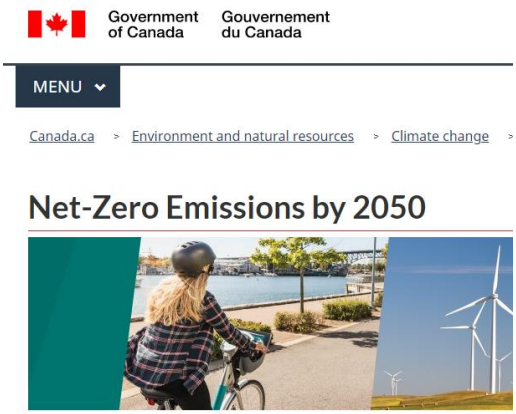
1

2

NRCan's Material Carbon Emissions Estimator (MCE²) Tool

- Free tool to help builders understand the first carbon impacts of their homes
- Can help inform your product selections



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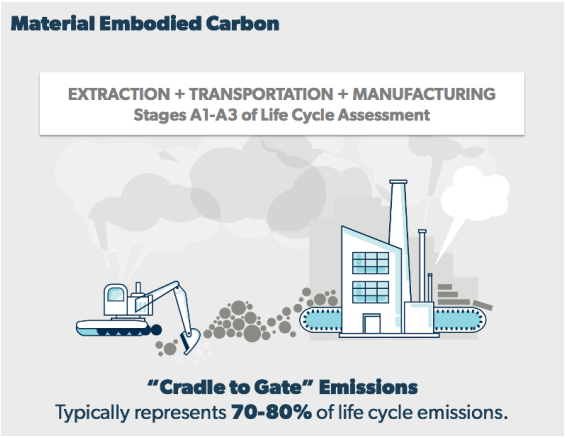
What does this calculator do?



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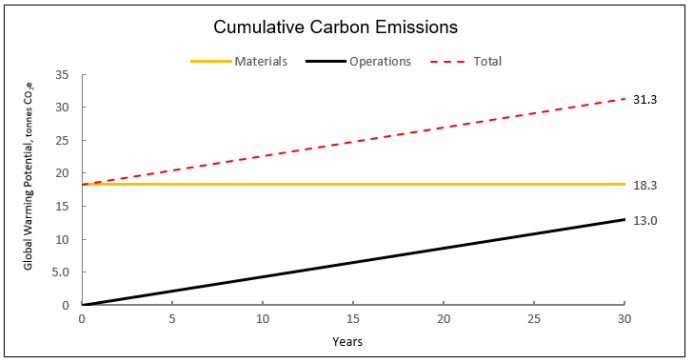
What do results look like?

- Depending on location and fuel source, embodied emissions can rival operational emissions.
- Material selection matters!

PROJECT EMISSIONS TIMELINE



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What do results look like?

- Can help you hone in on the most impactful areas of your project

TOP 10 MOST IMPACTFUL MATERIALS

Rank	kg CO_2e	Section	Material
1	12,075	Cladding	Brick, Clay, Generic Modular / Bri
2	5,897	Foundation Walls	Concrete - 0-25 MPa, Industry Ave
3	4,705	Foundation Walls	XPS foam board - AVERAGE (exc
4	2,564	Footings & Slabs	Concrete - 0-25 MPa, Industry Ave
5	2,243	Footings & Slabs	Concrete - 0-25 MPa, Industry Ave
6	1,969	Windows	Window - double pane / Vinyl fram
7	1,668	Garage	Brick, Clay, Generic Modular / Bri
8	993	Floors	Hardwood flooring - AVERAGE
9	978	Roof	EPDM Roofing Membrane / SPRI
10	940	Roof	Fiberglass loose fill - Roof Insulatic

Example case for illustration only

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2 minutes in the MCE²...

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April 2021

Material Carbon Emissions Estimator (MCE²)

Project Carbon Content

Step 1 **Import project data from HOT2000** (If no HOT2000 file, skip to Step 2)

Press Here to import HOT2000 Data

Clear All (User Input and all Assembly Tabs) | Clear This Sheet Only (User Input)

Energy Consumption / Energy Generation

Elec. kWh/yr	N. Gas m^3/yr	Elec. kWh/yr
8195	1781	0
Propane L/yr	**Oil L/yr**	**Wood kg/yr**
0	0	0

To override energy GHG intensities, use the Energy GHG tab.

Step 2 **Confirm or enter project information**

Address:	TRAILS	Province:	Ontario
City:	CLARINGTON	Postal code:	
Building Type:	Single Detached	Evaluation date:	7/26/2021
Storeys:	Two storeys	File ID:	
Year Built:	1990-99	File name:	
Heated Floor Area (above grade, m^2):	138.0		
Heated Floor Area (below grade, m^2):	72.5		
Heating Degree Days:	3890		

Operational Emissions

tonnes CO_2e / yr	t CO_2e / 30 yrs
3.7	110

Material Emissions

tonnes CO_2e	kg CO_2e / m^2
46.5	221

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Example 1 - OBC Embodied Carbon Scenarios

A **OBC Package A1 - Typical construction techniques and materials**

B **OBC Package A1 with lower carbon concrete, insulation materials, reduced high carbon cladding**

C **OBC Package A1 with low carbon cladding and carbon storing insulation**

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Example 1 - OBC Embodied Carbon Scenarios

A **OBC Package A1 - Typical construction techniques and materials**

Material Emissions

tonnes CO2e	kg CO2e / m2
46.5	221

B **OBC Package A1 with lower carbon concrete, insulation materials, reduced high carbon cladding**

tonnes CO2e	kg CO2e / m2
34.0	161

C **OBC Package A1 with low carbon cladding and carbon storing insulation**

tonnes CO2e	kg CO2e / m2
20.0	94.8

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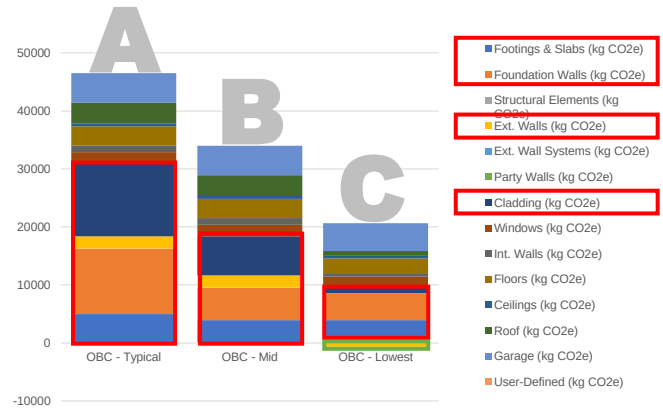
Example 1 - OBC Embodied Carbon Scenarios

A **Typical OBC Package A1**

B **OBC Package A1 with lower carbon concrete, insulation materials, reduced high carbon cladding**

C **OBC Package A1 with low carbon cladding and carbon storing insulation**



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Example 2 – NBC Tier 5, Embodied Carbon Scenarios

A **Tier 5 typical construction techniques and materials**

B **Tier 5 with lower carbon concrete, insulation materials, reduced high carbon cladding**

C **Tier 5 with low carbon cladding and carbon storing insulation**

Material Emissions

	tonnes CO2e	kg CO2e / m2
A	82.3	391
B	31.4	149
C	18.3	87.1

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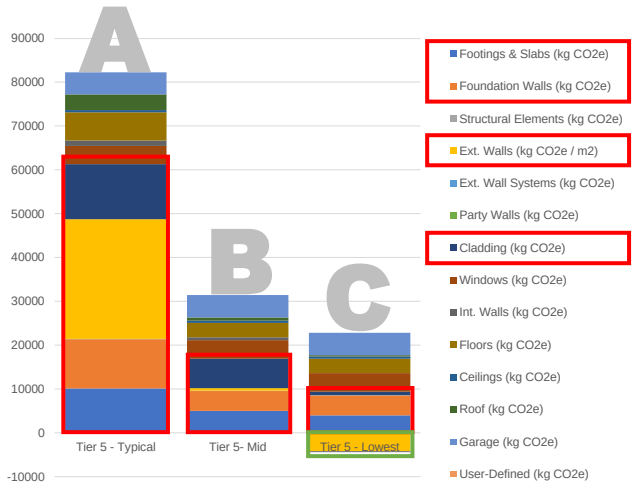
Example 2 – NBC Tier 5, Embodied Carbon Scenarios

A **Tier 5 typical construction techniques and materials**

B **Tier 5 with lower carbon concrete, insulation materials, reduced high carbon cladding**

C **Tier 5 with low carbon cladding and carbon storing insulation**



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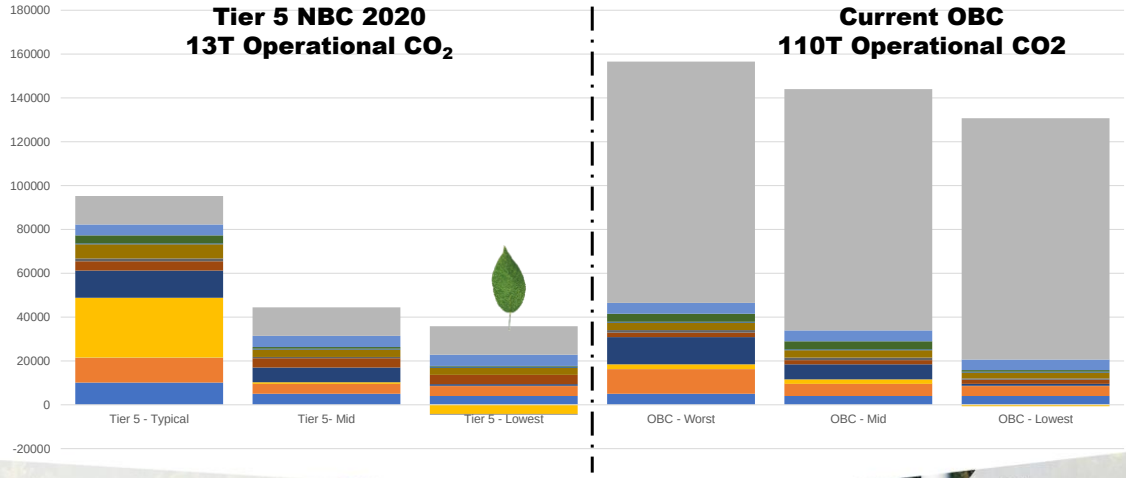
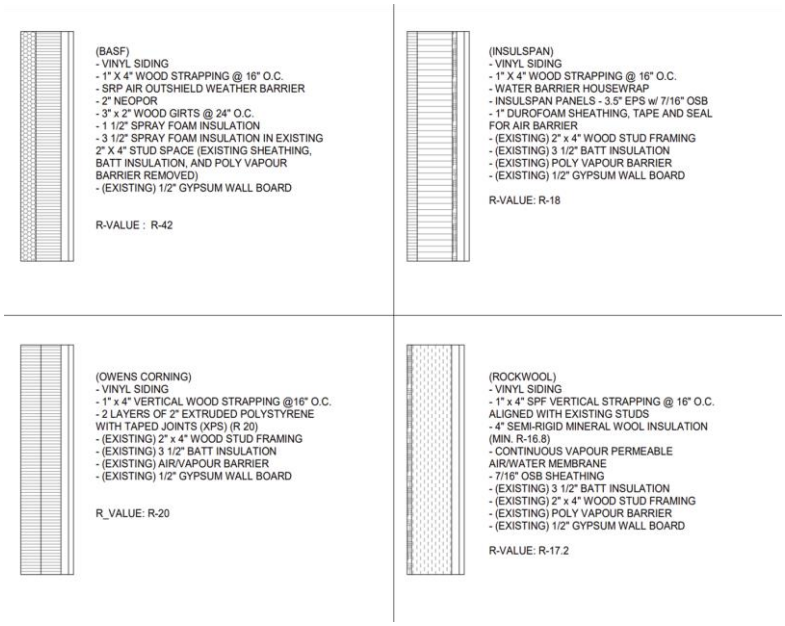
Examples 1 & 2 – 30 year CO_2 Outlook



WALL ASSEMBLIES

- **BASF (R-42)**
  - Spray Polyurethane Foam
- **Insulspan (R-18)**
  - SIP Panels
- **Owens Corning (R-20)**
  - Rigid Insulation
- **Rockwool (R-17)**
  - Mineral Fiber Insulation
- **Dryvit (R-20)**
  - Expanded Polystyrene Insulation



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BASF (R-42)

SECTION 12 → REVIEW — SELECTED MATERIALS — 9,093 | 10,958 | 1,865

SECTION	CATEGORY	MATERIAL	NET CARBON FOOTPRINT [kg CO_2e]	CARBON EMISSIONS [kg CO_2e]	CARBON STORAGE [kg CO_2e]
Footings & Slabs	SLAB FLOOR(S)	Concrete - 0-25 MPa, Industry Average Benchmark / CRMCA / Can. Avg.	87	87	0
Foundation Walls	FOUNDATION WALL CONTINUOUS INSULATION	Spray polyurethane foam - Closed Cell (HFO) / SPFA / / R 6.6/inch	542	542	0
Foundation Walls	INTERIOR FOUNDATION WALL CLADDING	Drywall 1/2" - AVERAGE	90	90	0
Structural Elements	HEAVY STEEL COMPONENTS	Steel post / Generic / / 3.5 x 0.216" (89 x 5.5 mm), Sched 40 STD	128	128	0
Ext. Walls	WOOD FRAME WALLS	Wood framing & siding - SPF / American Wood Council & Canadian Woo	111	111	0
Ext. Walls	STRUCTURAL SHEATHING	OSB sheathing / Huber / ZIP System / 7/16" Sheathing, protective barrie	360	360	0
Ext. Walls	CAVITY INSULATION	Spray polyurethane foam - Closed Cell (HFC) / SPFA / / R 6.6/inch	6,884	6,884	0
Ext. Walls	CONTINUOUS INSULATION (EXT. or INT.)	EPS foam board with graphite / BASF / Neopor / R 4.7/inch, Type II, 15 pc	411	411	0
Cladding	EXTERIOR CLADDING	Vinyl Siding / Vinyl Siding Institute / 0.040" Double 4.5"	484	484	0
Cladding	STRAPPING for RAIN SCREEN	Wood framing & siding - SPF / American Wood Council & Canadian Woo	16	16	0
Windows	TRIPLE PANE WINDOWS - GENERIC	Window - triple pane / Vinyl frame / / USA & CAN	1,238	1,238	0
Roof	WOOD FRAME ROOF	Wood framing & siding - SPF / American Wood Council & Canadian Woo	19	19	0
Roof	ROOF DECKING	OSB sheathing / American Wood Council & Canadian Wood Council / / I	19	19	0
Roof	ROOF STRAPPING	Wood framing & siding - SPF / American Wood Council & Canadian Woo	1	1	0
Roof	ROOF INSULATION	Spray polyurethane foam - Closed Cell (HFC) / SPFA / / R 6.6/inch	161	161	0
Roof	ROOF INSULATION	Cellulose - Roof Insulation - AVERAGE	-1,457	408	1,865

INSULSPAN (R-18)

SECTION 12 → REVIEW — SELECTED MATERIALS — 2,573 | 4,438 | 1,865

SECTION	CATEGORY	MATERIAL	NET CARBON FOOTPRINT [kg CO_2e]	CARBON EMISSIONS [kg CO_2e]	CARBON STORAGE [kg CO_2e]
Footings & Slabs	SLAB FLOOR(S)	Concrete - 0-25 MPa, Industry Average Benchmark / CRMCA / Can. Avg.	87	87	0
Foundation Walls	FOUNDATION WALL CONTINUOUS INSULATION	Spray polyurethane foam - Closed Cell (HFO) / SPFA / / R 6.6/inch	368	368	0
Foundation Walls	FOUNDATION WALL INSULATION	Mineral wool batt - Foundation Wall Insulation - AVERAGE	138	138	0
Foundation Walls	INTERIOR FOUNDATION WALL CLADDING	Drywall 1/2" - AVERAGE	90	90	0
Structural Elements	HEAVY STEEL COMPONENTS	Steel post / Generic / / 3.5 x 0.216" (89 x 5.5 mm), Sched 40 STD	128	128	0
Ext. Walls	STRUCTURAL SHEATHING	OSB sheathing / Huber / ZIP System / 7/16" Sheathing, protective barrie	360	360	0
Ext. Walls	CONTINUOUS INSULATION (EXT. or INT.)	EPS foam board - AVERAGE	932	932	0
Cladding	EXTERIOR CLADDING	Vinyl Siding / Vinyl Siding Institute / 0.040" Double 4.5"	484	484	0
Cladding	STRAPPING for RAIN SCREEN	Wood framing & siding - SPF / American Wood Council & Canadian Woo	16	16	0
Windows	TRIPLE PANE WINDOWS - GENERIC	Window - triple pane / Vinyl frame / / USA & CAN	1,238	1,238	0
Roof	WOOD FRAME ROOF	Wood framing & siding - SPF / American Wood Council & Canadian Woo	19	19	0
Roof	ROOF DECKING	OSB sheathing / American Wood Council & Canadian Wood Council / / I	19	19	0
Roof	ROOF STRAPPING	Wood framing & siding - SPF / American Wood Council & Canadian Woo	1	1	0
Roof	ROOF INSULATION	Spray polyurethane foam - Closed Cell (HFC) / SPFA / / R 6.6/inch	161	161	0
Roof	ROOF INSULATION	Cellulose - Roof Insulation - AVERAGE	-1,457	408	1,865

OWENS CORNING (R-20)

SECTION 12 → REVIEW — SELECTED MATERIALS — 3,785 | 5,650 | 1,865

SECTION	CATEGORY	MATERIAL	NET CARBON FOOTPRINT [kg CO_2e]	CARBON EMISSIONS [kg CO_2e]	CARBON STORAGE [kg CO_2e]
Footings & Slabs	SLAB FLOOR(S)	Concrete - 0-25 MPa, Industry Average Benchmark / CRMCA / Can. Avg.	87	87	0
Foundation Walls	FOUNDATION WALL CONTINUOUS INSULATION	Spray polyurethane foam - Closed Cell (HFO) / SPFA / / R 6.6/inch	368	368	0
Foundation Walls	FOUNDATION WALL INSULATION	Mineral wool batt / Rockwool / Safe'n'Sound, ComfortBatt / R 3.8/inch	68	68	0
Foundation Walls	INTERIOR FOUNDATION WALL CLADDING	Drywall 1/2" - AVERAGE	90	90	0
Structural Elements	HEAVY STEEL COMPONENTS	Steel post / Generic / / 3.5 x 0.216" (89 x 5.5 mm), Sched 40 STD	128	128	0
Ext. Walls	CONTINUOUS INSULATION (EXT. or INT.)	XPS foam board / Owens Corning / Foamular NGX 250 (New 2021) / R 5/i	2,574	2,574	0
Cladding	EXTERIOR CLADDING	Vinyl Siding / Vinyl Siding Institute / 0.040" Double 4.5"	484	484	0
Cladding	STRAPPING for RAIN SCREEN	Wood framing & siding - SPF / American Wood Council & Canadian Woo	16	16	0
Windows	TRIPLE PANE WINDOWS - GENERIC	Window - triple pane / Vinyl frame / / USA & CAN	1,238	1,238	0
Roof	WOOD FRAME ROOF	Wood framing & siding - SPF / American Wood Council & Canadian Woo	19	19	0
Roof	ROOF DECKING	OSB sheathing / American Wood Council & Canadian Wood Council / / I	19	19	0
Roof	ROOF STRAPPING	Wood framing & siding - SPF / American Wood Council & Canadian Woo	1	1	0
Roof	ROOF INSULATION	Spray polyurethane foam - Closed Cell (HFC) / SPFA / / R 6.6/inch	161	161	0
Roof	ROOF INSULATION	Cellulose - Roof Insulation - AVERAGE	-1,457	408	1,865

ROCKWOOL (R-17)

SECTION 12 → REVIEW — SELECTED MATERIALS — 2,356 | 4,221 | 1,865

SECTION	CATEGORY	MATERIAL	NET CARBON FOOTPRINT [kg CO_2e]	CARBON EMISSIONS [kg CO_2e]	CARBON STORAGE [kg CO_2e]
Footings & Slabs	SLAB FLOOR(S)	Concrete - 0-25 MPa, Industry Average Benchmark / CRMCA / Can. Avg.	87	87	0
Foundation Walls	FOUNDATION WALL CONTINUOUS INSULATION	Spray polyurethane foam - Closed Cell (HFO) / SPFA / / R 6.6/inch	368	368	0
Foundation Walls	FOUNDATION WALL INSULATION	Mineral wool batt / Rockwool / Safe'n'Sound, ComfortBatt / R 3.8/inch	68	68	0
Foundation Walls	INTERIOR FOUNDATION WALL CLADDING	Drywall 1/2" - AVERAGE	90	90	0
Structural Elements	HEAVY STEEL COMPONENTS	Steel post / Generic / / 3.5 x 0.216" (89 x 5.5 mm), Sched 40 STD	128	128	0
Ext. Walls	STRUCTURAL SHEATHING	OSB sheathing / Huber / ZIP System / 7/16" Sheathing, protective barrie	360	360	0
Ext. Walls	CONTINUOUS INSULATION (EXT. or INT.)	Mineral wool board / Rockwool / Rockboard 60 / R 4.3/inch	785	785	0
Cladding	EXTERIOR CLADDING	Vinyl Siding / Vinyl Siding Institute / 0.040" Double 4.5"	484	484	0
Cladding	STRAPPING for RAIN SCREEN	Wood framing & siding - SPF / American Wood Council & Canadian Woo	16	16	0
Windows	TRIPLE PANE WINDOWS - GENERIC	Window - triple pane / Vinyl frame / / USA & CAN	1,238	1,238	0
Roof	WOOD FRAME ROOF	Wood framing & siding - SPF / American Wood Council & Canadian Woo	19	19	0
Roof	ROOF DECKING	OSB sheathing / American Wood Council & Canadian Wood Council / / I	19	19	0
Roof	ROOF STRAPPING	Wood framing & siding - SPF / American Wood Council & Canadian Woo	1	1	0
Roof	ROOF INSULATION	Spray polyurethane foam - Closed Cell (HFC) / SPFA / / R 6.6/inch	161	161	0
Roof	ROOF INSULATION	Cellulose - Roof Insulation - AVERAGE	-1,457	408	1,865

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NRCan's Material Carbon Emissions Estimator (MCE²)

Coming Soon!

- Available for free through the LEEP website soon
- Intuitive architecture, easy to navigate
- Provides key insights on overall carbon consumption
- Really fun activity for a Friday evening!!

https://www.nrcan.gc.ca/energy-efficiency/homes/local-energy-efficiency-partnerships-leep/leep-technology-guides/17346

https://makeagif.com/gif/chubby-checker-lets-twist-again-lyrics-AUzuvq

Thank you!

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