SE 2050

EMBODIED CARBON ACTION PLAN

Blackwell

CONTENTS

1. INTRODUCTION 3

2. EDUCATION PLAN 4

3. KNOWLEDGE SHARING 4

4. REDUCTION STRATEGY 5

5. REPORTING PLAN 6

6. ELECTIVE DOCUMENTATION 7

7. LESSONS LEARNED 8

1. INTRODUCTION

At Blackwell, we engineer structures for a diverse range of clients. We've worked hard to develop a company culture of deep engagement with the values that drive our clients' projects forward. In practice, however, this results in projects that occupy the full spectrum in terms of carbon intensity. While it can be gratifying to focus on our mass timber, straw bale and rammed earth structures, our goal is to progressively reduce the embodied carbon on all our projects, with a particular focus on projects with high carbon density.

We recognize that the construction industry is a primary contributor to the climate crisis. It is estimated that 6%[1] of the carbon emissions in the atmosphere are attributable to the construction of buildings; at least half of that comes directly from structural components of the build. In joining the SE2050 Commitment, Blackwell is bringing an explicit focus to understanding, evolving and executing carbon reduction strategies across the breadth of our portfolio.

We are committed to measuring and reducing the embodied carbon associated with our work. Our goal is to assimilate current best practices from our industry and to focus our engineering insight and energy on developing design and documentation standards that result in highly carbon-efficient structures, with the ultimate end of achieving net zero structures by 2050.

2. EDUCATION PLAN

Our internal plan will initially focus on establishing a nuanced understanding of the climate crisis and the contributions attributable to embodied carbon in building structures. In pursuit of this understanding, we have identified several external study resources for our staff to review, which will be followed up with internal discussion sessions. This endeavor is funded through our professional development budget.

A working group has been initiated that is developing expertise on embodied carbon accounting and reduction strategies associated with concrete, masonry, steel, and timber. This group will provide regular internal seminars to communicate best practices in terms of measurement, design strategies, and documentation leading to the reduction of embodied carbon in our structures. These strategies will be formalized into white papers that will be refined as more information is assimilated. These white papers will be shared with our clients and peers. We will invite leading low carbon fabricators and suppliers to present their products and processes to the wider firm.

We encourage participation in carbon leadership forum seminars and other peer community initiatives including the Canadian Green Building Council (CaGBC).

3. KNOWLEDGE SHARING

Blackwell partners with architects on multiple projects pursuing CGBC Zero Carbon, Passive House and LEED certifications each year. Our pledge is to provide embodied carbon analysis relating to assessment stages A1-A3 for concrete, structural steel, timber, and other major structural material scopes for these projects.

An initial analysis will accompany schematic design and will be repeated with increasing refinement to accompany each formal cost estimate. Our findings will be discussed with our clients and Contractors at all relevant opportunities.

Blackwell has presented embodied carbon analysis relating to our concrete and structural steel design approach and specifications to Architects, Municipal Owners and Industry partners. We regularly give crits on structural design within Architecture programs at universities throughout Canada. Blackwell studied and presented findings on a GWP comparison between ground improvement and deep foundations. We are currently working with an architect's office on program specific evaluation guidelines for conformance with the City of Toronto's embodied carbon requirements. We will continue to pursue these opportunities in order to expand our knowledge and share the results of our learning with current and upcoming generations of designers.

4. REDUCTION STRATEGY

Our first year involved developing a set of tools to reliably and efficiently quantify structural scope and the embodied carbon associated with these elements. Our approach used a set of internal tools embedded in our BIM models and related these to a library of Type III EPDs that are confirmed to be accessible in each project's market.

In our second year, we attempted to set baselines for building types based on our initial studies and with access to the SE2050 database and feedback from the local market. For our recreation center project, we found that setting a baseline was dependant on program (pool, ice rink, gymnasium). Each program element came with a well defined and difficult to improve upon carbon cost. We are able to make some improvements with specification changes, but, for example, both pools and ice rinks have high performance requirements for concrete and we have been unable to cut GWP from these areas. For recreation areas we have found that it is practical to set baselines and limits based on program rather than square footage. With other building types, our projects were to varied to determine realistic baselines. In our third year, we plan on shifting to quantifying various floor systems so that designers and our clients can be aware of what the lowest GWP floor and roof systems will be no matter the context of the project. This will focus our efforts on where we can make a difference.

Fundamental to our carbon reduction strategy is the evolution of our specifications to target GWP limits associated with structural concrete and steel components. This work has been communicated with a series of policy papers so that uniform and consistent take-up is encouraged across the office. These policies will also be shared with our clients so that the initiative is coordinated with the project's broader goals. We have created low GWP design strategies for Timber, Steel and Concrete.

A lessons-learned register has been established that notes key takeaways from our initial comparative schematic studies as well as the results of our LCA analyses. This register will form the basis of a carbon-efficient design strategy document that will aid our engineers in advancing our sustainability goals.

5. REPORTING PLAN

We will track structural components through project BIM models. Our modeling practice is explicit and detailed and incorporates concrete mix designs for each class of concrete elements along with all structural steel components and plate fabrications. Structural scope will be associated with Type III EPDs depending on the project's overall goals as captured in our specifications. Accessibility of products associated with the EPDs will be verified through Contractor contacts within the project's regional market.

Our analysis will be limited to LCA stages A1-A3 and will focus exclusively on concrete, concrete reinforcement, structural steel and metal deck, and structural timber and wood deck. For current projects, we will do embodied carbon analysis to accompany each costing report. In our first year, we selected three recently tendered projects to analyze. We have used contractor feedback to modify our takeoffs to accurately reflect the volume of material used vs the volume of material designed and modeled. These calibrations were used to calibrate our LCA assessments. In our second year we submitted 5 projects. We commit to submitting 5 projects in our third year as well.

6. ELECTIVE DOCUMENTATION

Education

- The 2025 ECAP will be distributed to the office and discussed during a tech talk on sustainability.
- Invite 2 industry leaders to speak to the office on sustainable design or sustainable materials over the year.
- Conduct quarterly tech talks on sustainability, highlighting updates to specifications, internal design guidance or internal LCA infrastructure for wider audience uptake.

Reporting

- Submit 5 projects to SE2050 database for 2025.
- Internally compare various embodied carbon reports from different project types to gain further insights.

Reduction

- Use our embodied carbon analysis tools to provide LCA costs during the design phase, enabling the selection of low carbon design choices.
- Integrate low carbon requirements in our general notes and specifications.
- Using our low GWP specifications for both concrete and steel on a recent project resulted in a 23% decrease in GWP for the projects structure.

Advocacy

- Share our commitments and involvement with the SE2050 initiative through a variety of communication channels including social media, website and news letters.
- Communicate with our clients and industry peers about the SE2050 initiative and the importance of embodied carbon reduction. Become involved within our industry and in broader contexts to advocate for more sustainable practices.
- Continue to request type III EPDs from industry contacts and project partners to build our internal library and maintain focus on carbon reduction within the industry.

7. LESSONS LEARNED

The following are a few of the lessons we have learned over the past year, which we have used to inform our goals and initiatives for 2025.

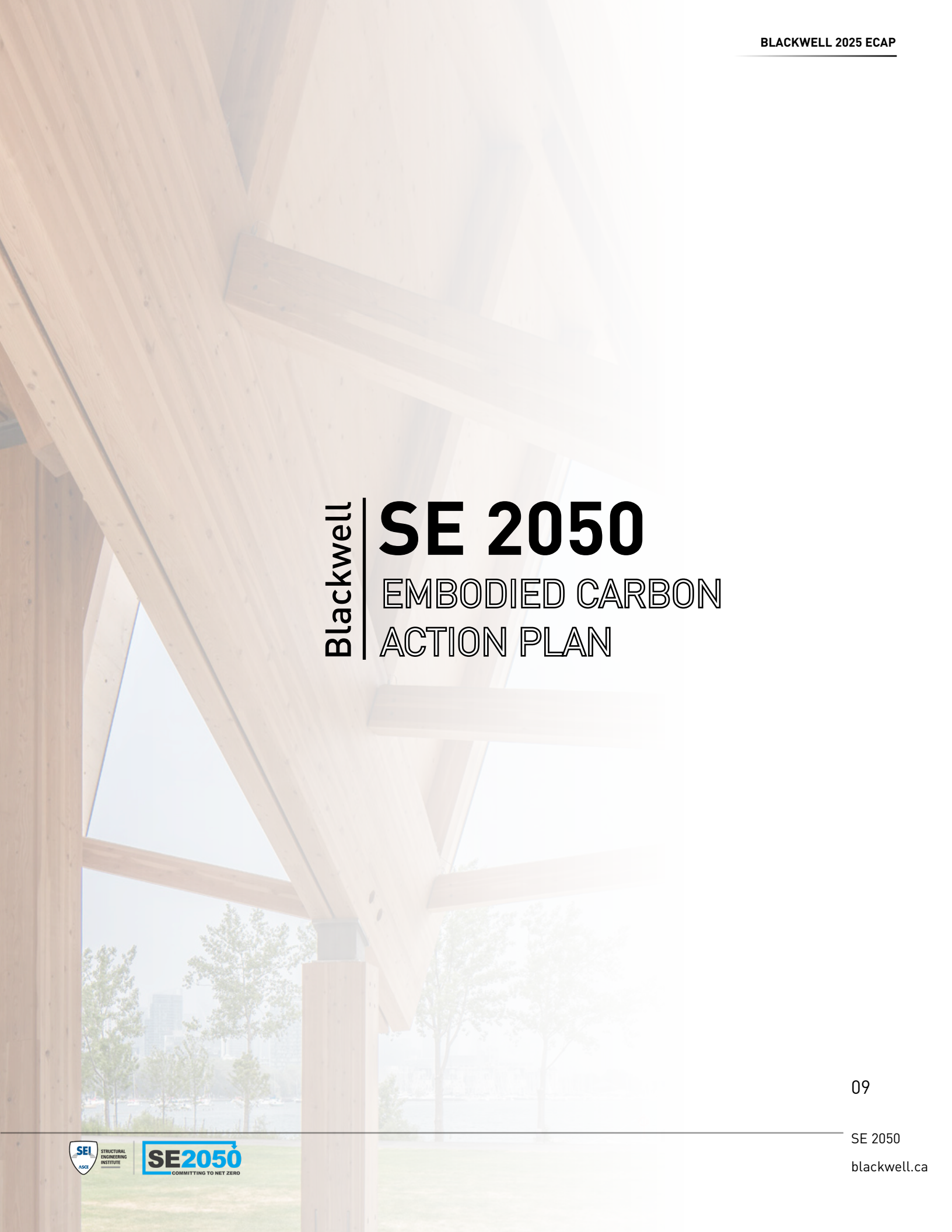
- Our internal LCA tool and integration with Revit is not as comprehensive as originally envisioned, LCA assessments take longer than anticipated as our modeling practice evolves. We have several staff that have developed expertise in LCAs, but the skill has not been transmitted office wide.

- We continue to have success specifying lower GWP concrete in the local market.

- Re-use of steel sections from demolished buildings would require a massive industry shift and seems unlikely in the near future

- Mass timber solutions are not always the lowest GWP, we have found replacing large glulam beams with steel trusses made of low GWP steel has benefited a project.

- The connections in mass timber systems can be up to 5% of the GWP of the system.



Blackwell

SE 2050

EMBODIED CARBON ACTION PLAN