





HECC HOMESTAR EMBODIED CARBON CALCULATOR



THINK · TALK · CREATE CARBON TOOLS WEBINAR SERIES

Upcoming webinars

Webinar 5 Wednesday 8 June 12–1pm

LCAQuick





Previously

Carbon tools webinars

- LCAPlay
- CO₂RE tool
- Life cycle assessment an overview
- Carbon Challenge Science and Solutions webinars (March 2022)
- Carbon and the New Zealand construction industry
- Compliance and calculating building carbon footprints
- Carbon challenges
- Design and build a low-carbon dwelling

www.branz.co.nz/pubs/previous-webinars/







About us

Sam Archer, NZGBC

Albrecht Stoecklein, Design Navigator







Questions

Please feel free to ask questions by using the Chat feature

We will take questions at the end of the webinar

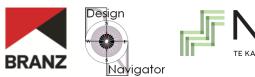




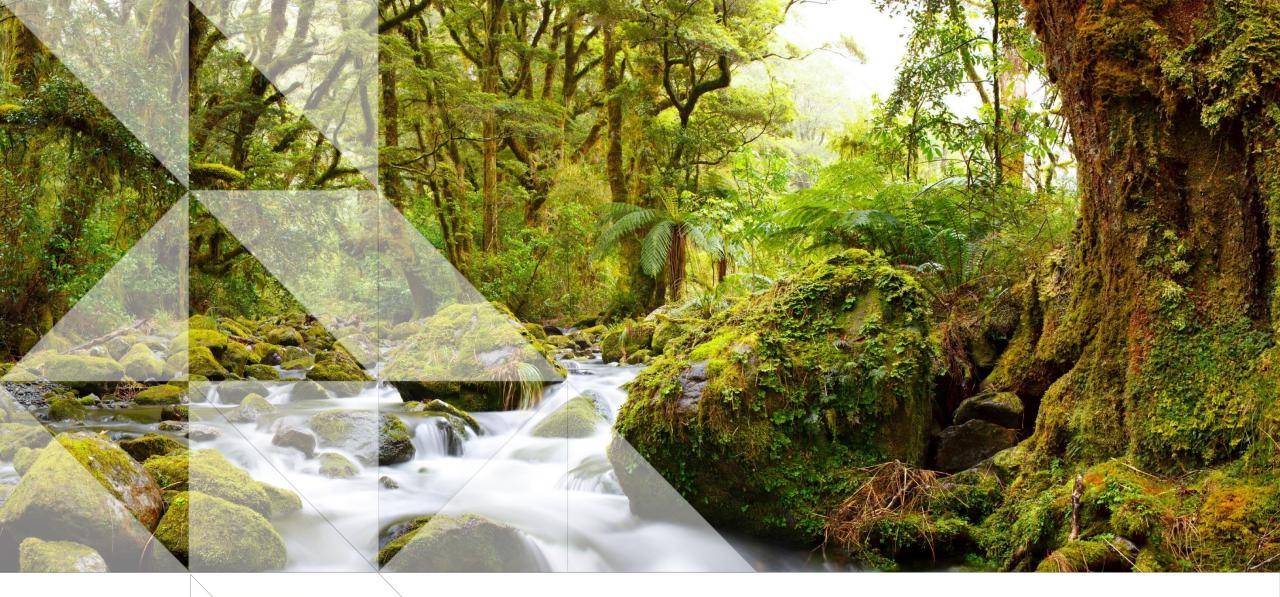
Programme

- Background to HECC
- HECC demonstration
- Q&A













esign







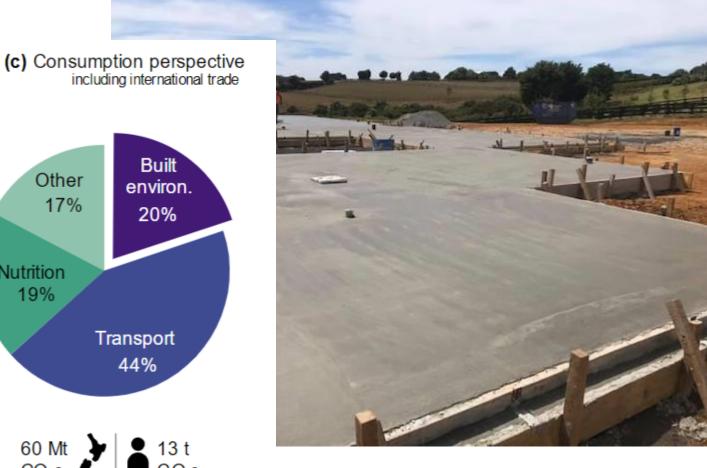
Nau mai, haere mai ki Aotearoa. Te kainga o Te Kaunihera Hanganga Tautaiao o Aotearoa.

H1 Introduction: Calculation Method



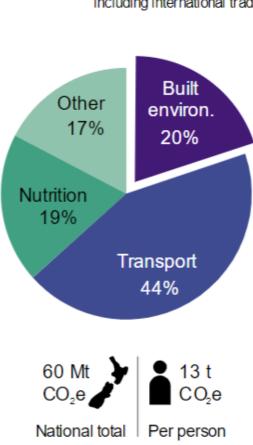


Embodied carbon



Background

10





Homestar v5

Background

11 —





v5 Technical Manual



Version 5.0.2 for public release Issue Date: 12 November 2021



Homestar v5





Version 5.0 for public release Issue Date: 25 August 2021



EN2: Embodied Carbon

Points Available	6					
Mandatory Minimums	8 Homestar and above: Projects must carry out a full cradle-to-cradle lifecycle assessment modules A-D of EN 15978.					
Aim	To reduce greenhouse gas emissions associated with products and materials used to construct a home.					
Project-wide	Yes	Calculator	Yes			



Government efforts

13 —

Building for Climate Change

	Initial Cap	Intermediate Cap	Final Cap
Operational Emissions Cap CO ₂ -e/(m ² .a) ¹²		ll be a reporting mechanism for onal emissions from the three o	
Fossil Fuel combustion emissions ¹³ CO ₂ -e/(m ² .a)	18	9	0
Electricity Use kWh/(m².a) ¹⁴	180	90	45
Thermal performance (demand) kWh/(m².a)	60	30	15
Services efficiency (delivered) kWh/ (m².a)	60	30	15
Water use l/p/d ¹⁵ (to be converted to m ³ / m ² based on occupancy of the building type)	145	110	75



The need to simplify

Building for Climate Change

Building firms grouped by new dwellings built (year to June

2017)

UNITS BUILT	NUMBER OF BUILDING COMPANIES	TOTAL NUMBER OF DWELLING UNITS BUILT	% OF ALL UNITS	AVERAGE UNITS PER BUILDER
>200	15	5,850	19%	390
101– 200	10	1,440	5%	144
51–100	40	2,800	9%	70
21–50	140	4,900	16%	35
11–20	230	3,680	12%	16
6–10	500	4,000	13%	8
1–5	3,100	7,780	26%	2.5
Totals	4,035	30,450	100%	7.5



...hard to use for non LCA professional...

Previous tools

Maxter Selection Panel: Controls of the results presented on this sheet: Graph D: Building Material Analysis for Life Cycle Stages AI -A3, B2, B4, CI -C4, & D. 1 Select Life Cycle Impact Inductor Select Life Cycle Stages (Nix Appled To Coph D A: AI Suges Sheet) Select Cife Cycle Stages (Nix Appled To Coph D A: AI Suges Sheet) 1 Select Life Cycle Stage (Nix Appled To Coph D A: AI Suges Sheet) Select Cife Cycle Stages (Nix Appled To Coph D A: AI Suges Sheet) 1 Select Results Normalisation Unix Select Results Normalisation Unix Select Results Normalisation Unix 3 Select Results Normalisation Unix Select Results Normalisation Unix Select Results Normalisation Unix 1 Select Results Normalisation Unix Select Results Normalisation Unix Select Results Normalisation Unix 1 Select Results Normalisation Unix Select Results Normalisation Unix Select Results Normalisation Unix 1 Select Results Normalisation Unix Select Results Normalisation Unix Select Results Normalisation Unix 1 Select Results Normalisation Unix Select Results Normalisation Unix Select Results Normalisation Unix 1 Select Results Normalisation Unix Select Results Normalisation Unix Select Results Normalisation Unix 1 Select Graph D in not controlled by selections nonel 2.	6				BUILD	DINGM	ATERIALS ANALYSIS		
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Reforced concrete, 30 MS, in site, sc. 100 kg/m3 date individing, (OPC) Almeane (and/off (a		3							
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Image: PR_25_71_14_5_11Auminium composite material (ACM) panet 4mm thuck N of Total Largest BiH Objects Containing Selected Material for Life Cycle Stage: A1-A3 kg CO2eq Material Impact N of Total Largest BiH 1 Phan Table Stad Wall (000, R22, RAB Bourd, Auminum Cadding E358-81 0.01 2 5_00mm Snel Stud Accounts: Wall (030, R22, RAB Bourd, Auminum Cadding E358-81 0.01 1 2 0.00 <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>									
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Image: Point of Specified Material in other SIM Objects Difference	stes	Building PR_25_7	Material (ALI) 1_14_5_1(Aluminium composite material (ACM) panel, 4mm thick		* N of Total	PR,25,7	g Material (ALL) 11,51,5,1,2(Aluminium (anodised finish, one side 0.02 mm), flat sheet	0.9mm BMT	N of Total
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Precast concrete, supply 20000001 (ALI) CBI Building Object (ALI) CBI Code: 3121 In situ concrete, structural Structural steel 119003.24 CBI Code: 3121 In situ concrete, structural Largest Contributing Materials in Selected CBI Object for Life Cycle Stage: AI-A3 kg CO2eq Material Imp	tes £6IM	Building PR_25_7 Largest	Material (ALI) 1.14, 5, 11 Aluminium composite material (ACM) panel, 4min thick BIH Objects Containing Selected Material for Life Cycle Stage: A1-A3 Pown Timber Stud Wal (2000_R22_RA8 Board_Aluminum Cladding Ex_90mm Sneel Stud Accountic Wall (2030 4.4-8.8m i for a study of the study	* kg CO2xq 2555-80 0.000-000-00 0.000-000-00 0.000-000-000-000-000-000-000-000-000-0	X of Total Material Impact 0.3% 0.0%	Top Ranking CB1	g Material (ALS) TI_51_5_1_2() Aluminium Janodised finish, one side 0.02 mm), flat sheet argest CBI Objects Containing Selected Material for Life Cycle Stages 1 - 2 - 3 - 4 - 5 - Impact of Specified Material is other C Table E: CBI Material Analysis: Materials Within ding Object (ALI) odes 3123 In situ concrete, structural st Costributing Materials in Selected CBI Object for Life Cycle Stages	0.9mm EMF I-A3 Bg CO2eq 0.000	N of Total Material Impac 0.0%
Precast concrete, stepply 7000031 In situ concrete, structural 312454-02 Structural steel 11902.24 Profiled metal sheet reaction 9000.30	tes £6IM	Building PR_25_7 Largest	Material (ALI) 1.14 (5, 1) Aluminium composite material (ACM) panel, 4min thick BIH Objects Containing Selected Material for Life Cycle Stage: A1-A3 Phen Tinber Stud Wal ((600, R22, RAB Sourd, Aluminium Cladding Ex_90min Steel Stud Accountic Wall ((350 4.4-8.5m) Example of Specified Material in other BIM Object Frecast concrete, supply In situ concrete, structural Structural steel 119023.24	* kg CO2xq 2555-80 0.000-000-00 0.000-000-00 0.000-000-000-000-000-000-000-000-000-0	X of Total Material Impact 0.3% 0.0%	Top Ranking CB1	g Material (ALL) TI_51_5_1_2 () Aluminium Janodised finish, one side 0.02 mm), flat sheet argest CBI Objects Containing Selected Material for Life Cycle Stages 1 - 2 - 3 - 4 - 5 - Impact of Specified Material is other C Table E: CBI Material Analysis: Materials Within ding Object (ALL) odes 3123 In situ concrete, structural st Contributing Materials in Selected CBI Object for Life Cycle Stages 1 Reinforced concrete, 25 MPs, in-situ, inc. 100 kg/m3 stael reinforcing, (0	0.9mm EMF I-A3 Bg CO2eq 0.000	N of Total Material Impac 0.0%
Precast concrete, supply In situ concrete, structural Structural steel 31264-02 CBI Godis 3121 In situ concrete, structural Structural steel 31264-02 V N of Total Largest Contributing Materials in Selected CBI Object for Life Cycle Stage: AI-A3 Sg CO2eq Material Imp 1 Reinforced concrete, 25 MPs, in-situ, inc. 100 ligits) steel reinforcing (OPC) 100005	ELS BIM	Building PR_25_7 Largest	Material (ALI) 1.14 (5, 1) Aluminium composite material (ACM) panel, 4min thick BIH Objects Containing Selected Material for Life Cycle Stage: A1-A3 Pown Tinber Stud Wall (9600_R22_RA8 Sourd_Aluminum Cladding Ex_90min Steel Stud Accountic Wall (9350 44-8.8mi a - Expect of Specified Material in other BIM Object Frecast concrete, supply In situ concrete, structural Structural steel Profiled metal sheet roofing 90306.88	* kg CO2xq 2555-80 0.000-000-00 0.000-000-00 0.000-000-000-000-000-000-000-000-000-0	X of Total Material Impact 0.3% 0.0%	Top Ranking CB1	g Material (ALL) TI_51_5_1_21 Aluminium Janodised Enish, one side 0.02 mm), Eat sheet argest CBI Objects Containing Selected Material for Life Cycle Stages 1 - 2 - 3 - 4 - 5 - Impact of Specified Material in other C Table E: CBI Material Analysis: Materials Within ding Object (ALL) ode: 3123 In situ concrete, structural st Contributing Materials in Selected CBI Object for Life Cycle Stages 1 Rainforced concrete, 25 MPs, in situ, inc. 100 kg/m3 stael reinforcing, (2 Rainforced concrete, 30 MPs, in situ, inc. 50 kg/m3 stael reinforcing, (0.9mm EMF I-A3 Bg CO2eq 0.000	X of Total Material Iropas 0.0% 0.0% 0.0% 0.0% 0.0% 0.0% 0.0%

5 Sand

1.80E+02

0.0%

0.0

15 —

At the material level...



C	$\begin{array}{c c} & \bullet \\ aste \\ \bullet \\ \bullet \\ \end{array} \end{array} \xrightarrow{\bullet} \\ B \\ I \\ \blacksquare \\ B \\ I \\ \blacksquare \\ I \\ I$	E = ≫ ~ cb E = ← → E ↔ ~		al Format as Cell y * Table * Styles Styles	e 🖂 2	∑ ~ A Z Z Sort & Find & Filter ~ Select ~ Editing	Analyze Data Analysis Sensitivit
C1	\downarrow \downarrow \downarrow \times \checkmark f_x						
	A	D	E	F	G	н	
1 2 3	Green Star Embodied Carbon Calculator Substructure						
4	Category	Material type	Matching material	Amount Unit	Source		Waste % (input) W
5	Slabs	Concrete	Reinforced concrete, 50 MPa, in-si	15 tonn	ne		15%
6	Piles						
7	Retaining Walls						
8	Other						
8 9 10 11							
10							
12							
16 13							
14							
14 15 16							

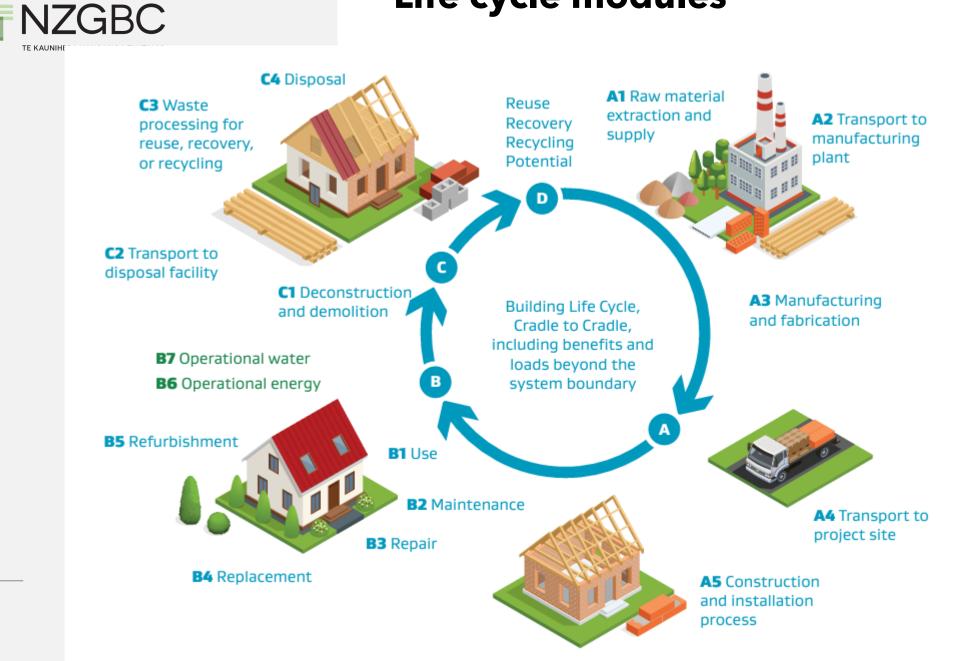


At the assembly level...

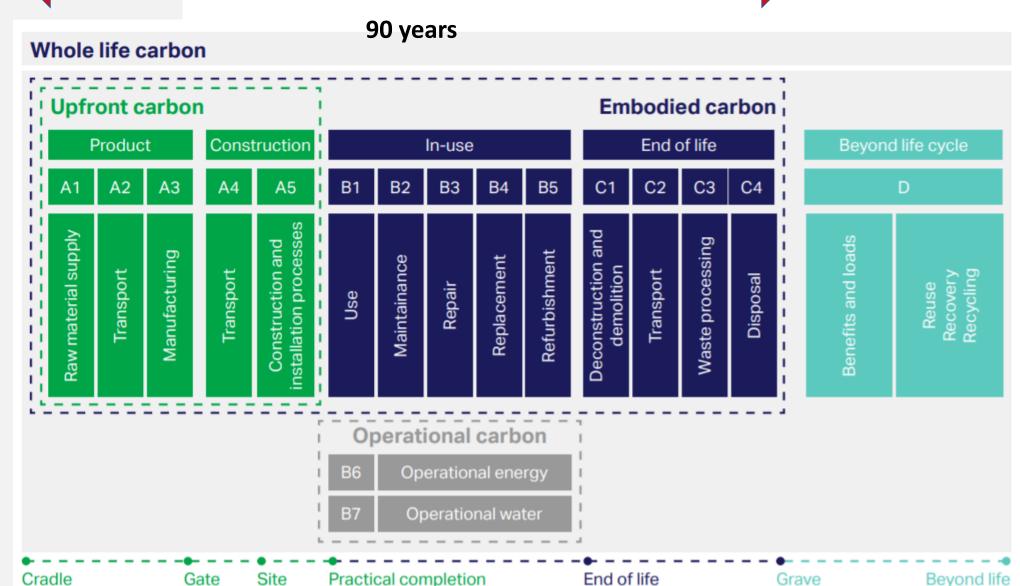
Roofs
Climate Change impact

3,426 kg CO₂ eq

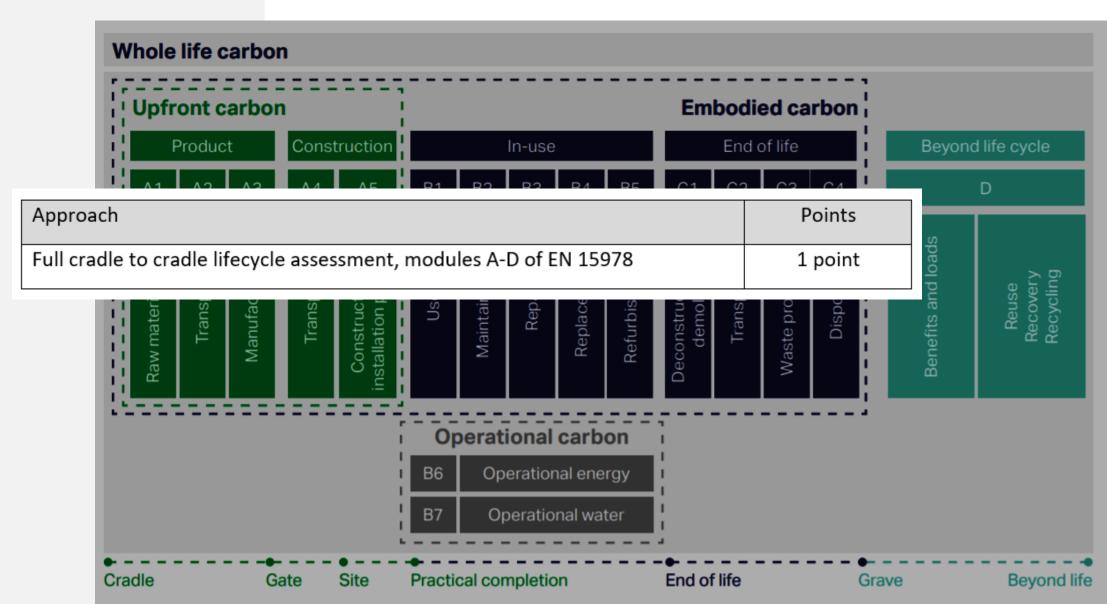
ID	Element Name	Туре	Description	Option	<i>Area</i> [<i>m</i> ²]
R1	Roof 1	Profiled steel	Low slope timber-framed, 190 mm rafters and battens	70 x 35 mm timber battens, insulation	100
R2	Roof 2		Pitched timber-f	ramed roof – R 3.3	
R3	Roof 3		corrugated iron cla 90 mm bottom ch		
R4	Roof 4		chord spacing 900 insulation with R-v		-
	17 —		Note that an insu of R 3.5 is require to get a roof R-va	ed in this example	













Kāinga pai ke atu, tūturi

Upfront emissions

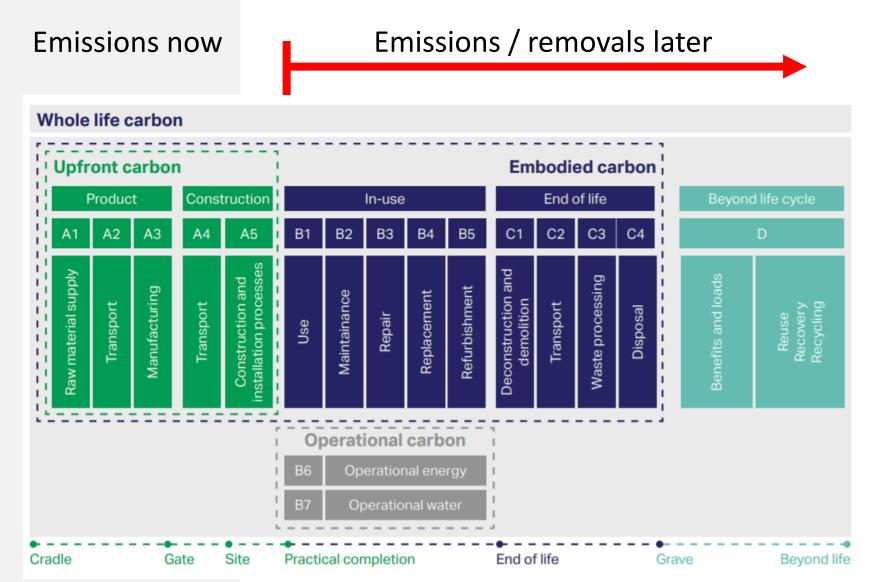
• Points awarded for reduction in upfront emissions (A1-A5)

	Percentage increase on emissions target	Materials and construction stage (A1-A5) emissions: kg.CO ₂ -e/m ²	Points
ka hon	<160%	156	1 point
v5 Technical M	<120%	132	2 points
	<80%	108	3 points
	<40%	84	4 points
Version 5.0 Issue Date:	NZ residential carbon budget required to limit global warming to 1.5°C.	60	5 points



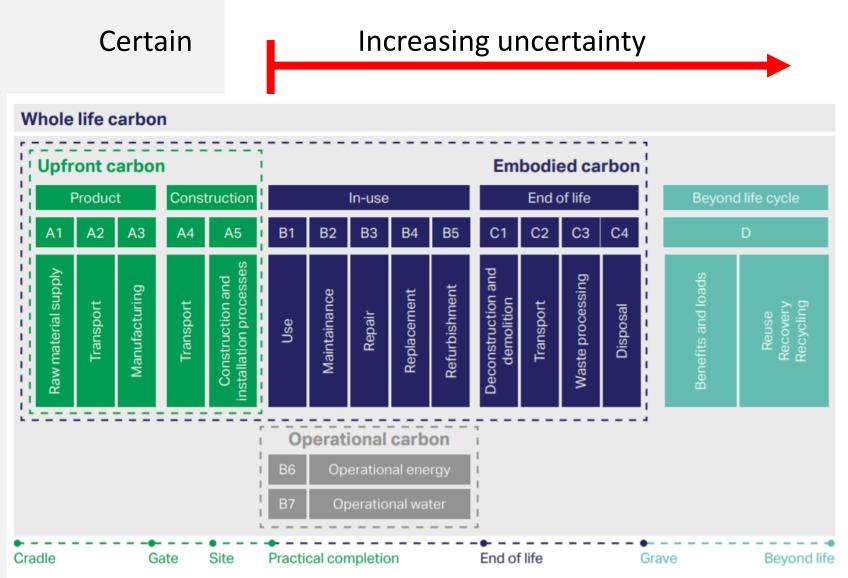
22

Why focus on upfront emissions?





Why focus on upfront emissions?

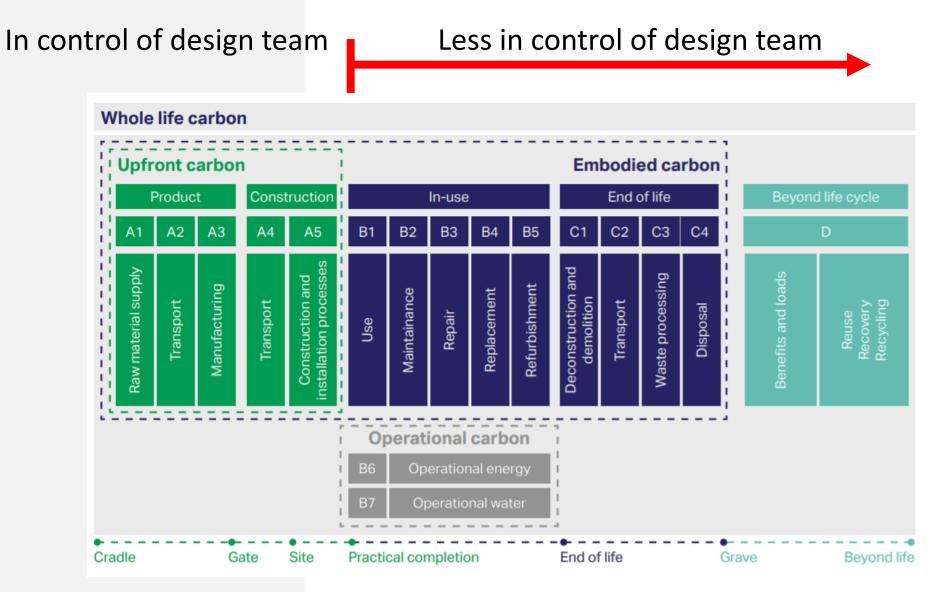


23 -

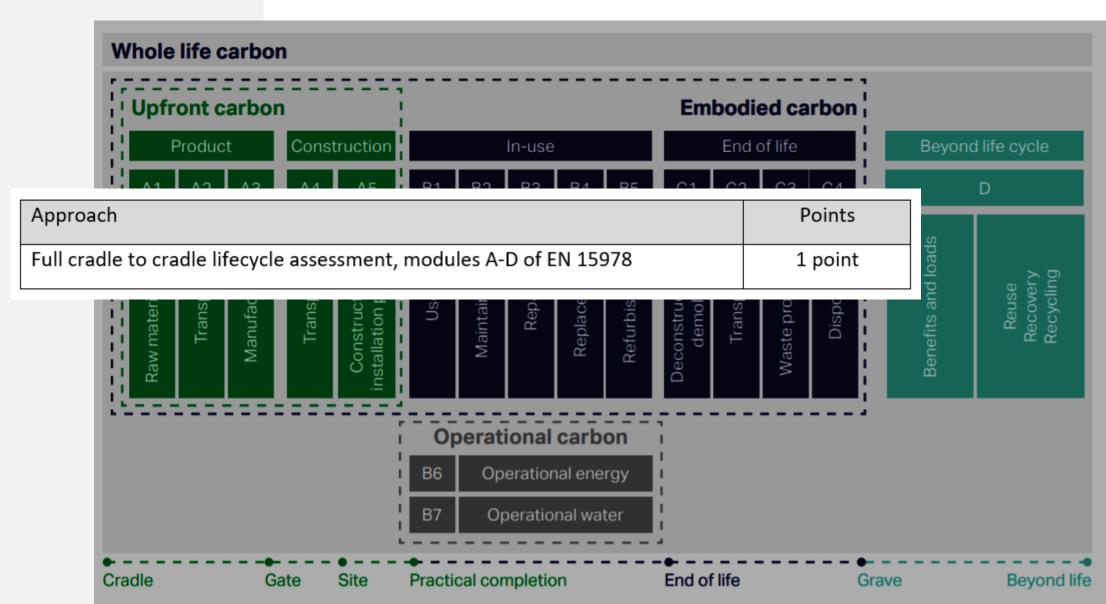


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Why focus on upfront emissions?

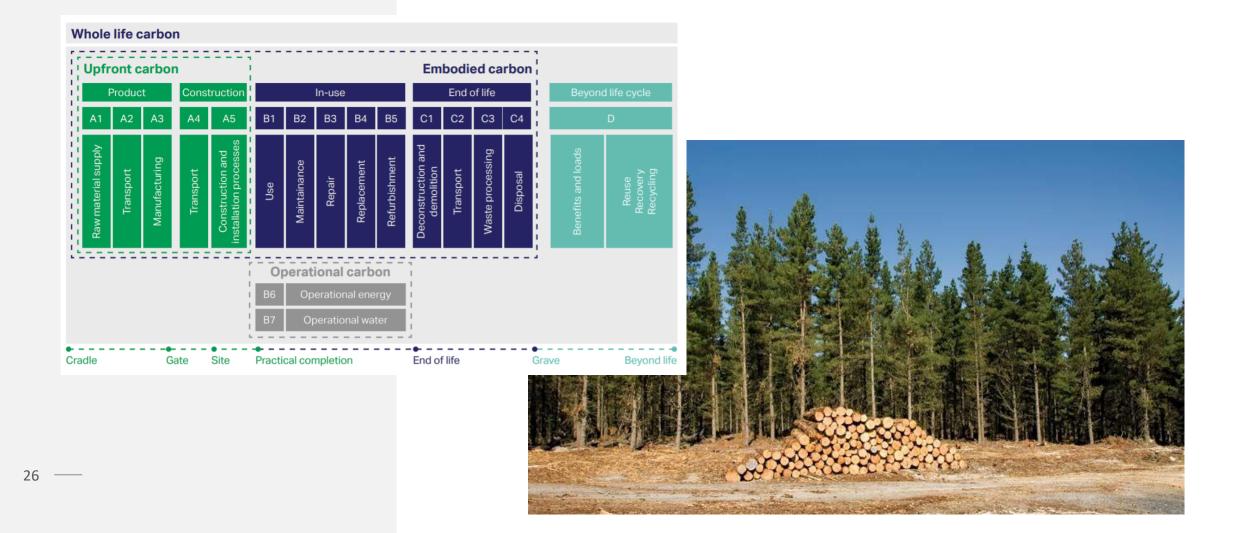








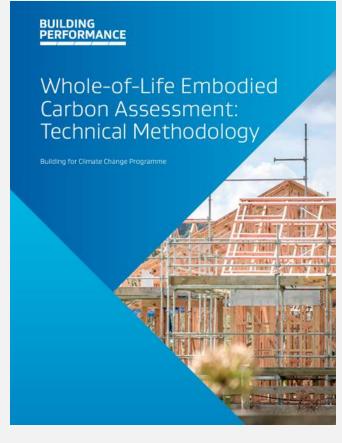
Biogenic carbon

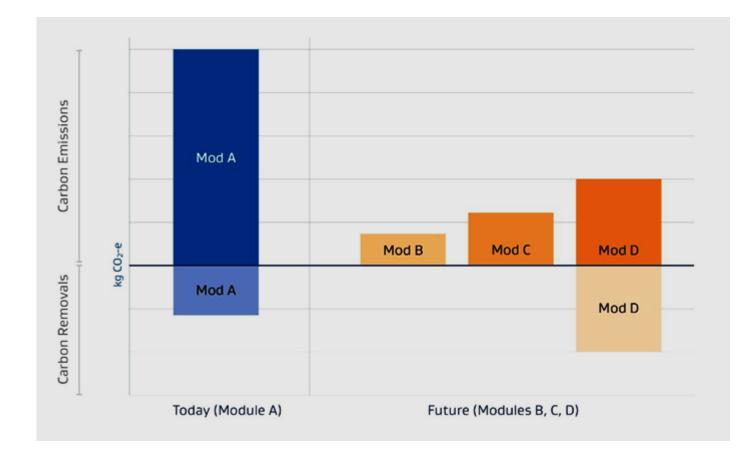




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MBIE reporting framework



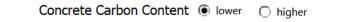




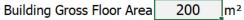
The Calculator

Summary Sheet

Options



External Walls



Roofs

Results

Total Climate Change Impact (A1-A5) Climate Change Impact Intensity

32,949 kg CO ₂ eq	
165 kg CO ₂ eq/m ²	

	Climate Change [kg CO2 eq]							
	A1-A5	В	С	D	Total			
Roofs	6,852	6,554	1,597	-2,808	12,196			
External Walls	2,506	3,628	2,165	-638	7,661			
Internal Walls	642	934	740	-95	2,222			
Windows	5,524	11,215	84	-4,002	12,821			
Ground Floors	13,087	0	1,601	-944	13,744			
Midfloors	0	0	0	0	0			
Floor Coverings	3,138	29,008	1,006	0	33,152			
PV	1,200	30	40	-100	1,170			
Total	32,949	51,370	7,233	- 8,587	82,965			

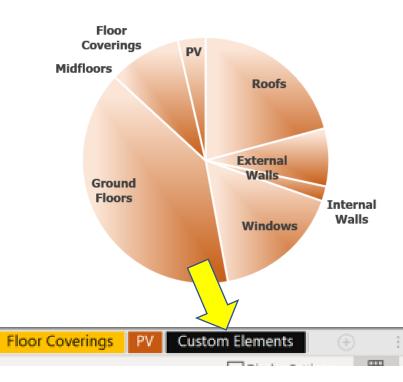
Windows

Internal Walls

Ground Floors

Midfloors





Summary



Updates...

+ Environmental Product Declaration

For ready-mixed concrete



In accordance with ISO 14025 and EN 15804+A1 for

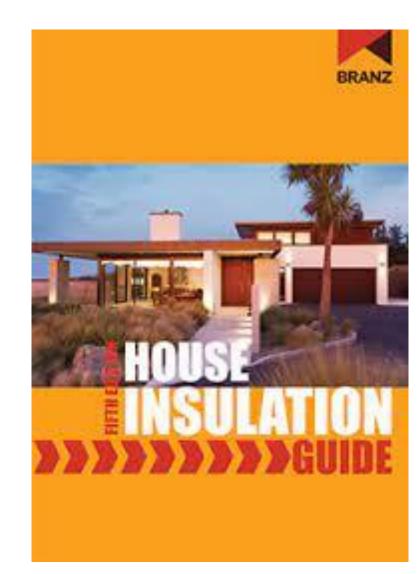
FIRTH CERTIFIED READY-MIXED CONCRETE

Programme EPD Australiana, www.epd-australiana.com Programme SPD Australiana Lod EPD registration number 5-P-02030 Publicem data 80,002,020 Valid unel. 80,002,020 Geographical scope GEPD New Zealand



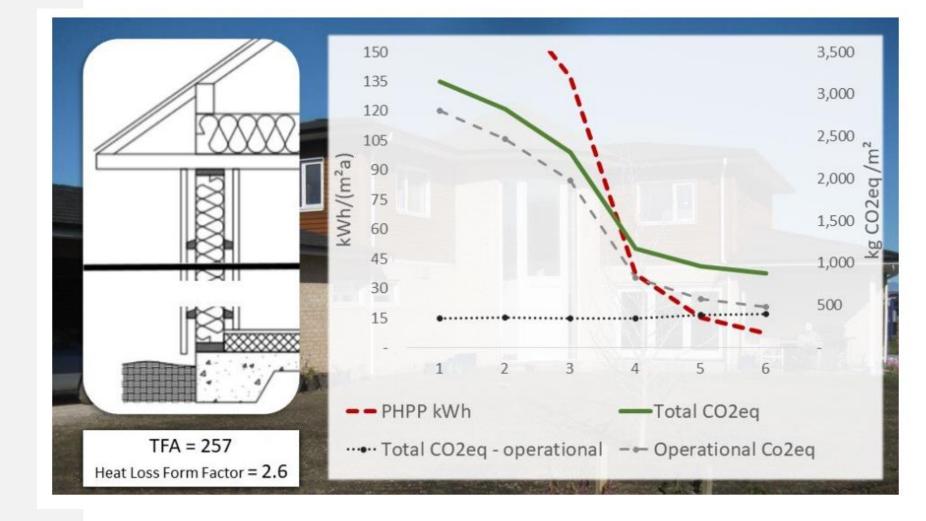
Firth

SEPTEMBER 2000



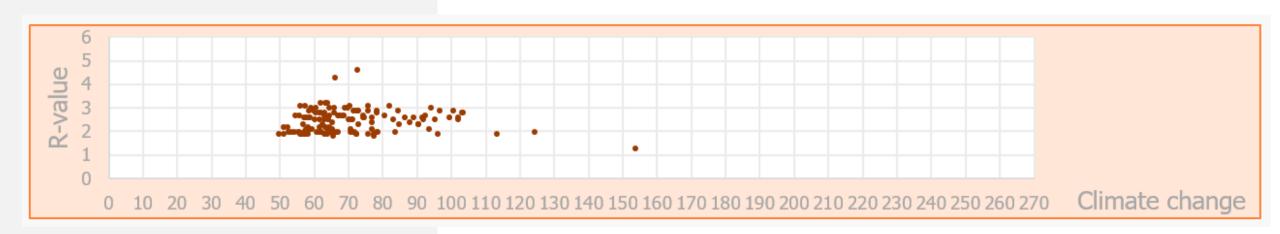


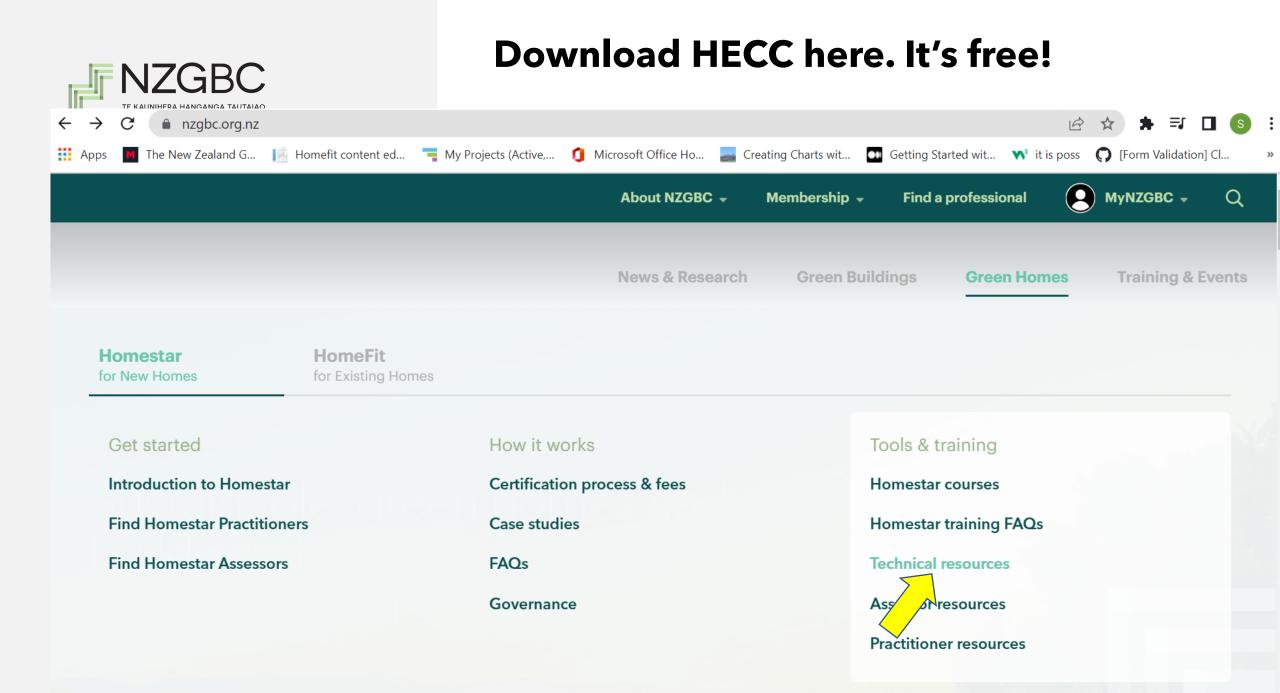
What about the full life cycle?





Correlation between R-value and embodied emissions...







All homes and buildings in Aotearoa

green and sustainable, making

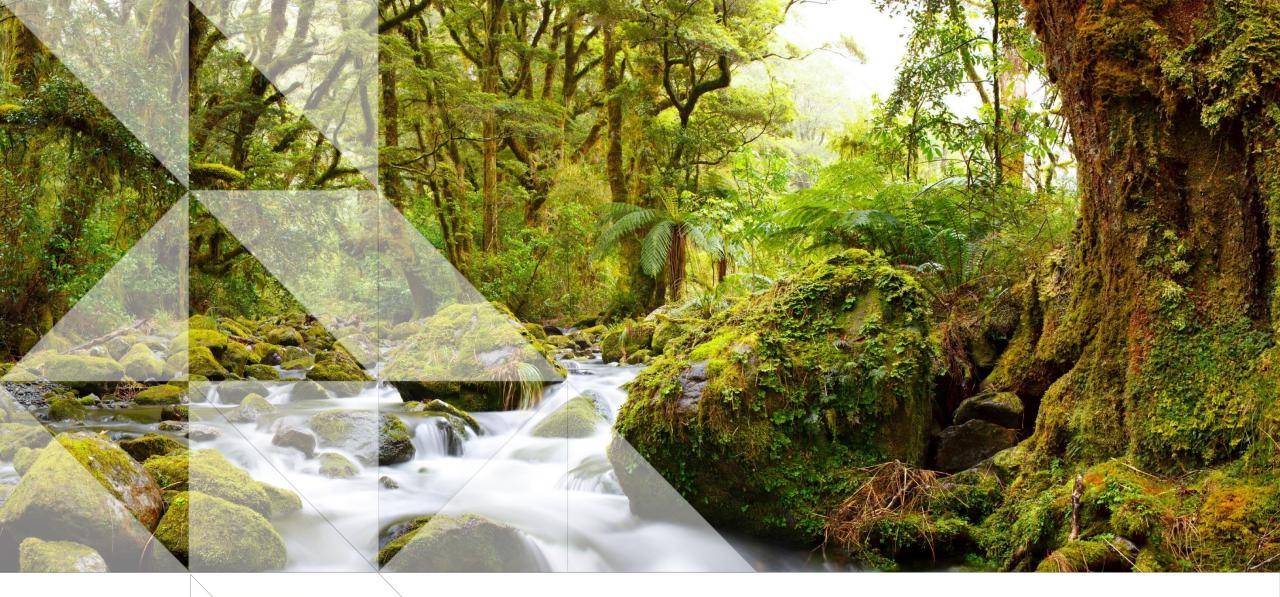
healthier, happier New Zealanders.















Design



