

City of Toronto becomes first municipality in North America to cap embodied carbon in building materials

Updates to the Toronto Green Standard were informed by study co-authored by Mantle, the City of Toronto, and the University of Toronto's Ha/f Research Studio, with funding from The Atmospheric Fund.

CHALLENGE

The Toronto Green Standard (TGS) is a critical tool used by the City of Toronto to create greener buildings.

By requiring low-carbon development beyond the minimum standards of the Ontario Building Code, the TGS supports the City's goals for resilience, climate action, and affordability.

Introduced as a voluntary measure in 2006, Tier 1 of the TGS became mandatory in 2010. The higher performance Tiers 2 and 3 are voluntary and are supported by a Development Charge Refund program.

In 2022, the City of Toronto was looking for ways to improve developers' uptake of the higher performance levels.

With funding from The Atmospheric Fund (TAF), the City collaborated with Mantle and the University of Toronto's Ha/f Research Studio to conduct a benchmarking study on embodied emissions in new developments.

The questions the study sought to answer were:

1. What is a typical level of embodied emissions for new construction?
2. Is the industry ready to measure and reduce embodied emissions?

APPROACH

For its benchmarking study, Mantle and its partners gathered data from large "Part 3" buildings in Ontario as well as two City-owned projects in the late stages of design.

The study sought to collect and compare whole building embodied emissions results—as calculated through life cycle assessments (LCAs).

Designers, owners, and builders across the province answered the call and shared their data. Projects predominantly used either One Click LCA or Athena software.

Almost none of the 41 projects in the dataset actively tried to reduce their embodied emissions in any significant or systematic way. Instead, their assessments were about understanding the embodied carbon of their standard designs and materials.

The study included a Project Advisory Committee of 16 experts. Four workshops, with 310 participants in total, were held to share findings and hear the perspective of industry players.



The study resulted in a policy primer for Ontario municipalities.

RESULTS

The study was the first attempt to collect and compare embodied emissions results as calculated using whole building life cycle assessments (WBLCA) for Part 3 buildings in Ontario.

The team's final output was a policy primer titled, "Regulating Embodied Emissions of Buildings: Insights for Ontario's Municipal Governments."

Among the primer's key findings:

- The industry is already calculating embodied emissions for large buildings in Ontario.
- Most embodied emissions from new construction come from procuring a handful of key materials: concrete, steel, insulation, and timber.
- Many 'low-hanging fruit' solutions can be implemented to significantly reduce embodied emissions, with little or no impact on costs and schedule.

As a direct result of the benchmarking study and policy primer, the City of Toronto became the first jurisdiction in North America to limit embodied carbon from new municipal building construction by requiring lower-carbon construction materials.

The TGS is often referenced as an example for other municipalities.

Since Toronto introduced its new embodied emissions caps in May 2023, other municipalities across North America have adopted similar measures.

To support municipalities' efforts to reduce embodied carbon emissions, Mantle, Ha/f, and the City of Toronto again partnered with TAF to deliver an "Embodied Carbon Management Toolkit."

The team's ground-breaking work on embodied carbon was recognized with an "Innovation in Industry" award at the 2023 CLF Ontario Embodied Carbon Awards.

Our study showed we could cut embodied emissions by nearly 30%—that's 800 tonnes of CO₂e—just by swapping three materials for lower impact alternatives, with zero impact on cost or schedule. — **Ryan Zizzo** CEO, Mantle Developments