

Carbon Impact of Part 9 Buildings



Spring Builder & Designer Breakfast



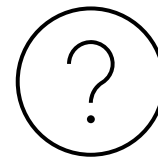
Key Points:

- significant reductions in carbon emissions needed to halt global warming
- buildings contribute significant carbon emissions from operation
- building materials represent significant embodied carbon
- buildings are part of the problem, but also part of the solution
- energy efficiency needs to be ramped up: use less energy for same results
- switch fuels to lower-carbon options
- building materials and processes to favour lower-carbon options



Carbon is coming.





What's the issue?

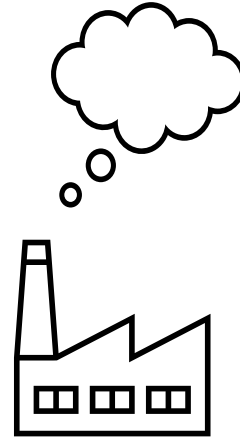
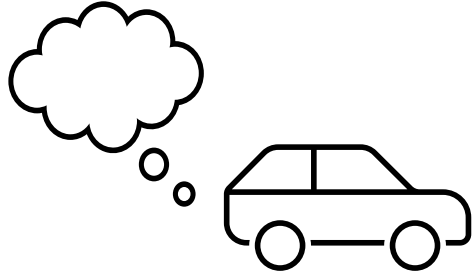
- Greenhouse gases (GHGs) contribute to global warming
- GHGs include carbon dioxide (79%), methane, nitrous oxide, fluorinated gases, refrigerants, etc
- global warming severity of GHGs are ranked against CO₂
- "black carbon" = soot from burning diesel, coal, biomass fuels
- GHGs = carbon dioxide (or equivalent)
- now we can count GHGs, by counting tonnes of carbon dioxide contained in the particular GHG

How much is a tonne of carbon dioxide?

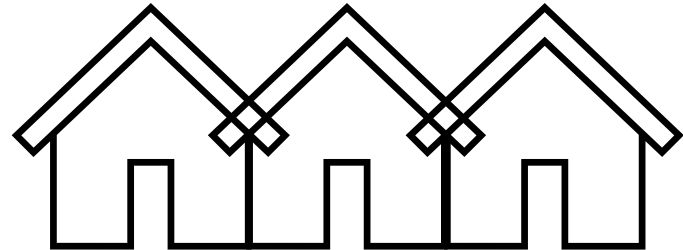
- 1000kg mass
- but it's CO₂, a gas
- 1 tonne CO₂ takes up nearly 20,000 cu ft
- volume of a 2500 sq ft house
- ¼ of an Olympic size swimming pool



Sources of GHGs:

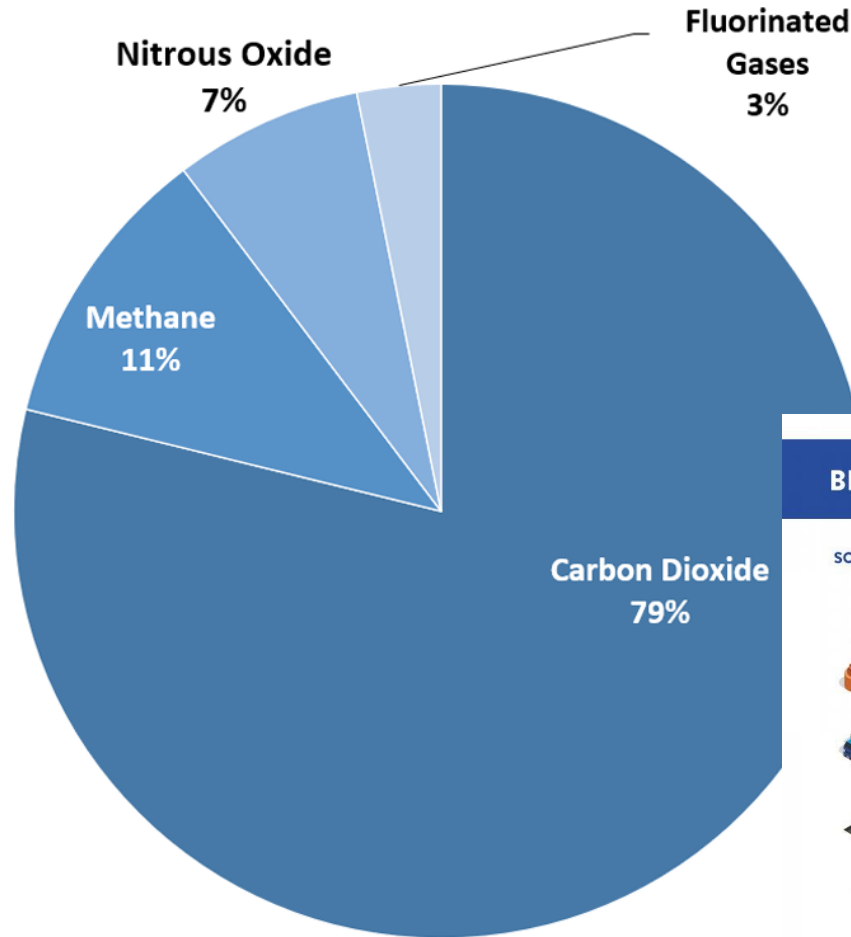


Part 9 buildings:



Overview of U.S. Greenhouse Gas Emissions in 2020

- CO₂ is the primary GHG
- others are quantified as "CO₂ equivalents"

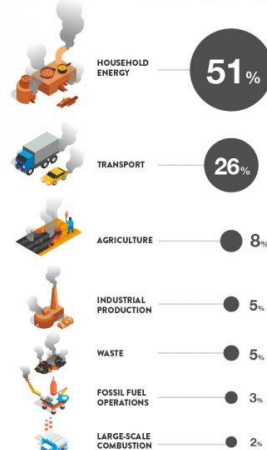


U.S. Environmental Protection Agency (2022). Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2020

BLACK CARBON (BC)

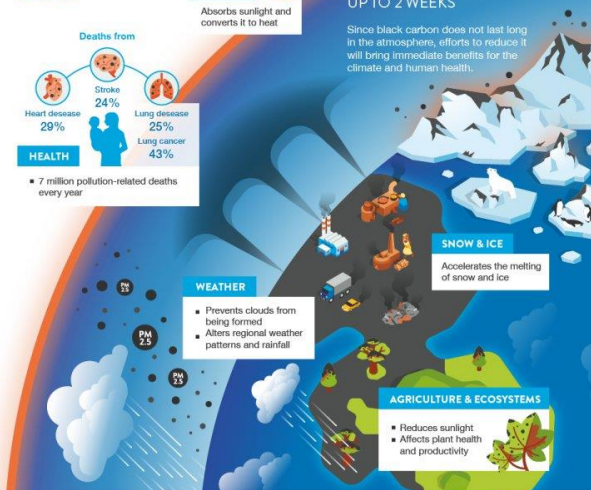
SOURCES

Black carbon is one of many particles and gases that are emitted when diesel, coal, and other biomass fuels are burned.



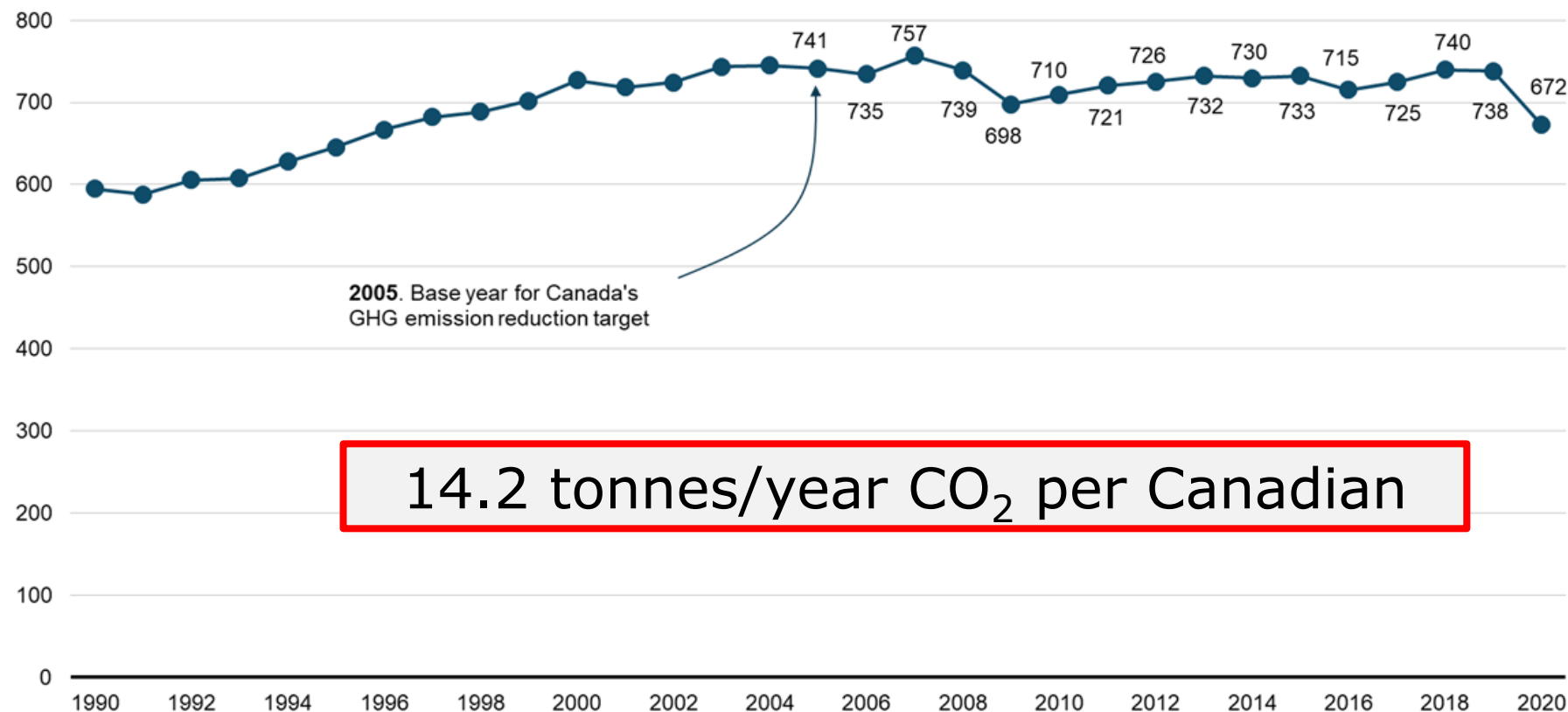
Black carbon, or soot, is part of fine particulate air pollution (PM_{2.5}) and contributes to climate change.

IMPACTS



www.ccacoalition.org/black-carbon

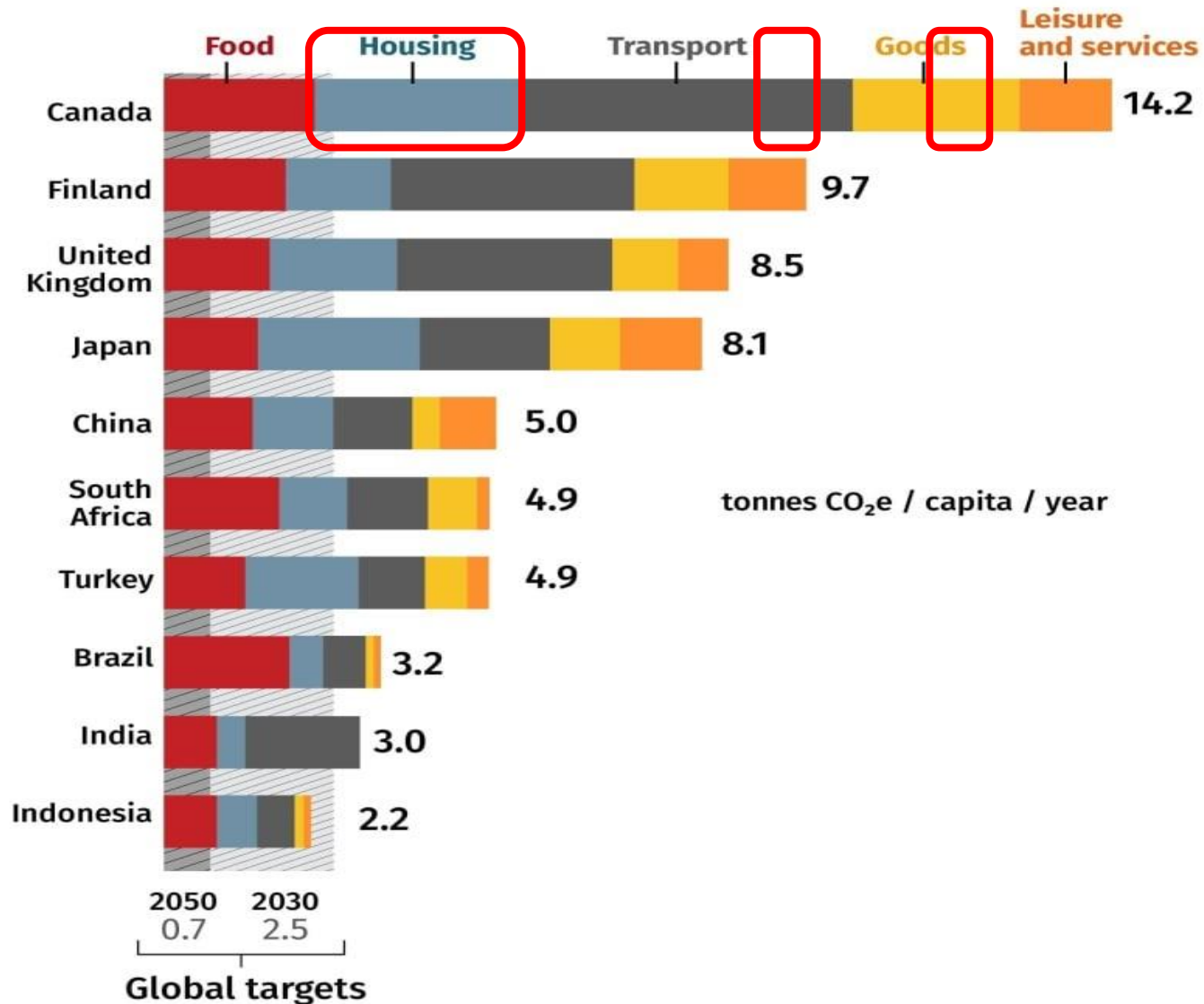
Megatonnes of carbon dioxide equivalent



www.canada.ca/environmental-indicators

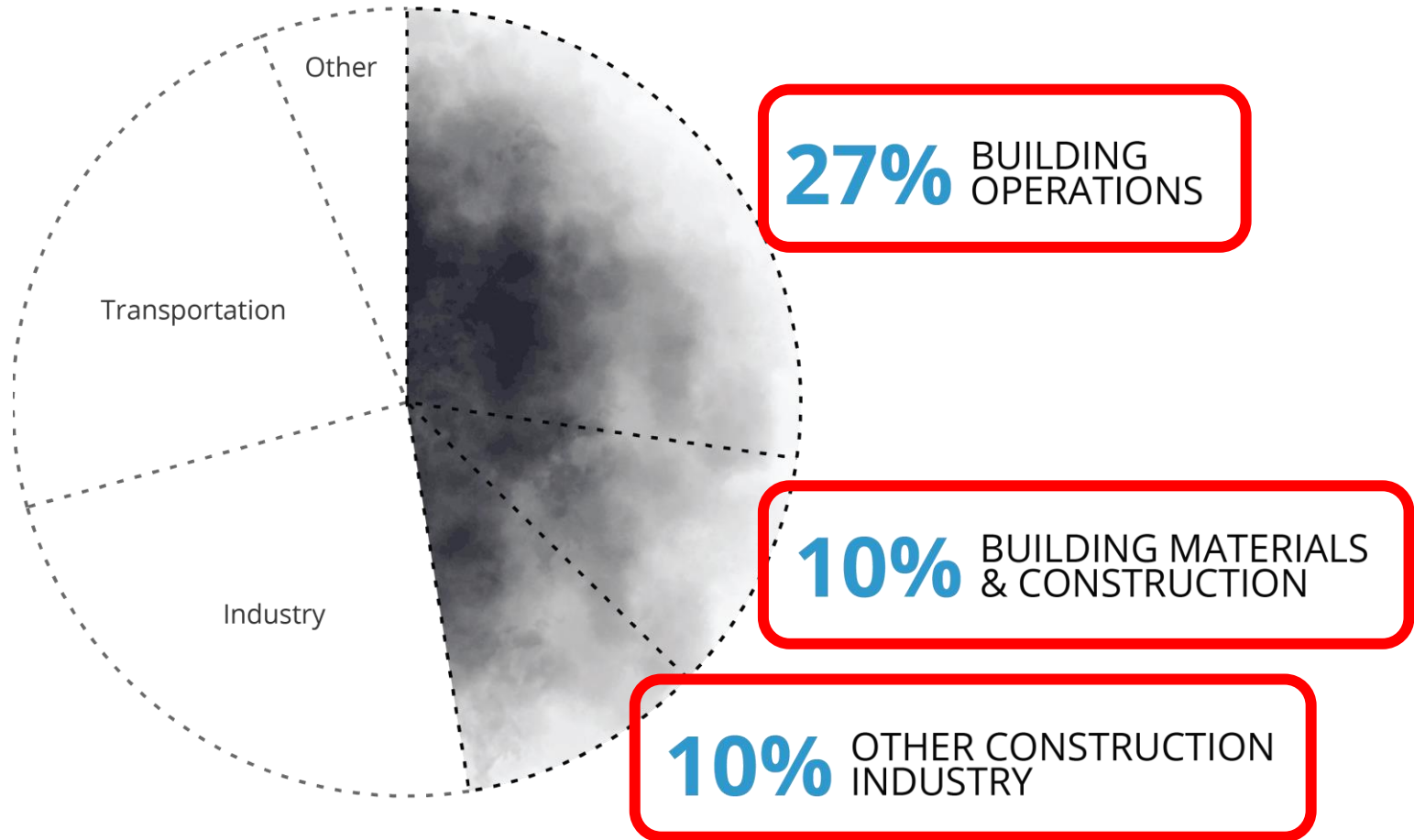


Total per-capita carbon footprint by country and sector



How do buildings fit in?

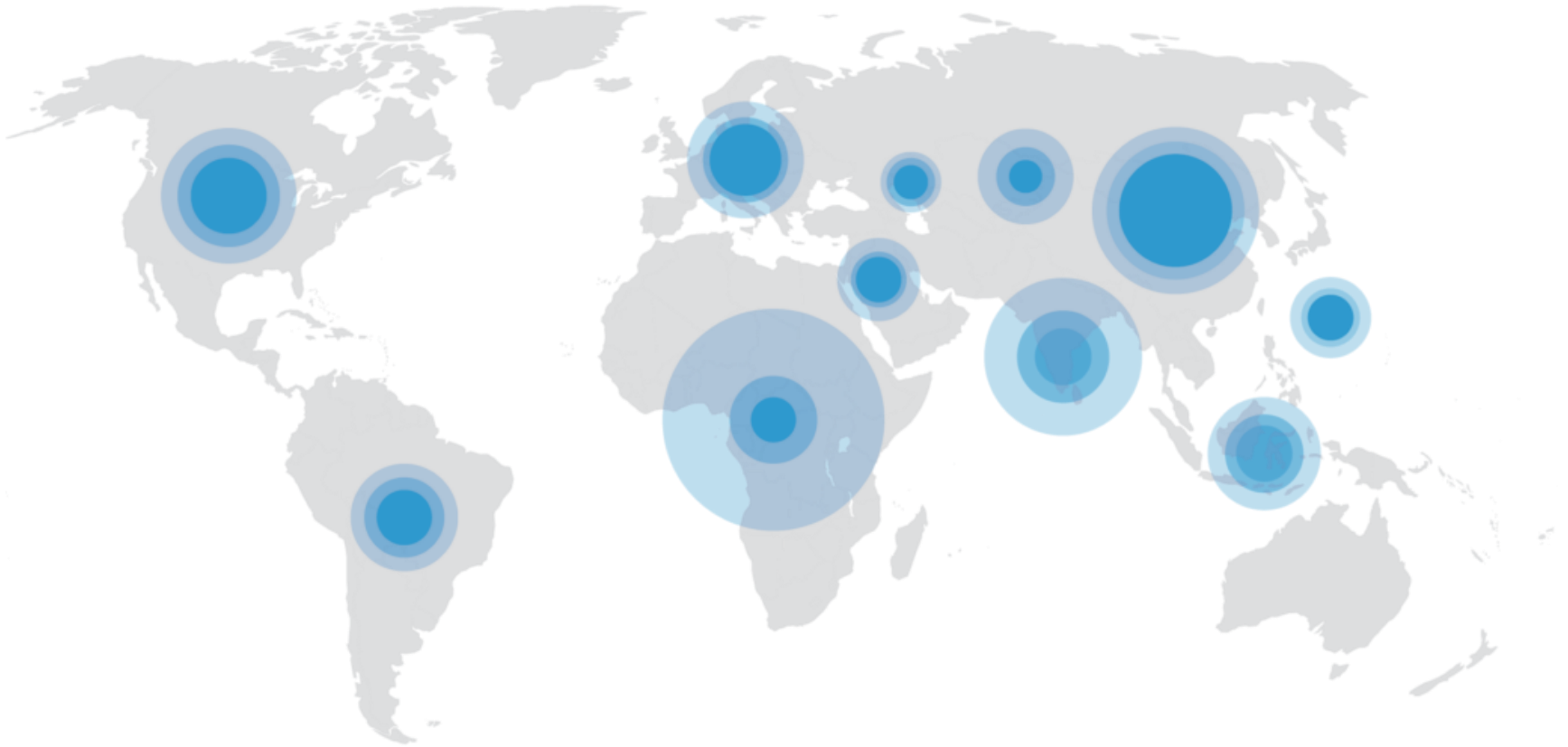
Annual Global CO₂ Emissions



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Data Sources: Global ABC Global Status Report 2021, EIA



Global building floor area
is expected to **double** by 2060.



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Data Sources: Global ABC, Global Status Report 2017

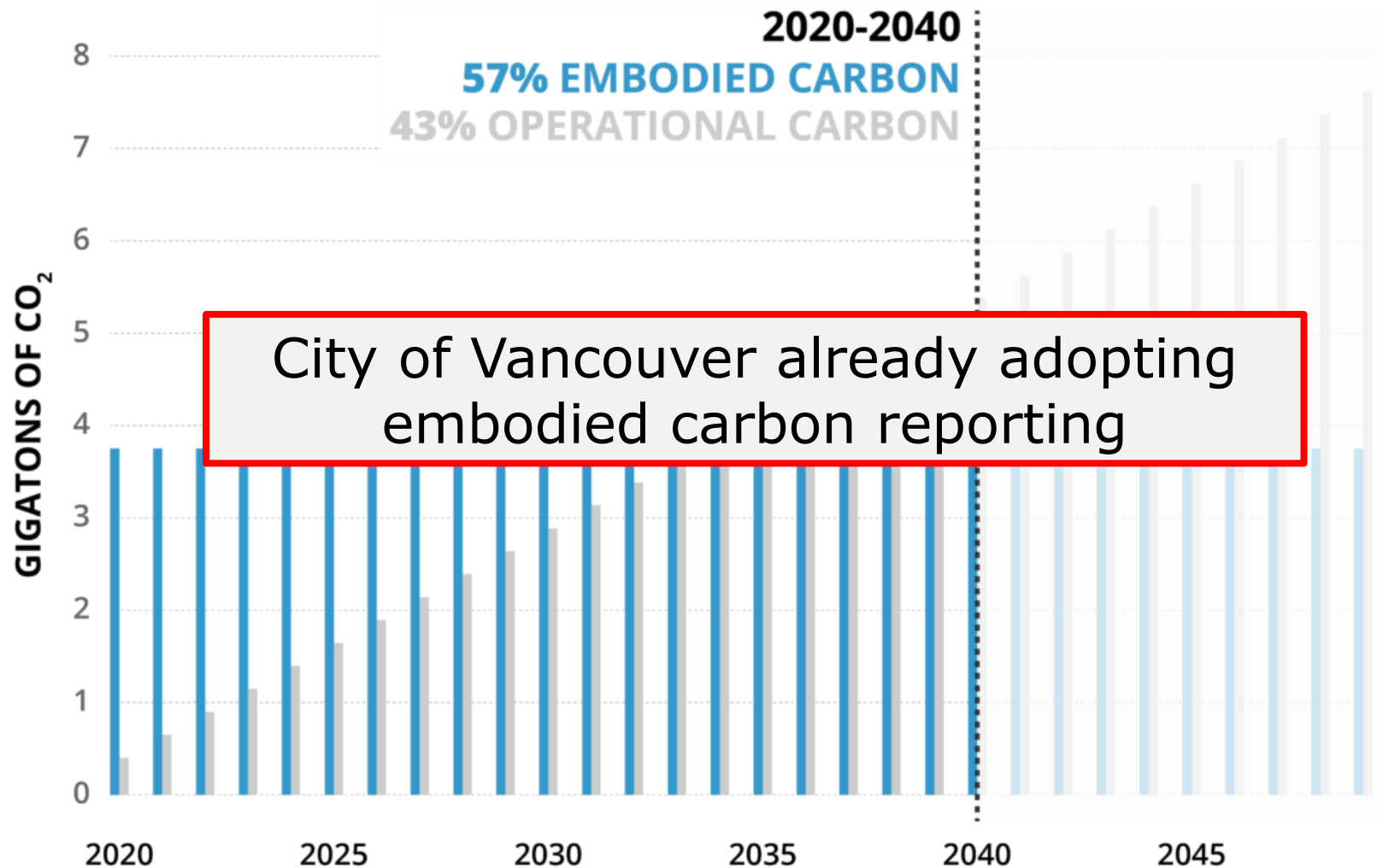
In 2040, **2/3 of the global building stock** will be buildings that exist today.
Without upgrades, they will still be emitting GHGs.



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Data Source: IEA Energy Technology Perspectives 2020, February 2021 Revised Edition

Total Carbon Emissions of **Global New Construction** *with no building sector interventions*

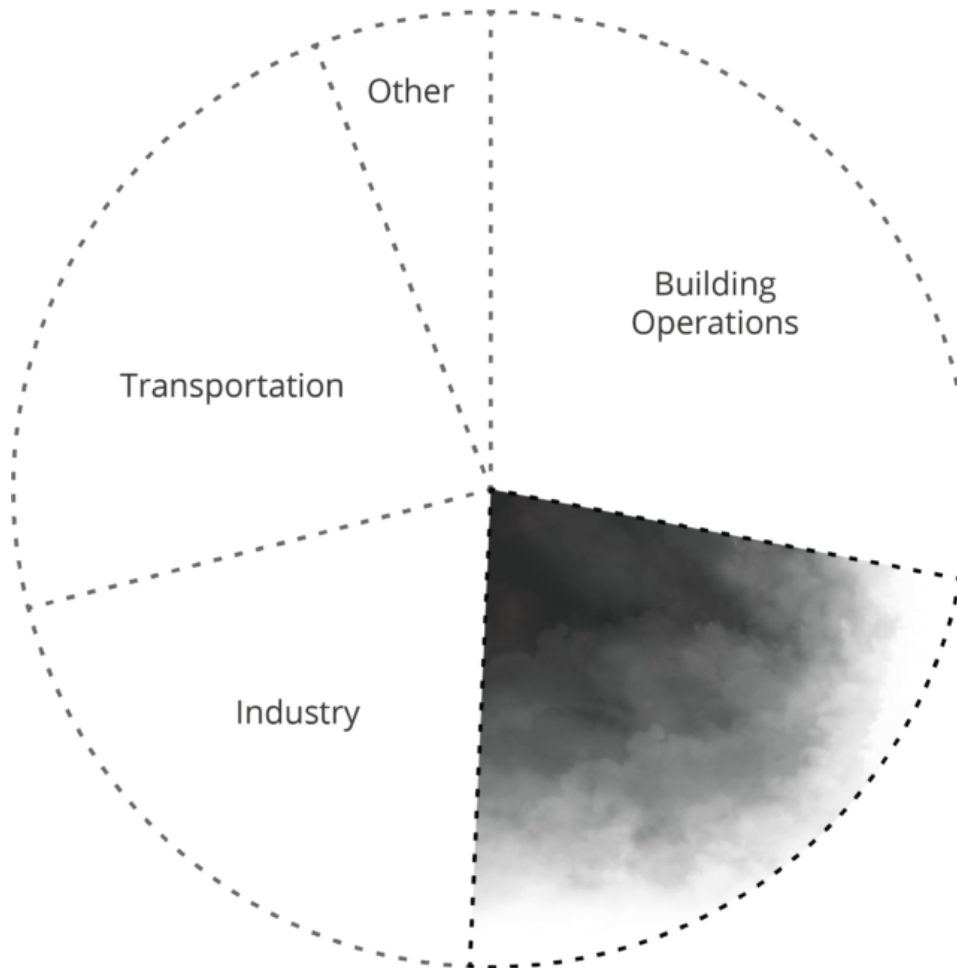


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Data Sources: UN Environment Global Status Report 2017; EIA International Energy Outlook 2017



Annual Global CO₂ Emissions



23%

Concrete (11%)

Steel (10%)

Aluminum (2%)

Insulation?

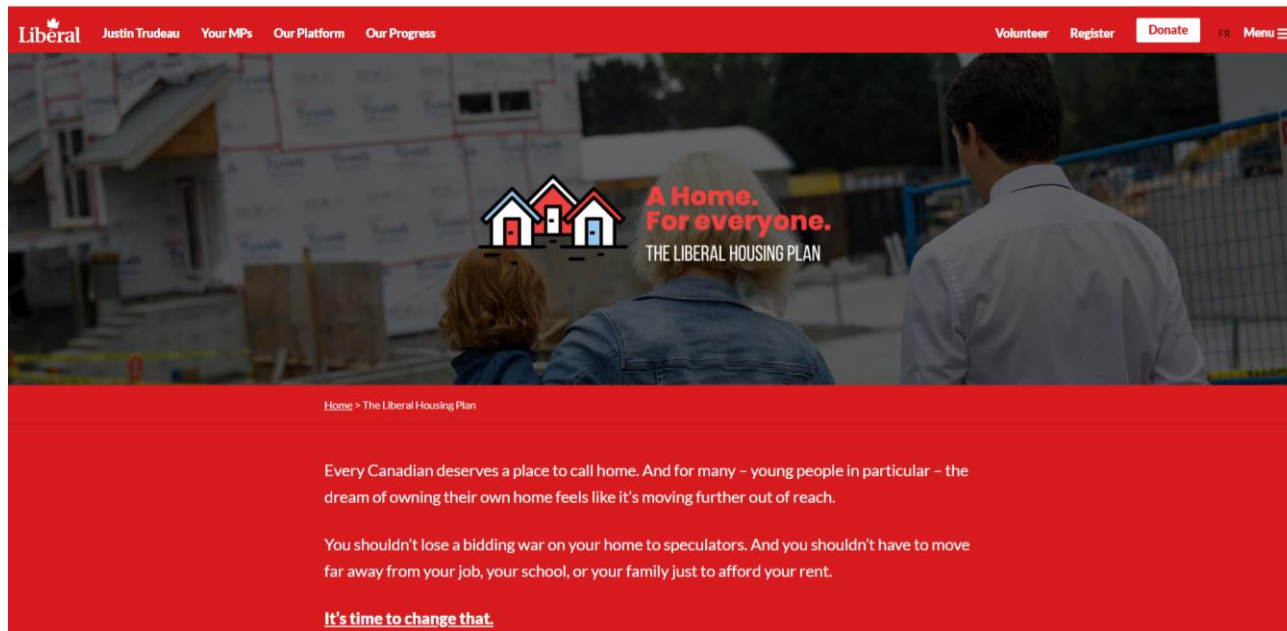
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Data Sources: Global ABC Global Status Report 2018, EIA



Buildings are a big part of the issue:

- buildings consume a lot of energy (40%)
- carbon emissions come from energy consumed
- building materials contain/represent “embodied carbon”
- there are many inefficient existing homes, using significant amounts of energy and generating GHGs
- we need to build a lot more homes (apparently)



What are the solutions:

- BC Energy Step Code in place to reduce energy consumption
- up to 80% energy savings by 2032
- carbon emissions limits coming- end of 2022? “GHGi”
- Step Code for renovations of existing houses?



ENERGY
STEPCODE
BUILDING BEYOND THE STANDARD

What are the solutions, con't:

- requirements for calculations of embodied carbon, from building materials
- fuel switching, to electricity, or renewable natural gas
- significant incentive programs to encourage owners of existing houses to upgrade efficiency and/or fuel switch?



Going forward to learn more:

- talk to your Energy Advisor about carbon calculations; GHGi most likely coming next
- “carbon benchmark” your current operations
- seminars on carbon: City of New Westminster, HAVAN/CHBA BC, BCIT, etc
- look for opportunities where you can make carbon reduction work for you:
 - municipal incentives
 - green building programs
 - promote your efforts- home buyers are starting to look



Where are things going (my thoughts):

- significant improvements to the performance/energy efficiency of buildings
- Energy Advisors to generate operational carbon calculations
- Energy Advisors can use embodied carbon calculator tool (MCE2 by NRCan) with HOT2000
- more use of heat pumps:
 - “clean” electricity, energy savings and cooling
- more use of wood as a building material
- fuel switching of regular natural gas to renewable natural gas



Summary:

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Questions?

Thank you!

