AKBLG 2022 Annual Convention

Moving Beyond Just Energy Efficiency

Presented by
Sam Ellison, ***Senior Building Official, City of Nelson***
Natalie Douglas, ***Climate Resilience Planner, City of Nelson***

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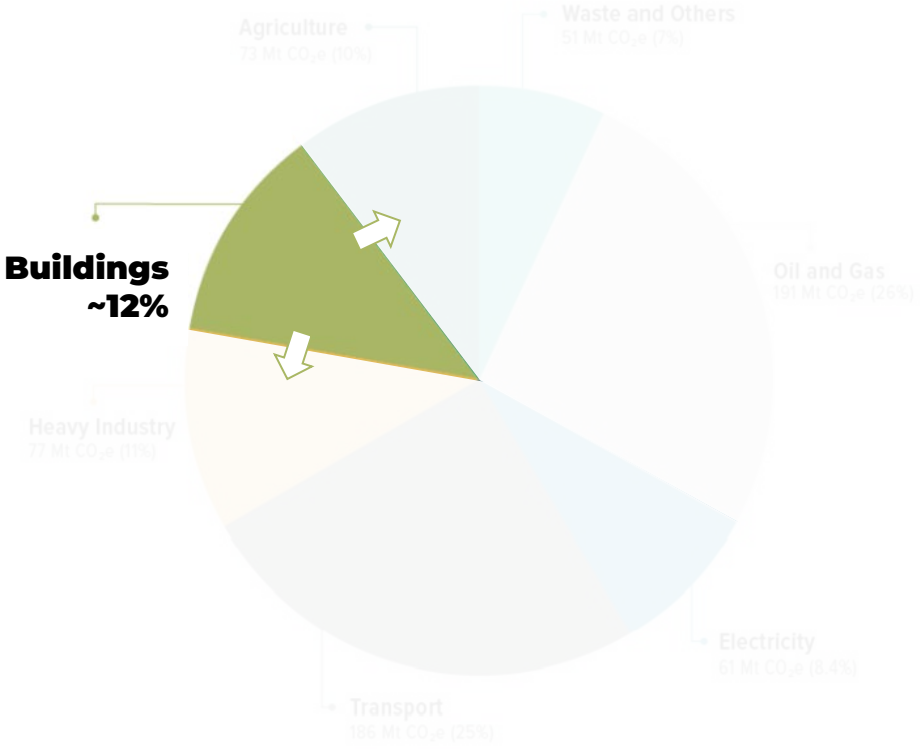
Canada's Greenhouse Gas Emissions by Economic Sector (2019)



In 2019, the buildings sector was the third-highest source of GHG emissions, responsible for ~12% of total national emissions in Canada

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REGIONAL DISTRICT CENTRAL KOOTENAY

Regional Energy Efficiency Program

ENERGY STEPCODE
BUILDING BEYOND THE STANDARD

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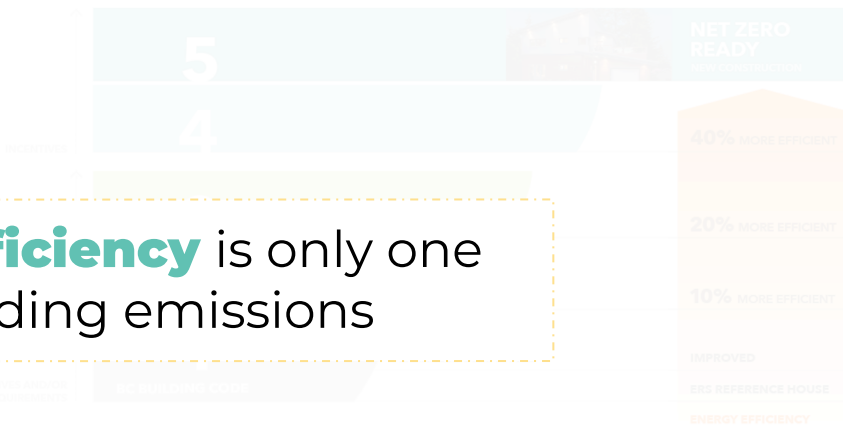
Federal Incentive Programs (e.g., Greener Homes Grant, Green and Inclusive Community Buildings program)

Provincial Incentive Programs (e.g., BC Step Code)



Increasing **energy efficiency** is only one piece of reducing building emissions

Regional Education Programs (e.g., Regional Energy Efficiency Program)

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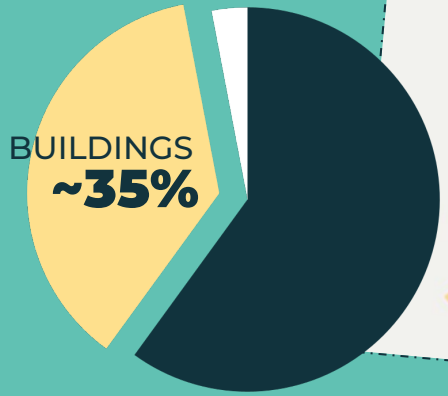
Nelson Next:



Aspiration Two

Infrastructure and buildings in Nelson are zero carbon, and resilient.

Kick-start and support a rapid transition to zero-emission and disaster-resilient homes, buildings, and communities, and lower-impact development and construction. Reducing building emissions is a top priority for achieving Nelson's climate goals and targets.

Co-Benefits

Sustainable Behaviour | Improved Resource Efficiency | Public Health

Strategies

1. New buildings are net zero ready, have low embodied carbon, and are resilient against a changing climate.
2. Existing buildings are retrofitted to achieve deep energy savings, reduced emissions, and climate resilience.
3. Our building sector and academic institutions are leaders in green building research, innovation, and construction.
4. Financial barriers to energy efficient and resilient buildings will be reduced through a range of support mechanisms (i.e. grants, targeted programs, specialized support services, etc.).

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BC Step Code

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Nelson Next:

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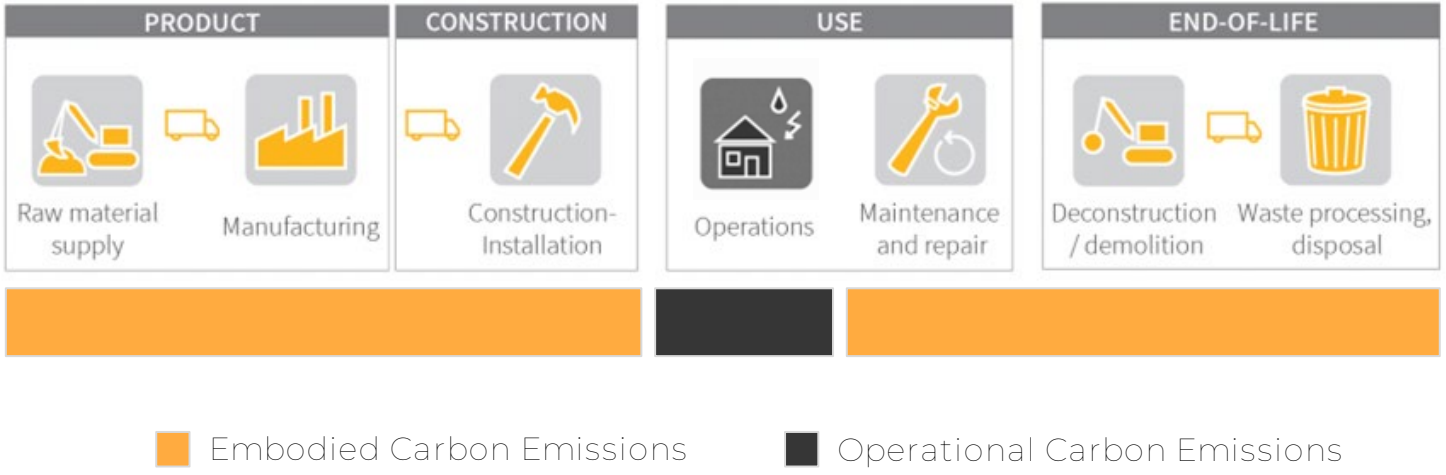
Nelson & Castlegar Study Partners

A Holistic Approach to Buildings



Embodied Carbon
(otherwise known as material carbon emissions and embodied emissions)

=

11% of global emissions

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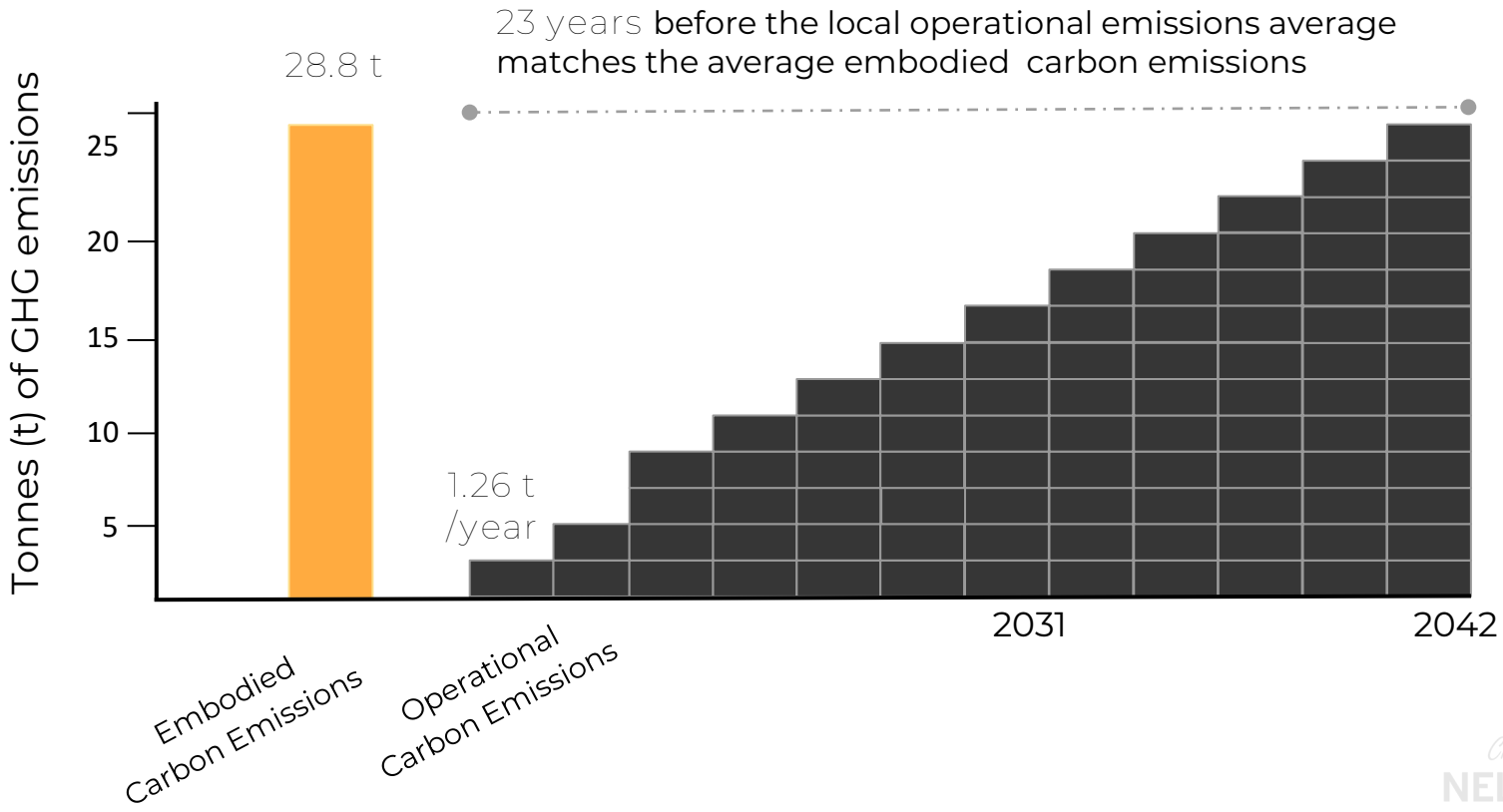
The Nelson and Castlegar study showed us that it would take ...



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Changes are coming...

More Robust Emissions Accounting Requirements

More Opportunities for Energy Advisors

Work to Consider MCEs within the BC Step Code

It will be good to get ahead of this.

This is possible.
There are affordable choices you can make now that can be impactful.

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Test.

High Step Code homes can have high MCEs but it is **not inevitable**

Assess.

There are accessible material substitutions and **actions we can take right now**

Introduce.

The building community **is interested** in obtaining more guidance on how best to take action

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Test.

BENCHMARKING REPORT

FREE DOWNLOAD on the City of Nelson's Website

Benchmarking Report

Establishing the Average Upfront Material Carbon Emissions in New Low-Rise Residential Home Construction in the City of Nelson & the City of Castlegar

Prepared for
Meeri Durand, Manager of Planning, Development & Sustainability, City of Castlegar
Sam Ellison, Senior Building Inspector, City of Nelson

Prepared by
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Erik Bowden, Embodied Carbon Analyst, Builders for Climate Action
Eve Treadaway, Research Assistant, Builders for Climate Action
Javaria Ahmad, Sustainability Analyst, Builders for Climate Action
Michele Deluca, Registered Energy Advisor, 3West Building Energy Consultants
Natalie Douglas, Embodied Carbon Pilot Coordinator, City of Nelson

Table 1 lists the specific material substitutions that can lead to a 69% reduction in emissions (best conventional materials) and a 140% reduction in emissions (best possible materials).

As-Built Materials	Best Conventional Material Substitution	Best Possible Material Substitution
Average concrete	High SCM concrete	High SCM concrete
EPS sub slab insulation	-	Foam glass gravel
EPS ICF	Wood chip ICF	Treated wood foundation
Mineral wool cavity insulation	Cellulose	Straw bale
Continuous insulation	Wood fiberboard	-
Hardwood floors	½ linoleum flooring	Linoleum & cork flooring
Mineral wool roof insulation	Cellulose	Cellulose
309.1 kg CO2e/m2	**151.3** kg CO2e/m2	**55 kg** CO2e/m2

Table 1. *This table demonstrates the impact that material selection can have on overall material carbon emissions.*

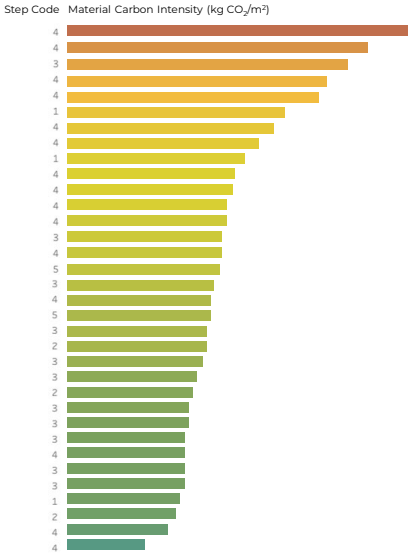
Targeted Insights

MCEs are a relatively new consideration for the building sector. This study represents the first time that a group of as-built new homes has been examined for MCE using a consistent methodology and the results draw attention to a wide range of opportunities to act. The building sector is complex, with many stakeholders having influence over the design and construction of new homes. We have attempted to direct insights arising from this study to particular stakeholder groups to promote the practicality of this report. It should be noted that in many cases the insights are overlapping.

Insights for Building Designers

Building designers can play a crucial role in reducing MCE and achieving lower CUI from new homes in several ways, from early schematic design to product specification. Designers can inform their clients on the climate impacts of their decisions, help guide them towards decisions that lead to better outcomes for the environment and climate, and quantify the results of these decisions. More specifically they can:

- Employ tools such as MCE^2 or BEAM to inform schematic design and use the tools to refine design and material choices throughout the design process
- Design homes to minimize the use of concrete and by specifying concrete with the lowest possible MCE
- Minimize the amount of uninhabited floor area by eliminating or reducing the size of garages, and unfinished basements
- Specifying materials that have the lowest possible MCE or, where possible, carbon-storing materials (see Material Guide)



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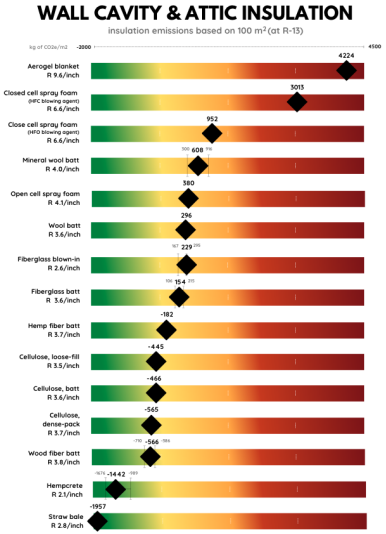
Assess.

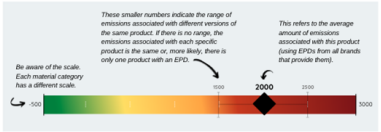
MATERIALS GUIDE

FREE DOWNLOAD on the City of Nelson's Website



This guide provides a comparison of the greenhouse gas emissions that come from a *cradle-to-gate* (A1-A3) analysis of different categories of building materials. In this context, *cradle* refers to resource extraction and *gate* refers to the factory gate (i.e., before the product is transported to the consumer). In other words, this guide tells you which materials have less emission intensive raw material acquisition and manufacturing processes and therefore a smaller carbon footprint. This information is presented in a manner similar to the fuel efficiency ratings you find for automobiles. It is intended to help you compare building material options based on their material carbon emissions (sometimes called *embodied carbon* or *embodied emissions*).

The results in this guide are shown for a specific amount of material, noted below each section title (e.g., concrete emissions for 1 m^3 at 25 mPa strength) and are based on source data obtained from Environmental Product Declarations (EPDs). EPDs are internationally recognized standardized reports on product impacts. Most green building certifications processes require Type III EPDS, which means that the EPD has been reviewed by a third party. It should be noted that the specific product you are choosing may not be included in this guide since not every manufacturer has created an EPD. That being said, most products within the same material types have similar manufacturing processes and thus, tend to rank similarly according to their material carbon emissions.



The product types (e.g., brick) in each material category (e.g., cladding) are listed in this guide from highest emissions to lowest emissions. If you want to reduce the material carbon emissions of your home, select products that are further down on the list. It is important to recognize that we are recommending that the material carbon emissions discussed in this guide be considered in conjunction with energy efficiency considerations and other priorities (e.g., fire smart and other disaster resilience and climate adaptation strategies).

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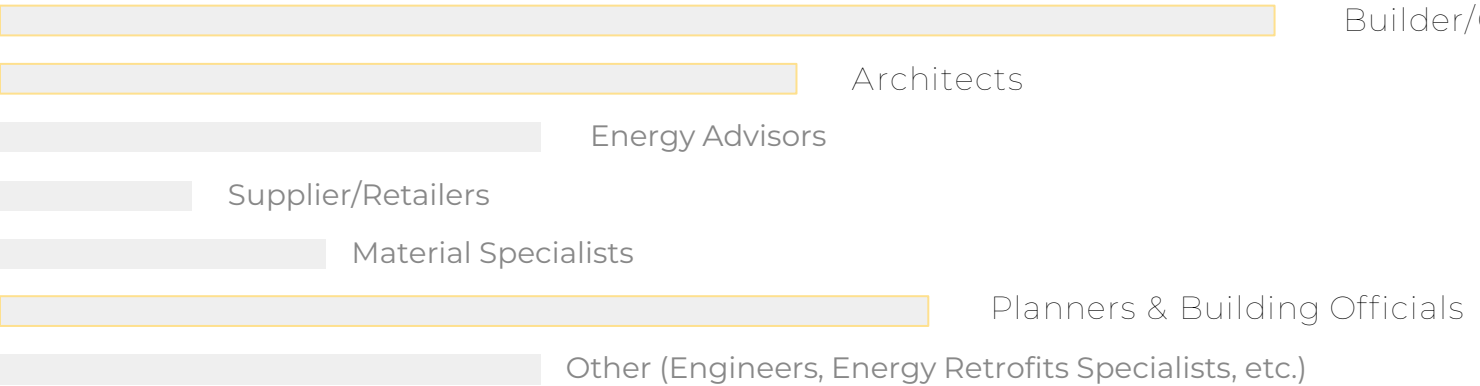
Introduce.

Engaged **100+** people through workshops & presentations in Fall 2021

WORKSHOPS, PRESENTATIONS, ETC.



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What's **Next** for Nelson?

Collaborate with our keen building community via an Embodied Carbon Advisory Group

Integrate embodied carbon considerations into REEP

Build capacity internally and pursue Nelson Next goals

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Thank you to our partners who made this work possible and to all of you for attending our presentation today.

Learn more about the City's many climate programs (e.g., REEP) at www.nelson.ca/programs

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Sam Ellison at sellison@nelson.ca

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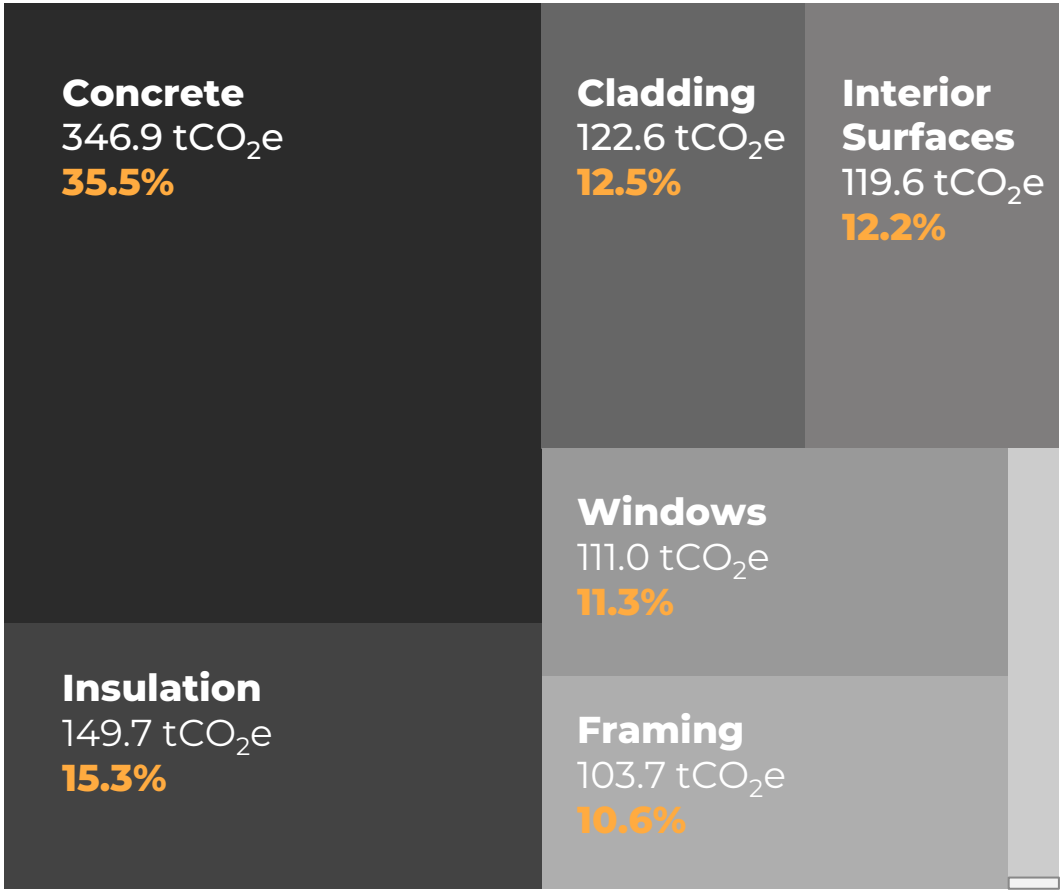
EXTRA SLIDES



Embodied carbon emissions breakdown from all materials used in the Nelson & Castlegar study homes (2019-2021)

Roofing
23.9 tCO_2e
2.4%

Structural Elements
0.5 tCO_2e
>0.1%

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Possible Substitutions for the Highest MCI house

Change to **Best Conventional** Materials

Average concrete →	High SCM concrete
EPS ICF →	Wood chip ICF
Mineral wool cavity insulation →	Cellulose
XPS continuous insulation →	Wood fiberboard
Hardwood floors →	½ Linoleum flooring
Mineral wool roof insulation →	Cellulose
309.1 →	151.3 kg CO_2e/m^2

Change to **Best Possible** Materials

EPS sub slab insulation →	Foam glass gravel
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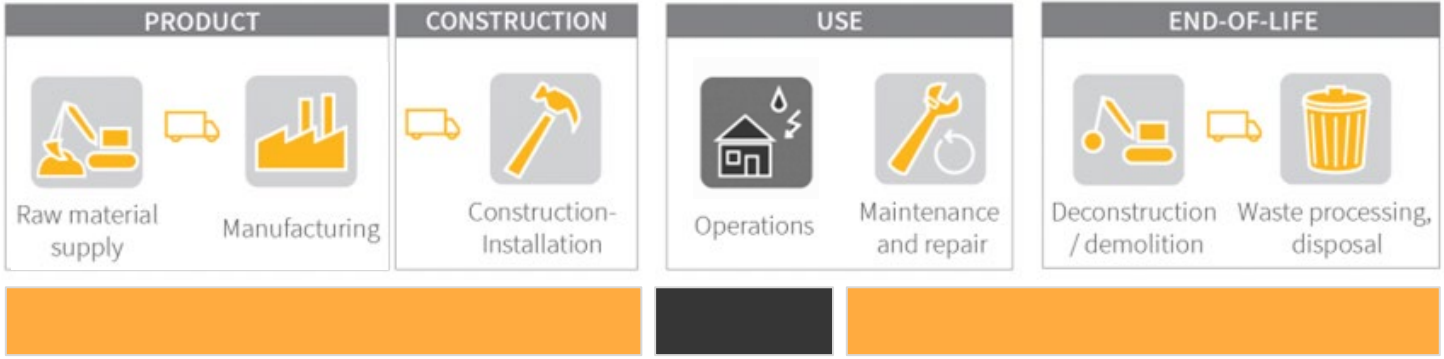

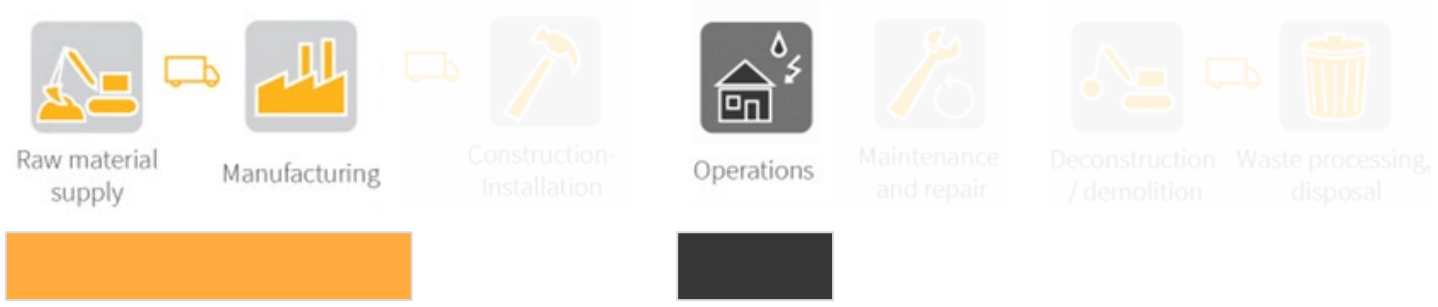

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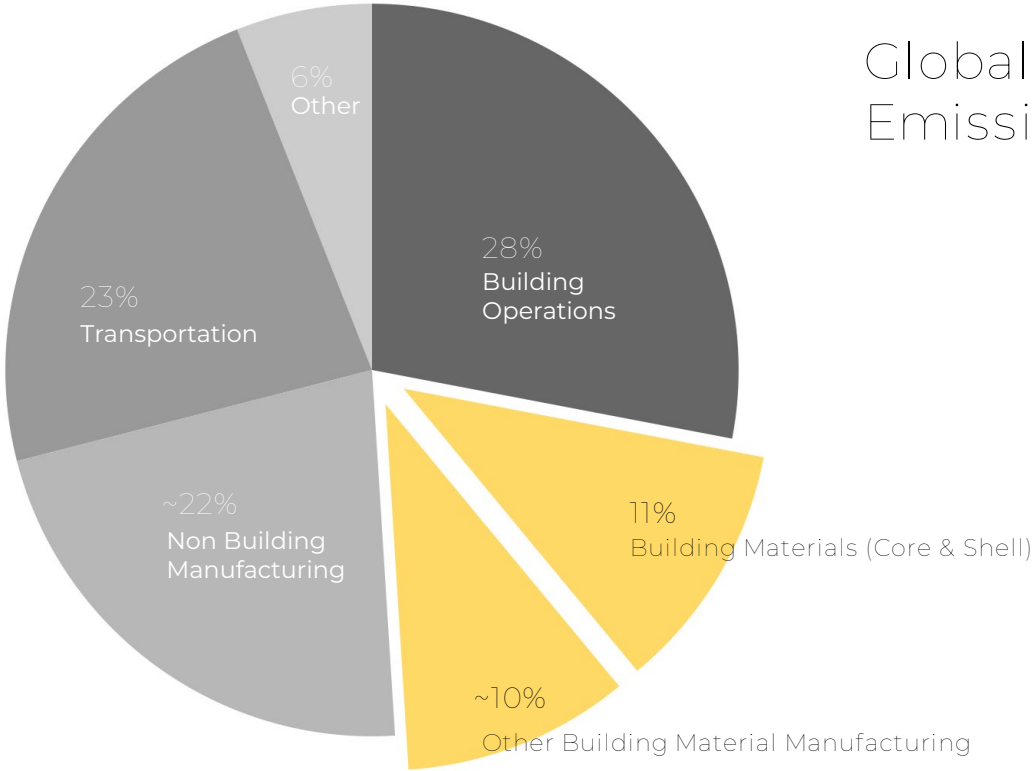
Global CO_2 Emissions by Sector



Adapted from 2019 Global Status Report, Global Alliance for Building and Construction (GABC) and Architecture 2030.

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