Faster Housing, Lower Carbon, Better Value

CAHP | ACECP

Briefing Note 01

Retrofit is a climate policy and a housing policy.

Retaining existing buildings avoids the emissions associated with demolition, new material extraction, and construction while offering equivalent cost efficiencies and faster project timelines that can accelerate housing delivery and improve affordability.

Canada's existing building stock represents a major opportunity to advance housing supply, climate action, and economic development simultaneously. Federal and provincial governments play a critical role in enabling this shift by implementing retrofit-first policies, aligning housing and climate programs, and reducing barriers by integrating whole-life carbon considerations into national building codes and funding frameworks.

A typical rental residential unit at 1660 Hollis Street, Halifax (Unlocking the Value of Existing Buildings, Case Study 1), a former mid-century office building transformed into lofts.

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Call to Action for Federal and Provincial Governments

Integrate Retrofits and Reuse into the Housing Strategy

- Retrofit and adaptive reuse can accelerate project timelines by avoiding demolition and major structural reconstruction and bring housing to market faster than typical new construction.
- Making retrofit and reuse a component of Canada's housing strategy recognizes existing and heritage buildings as essential assets in addressing housing supply.

Introduce Policies in Support of Retrofit

- Outdated building and energy codes designed primarily for new construction make building reuse unnecessarily complex and create barriers to conserving existing assets.
- National building and energy codes currently emphasize operational energy performance. Incorporating whole-life carbon considerations into code frameworks would allow decision-makers to evaluate the full carbon picture when weighing the value of retrofit against the value of replacement.
- Federal and provincial governments should support the development and adoption of updated policies and building codes that enable the reuse of existing buildings, such as performance-based compliance pathways for building and energy codes.

Recognize Retrofit as an Effective Cost and Carbon Strategy

- Policies that support adaptive reuse deliver both economic and environmental benefits. By retaining existing structures and building components, carbon emissions associated with demolition and new material production are avoided.
- Retrofit projects can reduce capital costs by leveraging existing building assets and shortening construction timelines, while focusing investment on targeted upgrades and new uses.

Strengthen Local Economies and Skilled Trades

- Retrofit and building conservation projects create employment in construction, engineering, and specialized trades.
- Adaptive Reuse can stimulate regional economic activity, drive demand for made-in-Canada materials and support workforce development in emerging low-carbon construction practices.
- Invest in training programs that expand expertise in envelope diagnostics, electrification, conservation, and heritage craft trades to build the workforce capacity needed to deliver retrofit at scale.

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Code Pathways for Existing Buildings

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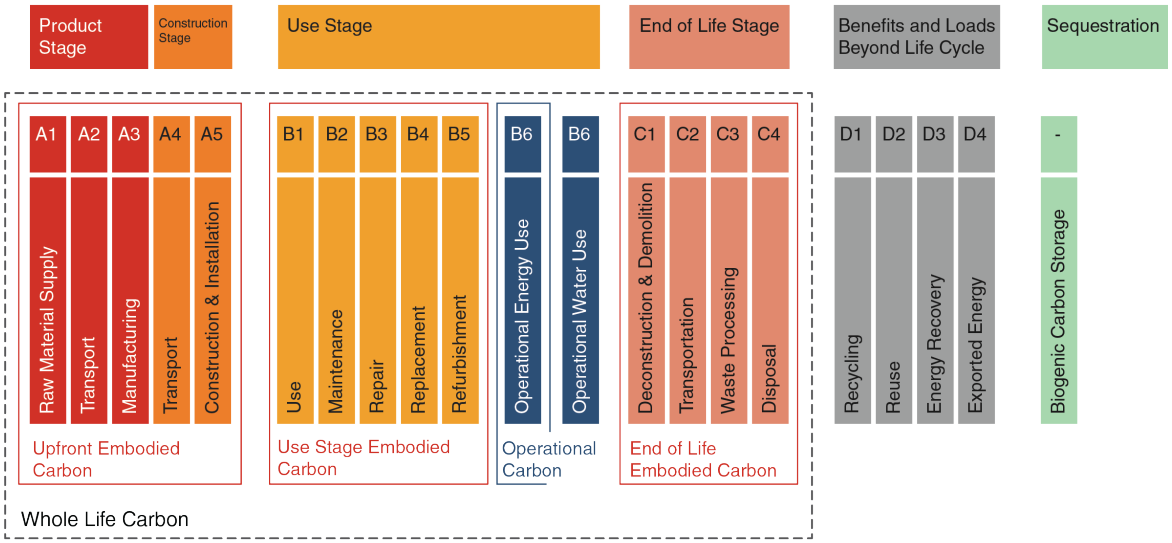
Briefing Note 02

Existing buildings are an embodied carbon investment; the emissions from their original construction are already spent.

Retaining material value, rather than demolishing and rebuilding, is one of the most effective climate actions available. Authorities having jurisdiction and code consultants enable retrofit solutions that maintain code intent while recognizing this reality. Performance-based compliance approaches and alternative provisions meet safety and energy objectives while avoiding unnecessary demolition.

The National Building Code (NBC) and National Energy Code of Canada for Buildings (NECB) 2025, published in December 2025, formally define "existing building" and "heritage building" for the first time and introduce dedicated alteration parts with proportional energy performance requirements for retrofit projects. Where NBC/NECB 2025 has not yet been adopted provincially, these definitions and principles can still inform interpretation and the exercise of discretionary authority.



Life Cycle Assessment (LCA) systems boundaries as defned by EN 15978 and ISO 21930, including biogenic carbon storage.

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Call to Action for Authorities Having Jurisdiction & Code Consultants

Recognize Existing and Heritage Buildings in Code Application

- Use the NBC 2025 definitions of "existing building" and "heritage building" in permitting decisions, as heritage buildings may qualify for additional flexibility under the alteration provisions.
- Apply the new alteration parts rather than defaulting to full new-construction standards for retrofit and change-of-use projects.

Implement New Alteration Provisions in Practice

- Familiarize permitting staff with the scope, triggers, and extent-of-alteration provisions in NBC Part 10 and NECB Part 13. They are designed to be proportional, not to impose disproportionate burdens.
- Use the extent-of-alteration framework to prevent compliance requirements from expanding beyond the scope of the work proposed.
- Apply NBC Sentence 10.1.1.5.(1) for fenestration replacements. Replacement components must perform no worse than what they replace; a practical, achievable standard.

Enable Performance-Based Compliance

- Whole-building energy modelling aligned with the NECB's Objectives and Functional Statements can demonstrate compliance without relying solely on prescriptive component upgrades.
- Performance paths prioritize the most impactful improvements while retaining viable building elements. The tiered improvement framework in the new alteration parts is more appropriate than new-construction airtightness and thermal targets for existing buildings.

Support Retrofit-Focused Code Development

- Advocate for expanded heritage-specific flexibility, whole-life carbon metrics, and proportional GHG emissions requirements for existing buildings in the next code cycle.
- Contribute practical permitting experience to code development bodies to help refine alteration provisions based on real project outcomes.

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Building Value Through Reuse

CAHP | ACECP

Briefing Note **03**

Retrofit projects accelerate delivery and offer cost advantages when major structural systems and foundations are retained, which avoids lengthy demolition, excavation, and new structural construction.

The 2025 editions of the National Building Code and National Energy Code of Canada for Buildings introduce dedicated alteration provisions and performance-based compliance pathways that make retrofit a more viable and better-defined regulatory option than before. Retrofit options reduces project scope and schedule risk while allowing investment on targeted upgrades, modern building systems, and new program areas that boost performance and market appeal.

When combined with strategic additions or intensification, retrofit can also unlock additional floor area and new revenue-generating space while preserving the value already embedded in the existing asset. For owners and developers, this approach can transform underperforming properties into higher-value assets, extend building lifespans, and deliver projects faster while aligning with growing market expectations around resource efficiency and carbon performance.

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Call to Action for Developers and Construction Industry

Improve Project Economics by Leveraging Retrofit

- Retaining existing structures reduces costs associated with demolition, disposal, excavation, and new construction.
- Targeted upgrades allow capital to be focused on improvements that directly increase building performance and tenant appeal.
- Extending the life of existing assets spreads capital investment over longer time horizons and can improve lifecycle returns.

Engage with Financing and Policy Tools

- Make use of retrofit-specific financing instruments: green loans, retrofit tax credits, density bonuses, and expedited permitting programs.
- Factor non-energy benefits, including job creation, heritage value, neighbourhood stability, and tenant appeal into investment analysis. Traditional ROI models consistently undervalue these outcomes.
- Retrofit generates significantly more job-years per dollar invested than new construction, making a meaningful consideration for community benefit agreements and public-private partnerships.

Evaluate Retrofit Early in Feasibility Studies

- Early evaluation reveals opportunities to retain structural systems, foundations, and other major components that represent significant cost and carbon investment.
- Engage heritage professionals early, as their expertise in existing buildings balances conservation, performance, and long-term value.

Add and Intensify to Unlock Asset Value

- Adding floors or expanding building area can improve project viability while preserving the embodied value of the original structure.
- Combining retrofit with densification allows developers to increase usable floor area while avoiding the full cost and environmental impact of demolition and reconstruction.

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Heritage Homes are the Greenest Homes

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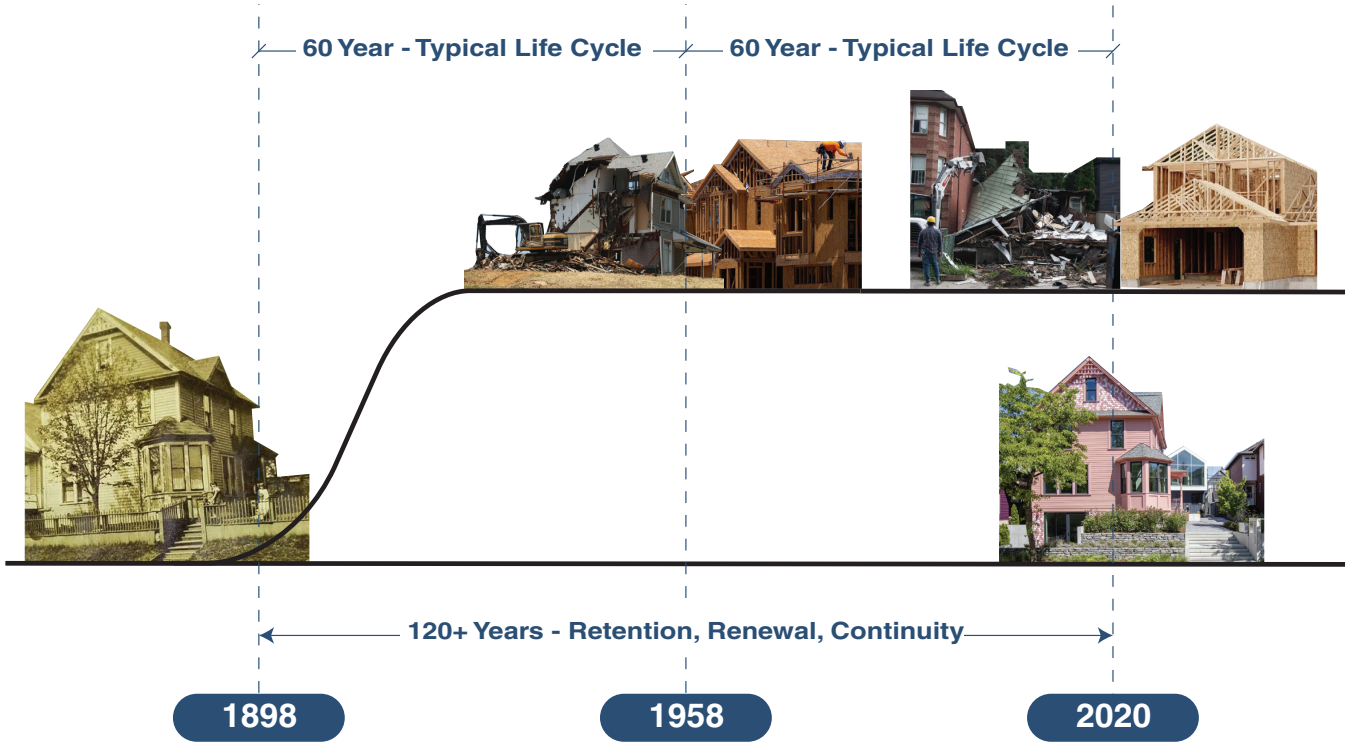
Briefing Note **04**

Buildings account for about 40% of global greenhouse gas emissions, including emissions from producing construction materials.

Much of this carbon is released before a building is even occupied, meaning existing buildings already contain significant "embodied carbon". Demolishing buildings wastes this investment and creates new emissions through new construction. Renovations and retrofits are more cost-effective and take less time than building new, while improving comfort, lowering energy bills, and reducing environmental impact.



Archival House Image (left): Courtesy of Mira Project 851 ("Big House" collection). Restored House Image (right): Janis Nicolay, Canadian Architect.

Maintaining and upgrading existing homes avoid these impacts while also preserving the character and cultural heritage of neighbourhoods, allowing buildings to continue serving families and communities for decades.

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Call to Action for Homeowners

Maintain and Upgrade Your Home

- Maintain, repair, and renovate existing homes whenever possible instead of demolishing and rebuilding.
- Inspect and repair before replacing , caulking, weatherstripping, repointing mortar, refinishing wood, and patching plaster are lower-cost, lower-carbon interventions that extend the life of existing materials significantly.
- Retaining an existing home's structure reduces cost, material waste and construction-related emissions.

Improve Energy Performance Through Electrification and Retrofit

- Electrifying your home can significantly reduce both carbon emissions and energy costs over time, particularly as Canada's electricity grids become cleaner. Replacing a gas furnace with a heat pump is one of the most impactful changes a homeowner can make to reduce carbon emissions and energy costs over time.
- Consider upgrades such as insulation improvements, weatherstripping, storm windows, air sealing, and efficient heating systems.
- These improvements reduce energy use, lower utility bills, increase indoor comfort, and be completed on a faster timeline than new construction.
- Retrofitting an existing home can achieve energy and comfort benefits comparable to new construction.

Work With Professionals to Meet Building Codes

- A qualified professional can help identify which upgrades will have the greatest impact for your specific home, climate, and budget.
- A retrofit strategy will allow the work to be done in phases that will save money and material up front, while meeting energy performance targets.
- Under the updated National Building Code (NBC) and National Energy Code of Canada for Buildings (NEBC) 2025, designers and energy consultants can use performance-based approaches to show that a renovated home meets the intent of the code, even when existing building elements are retained. You do not need to rebuild to comply.

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Early Design Strategies for Existing Buildings

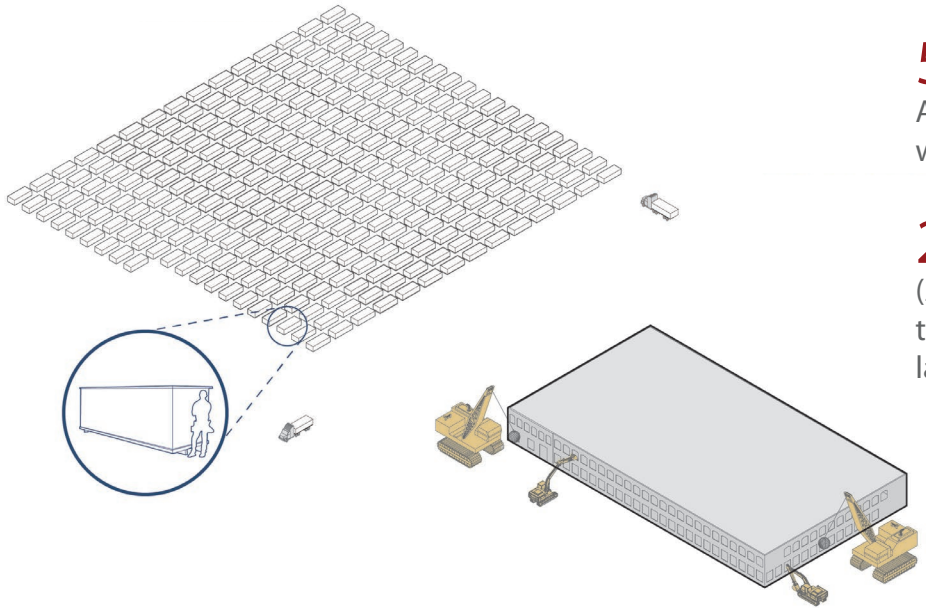
CAHP | ACECP

Briefing Note **05**

Prioritizing reuse early in a project can deliver significant climate, cost, and schedule benefits.

Assessing existing structures, materials, and systems identifies opportunities for repair and retention that preserve embodied carbon while reducing construction and maintenance costs. Combined with targeted upgrades and alternative compliance pathways, adaptive reuse can accelerate project delivery while meeting performance, safety, and conservation objectives.

Architects and designers play a critical leadership role in early-stage decisions by integrating whole-life carbon modelling and a climate lens into adaptive reuse feasibility and concept design.



Potential waste created by demolition of a 1940s 8,800 m^2 two-storey brick textile factory:

5,860 m^3
Approximate total material waste volume generated.

290 Dumpsters
(20 m^3 each) required to transport demolition waste to landfill.

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Call to Action for Architects and Designers

Establish Reuse as the First Principle

- Evaluate reuse as the baseline option early in the project by assessing existing structures, materials, and systems to identify opportunities for retention.
- Reduce upfront construction costs and long-term maintenance costs by minimizing demolition, new material use, and major structural interventions.
- Accelerate project delivery by shortening design and construction timelines, reducing permitting complexity, and enabling earlier occupancy and reducing carrying costs.

Repair Rather Than Replace

- The reinforced concrete structural frame is the largest share of embodied carbon. Its retention avoids major reconstruction costs, while enabling functional upgrades.
- Retaining existing brick masonry walls can preserve significant embodied carbon and may not require additional exterior insulation to improve overall energy performance.
- Existing windows are a critical point of heat leakage and energy loss. Performance improvements through caulking, weather stripping and improved sealing repairs may be sufficient instead of replacement.

Leverage Performance Based Code Compliance

- Performance-based compliance pathways offer an opportunity to retain and reuse building elements while achieving thermal performance, life safety, and other code requirements. This improves the building's overall emissions in a whole life carbon framework.

Take Climate Action Through Conservation

- Use adaptive reuse strategies that extend the life of existing assets, delivering lower whole-life carbon impacts while supporting long-term stewardship of existing buildings.
- Coordinating heritage conservation with performance upgrades, such as targeted envelope improvements and electrification, can help maintain character while reducing operational carbon emissions.

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Building Structures are a Carbon Bank

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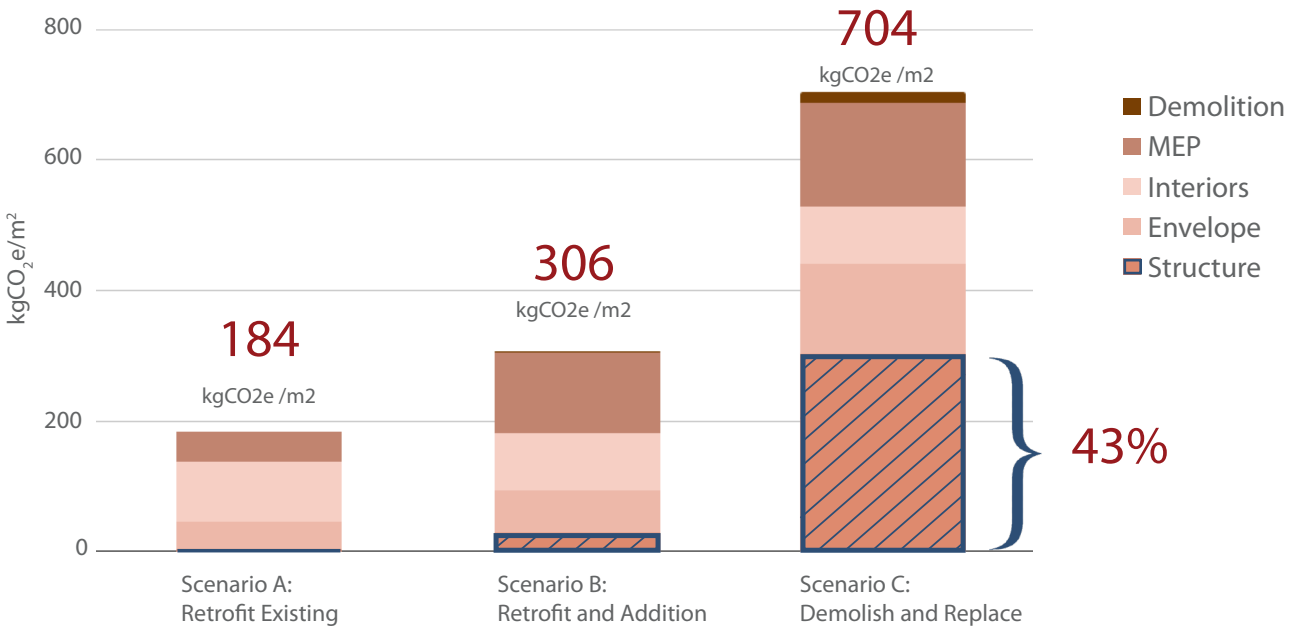
Briefing Note **06**

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.

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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.

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Retrofits, Refrigerants, and Carbon Performance

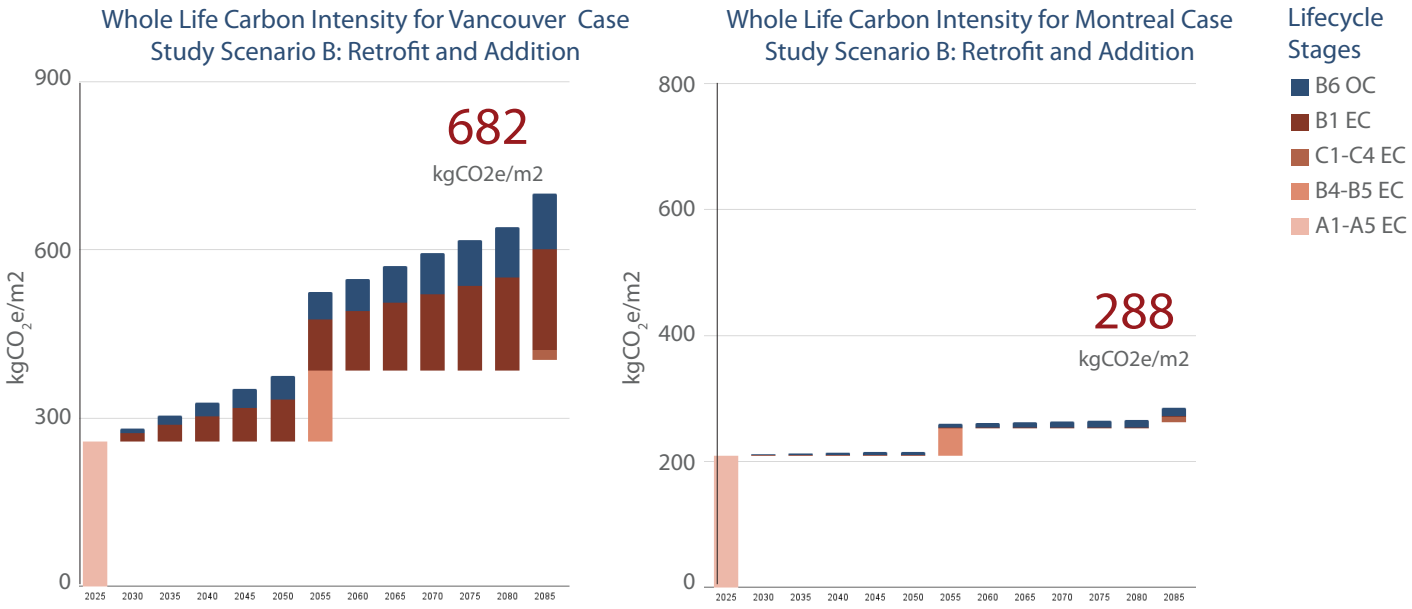
CAHP | ACECP

Briefing Note **07**

Mechanical systems are a significant driver of both embodied and operational carbon in retrofit projects.

In buildings served by clean electricity grids, refrigerant choice, not energy efficiency, can become the dominant whole-life carbon variable. When an existing building undergoes alteration, the new provisions in National Building Code (NBC) 2025 Part 10 and National Energy Code of Canada for Buildings (NECB) 2025 Part 13 require that HVAC and service water heating systems meet updated energy performance standards.

As grids across Canada decarbonize and embodied carbon requirements enter future codes, mechanical engineers have an increasingly critical role in shaping a project's total carbon outcome.



These graphs show the significant difference refrigerant specification can make to whole life carbon emissions. The Vancouver residential retrofit (left) specified R-32 refrigerant which is currently typical for residential scale buildings as R-410A is phased out (B1 denoted by the dark brown bar). In comparison the Montreal office building (right) specified R-454B, which has a much lower GWP impact over the 60-year analysis period.

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Call to Action for Mechanical Engineers

Match System Selection to Local Grid Carbon Intensity

- In regions with low-carbon electricity grids, the operational carbon benefit of marginally higher-efficiency equipment is minimal. Embodied carbon in the mechanical system, particularly refrigerants, becomes the more important variable.
- Early assessment of available mechanical room space is critical, as constraints directly determine what system types can achieve code compliance.
- In heritage buildings, select systems that avoid penetrating or obscuring character-defining elements. Ductless and hydronic distribution strategies can often minimize physical intervention while meeting energy performance requirements.

Electrify and Recover Heat Wherever Feasible

- Specify heat pumps as the default heating and cooling strategy to meet performance targets in National Building Code (NBC) Part 10 and National Energy Code of Canada for Buildings (NECB) Part 13. Gas-fired backup should only be considered where peak electrical capacity is a demonstrated constraint.
- Incorporate energy recovery ventilation in all residential and office retrofit projects. Heat recovery significantly reduces heating energy demand and is achievable in both ducted and ductless configurations.

Specify Low Carbon Refrigerants

- Refrigerant leakage over a building's service life can represent the single largest embodied carbon contribution from a mechanical system, in some building types exceeding the contribution of envelope and interiors combined. Design for leak minimization.
- Specify low-GWP refrigerants as a default and evaluate ultra-low GWP alternatives where safety and application constraints permit.

Engage With Emerging Retrofit Codes

- Anticipate mandatory refrigerant GWP thresholds and leak-rate requirements in future codes and begin advising clients on refrigerant strategy now.
- Advocate for performance-based mechanical compliance pathways in retrofit contexts and contribute technical expertise to National Model Codes Committee processes through professional associations.

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Envelope Performance Pathways for Retrofits

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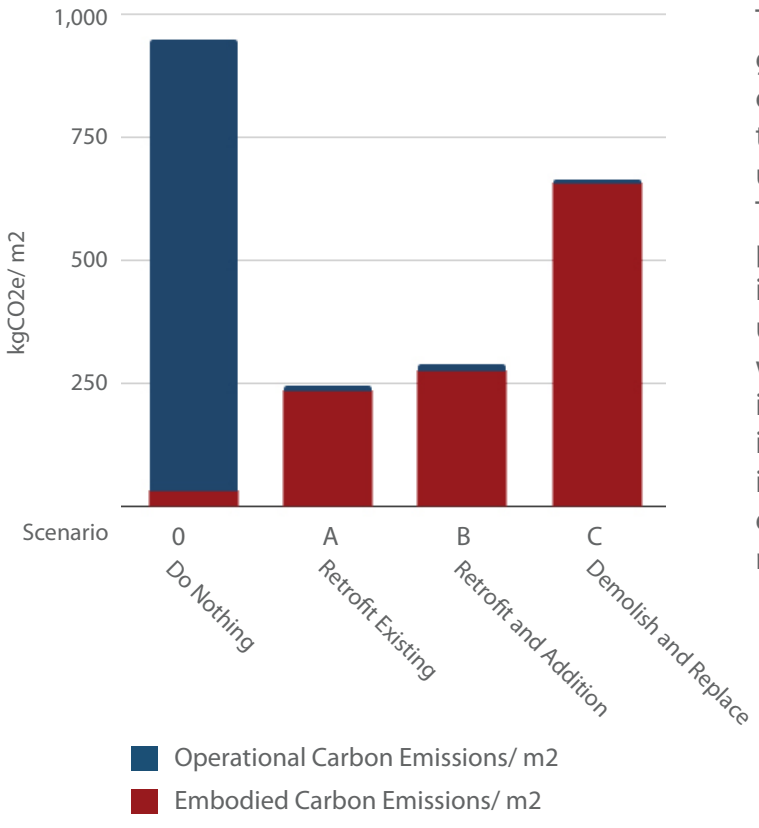
Briefing Note **08**

Building envelopes are a critical lever for reducing whole-life carbon.

Retaining and upgrading existing walls, windows, and roofs preserves the embodied carbon already invested in a building while avoiding the emissions, costs, and waste associated with premature replacement.

Performance verification and National Energy Code of Canada for Buildings (NECB) Part 8 whole-building energy modelling further enable energy code consultants to demonstrate compliance through overall building performance, supporting adaptive reuse and targeted envelope upgrades instead of prescriptive full replacements.

Embodied and Operational Carbon Overview for Montreal Case Study



This comparative Whole Life Carbon graph shows the enormous difference in operational carbon over time by electrifying the building, alongside targeted envelope upgrades in the two retrofit scenarios. To balance embodied and operational performance of the envelope no additional insulation was added to the existing uninsulated brick walls, but the 80-year-old windows were replaced. Comparatively, in the new build (Scenario C), the improvement in operational performance is marginal and completely overset by the embodied carbon associated with all new materials and construction.

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Call to Action for Building Envelope and Energy Code Professionals

Analyze Performance of Existing Conditions

- Conduct a thorough envelope assessment to identify what can be retained versus replaced to meet a balance between embodied and operational carbon.
- Use thermal scans, air leakage testing, and targeted openings to uncover concealed conditions and reduce uncertainty during design and construction.
- Windows are critical to building performance. Assess condition of existing windows and consider opportunities for repair before full replacement.

Focus Thermal Upgrades Where They Matter

- Strategically prioritize envelope improvements that deliver the greatest operational carbon savings while saving embodied carbon.
- Instead of full replacements, consider selective upgrades like air sealing, secondary glazing, window improvements, or targeted insulation to reduce heat loss and preserve existing materials.
- Use airtightness testing, thermography, and on-site verification to commission the envelope and ensure it performs as designed.

Balance Envelope performance with Electrification

- Electrification is often the most effective strategy for decarbonizing operational emissions if the project is in a province with a clean grid based on renewable power generation.

Use Performance-Based Compliance Pathways

- Using National Energy Code of Canada for Buildings (NECB) whole-building energy modelling (Part 8 performance path), energy code consultants can demonstrate compliance based on overall building performance rather than prescriptive envelope requirements.
- This approach allows existing envelope assemblies to remain in place where appropriate, while targeted upgrades and system improvements achieve the required energy performance outcomes.

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