

Mapping construction sector greenhouse gas emissions: A crucial step in sustainably meeting increasing housing demands

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In Canada, as elsewhere, there is a tension between the need to build more infrastructure and housing for a growing population, while simultaneously reducing greenhouse gas (GHG) emissions to avoid the most serious impacts of climate change. Our study uses an Environmentally Extended Input-Output (EEIO) analysis to calculate the source of construction sector emissions in Canada by commodity type, construction sector, and region. EEIO models work by combining transactions of goods and services in an industry with variables representing their environmental impact. Using this analysis, we have projected scenarios for Canada's construction sector GHGs in 2030 if (1) no changes are made to current practices; (2) a rapid construction increase occurs to meet housing targets; or (3) a rapid construction increase occurs and manufacturing of construction materials become 25% less GHG intensive.

Our findings highlight that Canada's current construction practices cannot accommodate the construction required to restore housing affordability by 2030 without substantial environmental consequences. Meeting both Canada's 2030 housing affordability and climate commitments will require an ~80% reduction in embodied GHG emissions per home.

Key Findings:

1. The construction sector in Canada is responsible for 90 MtCO₂e of emissions, of which *Residential* construction is the highest-emitting sub-sector (at 42%), followed by *Infrastructure* (at 39%), and then *Government Services, Education, and Healthcare* (at 19%).
2. Of the 90 MtCO₂e of emissions, 35% are imported, particularly from China (9.78 MtCO₂e), the United States (MtCO₂e), India (1.02 MtCO₂e), and Mexico (0.9 MtCO₂e). Consequently, reductions in Canada's construction sector emissions will be in part dependent on climate commitments and reductions in other countries.
3. Most emissions (84%) come from the product stage (mining and manufacturing of raw materials), 5% from transportation and 10% from onsite construction activities. This reinforces the need to focus on reducing material use and the GHG intensity of materials.
4. In most provinces, residential construction is the largest sector source of GHG emissions, except in Alberta, Newfoundland and Labrador, Saskatchewan, and the Territories, where oil and gas infrastructure is the largest source.

Achieving Canada's housing and climate targets will require significant infrastructure changes. Actions such as minimizing non-housing infrastructure (like roads or oil and gas extraction), reducing the quantity of materials per home, and allocating more GHG budget to construction from other sectors could help tackle this wicked problem.

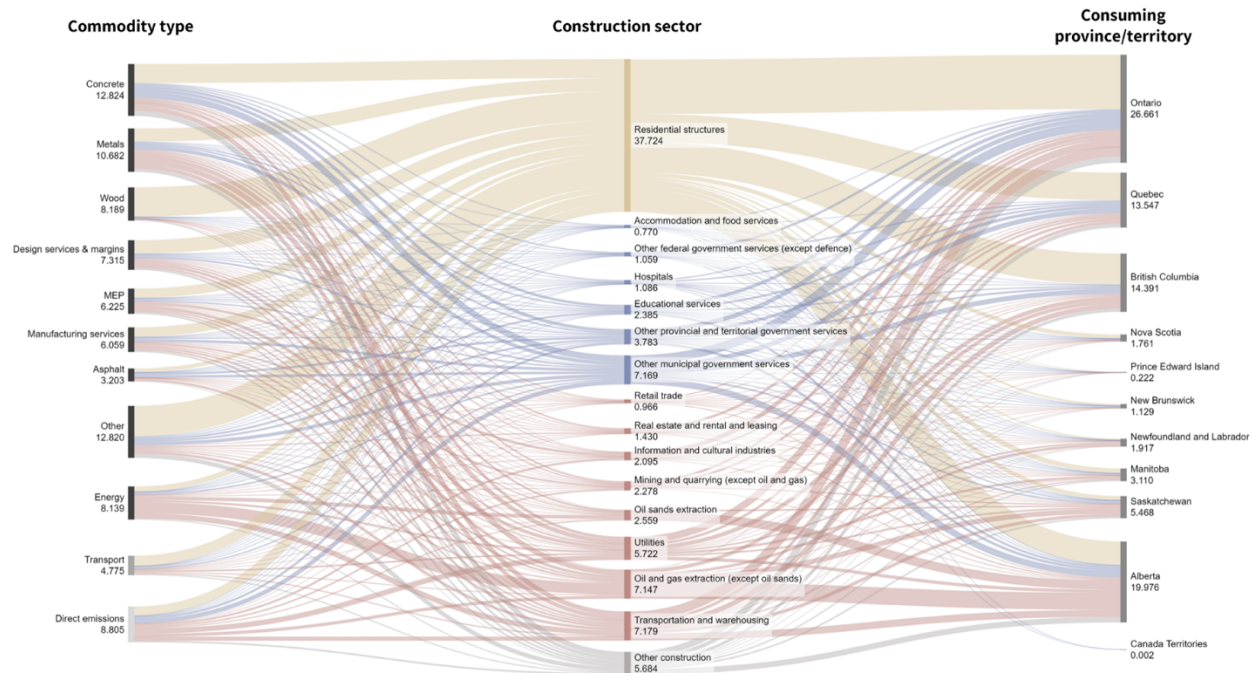


Figure 1 GHG Emissions in the Canadian construction sector

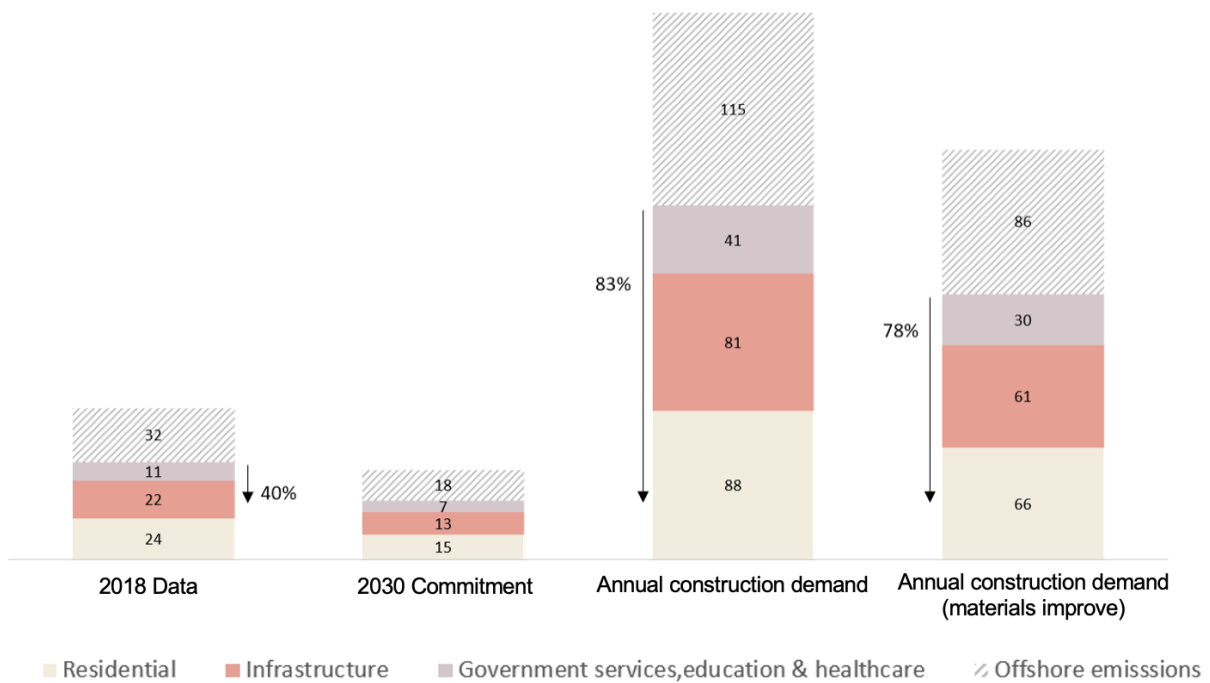


Figure 2 Gap between climate and infrastructure commitments