people bringing new life to the built environment through vertical structures, particularly buildings and innovative projects in terms of their end use or structural design. These people include owners, architects and institutions such as universities and local governments.



Blue Nest Structural Team



GARRET BRAUN

Principal, P.E.



CHRIS FOLSOM

Project Engineer



PIYUSH PRADHANANGA

Ph.D., LEED Green Associate,
ENV SP, EIT

Embodied Carbon Reduction
Champion



JULE GIBBONS

Engineer

Our Commitment to SE 2050

**“Dedicated to Designing Adaptable, Resilient,
and Regenerative Buildings”**

As a firm, we are dedicated to positively impacting our community and we see sustainability as a key aspect of that positive impact. As part of the teams creating the next generation of buildings, we know we have a responsibility to our clients, their neighbors and future users of these structures. We honor this responsibility by designing enduring buildings that use materials responsibly. Through flexible designs that accommodate future uses, careful detailing to prevent deterioration and the specification of environmentally conscience materials, we are able to bring these ideals to life.

To deepen our commitment to environmental stewardship, we aim to establish a robust framework for tracking and reporting embodied carbon goals. By doing so, we will not only measure the effectiveness of our current initiatives but also identify opportunities for improvement and innovation. Our commitment to the SE2050 program underscores our dedication to reducing embodied carbon in the built environment and our resolve to lead by example in creating a more sustainable future.



Internal Announcement

To Chris Folsom <cfolsom@blueneststructural.com>; Jule Gibbons <jgibbons@blueneststructural.com>
Cc Garrett Braun <gbraun@blueneststructural.com>

Dear All,

I am excited to share important news about our firm's commitment to sustainability and reducing embodied carbon in structural engineering projects. We are officially joining the SE2050 Commitment Program, an initiative aimed at achieving net-zero embodied carbon in structural systems by the year 2050.

As part of this commitment, our short-term goal is to develop an infrastructure to measure, and report embodied carbon and environmental impacts from a select group of our structural engineering projects. We will use this data to establish comparison groups and a baseline for these groups. Upon establishing these groups and baselines we will commit to a specific reduction in embodied carbon over a specific period of time. This means we will be working more closely with clients, suppliers, and our internal teams to implement sustainable solutions that align with the SE2050 goals. This is a significant step, and we will need the collaboration and creativity of every one of you to make this vision a reality.

I encourage you to go through the resources provided by the Structural Engineering Institute (SEI) by clicking the link below to learn more about embodied carbon reduction in structural engineering.

1. Introduction to Embodied Carbon: <https://se2050.org/resources-overview/embodied-carbon/>
2. Carbon Reduction Strategies: <https://se2050.org/resources-overview/structural-materials/>
3. Tools and Case-studies: <https://se2050.org/resources-overview/tools-and-data/>

Regards,



**Piyush Pradhananga, PhD, EIT, LEED Green
Associate**

Engineer - Structural

BLUE NEST STRUCTURAL

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Be sure to follow us!  



Elective Documentation Included in the ECAP

Education	a. Included a narrative of how the Embodied Carbon Reduction Champion will engage embodied carbon reduction b. Attended one webinar focused on embodied carbon for structural engineers. c. Presented embodied carbon action plan during internal meeting.
Reporting	a. Submitted two projects per U.S. office with structural engineering services to the SE 2050 Database.
Reduction	a. Established firm-wide reduction targets in the short-term (<1 year) and long-term (>5 years)
Advocacy	a. Defined ways in which the design team can collaborate to reduce embodied carbon b. Publicly declared firm as a member of the SE 2050 Commitment on our website, LinkedIn, or other social media).

Education Plan

Sustainability Education

Our firm's continuing education program included a webinar on "Embodied Carbon 101 : Structure" from Boston Society of Architecture and incorporated embodied carbon education in our onboarding process for all new employees.

Introduce Tools

We introduced different tools to calculate embodied carbon for structural materials and integrated beacon plugin in Revit to quantify embodied carbon from our projects.

Research

Our Embodied Carbon Reduction Champion engaged in research about low carbon materials for structural design (e.g., high recycled content steel such as AEOS steel products) and established embodied carbon base levels for different types of building including steel, wood and masonry building.

Encourage

We encouraged employees to seek out opportunities and innovative ways to reduce embodied carbon and integrate sustainable practices such as adaptable reuse, circular economy, and regenerative design into projects.

REPORTING PLAN

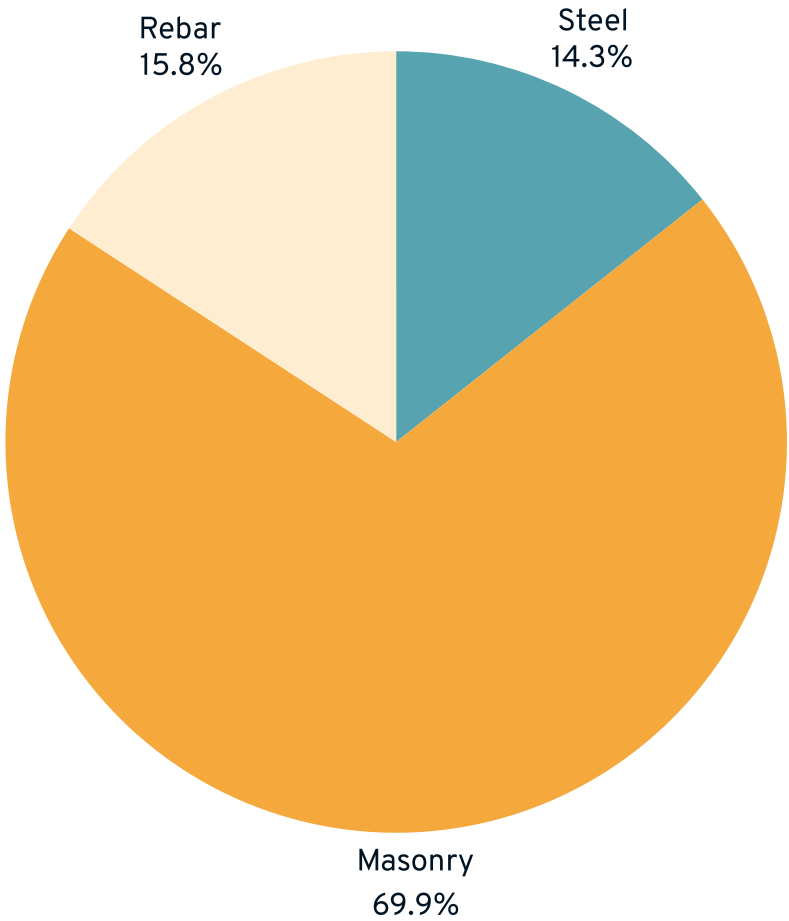
Blue Nest Structural is submitting life-assessment data from two projects for SE2050 commitment. First project is multi-family residential building made up of wood and masonry. Another project is a industrial warehouse made up of mainly steel and masonry. These projects have been selected based on their economic value and size.

METHODOLOGY	LIFE-CYCLE ASSESSMENT	SCOPE
We requested stakeholder such as contractors to provide product specific environmental product declarations (EPDs). We aim to track as many product specific EPDs as possible which would help us accurately quantify the embodied carbon for the projects that have been completed.	We used Beacon to calculate embodied carbon from different structural materials used in the project. We found this software very useful for also determining material quantities at design stage and how the project is performing in comparison to the embodied carbon baseline.	The scope of our data is limited to A1-A3 i.e. product stage.

DOMINION CONSTRUCTION PARTNERS HEADQUARTERS

We designed a new 1-story approximately 70,000 square foot office & warehouse. The building is constructed of steel roof framing supported on masonry bearing walls at the exterior and interior steel columns. Based on the life cycle analysis, the building has an estimated 284 kg CO₂/m² (58.2 Lb. CO₂/ft²) of embodied carbon which falls under the benchmark of low-carbon buildings.

Based on the results from Beacon, masonry bearing walls used in the structure has the highest percentage of embodied carbon followed by rebar and steel as shown in the chart. Approximately 77, 122 CF of masonry used in this structure contributes to the 70% of total embodied carbon produced by the production stage of the masonry.



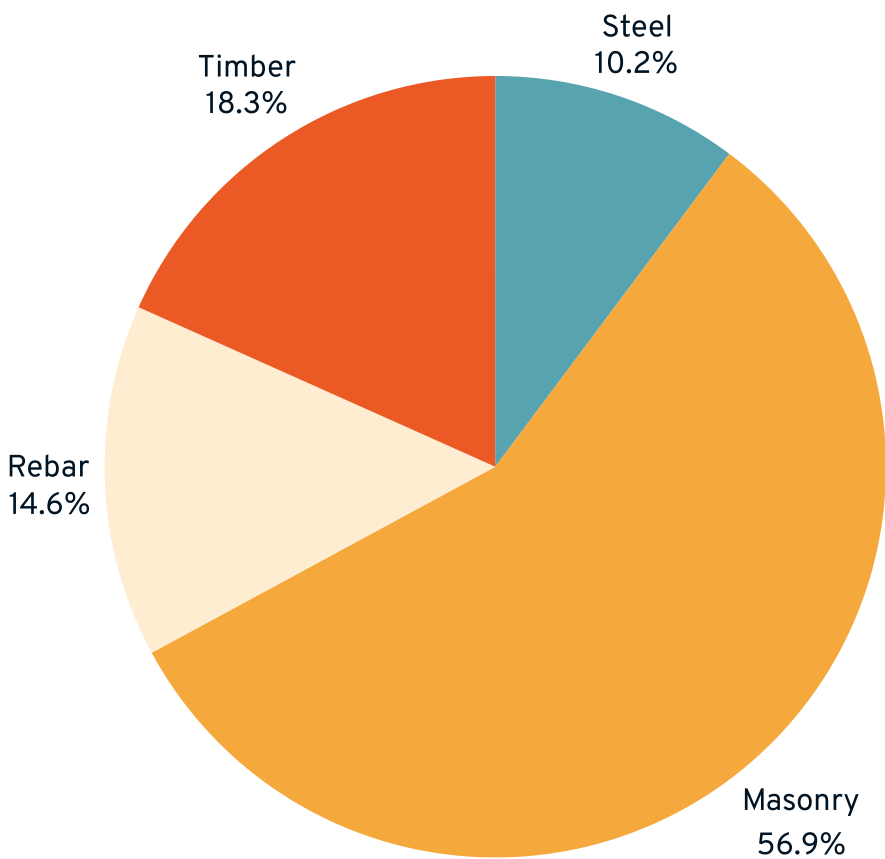
% of Embodied Carbon from different materials



SWANSBORO PLACE

We designed a new 4-story approximately 74,376 square foot multifamily residential building. The building is constructed of wood floor and roof framing supported on masonry bearing walls at the exterior and interior wood posts. Based on the life cycle analysis, the building has an estimated 70 kg CO₂/m² (14.3 Lb. CO₂/ft²) of embodied carbon which falls under the benchmark of low-carbon buildings.

Based on the results from Beacon, masonry bearing walls used in the structure has the highest percentage of embodied carbon followed by timber, rebar, and steel as shown in the chart. Approximately 22, 590 CF of masonry used in this structure contributes to the 57% of total embodied carbon produced by the production stage of the masonry.



% of Embodied Carbon from different materials





FIGHT TODAY
FOR A BETTER
TOMORROW

A protest sign made of three pieces of cardboard, held up by a crowd. The sign reads "FIGHT TODAY FOR A BETTER TOMORROW". The words "FIGHT TODAY" and "TOMORROW" are written in large, bold, black block letters. The word "FOR" is also in black block letters, but "A BETTER" is written in a red, cursive script. The background is a blurred crowd of people at a protest, with a white building and greenery visible in the distance.

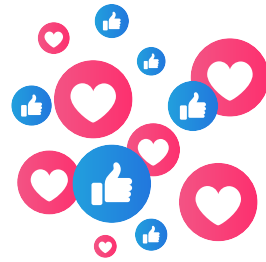
Embodied
Carbon
Reduction
Strategies



Long Term Strategies (5+ years)



Advocacy/Knowledge Sharing Narrative



Action Step 1

Blue Nest Structural social media platforms mainly targets young audience at college level to educate them about industry practices. We aim to consistently share educational content about sustainability efforts related to reducing embodied carbon, adaptive reuse of buildings and regenerative design in our Website, Instagram and LinkedIn.



Action Step 2

We aim to issue an external announcement to our clients about our SE 2050 commitment and integrate our commitment in our email signatures. We will also discuss with clients the importance of requiring that some of the structural materials come with product-specific EPD's in an effort to make embodied carbon reduction part of the project scope



Action Step 3

We aim to collaborate with suppliers, architects or contractors to identify opportunities for low carbon specifications and material procurement. Additionally, one of our future goal is to use embodied carbon data during schematic design phase to make comparisons between structural systems such that clients are inclined to adopt sustainable methods.



LESSONS LEARNED

As our firm is gradually adopting sustainable practices in structural design, establishing a embodied carbon baseline averages for different project types will take several years of actively tracking the data. While the data collected for a few completed projects suggests that our projects have low embodied carbon in comparison to benchmarks, it is too early to jump into conclusion. We also believe that our staff has gained awareness about embodied carbon through SE2050 resources and we need to further advance our knowledge through consistent sustainability continuing education efforts.



SUSTAINABILITY EFFORTS

Our sustainability efforts in the year 2025 will focus on designing building using sustainable materials like mass timber, shipping container and recycled steel products to align with our sustainability aspirations.



CONTINUED COMMITMENT

While celebrating achievements, we recognize ongoing challenges and reiterate our enduring commitment to SE2050 net zero carbon efforts. We aim to engage stakeholders to align with our sustainability goals as early as possible to ensure better collaboration. Strategic collaborations with key partners will expand our reach and collective influence, contributing to the overall success in advancing reduction in embodied carbon.