

Building Structures are a Carbon Bank

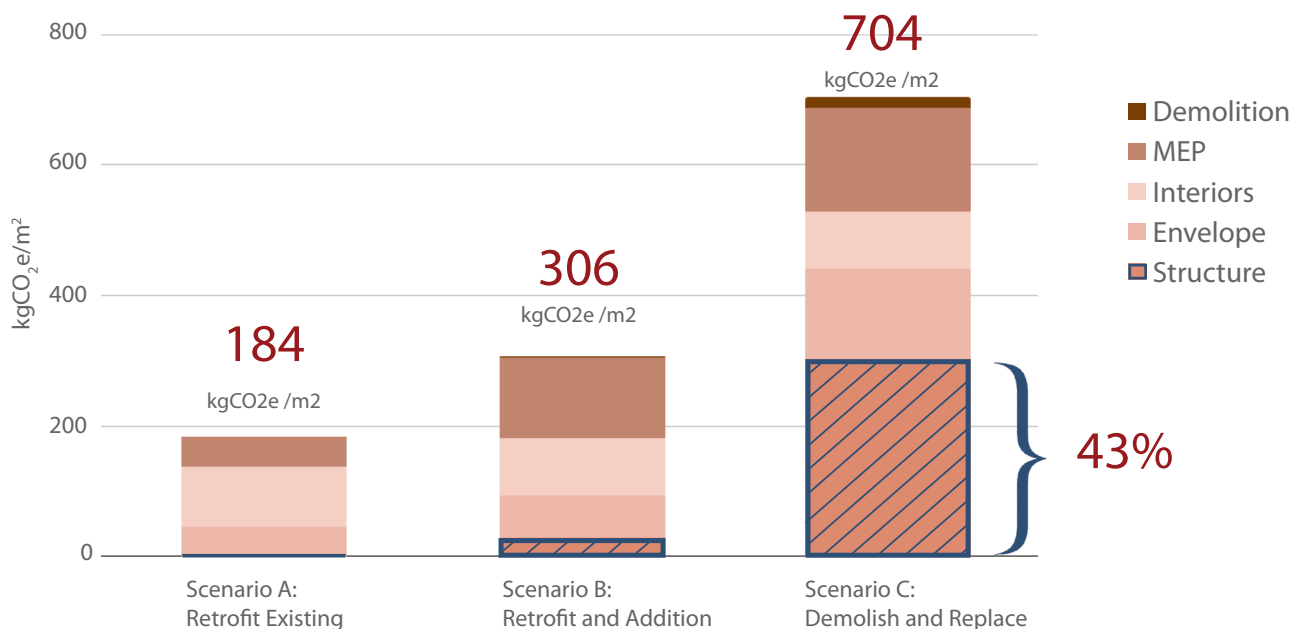
Briefing Note 06

Retaining structural components preserves most of the embodied carbon invested in the existing building.

Retaining foundations and structural frames preserve the embodied carbon, and avoids the substantial upfront emissions from demolition, new material production, and reconstruction.

Successful retention depends on good condition or repairability, underscoring the importance of active maintenance and thoughtful detailing for long-term durability. Reusing existing foundations and structure can also accelerate project timelines while reducing both upfront construction costs and carrying costs.

Embodied Carbon Across All Halifax Case Study Scenarios



In the above graphs, structure accounts for 40-50% of the embodied carbon in the demolish-and-replace scenarios, while reusing existing structures can reduce embodied carbon in retrofit scenarios by more than half. To support a “reuse-first” approach, assess structural and seismic upgrades early in the project, with demolition considered only after all reuse options have been exhausted.

Excerpts from *Unlocking the Value of Existing Buildings*. This briefing note is part of a series summarizing key insights from *Unlocking the Value of Existing Buildings: a new approach to codes for carbon, culture and cost*. The full report is available here: cahp-acecp.ca/learning-resources/

Call to Action for Structural Engineers

Conduct Early Structural Assessment for Reuse

- Evaluate the reuse potential of existing foundations, gravity systems, lateral systems, and floor structures, rather than just their capacity for new loads.
- Identify the minimum structural intervention required to achieve project objectives, rather than defaulting to full replacement. Partial retention often delivers most of the carbon benefit at a fraction of the cost.
- Quantify the embodied carbon of proposed structural interventions and compare them against reuse alternatives. This is increasingly expected by clients and will be required by future codes.

Retain Foundations Wherever Feasible

- Existing foundations represent some of the most carbon- and cost-intensive elements of any construction project. Reusing them avoids excavation, formwork, concrete, reinforcement, and dewatering, which are all significant carbon and cost contributors.
- Foundation reuse is achievable in most retrofit scenarios with appropriate condition assessment and, where needed, targeted localized strengthening.

Upgrade Lateral System Strategically

- Seismic upgrading requirements can significantly affect the retrofit carbon balance. Explore less invasive lateral retrofit strategies such as viscous dampers, steel moment frames, and base isolation that can achieve equivalent life-safety outcomes instead of full shear wall replacement.
- Engage with the project team early on seismic strategy, as lateral system decisions affect architectural planning, mechanical coordination, and overall project feasibility.

Detail for Reusability and Active Maintenance

- Develop and follow routine maintenance requirements to keep existing structure in good condition to maximise re-usability potential on all existing structures.
- Design and detail new structures to allow for adaptive reuse in future.

