



Engineers



EMBODIED CARBON ACTION PLAN 2025





TRCA Administrative Headquarters

CONTENTS

- 1.0 RJC's Commitment
- 2.0 Embodied Carbon Team
- 3.0 Education
- 4.0 Knowledge Sharing/Advocacy
- 5.0 Reduction Strategy
- 6.0 Reporting Plan
- 7.0 Lessons Learned

1.0 RJC'S COMMITMENT

RJC Engineers (RJC) is an employee-owned engineering firm that celebrates creative thinking, prompt service, and technical excellence in the design and maintenance of structures. RJC provides structural engineering, structural restoration, building science, parking facility design, structural glass engineering, and building energy modeling services. Bringing the best of RJC to every project for over seven decades, the firm integrates ingenuity and practicality to create success for its clients and their projects.

RJC recognizes that the decisions we make today as structural engineers can impact society for generations. With this in mind, we acknowledge our role in shaping a more sustainable future and fully support the vision that all structural engineers shall understand and make efforts to reduce and ultimately eliminate embodied carbon in their projects by the year 2050.

For over seven decades, we have promised “Creative Thinking. Practical Results” to our clients and industry partners. While our promise remains the same a lot has changed within industry. One thing that has not changed fast enough however, is the high carbon load of buildings. Worryingly atmospheric CO₂ levels have risen from 311ppm (in 1950) to over 420 ppm as we prepare our 2025 Embodied Carbon Action Plan. As creative thinkers passionate about solving problems, we see our commitment to SE 2050 as an opportunity to develop and share bold, innovative, and practical solutions.

RJC's in-house building performance team has Life Cycle Analysis expertise to measure and track environmental impacts across the full building life cycle, including embodied carbon. Our engineers and technologists have worked on numerous LEED, Passive House, Toronto Green Standard, and BC Step Code projects.

Is RJC ready to educate, explore, question, solve, report, and share? Yes, we are.

This Embodied Carbon Action Plan (ECAP) outlines how we at RJC will capitalize on our strengths and, creatively, practically drive down carbon emissions associated with our projects while simultaneously helping the industry.

2.0 EMBODIED CARBON TEAM

Many hands make light work. Professional development, internal training, and systems optimization are integral parts of RJC, and we have long-standing Technical Excellence Committees, each with a focus relating to specializations within RJC. These groups provide a wealth of expertise as well as mechanisms for distribution of information across the firm’s offices and disciplines.

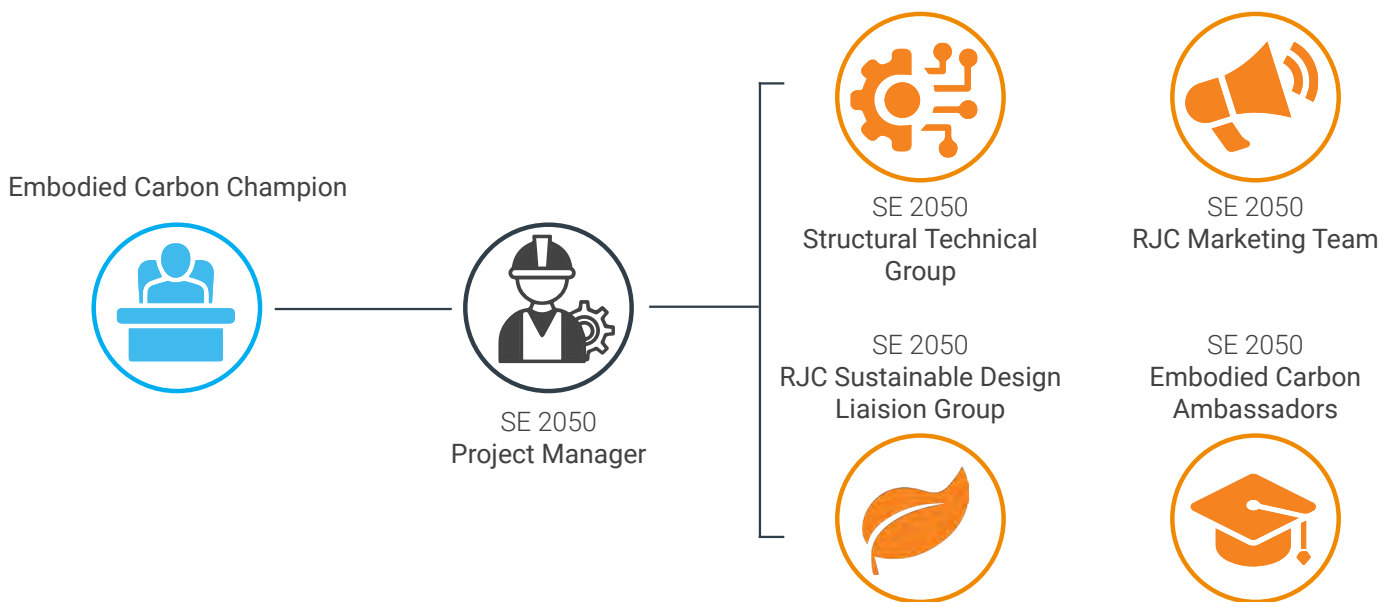
Two of RJC’s Technical Excellence Committees are at the forefront of progressing RJC’s SE 2050 initiatives: the Structural Technical Liaison Group (STG) and the Sustainable Design Liaison Group (SDG). These two groups work hand-in-hand to advise on and roll-out SE 2050 initiatives for RJC’s various regions and specializations.

To further help coordinate these efforts, we have established a group of **Embodied Carbon Ambassadors** who are becoming subject matter experts spooled up from staff already working within the embodied carbon space (i.e. our LCA practitioners) as well as other structural staff interested in diving more deeply into this arena. These people will be “go-to” resources, and help disperse the load of education and knowledge sharing.

While all RJCers will be a part of much of our SE 2050 journey, we have identified people who will provide special focus and be tasked with leading the SE 2050 initiatives.

Our Embodied Carbon Champion, Dominic Mattman, is also chair of RJC’s Structural Technical Group, which is responsible for all technical aspects of RJC’s Structural Engineering Practice. This means the same person who heads our SE 2050 team also chairs the group tasked with management and development of technical resources, training and improving our staff, and coordination of RJC’s contributions to industry related to structural engineering (i.e. Code committees, etc.).

Dominic is assisted by Wendy Macdonald, our SE 2050 Project Manager, who will help with day-to-day management. RJC’s Structural Technical Group, Sustainable Design Liaison Group, Marketing Team, and our new Embodied Carbon Ambassadors will help with ideas, coordination, and implementation across the firm.



2.0 EMBODIED CARBON TEAM



Dominic Mattman
BASc, MASc, P.Eng., LEED® AP |
Associate
Embodied Carbon Champion

Dominic provides leadership for our SE 2050 implementation, directing how embodied carbon reductions are planned across the firm, and coordinating with the related structural initiatives headed by RJC's Structural Technical Liaison Group (STG).



Wendy C. Macdonald
P.Eng., ENV SP, LEED® AP BD + C |
Sustainability Consultant
SE 2050 Project Manager

Wendy will coordinate the day-to-day implementation of the SE 2050 ECAP process on behalf of our Embodied Carbon Champion, overseeing and directing the ECAP development and enactment.



Terry Bergen
CTech, LEED® AP, CPHC | Managing
Principal
SE 2050 RJC Board of Directors' Liaison

Terry will provide updates to RJC's Board of Directors, ensuring that our SE 2050 commitments and deliverables align with our strategic objectives and overall plan for the firm.



Duncan Rowe
BASc, MEng, P.ENG. LEED® AP, BECxP,
CPHD | Principal Performance Project
Designer
Chair Sustainable Design Liaison Group

As Chair of RJC's Sustainable Design Liaison Group (SDG), Duncan leads the group who coordinates sustainability related initiatives across the firm. Working hand-in-hand with RJC's Structural Technical Liaison Group, the SDG will be coordinating education efforts, distributing information about low carbon strategies.



Mike Moffatt
BASc, P.Eng., LEED® AP | Executive
Principal
SE 2050 Executive Committee Liaison

Mike offers strategic support to RJC's SE 2050 team at the Executive level, confirming SE 2050 program budget and initiatives are communicated appropriately to RJC's Board of Directors, and strategies are implemented in alignment with Board directives.



Tanya Kennedy Flood
BBA, CITP | Corporate Marketing and
Communications Leader
SE 2050 Communications Lead

Tanya is responsible for support the development and delivery of education and advocacy initiatives through effective communication strategies. Together with our SE 2050 Education Lead, Tanya is tasked with developing strong and effective communication plans to raise embodied carbon awareness internally and externally.

3.0 EDUCATION PLAN



Beyond the redistribution and expansion of our embodied carbon team, our education plan for 2025 consists of three primary strategies:

1. Continued basic literacy
2. Cross pollination
3. Custom learning

Continued basic literacy

Maintaining what we gained through our 2023 firm-wide Embodied Carbon Basic Literacy training, we maintain this level playing field by including access to the training in our onboarding materials. RJC is in the process of updating its internal training/“Knowledge Hub”. The Embodied Carbon page on RJC’s current Knowledge Hub will be updated and ported over to a new system, in order to provide an easy to access location for information, tools and templates. Our Embodied Carbon Ambassadors have their own MS Teams channel dedicated to the discussion of Embodied Carbon.

Cross Pollination

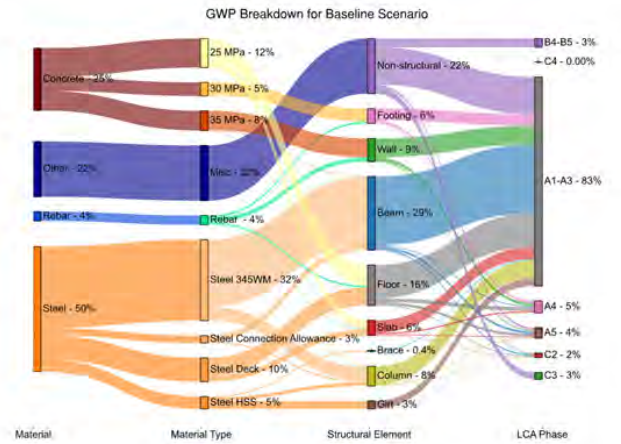
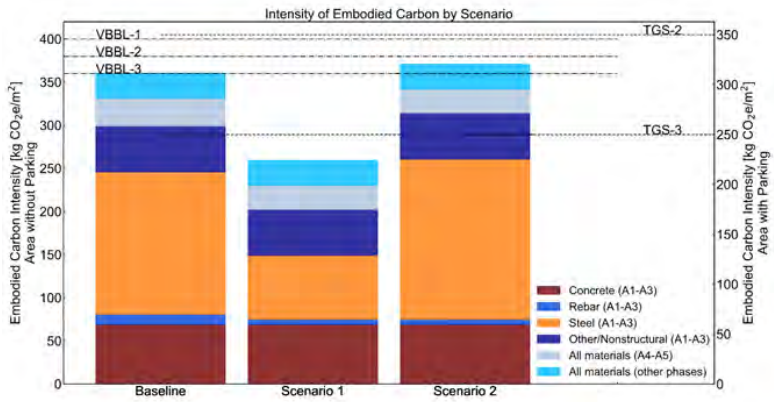
Our structural designers benefit from more information about how life cycle assessments are performed, and our life cycle assessment practitioners benefit from more information about structural design. To support this, in 2024 a cohort of ten selected individuals from across the firm did a deeper dive and took OneClick LCA’s Construction LCA Bootcamp. We will continue to expand the numbers of our staff with more detailed knowledge of the LCA process and offer this training to a new, 2025 cohort. Not everyone needs to be an expert LCA practitioner, but we want a solid number of designers and individuals within leadership to understand the process in enough depth to appreciate the best ways to affect good, low carbon change.

Custom learning

In 2025, we’re excited that our company wide, Structural Training Days will be focused on embodied carbon. Held in person, in four locations (Victoria, Vancouver, Red Deer, Toronto), all structural staff from across the firm will undergo all day training, with dedicated sessions on embodied carbon. Training will include high level information about embodied carbon, and critically: deep dives into how to contribute to RJC’s internal embodied carbon tracking and benchmarking process, and how to use our project creative visualization tool (RJC Ascend). Through 2023-2024 we created our RJC Ascend to calculate the embodied carbon on RJC structural projects and show our clients how we’re doing on their project. To accompany this, we’ve built an internal database to track our company wide information. The training days serve as our next stage roll-out of these tools across the firm so all structural staff can be expected (and some planned to be mandated) to understand and use them. It’s go time!

3.0 EDUCATION PLAN

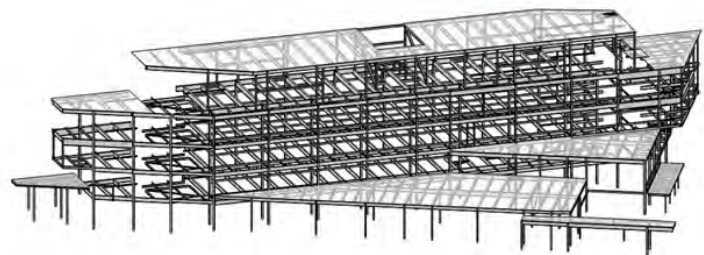
Images from RJC Ascend



| SECTION ID | SECTION NAME | BAR SUBCATEGORY | MATERIAL NAME | STEEL WEIGHT | REBAR WEIGHT | TOTAL WEIGHT |
|------------|--------------|-----------------|---------------|--------------|--------------|--------------|
| CL01 | CL01 | CL01 | CL01 | 1000 | 50 | 1050 |
| CL02 | CL02 | CL02 | CL02 | 1200 | 60 | 1260 |
| CL03 | CL03 | CL03 | CL03 | 1500 | 75 | 1575 |
| CL04 | CL04 | CL04 | CL04 | 1800 | 90 | 1890 |
| CL05 | CL05 | CL05 | CL05 | 2000 | 100 | 2100 |

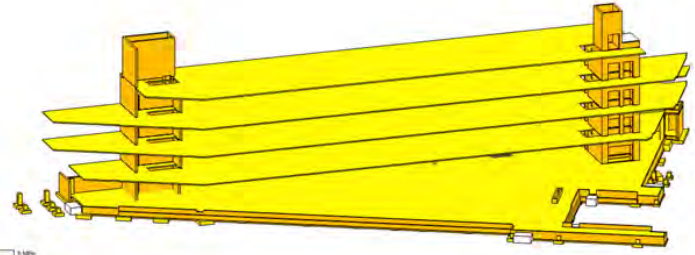
| SECTION ID | SECTION NAME | BAR SUBCATEGORY | MATERIAL NAME | STEEL WEIGHT | REBAR WEIGHT | TOTAL WEIGHT |
|------------|--------------|-----------------|---------------|--------------|--------------|--------------|
| DD01 | DD01 | DD01 | DD01 | 2000 | 100 | 2100 |
| DD02 | DD02 | DD02 | DD02 | 2500 | 125 | 2625 |
| DD03 | DD03 | DD03 | DD03 | 3000 | 150 | 3150 |
| DD04 | DD04 | DD04 | DD04 | 3500 | 175 | 3675 |
| DD05 | DD05 | DD05 | DD05 | 4000 | 200 | 4200 |

| SECTION ID | SECTION NAME | BAR SUBCATEGORY | MATERIAL NAME | STEEL WEIGHT | REBAR WEIGHT | TOTAL WEIGHT |
|------------|--------------|-----------------|---------------|--------------|--------------|--------------|
| FR01 | FR01 | FR01 | FR01 | 1500 | 75 | 1575 |
| FR02 | FR02 | FR02 | FR02 | 1800 | 90 | 1890 |
| FR03 | FR03 | FR03 | FR03 | 2200 | 110 | 2310 |
| FR04 | FR04 | FR04 | FR04 | 2600 | 130 | 2730 |
| FR05 | FR05 | FR05 | FR05 | 3000 | 150 | 3150 |



STEEL - MATERIAL BREAKDOWN - NORTH WEST VIEW

| CATEGORY | MATERIAL NAME | VOLUME | ESTIMATED REBAR WEIGHT | REBAR WEIGHT | TOTAL WEIGHT |
|----------|---------------|--------|------------------------|--------------|--------------|
| Concrete | Concrete | 10000 | 1000 | 1000 | 11000 |
| Rebar | Rebar | - | 1000 | 1000 | 1000 |
| Other | Other | 500 | 50 | 50 | 550 |



CONCRETE - OVERALL - CONCRETE STRENGTH

3.0 EDUCATION ELECTIVES

Provide a narrative of how the Embodied Carbon Champion will engage embodied carbon reduction at each office.



RJC's Embodied Carbon Champion (Dominic Mattman) will present and facilitate at each of the Structural Training days, in all locations, allowing for direct interaction with structural staff of all offices. This is also how each office will be trained in how to contribute to the database, helping create the feedback loop of office level benchmarks and targets.

We will continue to connect with our team of Embodied Carbon Ambassadors across the firm.

Present at least one (1) webinar focused on embodied carbon and make a recording available to employees (include resource in on-boarding materials).



RJC has a bespoke Embodied Carbon Basic Literacy Training, using the Boston Society for Architecture – Embodied Carbon 101 Youtube video teamed with a preamble recording from our SE 2050 Project Manager explaining what it means that RJC is an SE 2050 signatory, and an overview of the 2023 ECAP. This recording was made available during a company wide roll-out and “viewing parties” through 2023, and now is accessed through our company intranet.

Train all your firm's structural engineers on the core concepts and skills required to measure, reduce, and report embodied carbon.



Our 2025 companywide, Structural Training Days are specifically tailored for this goal. They will provide deep dive training into how to contribute to RJC's internal embodied carbon tracking and benchmarking process through our now developed in-house database and RJC Ascend.

Incorporate embodied carbon reduction in your onboarding process for all new employees.



Onboarding materials point new structural staff to embodied carbon resources, including the Embodied Carbon Basic Literacy Training, in our Knowledge Hub.

Initiate an embodied carbon interest group within your firm and outline their goals. This group may more broadly address sustainability, but they must include embodied carbon.



As previously mentioned, we have two related but separate groups who have a particular interest in embodied carbon. One is our Sustainable Design Liaison Group, whose mandate is to provide continuing education of staff regarding basic principles and latest trends in the practice of sustainable design.

Separately Embodied Carbon Ambassadors are individuals who have taken more in-depth training and engage with each other via a Microsoft Teams chat group when questions or topics of interest arise. They will become the go-to group for RJCers questions about embodied carbon.

3.0 EDUCATION ELECTIVES

Create an Embodied Carbon digital resource wiki and/or forum on your firm’s internal website for staff to create, share, and discuss Embodied Carbon educational resources.



2023 saw the launch of the Embodied Carbon information pages within RJC’s intranet, dubbed our “Knowledge Hub”. The Knowledge Hub is designed to function as wiki, with knowledge added as it becomes available. Technical specialists monitor the Hub, and addition of information is limited to designed Approvers and Editors. Our Embodied Carbon page continues to evolve, and currently includes resources for LCA practitioners and structural designers, links to the video of *RJC’s SE 2050 Commitment and Embodied Carbon Basic Literacy Training*, SE 2050 information, templates, protocols, and published case studies. Through 2025, our Knowledge Hub is being ported to a new, more interactive system, and the embodied carbon page will receive a refresh and update as part of this process.

Approved 2025/02/18 19:41 by amatman_rjc.ca (version: 3)

Embodied Carbon

This topic is under draft development.

Introduction

Embodied carbon is the carbon dioxide emissions associated with the materials required to build a building, throughout that building’s lifespan. Now that the industry is doing a better job of driving down emissions from buildings in operation, it is becoming ever more important that we also consider environmental impacts of the building materials themselves. AAs are starting to care about and even putting caps on embodied carbon. As structural and enclosure specialists, RJC has a significant say in a project’s embodied carbon and we need to know how best to respond to this new design requirement.

This page is intended as a general resource page for RJCers learning about embodied carbon, establishing consistent methodologies, and sharing lessons learned.

For an introduction to this topic, please watch [RJC’s SE 2050 Commitment and Embodied Carbon Basic Literacy Training \(75 min\)](#).

SE 2050

RJC is proud to further commit to sustainability as a signatory of SE 2050 – the Structural Engineers 2050 Commitment Program. The program provides an accessible sustainability program for individual structural engineers and structural engineering firms, with an accountable commitment strategy of active engagement on projects and sharing of information to achieve zero net carbon structures by 2050.

As a signatory of SE 2050, RJC joins a growing list of companies that have pledged to understand, reduce and ultimately achieve net zero carbon by 2050. RJC’s Embodied Carbon Action Plan (ECAP) outlines how the firm will capitalize on its strengths to creatively and practically drive down carbon emissions associated with its projects while simultaneously helping to bring forward ideas and education to the industry.

For more information about SE 2050, check out their website:

- <https://se2050.org/>

RJC’s SE 2050 Embodied Carbon Action Plans (ECAP)

How we plan to implement our SE2050 annual commitments is outlined in RJC’s Embodied Carbon Action Plan, or “ECAP”. The ECAP is updated each year and is posted publicly on the SE2050 website. Learn more about SE2050 and our commitments by reading RJC’s ECAPs:

- [RJC’s 2024 Embodied Carbon Action Plan](#)
- [RJC’s 2022-2023 Embodied Carbon Action Plan](#)

Resources

General Resources

- [Embodied Carbon 101 Basic Literacy - 80 min. video](#) by Boston Society for Architecture and the Carbon Leadership Forum-Boston
- [Top Ten Things Every Structural Engineer Should Know about Embodied Carbon](#)
- [SE 2050 Specification Guidance for Structural Engineers](#)
- [SE 2050 Library of Resources](#)
- [Canadian National Research Council: Strategies for low carbon concrete: primer for federal government procurement](#)
- [French language version](#)
- [RJC’s Embodied Carbon Memo for Structural Teams \(internal document\) LINK PENDING](#)

Proposal support

- [Boilerplate proposal language \(pending\)](#)
- [LCA Input Template ADD LINK](#)
- [LCA Input Template for City of Vancouver projects ADD LINK](#)

Resources for Life Cycle Assessment Practitioners

- [RJC’s LCA Protocol – a ‘how to’ for RJC LCA Practitioners](#)
- [National Research Council Canada \(NRC\) – National guidelines for whole-building life cycle assessment](#)
- [French language version](#)
- [City of Vancouver Embodied Carbon Guidelines \(pending\)](#)

Case Studies

- [Embodied Carbon in Residential Structures - a Toronto based Case Study](#)

Tools and software

RJC uses [OneClick LCA](#) for whole building life cycle assessments. OneClick LCA supports TRACI 2.1, the environmental impact assessment method developed by the U.S. EPA. OneClick LCA’s database conforms to ISO 14025, 14040, 14044, and EN 15804 or ISE 201930, has at least a cradle to gate scope, and is suitable for LEED, CASBC’s Zero Carbon Building Standard, City of Vancouver and Toronto Green Standard requirements. RJC’s use of other tools for reporting and concept stage embodied carbon estimates is still in development.

If you have questions or have resources you feel should be added to this page, please contact Dominic Matman (dmattman@rjc.ca), Danielle Arciaga (darciaga@rjc.ca), Wendy Macdonald (wmacdonald@rjc.ca), or Ghazal Sonboli (gsnboli@rjc.ca).

4.0 KNOWLEDGE SHARING/ADVOCACY



As an industry leader, RJC readily shares knowledge through industry publications, seminars, conferences, webinars, lunch and learns and more. We use many mediums to take full advantage of opportunities to share our knowledge, celebrate our successes, detail our case studies, and provide lessons learned with the larger industry and public.

In 2024 we were pleased to share findings from our 75th anniversary embodied carbon case study of some of our multi-unit residential buildings in Toronto and Vancouver. We contributed an episode to the Canada Green Building Council's Accelerating to Zero "AtoZ" series with our "[Structural Engineers Have Entered the Chat: Let's Talk Embodied Carbon](#)" webinar/podcast. In August, two of our staff gave a presentation at the [4th International Conference on New Horizons in Green Civil Engineering \(NHICE-04\)](#) at the University of Victoria.

In 2025 we will continue to talk about our work and hope to present at multiple conferences, including the Canada Green Building Council's Building Lasting Change conference, participating in the SE 2050 panel during the ASCE Structures Congress as well as Canadian Institute of Steel Construction Conference, as well as Low-Carbon Concrete Symposium.

Listen and learn: The AtoZ Podcast Series



Hosted by CAGBC, this new [Accelerating to Zero](#) series invites Canada's leading zero-carbon experts to the table for meaningful discussions on a range of innovative decarbonization solutions, strategies, and technologies impacting the building sector.

The debut episode, [The Future of Low-GWP Refrigerants](#), explores how the management and phase-out of high-GWP refrigerants have become essential components of Canada's path to carbon neutrality. Green building standards, including CAGBC's Zero Carbon Building Standards™, now include updated refrigerant guidelines, raising the stakes for HVAC professionals, building operators, and project teams.

This episode features guest speakers Pushpinder Rana of Mitsubishi Electric Canada and Martin Luymes of HRAI, both experts on the challenges and opportunities of transitioning to low-GWP refrigerants.

Released this month, "[Structural Engineers Have Entered the Chat: Let's Talk Embodied Carbon](#)", featuring Wendy Macdonald, Dominic Maltman, and Danielle Arciaga from RJC Engineers. This episode dives into embodied carbon in Toronto and Vancouver multi-unit residential buildings (MURBs), highlighting the role of structural engineers in addressing the "concrete elephant" in Canada's housing crisis. Don't miss this insightful and practical conversation.

Keep an eye out for this series of insightful dialogues and stay informed on the latest zero-carbon innovation on the [CAGBC AtoZ page](#).



4.0 KNOWLEDGE SHARING/ADVOCACY ELECTIVES

Publicly declare your firm as a member of the SE 2050 Commitment



Our [website](#) describes the value of SE 2050 and notes our pride to join a growing list of companies that have pledged to understand, reduce and ultimately achieve net zero carbon by 2050. We include a link to our 2023, 2024 and now this 2025 ECAP which further details our pledge and the reasons.

External Presentations & Case Studies



We share what we've learned. Our "Structural Engineers Have Entered the Chat: Let's Talk Embodied Carbon" podcast continues to be available for free for CAGBC members (and reasonably priced for those who aren't). 2025 is shaping up to be a busy year:

- Participating in SE 2050 Panel at the ASCE's Structures Congress
- RJC has been engaged in two separate case studies with the steel industry to be published in 2025. Both case studies will be presented at the Canadian Institute of Steel Construction Conference in Montréal.
- We're presenting at Low Carbon Concrete Symposium in Toronto this spring.
- We've submitted multiple case-study/presentation proposals for us to speak at the Canada Green Building Council's 2025 "Building Lasting Change" conference.



4.0 KNOWLEDGE SHARING/ADVOCACY ELECTIVES

Describe the value of SE 2050 to clients.



Our proposals highlight our commitment to SE 2050, our ability to provide LCA services, and/or to help others by providing structural material quantities.



In RJC presentations to prospective clients, we often include a series of slides on sustainability, including one specifically noting our SE 2050 commitment.

Engage with structural material suppliers in your region to communicate the importance of EPDs and low-carbon material options.



RJC has been engaged by the CISC to provide a case-study on Low-Rise Commercial Steel Buildings. A primary element of the study is the impact of product specific EPDs and progressing beyond industry average EPDs. We're also engaged in a multi-team study looking at the impacts on costs, construction schedule and sustainability of system material selection (concrete vs. steel vs. mass timber).

RJC regularly presents to the American Concrete Association (ACI) Ontario Chapter, including in 2024 on reducing embodied carbon through design, delayed strength gain, modulus testing, and performance targets. This work continues through a symposium organized by the Carbon Coalition and Concrete Ontario. RJC also collaborates with general contractors and material suppliers to minimize the gap between embodied carbon in structural specifications and what is produced in the field, which varies due to construction schedules, cold-weather applications, and concrete mix over-specification. Reducing this gap helps move beyond EPDs toward tracking and reporting embodied carbon in concrete. RJC also engages with the Canadian Institute of Steel Construction (CISC) to advance sustainable structural design.

4.0 KNOWLEDGE SHARING/ADVOCACY ELECTIVES



Propose alternative methods for advocacy and describe their value



RJC has an integral role in the development of Canadian Codes and Standards for wood-frame and mid-rise wood-frame developments. We participate at a national level on code groups to develop changes for wood, including those that have led the way to allowing taller wood buildings.

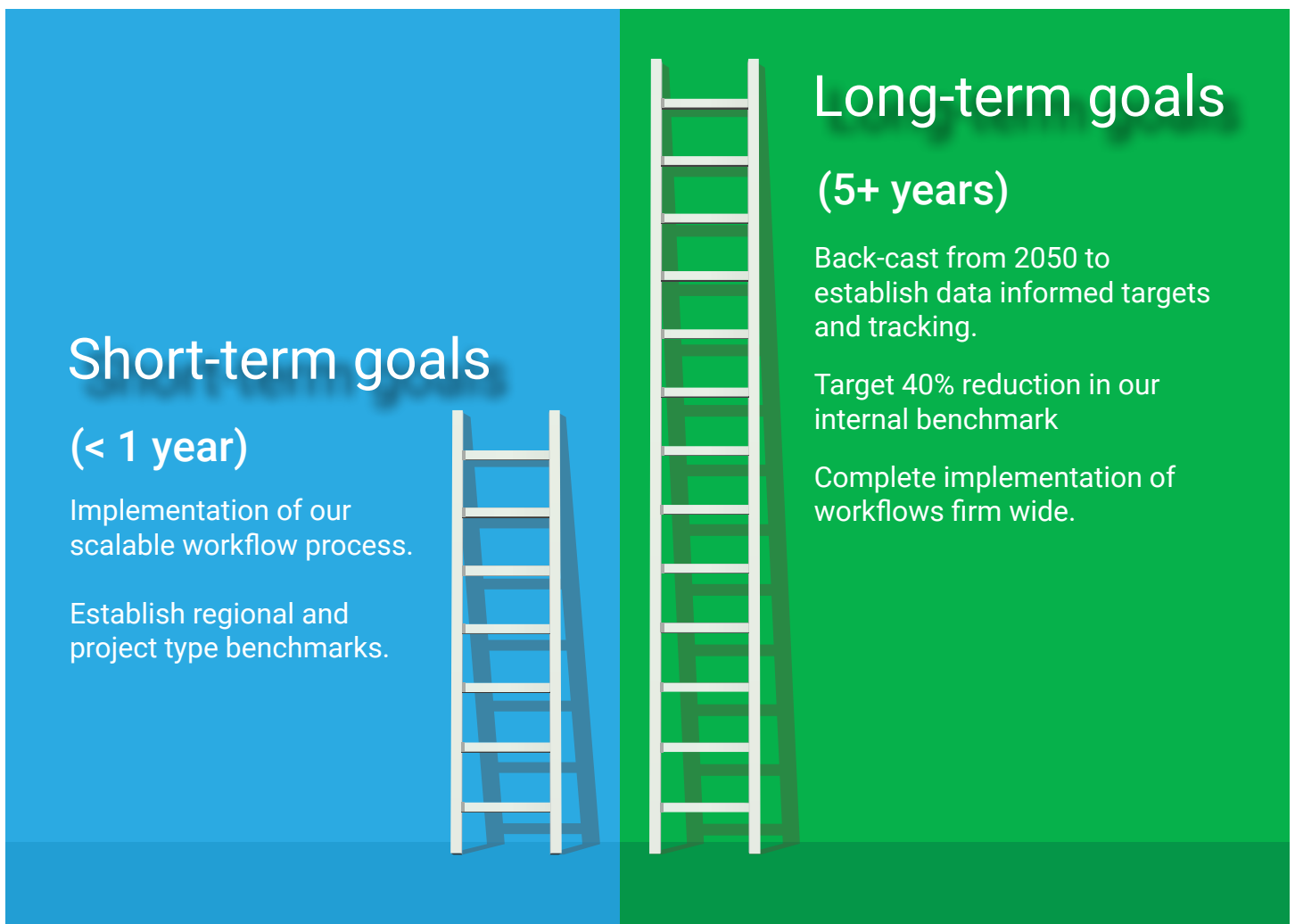
Another significant piece of advocacy is RJC's joining of the [Responsible Buildings Pact](#) – an initiative of the Climate Smart Buildings Alliance (CSBA). This group of developers, consultants, contractors and supporters is working to ensure “lower carbon materials are consistently considered and used”, to “derisk sustainable actions, create a culture of shared accountability for material decisions, and drive continually higher professional standards.” With the Responsible Buildings Pact's expectations of its signatories to engage in continuous learning, pilot test a Low Carbon Design Consideration process, track and report on outcomes, and collaborate with other Pact signatories, the Pact and SE 2050 share a number of common initiatives.



5.0 REDUCTION STRATEGY

With our internal embodied carbon database now up and running, and our RJC Ascend being rolled out to all staff, 2025 is the year of populating the benchmarking. We'll begin populating the database in earnest, with the thought that we can begin to establish benchmarks and targets. The database will be instrumental in helping us develop benchmarks based on historical "business-as-usual" design, and indicate how we'll need to adjust to align with our target.

With these foundations in place, and the training days early in 2025 to help explain the "how", we're mandating that our two largest offices (Toronto and Vancouver) will begin to incorporate embodied carbon analysis and reporting in the workflow. This will apply to all new construction structural projects (starting in 2025), greater than 1,800 m² (20,000 sq. ft.).



5.0 REDUCTION STRATEGY ELECTIVES

Set clearly stated, firm-wide reduction targets in the short-term (<1 year) and long-term (>5 years)

For our short-term target, we will be implementing a target of a maximum of 300 kgCO₂e/m² of built floor area for new construction, structural designs. We have selected 300 kgCO₂e/m² based on the Canada Green Building Council (CAGBC)'s Zero Carbon Building Standard – Design v4, which mandates a maximum embodied carbon intensity of 425 kgCO₂e/m² of built floor area. It is our understanding that approximately 70% of a building's embodied carbon is from the structure (on average). Our target of 300 kgCO₂e/m² is derived from 70% of the ZCB-Design mandate. Based on the projects in our LCA study average, this is an achievable upper bound target. SE 2050 recently completed statistical analysis and found that the 80th percentile of study projects had an embodied carbon intensity of 350 kgCO₂e/m² and a mean of 234 kgCO₂e/m². As ZCB-Design is intended to be an achievable yet focused target, we feel this is a good goal for the short term.

As a five-year goal, we want to target 175 kg kgCO₂e/m² (40% reduction) across the firm's relevant projects. This would satisfy 70% of the ZCB – Innovation credits as well as Toronto Green Standards V4 Tier 3.

Ultimately, we want to better understand what it means for RJC structures to be net-zero carbon by 2050. Does this mean carbon offsets? Are we building restorative/energy positive buildings? Are we building sufficient biobased buildings to compensate for our carbon emitting strategies? Will carbon sequestering materials come into play? All important questions to grapple with and understand. We wish to better understand the end goal and begin to back-cast from 2050.

5.0 REDUCTION STRATEGY ELECTIVES

Communicate the embodied carbon impacts of different design options to clients with creative data visualization.

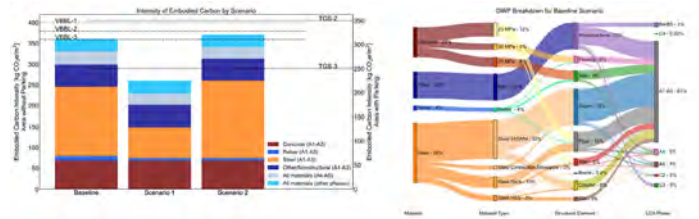


Communicating embodied carbon impacts to clients is one of the primary functions of RJC Ascend. The embodied carbon tool is an innovative solution to calculate structural material quantities more efficiently. It simplifies a traditionally time-consuming and error-prone process in gathering quick and accurate data which is crucial for embodied carbon calculations. The data from the tool isn't just numerical—it can be presented graphically or in tables, offering clients and contractors clear insights into construction costs and embodied carbon measures. Traditional methods of computing quantities from Revit models have been labour-intensive and prone to inaccuracies.

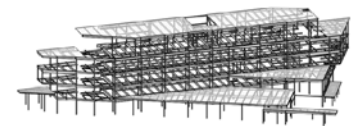
RJC has bridged this gap with:

- Precision and Speed: The tool allows for swift, high-quality data extraction.
- Accurate Data: With accurate data on structural materials, more precise embodied carbon calculations are possible.
- Optioneering: Revit Model can quickly be adjusted, EPD selections can be revised and the multiple scenarios compared.
- Versatility: Data can be showcased graphically or tabulated, aiding clients and contractors in making informed decisions.

The tool was first introduced to RJC structural designers and BIM modellers during lunch and learns in fall 2023. 2025 begins the incorporation of this tool into standard workflow processes.



| STEEL QUANTITIES | |
|------------------|----------|
| Material | Quantity |
| Material | Quantity |
| Material | Quantity |



| CONCRETE QUANTITIES | |
|---------------------|----------|
| Material | Quantity |
| Material | Quantity |
| Material | Quantity |



5.0 REDUCTION STRATEGY ELECTIVES

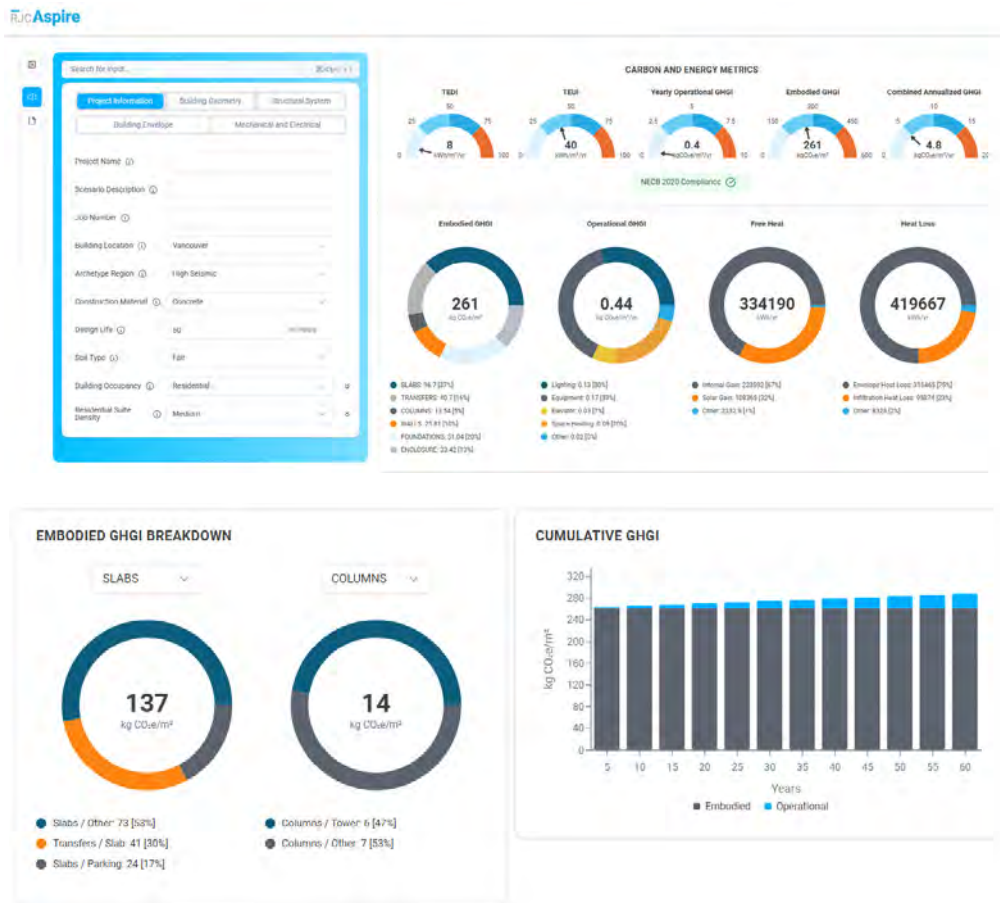
Develop and implement a workflow that makes it easier to make early design decisions based on embodied carbon.



RJC Aspire will allow our engineers to study the embodied carbon impacts of different structural design options. Evaluating impacts of structural system, spans, transfer elements, balconies and envelope systems in residential buildings. RJC Aspire also allows our engineers to see the operational carbon and reports a combined annualized Greenhouse Gas Intensity (GHGI) in kgCO₂e/m²/yr.

For 2025, RJC will begin to expand the project archetypes and materials considered within RJC Aspire to include MURB light wood-frame, commercial/institutional buildings in concrete, steel and mass timber.

<https://www.rjc.ca/culture/aspire.html>



5.0 REDUCTION STRATEGY ELECTIVES

Update your specifications to incorporate embodied carbon performance. Include embodied carbon in your submittal review requirements.



Our Sustainable Design Liaison group has been tasked with proposed updates to our Structural Specifications to incorporate embodied carbon performance. Concrete and steel specifications will be rolled out to ask for EDP submittals for the mixes used and structural steel products supplied. RJC's base specifications will ask the contractor to provide alternate pricing based on overall GWP reduction targets.

Other embodied carbon reduction strategies – carbon capture in cement



Dominic Mattman, Chair of RJC's Structural Technical Group and our 2024 Embodied Carbon Champion,



Scientific research underpins everything we do to fight climate change. This funding provides critical support, allowing government and academia to work together in exploring practical and achievable climate change solutions. By leveraging our unique expertise, we can foster collaboration across disciplines, sectors, communities, and research bodies.

The Honourable Steven Guilbeault

Former Minister of Environment and Climate Change Canada

was appointed to participate on an expert advisory panel to support the Canada Green Building Council and University of Toronto in a joint initiative to study carbon capture and utilization in cementitious building materials. Panel will meet quarterly for the duration of the project (2023-Q1 through 2026-Q3). The "[Burying Carbon in Buildings: Advancing Carbon Capture and Utilization in Cementitious Building Materials](#)" research project, partially funded by the Canadian Government, is looking at how carbon might be captured and used in concrete as a means to lower Canada's GHG emissions. While this is not yet a strategy that RJC can readily use on projects, we feel Dominic's involvement on this panel of industry experts is a valuable contribution to possible future strategies.

As the national organization representing members and stakeholders across the green building spectrum, CAGBC can access industry expertise to help advance research and mobilize the sector to implement market solutions. We are proud to partner with the University of Toronto on a project that has the potential to significantly reduce embodied carbon emissions from the cement industry. The results will contribute to the collective effort to decarbonize construction.

Thomas Mueller

President and CEO, CAGBC



6.0 REPORTING PLAN

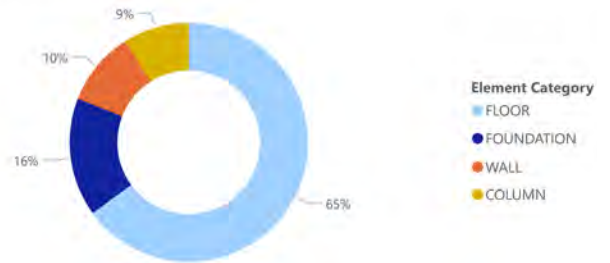


Our 2025 reporting plan is to pull from projects in our rapidly expanding internal database. Many of past SE 2050 submissions have drawn from RJC’s largest two offices (Toronto and Vancouver), included primarily concrete structure, projects within the past decade, with a focus on Multi-Family Residential Buildings (MURBs), although some healthcare and office buildings are also included. For 2025, we wish to expand our range to help us with establishing benchmarks across sectors and locations.

LCAs will be performed using OneClick LCA, inclusive of the A-C stages. We’ll rely on the EPD database within OneClick LCA unless there are specific product EPDs we need to source.

RJC Ascend interacts with our REVIT models, our internal database as well as OneClick LCA to complete the cycle. The project info, quantities and embodied carbon results are stored within our database for future data analysis. Our RJC Ascend can also export these results into the SE 2050 database import template simplifying data collection process.

Concrete Volume Breakdown



EMBODIED CARBON PROJECT MAP



Submit 5 projects with structural engineering services to the SE 2050 Database across the firm.



For 2025 we wish to expand our range to help us with establishing benchmarks across sectors and locations. While past years we’ve allowed ourselves the space to focus our efforts on “laying the foundations”, now that our tools are up and running, we are eager for 2026 to be our year to submit a wider cross section of projects representing a more diverse range of office locations.

6.0 REPORTING PLAN ELECTIVES

Compare the embodied carbon emissions from multiple projects across your firm. Analyze and document what data or pieces of information are most important and communicate the findings to your firm.



RJC's 75th anniversary embodied carbon study continues to be a platform we're building on to understand RJC designs and their associated emissions. In 2025 we plan to broadcast the results of that study by providing staff with lunch & learn opportunities to view our episode of Canada Green Building Council's Accelerating to Zero "AtoZ" series "[Structural Engineers Have Entered the Chat: Let's Talk Embodied Carbon](#)" webinar/podcast, where we summarized results of the study. We will also be working more extensively with our new tools to establish company benchmarks, and will distribute that information across the firm. Another major initiative for 2025 will be building out a dashboard for the RJC database to allow engineers to review data from all previous captured projects. This will allow engineers to easily access data from a variety of comparable projects and improve overall comprehension.



"Structural Engineers Have Entered the Chat: Let's Talk Embodied Carbon" webinar

Include all structural material quantities in your submissions to the SE 2050 database



RJC's new RJC Ascend, lends itself to easy reporting of structural materials and we will be happy to include these in our submissions to the SE 2050 database in the 2026-Q1 reporting period.

7.0 LESSONS LEARNED

Honestly, 2024 was a good year. We developed version 1 in our internal tools that will help us scale up well, and we're excited about the new, firm-wide ability to track information and establish benchmarks.

There continues to be opportunities for advocacy work and we're pleased that we're being asked to be part of those opportunities. Structural engineers have indeed "entered the chat". Something we have learned is the importance of knowledge dissemination across the firm. There continues to be some lack of transparency of "what's in the works" re: our tools. The Training Days will be instrumental in changing this dynamic and closing that gap.

On a very specific embodied carbon lessons learned level, we found the results of the 75th Anniversary LCA study, comparing MURBs in two of our major offices (Vancouver and Toronto), interesting.

We dove deep into the implications of different embodied carbon metrics across these two jurisdictions, learning about how including or excluding below grade parking area calculations can affect perception of carbon intensity. We also had our assumptions questioned. We were surprised that buildings in the higher seismic zone did not necessarily show higher carbon intensities. This may have been due to different sizes and styles of buildings in the two cities. However, it also begged the question of whether structures that are less constrained by seismic requirements enjoy a flexibility that can sometimes lead to less efficient (and higher carbon) design...and even whether municipalities can play a role in encouraging efficient and lower carbon design through urban design policy and planning.

We will continue to dig in and explore these ideas and make sense of how these lessons can help us in our decarbonization efforts. We'll get creative, and we'll translate our ideas into practice. It's the RJC way.



Creative Thinking
Practical Results



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