Executive Summary

Growing and Greening Canadian Construction

Five Ways for Canadian Construction Companies to Build More and Emit Less

Phase 1 : Onsite Emissions

The Transition Accelerator | L'Accélérateur de transition

About this Report

This report represents a collaborative effort by nine of Canada's leading general contractors, who came together to form the Canadian Construction Sustainability Alliance (CCSA) to advance practical, industry-led solutions for decarbonizing construction:

Research partner:

The Transition Accelerator / L'Accélérateur de transition

Acknowledgement:

This analysis is based on real operational data from 617 construction projects across Canada, representing the most comprehensive sectorwide emissions analysis conducted to date. We thank all participating companies for their transparency and commitment to advancing sustainable construction practices.

Disclaimer

This report provides a sector-wide view of greenhouse gas (GHG) emissions from Canadian construction jobsites and outlines practical opportunities for GHG reductions. The findings are based on aggregated and anonymized data from more than 600 projects and should be interpreted as illustrative and directional, not company-specific. Emission estimates and reduction scenarios are intended to show potential industry-wide outcomes under certain assumptions; actual results will vary by company, project, and region. The analysis is designed to inform strategic planning and collaboration, not to prescribe specific actions or guarantee future performance.

Executive Summary

Canada's Construction Sector: A Strategic Roadmap for Decarbonization

Canada's construction sector faces unprecedented infrastructure demands while navigating the imperative to reduce greenhouse gas emissions. This report, developed through a voluntary collaboration among industry leaders Aecon, Bird, Chandos, EllisDon, Graham, Ledcor, Multiplex, PCL, and Pomerleau in partnership with the Transition Accelerator, presents a strategic roadmap for achieving substantial emissions reduction from construction jobsite activities (A5 in the lifecycle stages), while strengthening competitive positioning.

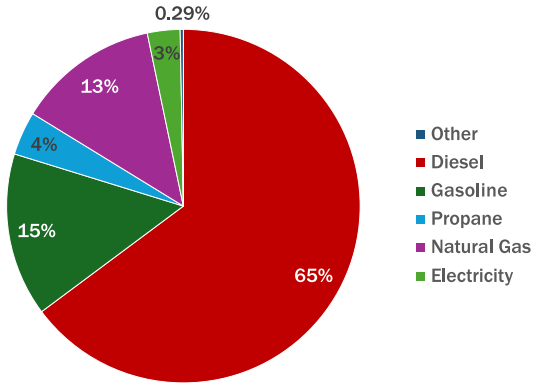
Based on the most comprehensive analysis of Canadian construction emissions conducted to date—drawing from 600+ real-world projects—this analysis provides practical cost-effective pathways that aim to simultaneously address decarbonization and enhance operational performance.

The Strategic Context: Building What Canada Needs

Canada's construction demands are extraordinary: 3.5 million new homes by 2030, $130 billion in transit infrastructure, $24 billion in healthcare facilities, and over $630 billion in industrial projects. The construction sector, responsible for an estimated 4% to 13% of national emissions depending on scope definition, will play a pivotal role in meeting Canada's commitment to reduce GHG emissions and achieve net-zero by 2050.

Construction-related emissions are significantly underestimated in national inventories, especially when considered in the broader context of building sector emissions. Notably, embodied carbon emissions from building products has a significant contribution to the sector's emissions profile. Yet, our analysis shows that construction processes alone represent a substantial and distinct source of emissions.

The sector's emissions profile for construction jobsite activities is dominated by diesel fuel consumption (65% of project emissions), followed by gasoline (15%) and natural gas (13%). The comprehensive project data analysis demonstrates that remote locations and diesel-dependent operations drive the highest emission intensities, while grid-connected projects demonstrate significantly lower environmental impacts. It is also important to underscore that general contractors often have limited direct control over all emission sources, as these stem not only from their own operations but also from decisions made by clients and subcontractors.

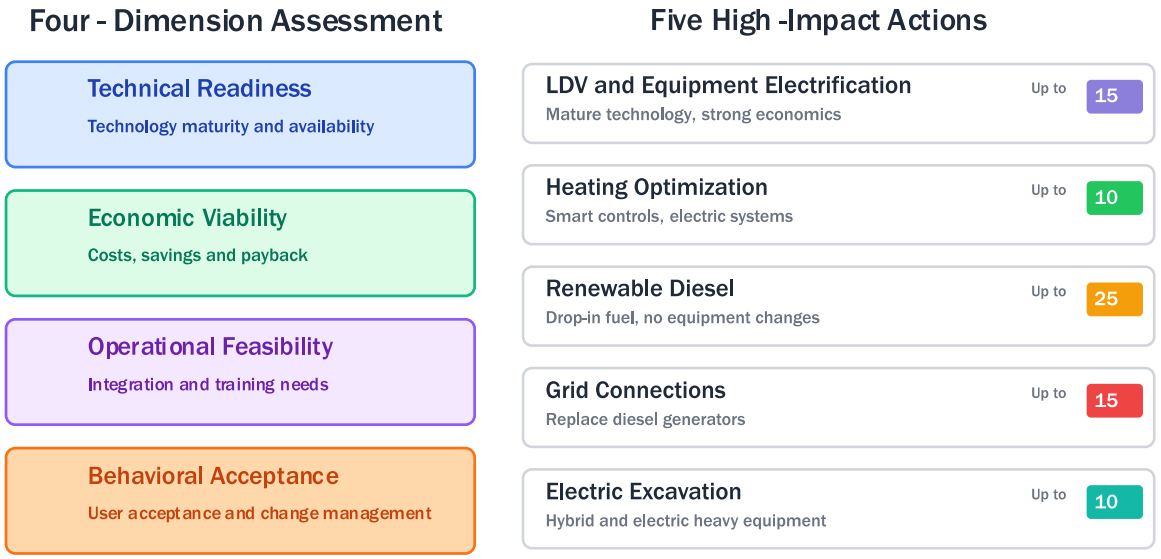


Proportion of emissions attributable to each fuel type

Rather than treating emissions reduction as a separate objective, this report examines how decarbonization can be integrated with and support the industry's core priorities of building more efficiently and affordably. This multidimensional approach serves as a critical stress test that filters out theoretical options and focuses on what is truly implementable.

Five High-Impact Actions: Practical and Integrated Solutions

To identify the most practical decarbonization pathways, each equipment category and fuel type was analyzed across the four key dimensions listed below. This assessment, grounded in real-world project data and sector expertise, revealed five coordinated actions that can reduce emissions from jobsites by 75% while delivering immediate business benefits:



Action 1: Electrify Light-Duty Vehicles and Small Equipment Light-duty vehicles scored highest across all assessment dimensions, with mature electric technology, strong economics, and minimal operational changes required. This action contributes up to 15% of total emissions reduction by eliminating gasoline consumption and displacing some diesel usage.

Action 2: Optimize and Electrify Heating Systems Heating emerged as a major emission source, particularly in cold climates and remote locations. Diesel remains the dominant heating fuel on many sites due to its high energy density, ease of transportation, and wide availability. Optimizing heating presents an immediate opportunity for cost savings and emissions reductions. When combined with the electrification of the heat source, this approach can contribute up to 10% emissions reduction while improving worker comfort and reducing fuel costs by displacing natural gas and some diesel heating systems.

Action 3: Adopt Renewable Diesel as Bridge Fuel For heavy equipment where electrification faces technical or economic barriers, renewable diesel provides immediate 40-80% lifecycle emission reductions without equipment modifications. While renewable diesel can achieve 80% emission reductions per litre, this action contributes up to 25% of total project emissions reduction because

it addresses the remaining diesel consumption after other actions have already displaced significant diesel usage through electrification and grid connections.

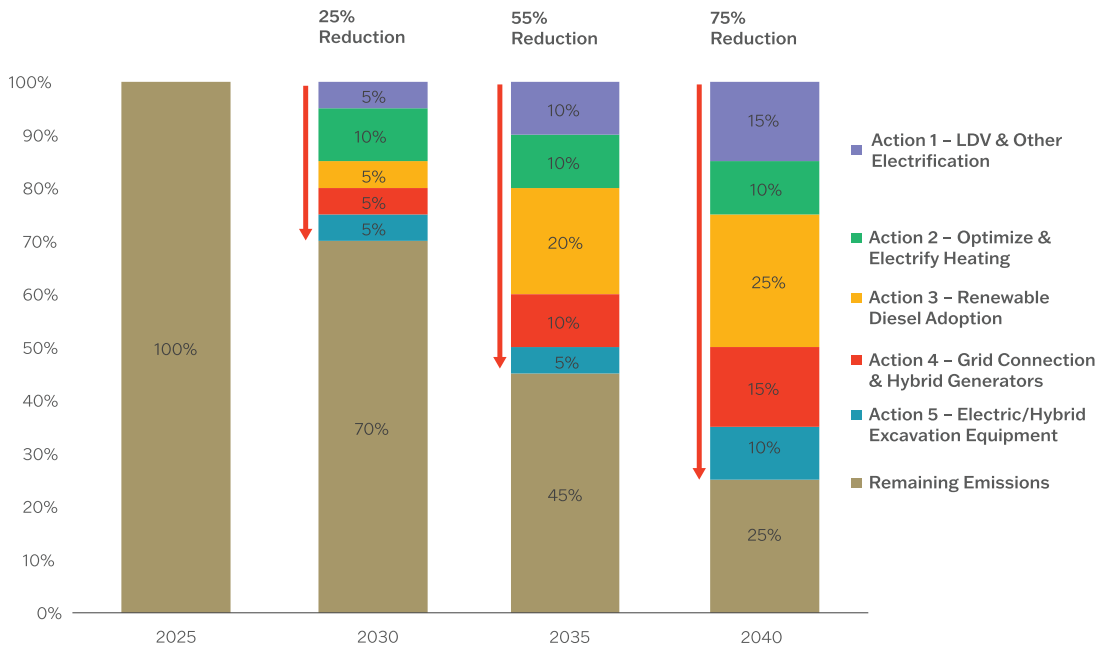
Action 4: Connect to Grid Power Instead of Diesel Generators Project data revealed generators as major emission sources at remote sites. Grid connections or hybrid systems contribute up to 15% emissions reduction while reducing noise and operating costs by eliminating diesel generator usage and enabling broader site electrification.

Action 5: Deploy Hybrid and Electric Excavation Equipment While heavy equipment electrification scored lower on current readiness, hybrid and electric systems contribute up to 10% emissions reduction while building operational experience with next-generation technologies and further reducing diesel dependency in heavy equipment operations.

Recommended Implementation Timeline: Balancing Ambition with Pragmatism

These projections provide directional understanding of emission reduction potential across the sector while recognizing that company-specific circumstances may differ significantly from these industry-level estimates. The pragmatic approach balances technical feasibility with economic viability, operational constraints, and organizational readiness for change, based on realistic fleet turnover cycles and typical infrastructure development timelines. The analysis establishes foundational groundwork for strategic planning, helping companies understand the order of magnitude of various strategies that will align the sector toward emission reductions.

- **By 2030: 25% Total Reduction** - Early adoption through vehicle electrification (5%), heating optimization (5%), renewable diesel adoption (10%), and grid connections (5%).
- **By 2035: 55% Total Reduction** - Scaled implementation with renewable diesel reaching 20% cumulative impact and electric excavation equipment beginning deployment.
- **By 2040: 75% Total Reduction** - Mature adoption with renewable diesel as the largest contributor (25%), followed by vehicle electrification and grid connections (15% each).



Companies with ambitious sustainability commitments can accelerate these timelines to achieve higher reductions by 2030.

Enabling Market Transformation

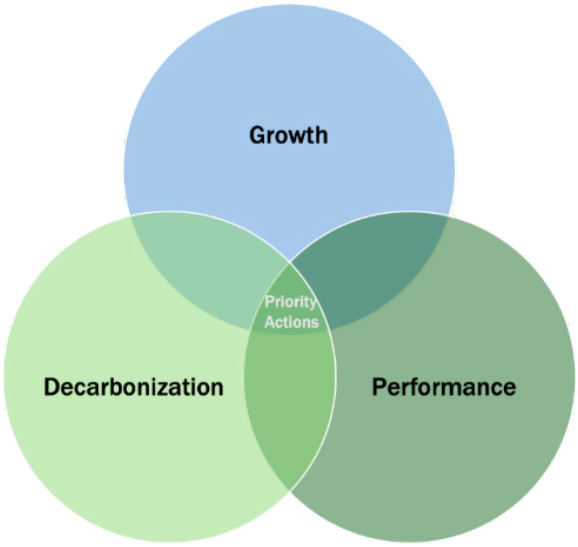
Success requires coordinated action across the entire value chain, with each stakeholder playing a critical role in scaling decarbonization technologies from pilot projects to industry-wide adoption:

- **Construction Companies:** Drive adoption through collective procurement power, early implementation, and workforce training to build market demand and operational expertise.
- **Equipment Manufacturers:** Expand electric product lines, provide operator training, and offer flexible rental terms to reduce customer risk and accelerate technology deployment.
- **Utilities and Energy Providers:** Streamline grid connection processes, offer rapid hookup services, and develop charging infrastructure to enable widespread electrification.
- **Fuel Distributors:** Secure renewable diesel supply chains, expand distribution infrastructure, and educate customers to make alternative fuels readily available.
- **Governments:** Sustain incentives for clean technology adoption while leading through public procurement requirements that create market demand and demonstrate viability.

Strategic Value of Coordinated Action

The five high-impact actions represent more than individual initiatives—they form a coordinated strategy that amplifies the construction sector's competitive advantages while achieving substantial emissions reductions. When implemented together, these actions create an amplification effect across three critical business dimensions:

- **Construction Company Growth:** Actions create new market opportunities, establish leadership in emerging low-carbon markets, and drive industry transformation through collective implementation.
- **Decarbonization of Operations:** Up to 55% emissions reduction achievable by 2035, positioning the sector to meet evolving climate requirements while contributing to Canada's national targets.
- **Project Performance Excellence:** Cost control through lower operating costs and reduced maintenance, schedule reliability through optimized equipment, quality assurance via precise control systems, and safety leadership through cleaner work environments.



Strategic Implementation Approach

Successful implementation requires a coordinated approach that leverages current market conditions, builds on proven economic models, and engages stakeholders across the entire value chain to create the enabling conditions for widespread adoption.

- **Build on Current Momentum:** Leverage government emphasis on infrastructure building to align decarbonization with national priorities.
- **Focus on Economic Winners:** Prioritize actions with clear payback periods to demonstrate value and build momentum.
- **Coordinate Across Value Chain:** Use collective buying power to influence suppliers while demonstrating value to clients and policymakers.
- **Lead Through Procurement:** Government clients can accelerate adoption through contract requirements for electric equipment, renewable fuels, and grid connections.

The Path Forward

The construction industry has everything needed to begin this transformation: proven technologies, viable business cases, willing partners, and growing client demand. These five actions provide a practical roadmap treating decarbonization as core business improvement rather than environmental compliance.

By implementing these evidence-based actions, Canada's construction sector can achieve up to 75% emission reduction over the next 15 years while building the foundation for continued growth and competitiveness. The question is not whether to act, but how quickly the industry can move forward together.