



# ***EMBODIED CARBON*** **ACTION PLAN**

**2025**











## INTRODUCTION

Embodied carbon, representing the carbon footprint associated with materials and construction processes throughout a building or project's life cycle, has emerged as a critical component of comprehensive sustainability efforts. As the built environment undergoes significant expansion, understanding and mitigating the carbon released during material production, transportation, and construction phases becomes paramount to our collective pursuit of a carbon-neutral future. This Embodied Carbon Action Plan provides a roadmap to implementing new strategies and solutions within our workflow that will allow us to systematically evaluate and reduce the embodied carbon footprint of our projects. Through these efforts, we hope to arrive at a future where sustainable design focuses not just on how buildings operate, but fundamentally changes how they are conceived and constructed.



## OUR COMMITMENT

As rapid and dramatic climate change becomes inescapable, we recognize our responsibility to implement a paradigm shift in the conventional approach to structural engineering design. Whereas our design focus has historically centered on life-safety considerations, recent environmental changes have made it apparent that our focus must broaden to include consideration for sustainability and resilience in equal measure.

Instrumental to this shift in priority is the establishment of a strategy for the reduction of embodied carbon in structural design. We have developed a series of near-term and long-term goals that will help us establish a knowledge base to grow our understanding of current reduction strategies, determine internal benchmarks by which to evaluate our progress, and initiate conversations with our clients and partners to support reduction objectives.

Our embodied carbon action plan is outlined by our approach to **EDUCATE** our team, **REPORT** our data, **REDUCE** embodied carbon in our projects, and **ADVOCATE** for embodied carbon-conscious design choices.



EDUCATE



REPORT



REDUCE



ADVOCATE

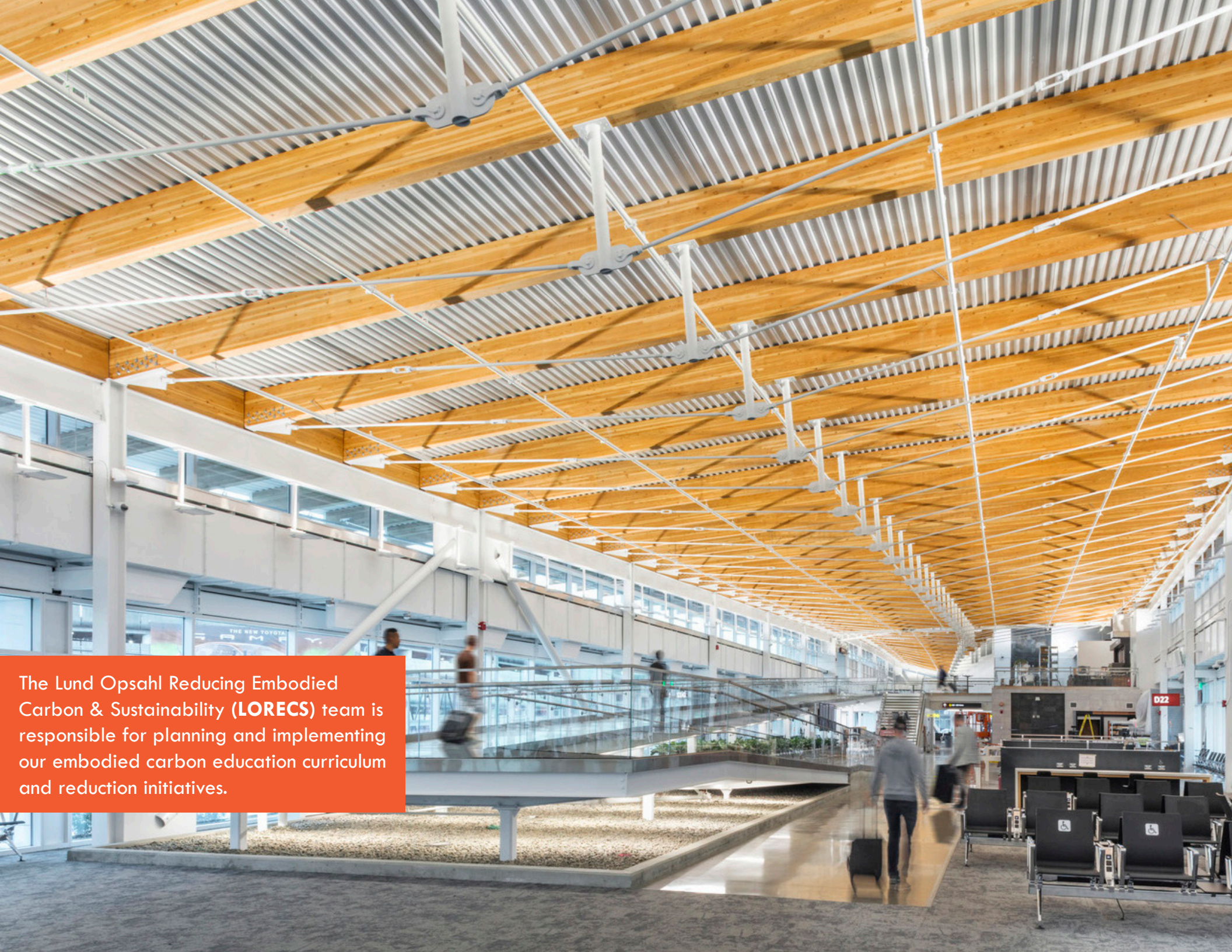






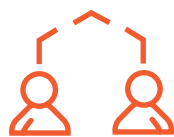
The Dominique Cantwell  
**BALCONY**





The Lund Opsahl Reducing Embodied Carbon & Sustainability (**LORECS**) team is responsible for planning and implementing our embodied carbon education curriculum and reduction initiatives.





## EDUCATE

Education empowers us with the knowledge and context to make informed decisions to effectively reduce the embodied carbon in our practice. The long-term vision for our education program is for embodied carbon reduction to be seamlessly integrated into our continuing education experiences in the office, through in-house mentoring, external program participation, and internal presentations will all incorporate concepts of sustainability. The main objective is to reduce embodied carbon in our projects. For our long-term goals, we aim to achieve the following:

- ▶ Curate up-to-date in-house educational resources
- ▶ Orchestrate regular continuing education initiatives
- ▶ Send office representatives to relevant workshops and conferences

Our **digital resource folder** includes items such as the “Top 10 Carbon Reducing Actions for Structural Engineers” and “How to measure and report embodied carbon” documents.

Realizing the long-term vision for our education program requires effort to get our team up-to-speed on the fundamentals of embodied carbon-conscious design and practice. We are educating our staff and growing our sustainability team. Our education goals include the following:

- ▶ Continue to leverage the expertise of our in-office embodied carbon interest group (**LORECS**) to plan and implement our embodied carbon education objectives
- ▶ Schedule quarterly continuing education presentations
- ▶ Continue to develop our **digital resource folder** on Sustainability & Embodied Carbon Reduction for staff
- ▶ Develop an internal reference document with EC 101 and guides to everyday SE reduction strategies, including design and discussion suggestions



## REPORT

For measuring and calculating embodied carbon, we are using the material takeoff function in Revit in conjunction with the Embodied Carbon Construction Calculator (EC3). Our first year of reporting involved defining and integrating LCA-focused modeling practices to ensure metrics are accurately measured and tracked within these programs. We are still in the process of evolving as best practices are developed and resources advance.

Our reporting plans are as follows:

- ▶ Submit all BIM-modeled projects to SE 2050's database for 2025
- ▶ Focus on the "Product Stage" of the building life cycle (Module A1-A3) for reports
- ▶ Include Global Warming Potential (GWP) data
- ▶ Support carbon-reducing strategies by measuring and tracking metrics during all project phases, but contributions to the database will be reported at the end of the Construction Design phase only

Our intent for the long-term is to automate embodied carbon evaluations in our REVIT workflow for real-time project reporting.



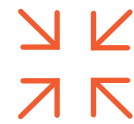












## REDUCE

Educating and reporting alone will not bring forth the dramatic change required to meet the challenge of reducing and ultimately eliminating embodied carbon in our projects by 2050. Essential to achieving this core goal is implementing reduction practices.

Our steps reduction include the following:

- ▶ Introduce embodied carbon reduction criteria in material specifications
- ▶ Incorporate embodied carbon guidelines in our General Notes
- ▶ Analyze all projects, aligning with our reporting targets, and establish an internal database of GWP data to create internal benchmarks.

In future years, we will set quantifiable goals for carbon reduction and continue to implement more ambitious strategies for reduction, which will be aided by Sustainability Nutrition Label, or “SNAIL”, and comprehensive data collection.





## ADVOCATE

Central to our commitment to SE 2050 is our motivation to contribute to industry-wide, cross-disciplinary collaboration to accelerate adoption of embodied carbon reducing strategies. We will achieve this by increasing awareness, sharing knowledge and data, and advocating for design choices that reduce embodied carbon.

The value of our commitment to SE 2050 to clients is clear: a **sustainable structure** is economical and **resilient**. Material efficiency results in greater economy, and strategically robust design choices reduce repair and maintenance costs and downtime after a hazard event.

Our advocacy goals reflect our drive to rapidly incorporate embodied carbon awareness into our practice:

- ▶ Continue to indicate our status as a committed member of SE 2050 in our proposals, company website, marketing materials, etc. (see right).
- ▶ During schematic design, provide our clients with an overview of the difference in embodied carbon between design options, and discuss the use of specific EPDs
- ▶ Add language to feasibility studies regarding the impacts of the embodied carbon of proposed construction

As we develop and refine our embodied carbon practices, we aspire to grow our advocacy efforts:

- ▶ Display an embodied carbon “nutrition label” (SNAIL) on every project cover sheet to showcase performance against industry standards
- ▶ Shift client discussions to include sustainability and resilience alongside safety and efficiency



### SUSTAINABILITY

Lund Opsahl is currently engaged in **\$1.4B** of sustainable design and construction projects, including Living Building Challenge, Passive House, and LEED projects. Beyond designing for certifications, we are committed to SE2050 and International Living Future Institute (ILFI).

#### Material Selection & Exploration

Material selection plays a critical role in both the financial and aesthetic outcomes of a project. We approach every design seeking balance between project objectives, cost, constructability, and environmental impact. This process involves balancing sustainable practices, meeting load-bearing requirements, adhering to cost and schedule constraints, and achieving the desired aesthetic.

True synthesis of perspective and experience may take the team in unexpected directions. We are eager to distill the right approach for every project.

#### Holistically Sustainable Design & Construction

Our “Sustainability Nutrition Label” sparks conversations around the carbon impact of the team’s design and is now featured on the cover sheet of our drawing sets (see right). Leveraging Revit and TallyCAT/EC3, this tool is available throughout design and can help inform design decisions by providing insights into their carbon impact.

#### Living Building Challenge Zero Energy & Zero Carbon

Strict thermal and energy guidelines require a shift in the way we approach design and construction. Familiar with thermal break materials, structural detailing at the energy envelope, and with capability for rapid analysis, we are experienced in guiding teams towards achieving these ambitious goals.

GLOBAL WARMING POTENTIAL	
2024-01-01 (2024)	
GROSS BUILDING AREA	23,184 SF (1,846 m <sup>2</sup> )
STRUCTURAL GWP kgCO <sub>2</sub> e/m <sup>3</sup>	127
REDUCTION FROM BASELINE*	14%
TOTAL STRUCTURAL GWP	1,332,407 kgCO <sub>2</sub> e
CHANGE FROM PREVIOUS PHASE	1%
*BASED ON 2020-01-01 (2020) DATA	
2020-01-01 (2020)	
GROSS BUILDING AREA	23,184 SF (1,846 m <sup>2</sup> )
STRUCTURAL GWP kgCO <sub>2</sub> e/m <sup>3</sup>	145
REDUCTION FROM BASELINE*	14%
TOTAL STRUCTURAL GWP	1,332,407 kgCO <sub>2</sub> e
CHANGE FROM PREVIOUS PHASE	1%
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The key to achieving our embodied carbon goals and meeting the needs of a changing climate requires an emphasis on both **sustainability** and **resiliency**.







## LESSONS LEARNED

At the outset of our commitment to SE2050, we directed our focus to a number of changes we saw as stepping stones towards establishing an ethos of sustainable design within the office. Throughout the year, we determined that it would be most effective to redirect our efforts and concentrate on firm wide education initiatives. This includes advancing our vision of a Sustainability Nutrition and Information Label (SNAIL) by establishing the infrastructure through automated processes, alongside developing our data collection and reporting process for SE2050. Coinciding with this effort, we began developing an internal embodied carbon reference document to provide guidance and establish a base level of information easily accessible to everyone in the office. The first step to reducing our impact is collectively understanding the scale.

As these processes are established, we intend to reintegrate many of these initial goals into our plans moving forward.

### EDUCATION

- ▶ To better educate our staff, we need to improve the organization of shared resources, making them more accessible. Our internal embodied carbon reference document will likely play a key role in this effort.
- ▶ The internal embodied carbon reference document will also facilitate discussions on key differences between material types and their embodied carbon (EC) implications. We do not currently have a focus on product specific EPDs, rather intend to drive discussions toward material savings and efficiency. We anticipate this document will also further inform continuing education presentations.
- ▶ While we've sent representatives to ILFI and online conferences/webinars, the next step is to present at these conferences and publish thought pieces, research, and insights.

### REPORTING

- ▶ In 2024, we submitted seven projects. Moving forward, we aim to integrate our LCA process into standard project workflows, enabling consistent reporting at the end of the Construction Design phase.
- ▶ We included GWP metrics within our reporting process but need to refine LCA automation to streamline material quantity reporting. Enhancing our process for more accurate, material-specific data is essential. Collaboration with Tally 2.0 for development may be beneficial.
- ▶ We plan to track project GWP data to develop an internal database and establish baseline values aligned with CLF and SE2050 guidelines.

### ADVOCACY

- ▶ Based on feedback from external industry professionals, we see great potential for the SNAIL to increase awareness of the embodied carbon implications of our designs, both with our clients and within our greater office team given the increased exposure to such data, further acting as a catalyst for greater sustainability discussions.
- ▶ Feasibility studies should incorporate language on the embodied carbon impacts of proposed construction. While this has been implemented based on client priorities, we should formalize default language by refining and standardizing phrasing used in projects.

### REDUCE

- ▶ Embodied carbon criteria and guidelines have been introduced in general notes for select projects with sustainability targets. We are working toward establishing default specifications and continuing to integrate lower-carbon materials in our design documents.









## CONCLUSION

As we navigate escalating climate concerns and a rapidly changing environment, our structural engineering philosophy is shifting from simple life-safety to a comprehensive design approach that integrates sustainability and resilience. As leaders of the built environment and stewards of the natural one, we acknowledge our role in achieving balance between built structure and the planet. We view our commitment to SE 2050 as just the beginning of our actions to address this changing paradigm. Our embodied carbon action plan outlines the steps we're taking to understanding embodied carbon, sharing data, reducing its impact in our practice, and advocating for sustainable design.





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