

CIBSE TM65: Embodied carbon of building services equipment

How to use it in ANZ

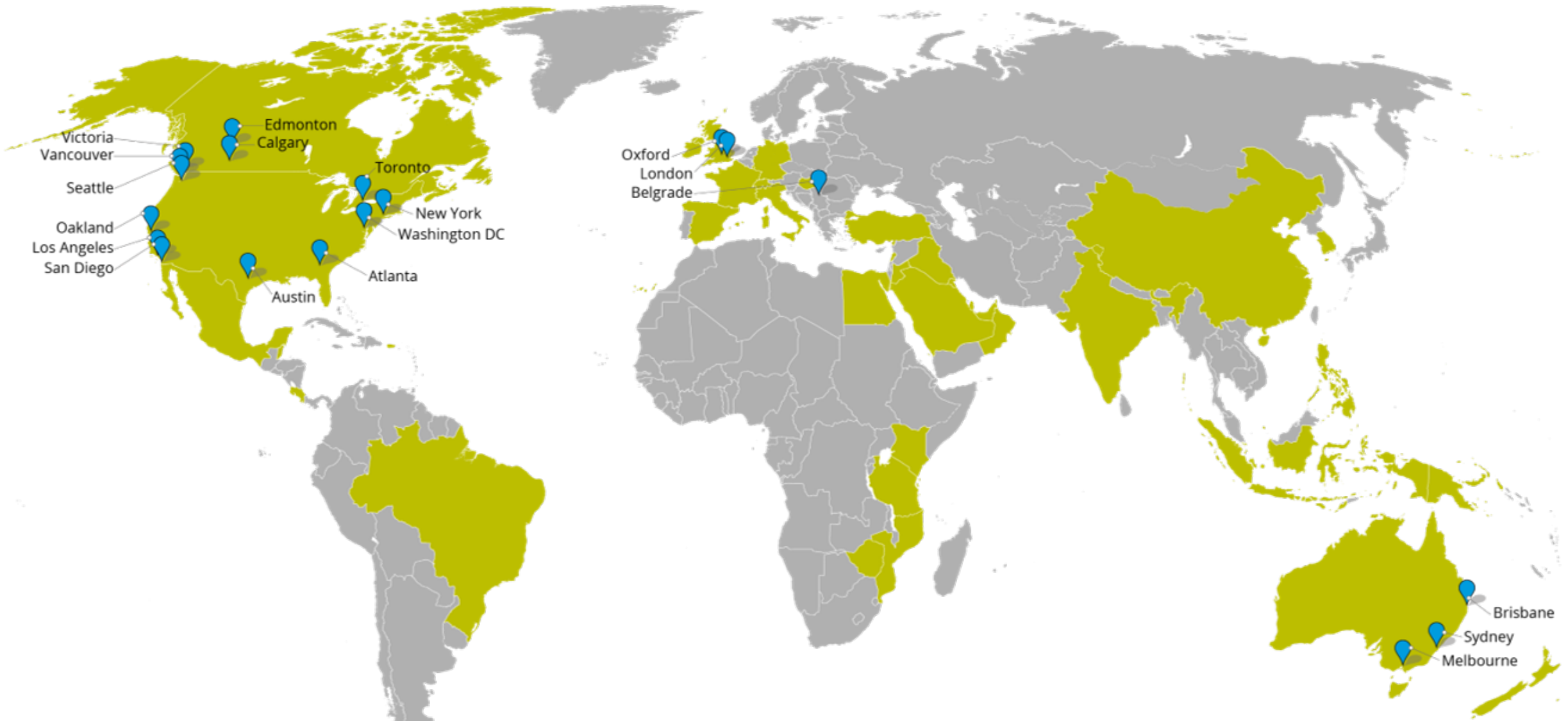


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Acknowledgment





Global network - projects in 30+ countries



Agenda

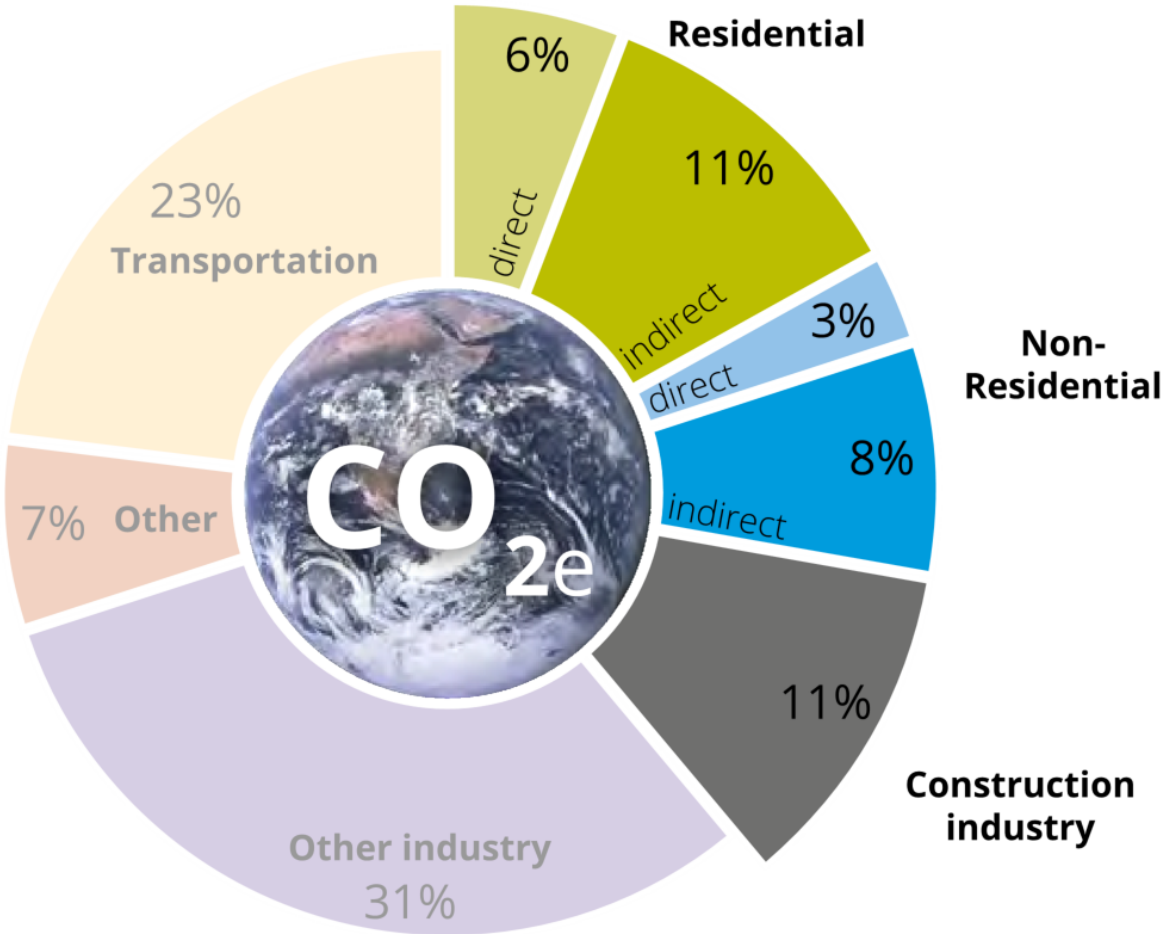
- What is the problem?
- CIBSE TM65
- System-level carbon impacts
- How to use TM65 in ANZ
- Next steps
- Wrap-up (key takeaways)



**What is the
problem?**



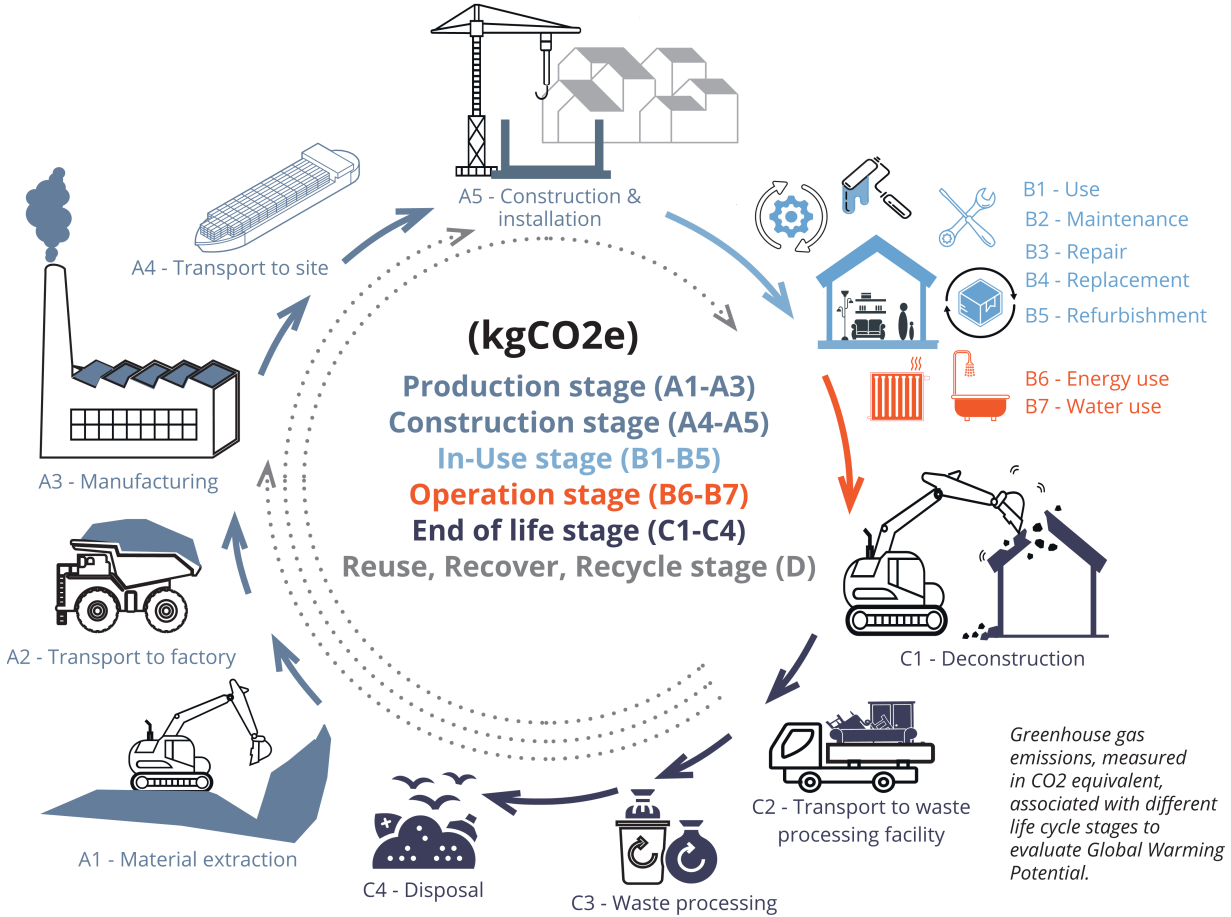
Buildings have a major impact on global carbon emissions



A Whole Life Carbon approach

Production & Construction stages

End of Life stage



B In-Use stage

B Operation stage

D Reuse, Recover, Recycle (Circular Carbon)

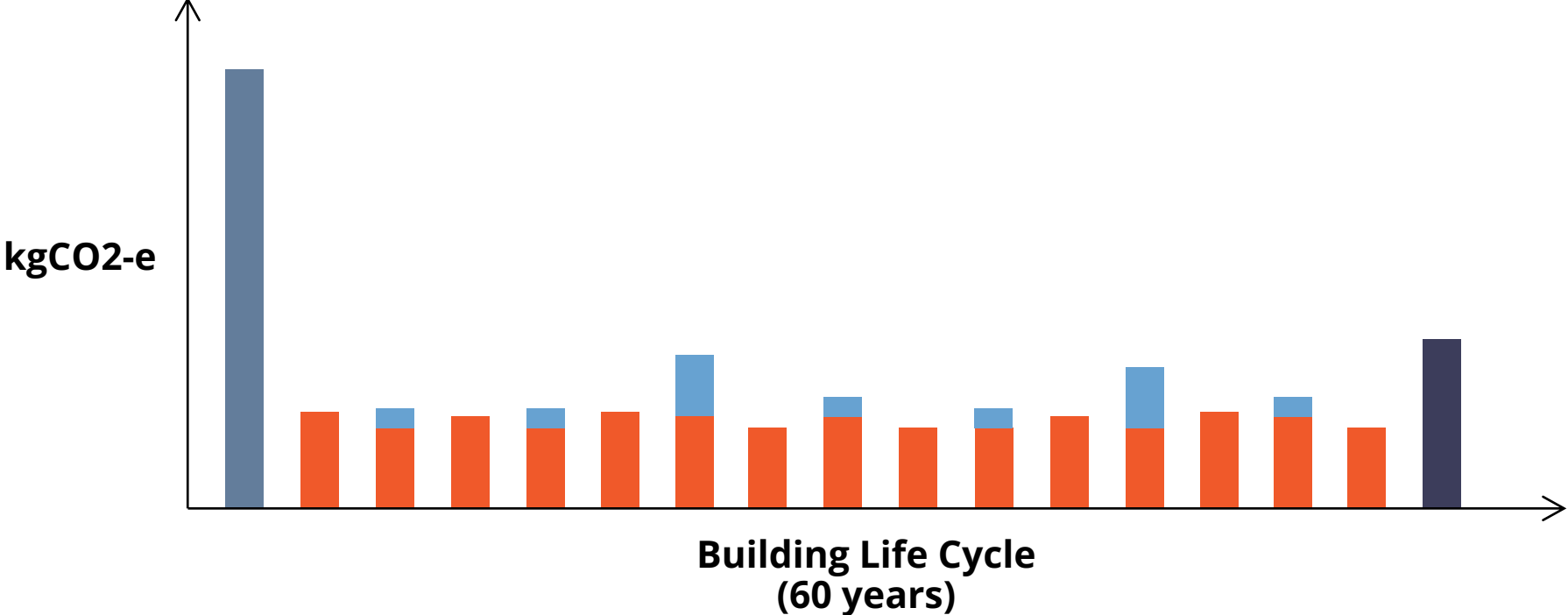
A B C Embodied Carbon

B Operational Carbon

Greenhouse gas emissions, measured in CO₂ equivalent, associated with different life cycle stages to evaluate Global Warming Potential.



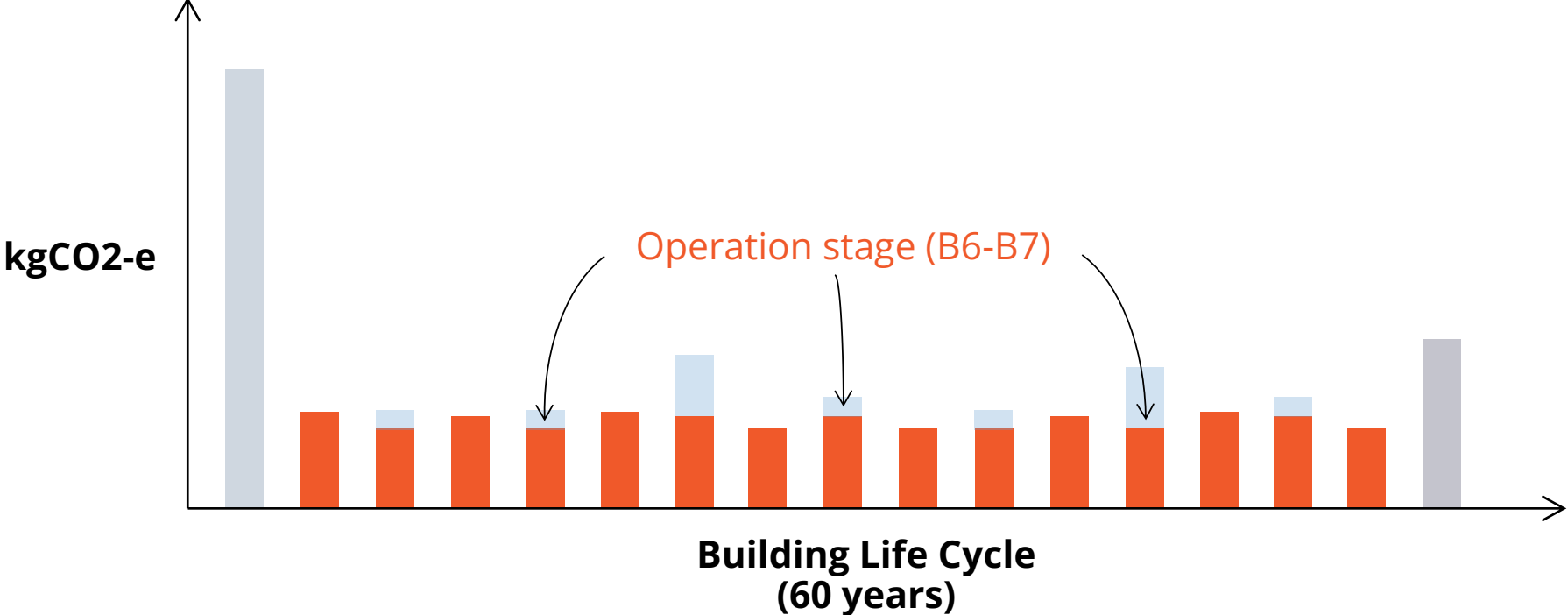
A Whole Life Carbon approach



A B C Embodied Carbon B Operational Carbon



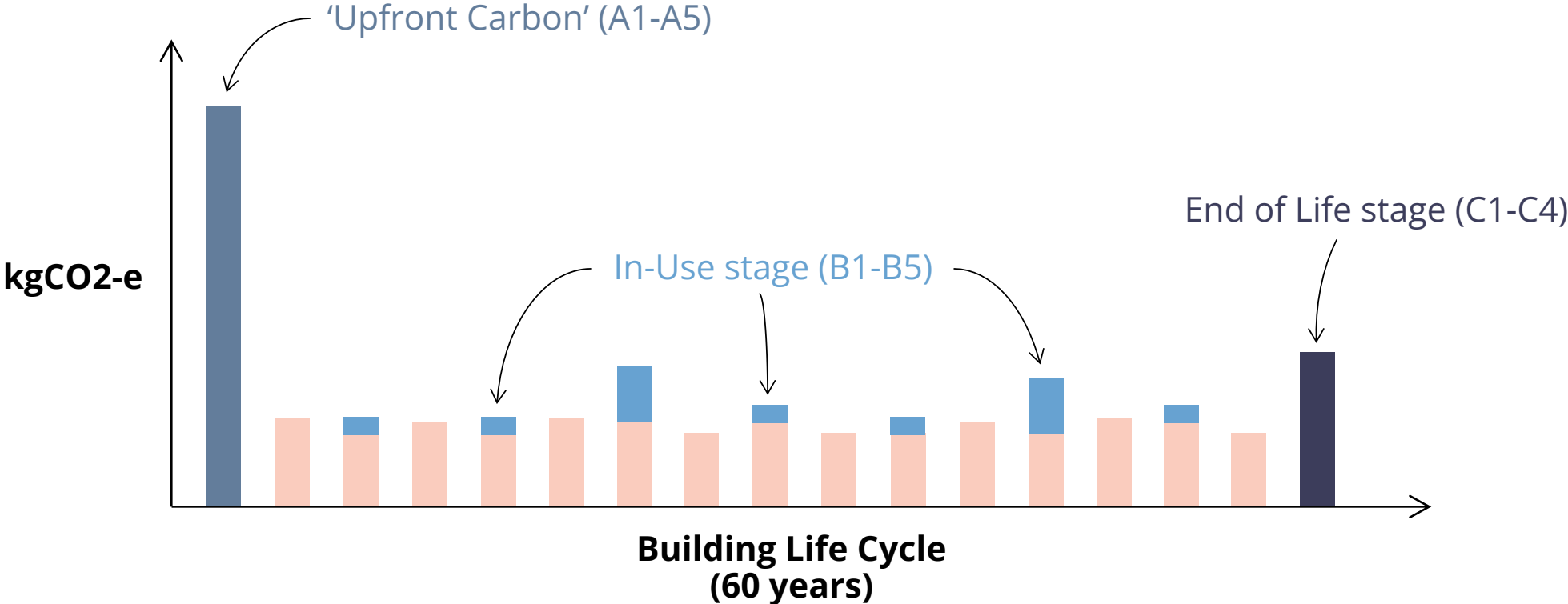
A Whole Life Carbon approach



A B C Embodied Carbon B Operational Carbon



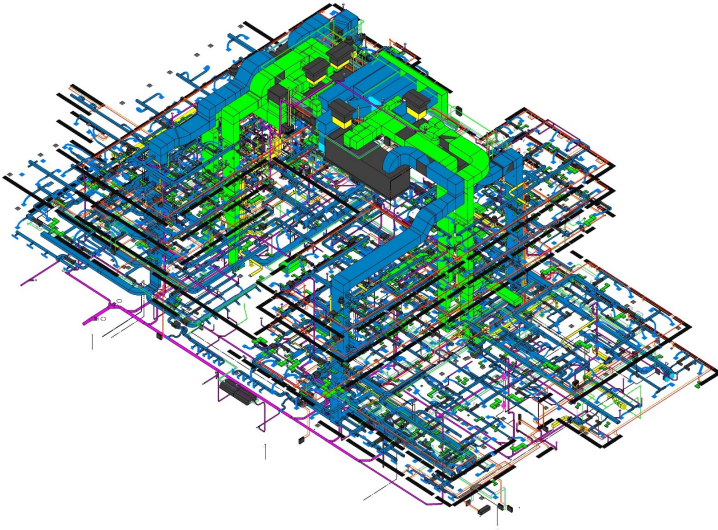
A Whole Life Carbon approach



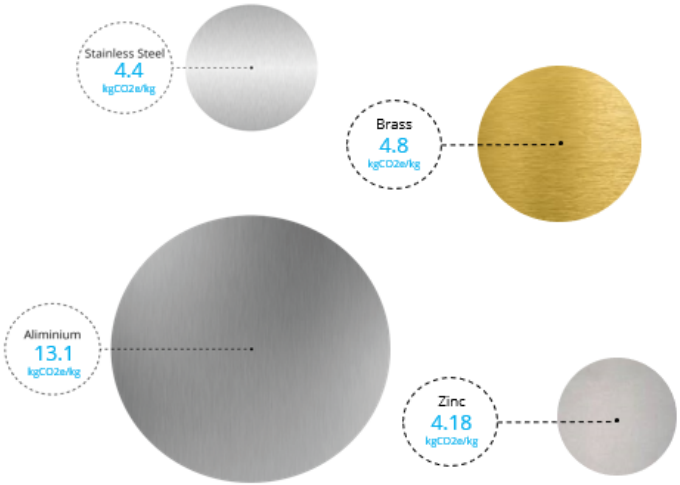
A **B** **C** Embodied Carbon **B** Operational Carbon



Services are high impact



Lots of 'Stuff'



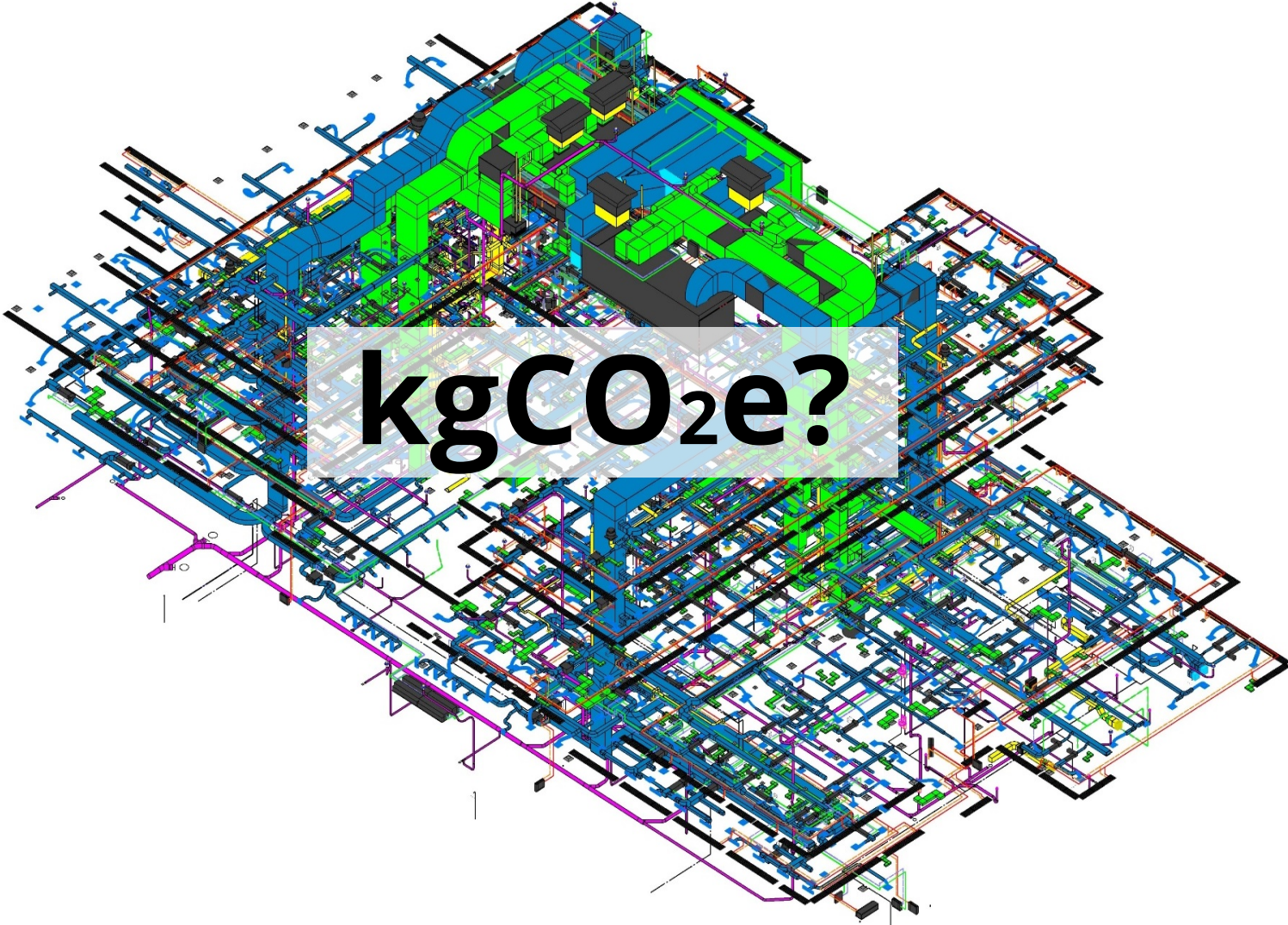
High Impact Materials



High Replacement Rates



Knowledge gap



Environmental Product Declarations

ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804

Owner of the Declaration	Wildeboer Bauteile GmbH
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-WL-20150036-ICA1-EN
ECO EPD Ref. No.	ECO-00000223
Issue date	16/09/2015
Valid to	15/09/2021

Circular volume flow controller VRE and VR
Wildeboer Bauteile GmbH



Institut Bauen und Umwelt e.V.





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variable volume flows in ventilation and air-conditioning systems and for shutting off the ventilation ducts.

2.3 Technical Data
The requirements in accordance with the harmonised regulations governing CE marking relating to electromagnetic compatibility (EMC) in line with EU Guideline /2004/108/EC, the performance rating according to /DIN EN 12589/ and the associated requirements according to /DIN EN ISO 5135/, /DIN EN ISO 3741/, /DIN EN ISO 5167-1/ and /DIN EN 175 V/ are fulfilled.

Technical construction data
The following data refers to a "worst-case" analysis of the electronic volume flow controller VRE. Further data – including concerning the constant mechanical volume flow controller VR – is available in the /manufacturer's documents/.

Name	Value	Unit
Supply voltage	24	V
Static pressure control range	20 - 1000	Pa
Permissible flow velocity	12	m/s
Volume flow range	34 - 6430	m ³ /h
Control voltage	0 - 10	V
Control voltage	2 - 8	V
Control voltage	2 - 10	V
Run time for 90° rotation of the damper blade approx.	90	s
Connected load (stationary)	0.5	W
Power consumption (in case of controlling)	1.5	W
Casing tightness class according to /DIN EN 1751/	C	-
Damper blade tightness class according to /DIN EN 1751/	3 - 4	-
Protection class IP	50 - 54	-
Housing design (circular/square)	circular	-

2.4 Placing on the market / Application rules
The requirements according to the harmonised regulations governing CE marking relating to electromagnetic compatibility (EMC) in line with /2004/108/EC/ and the associated requirements according to /DIN EN ISO 5135/ and the statutory guidelines are fulfilled. Use is governed by the respective national regulations. The /manufacturer's documents/ must be observed.

2.5 Delivery status
The following sizes are available: VR1 from DN 80 to DN 315, length 326 to 454 mm VRE1 from DN 100 to DN 400, length 326 to 451 mm. Optional accessories include an electric set point adjustment, lip seals and acoustic insulation. Each volume flow controller is factory adjusted to ensure a high and consistent degree of control accuracy.


2.6 Base materials / Auxiliary materials
Per cent by weight, all details are approximate.

VRE - casing, damper blade, measuring cell (excl. drive)
Steel, galvanised: 82% to 98%
Plastic: 1% to 6%
Electronic components: < 1%


VR - electric set point adjustment
Steel, galvanised: 37%
Plastic: 39%
Electronic cable: 18%
Electronic components (circuit boards etc.): 8%
Brass: 1%

VR - acoustic insulation
Steel, galvanised: 80% to 82%
Insulation: 18% to 20%


2.7 Manufacture
Production is at one location in the Weener plant. The necessary raw and semi-finished parts, ancillary materials and operation materials are delivered by suppliers and are integrated in production. Semi-finished parts are manufactured in a pre-fabrication using standard manufacturing methods. Metal parts are punched and edged to shape. Blanks are optimised accordingly in order to avoid waste. Any waste incurred is collected and where possible recycled by the corresponding companies, or disposed of and incinerated as domestic waste. Lubricants are largely collected, treated and re-used in production. Dust and fumes are extracted and collected on site. Prefabricated parts are assembled along with bought-in parts to volume flow controllers, inspected within the framework of quality assurance to /DIN EN ISO 9001/, packed and shipped. Each volume flow controller is factory-adjusted to ensure a high and consistent degree of control accuracy. The plant is subject to an energy management system.




Delivery of raw and semi-finished parts, auxiliary and operating materials




Production




Final assembly



Quality control



Packaging



Shipping the end product

3 Environmental Product Declaration Wildeboer Bauteile GmbH - Volume flow controller VRE, VR

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5. LCA: Results

The following tables depict the results of the indicators concerning the estimated impact, use of resources as well as waste and other output flows in relation to 1 VRE volume flow controller (2.87 kg/pc). Data can be requested from the manufacturer or a calculation tool supplied by the manufacturer can be used for calculating (scaling) to other sizes, accessories used and the VR controller (www.wildeboer.de/epd). The calculation method is explained in the conversion tool.

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE NOT DECLARED)																
PRODUCT STAGE			CONSTRUCTION PROCESS STAGE			USE STAGE						END OF LIFE STAGE				
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction	Transport	Waste processing	Disposal	Re-use/Recycling potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	X	X	X	X	X	X	X	MND	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: 1 VRE volume flow controller with a unit weight of 2.87 kg/pc.

Parameter	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	C1	C2	C3	C4	D
GWP	[kg CO ₂ e]	1.80E+1	1.70E+1	1.80E+1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	4.40E+1	3.00E+1	1.20E+1	1.20E+1	4.80E+1	4.80E+1
ADP	[kg FCE11-eq]	6.30E+0	1.60E+1	1.70E+1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	3.30E+0	0.00E+0	8.70E+0	3.20E+1	3.30E+1	4.20E+1
AP	[kg SO ₂ e]	3.30E+1	3.10E+1	3.30E+1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	8.10E+1	0.00E+0	1.70E+1	5.00E+1	3.10E+1	1.30E+1
EP	[kg PO ₄ -Eq]	1.70E+1	1.10E+1	1.30E+1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.20E+1	2.20E+1	1.30E+1	1.30E+1
POCP	[kg Pb-eq]	1.70E+1	1.10E+1	1.30E+1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	5.80E+0	4.20E+1	1.10E+1	2.20E+1
ADPE	[kg Sb-eq]	1.10E+1	3.30E+0	3.20E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	8.30E+0	0.00E+0	1.70E+1	3.70E+1	5.70E+1	1.30E+1
ADPF	[kg Sb-eq]	1.20E+1	1.30E+1	1.10E+1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.10E+1	0.00E+0	1.30E+1	1.20E+1	1.10E+1	1.40E+1

GWP = Global warming potential; ADP = Depletion potential of the abiotic non-fossil resources; AP = Acidification potential of acid and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources.

RESULTS OF THE LCA - RESOURCE USE: 1 VRE volume flow controller with a unit weight of 2.87 kg/pc.

Parameter	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	C1	C2	C3	C4	D
PERE	[MJ]	1.60E+1	1.40E+1	1.50E+1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.30E+1	0.00E+0	2.90E+1	1.30E+1	3.50E+1	4.20E+1
PERW	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
PERF	[MJ]	1.60E+1	1.40E+1	1.50E+1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.30E+1	0.00E+0	2.90E+1	1.30E+1	3.50E+1	4.20E+1
PERM	[MJ]	2.40E+1	9.20E+1	1.70E+1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	6.30E+1	0.00E+0	6.00E+1	1.10E+1	6.00E+1	4.60E+1
PERNRE	[MJ]	1.90E+1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
PERFRT	[MJ]	2.90E+1	9.20E+1	1.70E+1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	6.30E+1	0.00E+0	5.90E+1	1.10E+1	6.00E+1	4.60E+1
SM	[kg]	4.30E+1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
RSE	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
RSEF	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
RSENF	[MJ]	1.80E+1	1.30E+1	1.40E+1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.90E+1	0.00E+0	1.90E+1	1.60E+1	2.70E+1	3.00E+1

PERE = Use of renewable primary energy including renewable primary energy resources used as raw materials; PERW = Use of renewable primary energy resources used as raw materials; PERF = Total use of renewable primary energy resources; PERM = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PERNRE = Use of non-renewable primary energy resources used as raw materials; PERFRT = Total use of non-renewable primary energy resources; SM = Use of secondary materials; RSE = Use of renewable secondary fuels; RSEF = Use of non-renewable secondary fuels; RSENF = Use of net fresh water.

RESULTS OF THE LCA - OUTPUT FLOWS AND WASTE CATEGORIES: 1 VRE volume flow controller with a unit weight of 2.87 kg/pc.

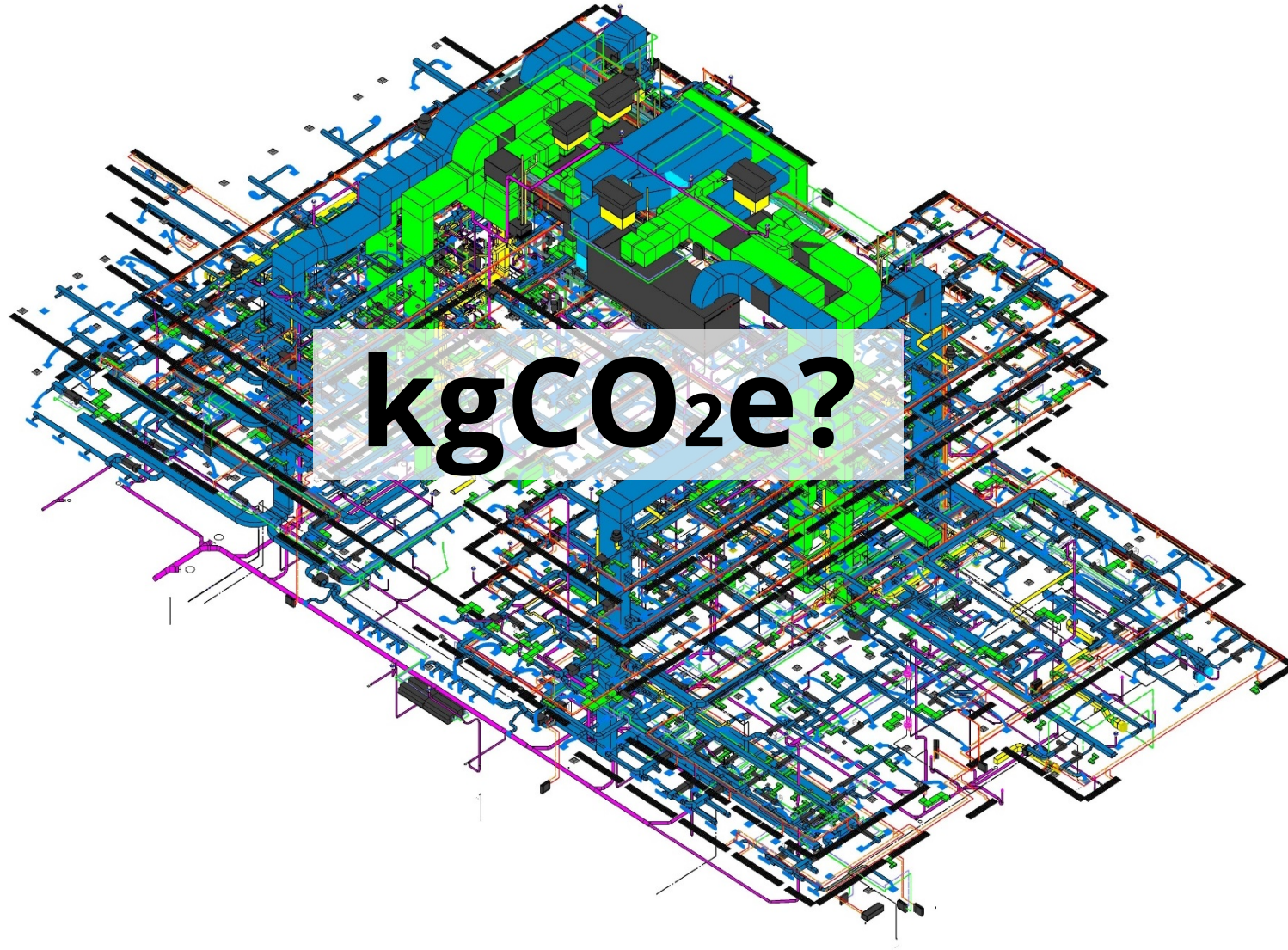
Parameter	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	C1	C2	C3	C4	D
HWD	[kg]	2.90E+1	4.10E+1	6.90E+1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.90E+1	0.00E+0	2.20E+1	2.00E+1	3.80E+1	6.00E+1
NHWD	[kg]	0.00E+1	1.00E+1	5.50E+1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	4.80E+1	0.00E+0	3.50E+1	4.00E+1	4.00E+1	4.00E+1
RWD	[kg]	5.30E+1	1.30E+1	3.00E+1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	7.50E+1	0.00E+0	6.90E+1	7.20E+1	2.00E+1	1.90E+1
CRU	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
MFR	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
MER	[kg]	0.00E+0	0.00E+0	1.30E+1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.60E+1	4.00E+1
REE	[MJ]	0.00E+0	0.00E+0	1.80E+1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	2.00E+1	2.30E+1
EEE	[MJ]	0.00E+0	0.00E+0	1.30E+1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	5.90E+1	6.90E+1

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EEE = Exported thermal energy.

An EPD provides a standard way to disclose environmental impacts about a product throughout its lifecycle, using a rigorous, consistent, third party reviewed methodology.



TM65 is here to help!



CIBSE TM65



What is TM 65?

What TM65 is



- A method for estimating embodied carbon in building services equipment
- A first step to promote transparency in the industry
- A reporting methodology
- A set of rules to allow the production of comparable carbon metrics
- A simple, replicable, standardised methodology

What TM65 isn't



- A detailed Life Cycle Assessment (LCA) at system level
- An Environmental Product Declaration (EPD)
- A peer reviewed certification
- An exhaustive assessment of the materials in a product
- A detailed and holistic assessment of all environmental impacts of a product (embodied carbon only)



How the TM65 fits into building Whole Life Carbon assessment

Whole Life Carbon – building level

Whole life carbon
Building Services

Whole life carbon assessment
rest of the building

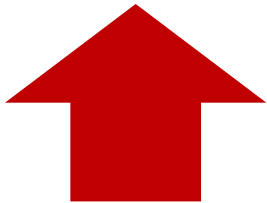
Embodied carbon
Building Services

Operational carbon
Building Services

Embodied
carbon
product level

Quantities
of
equipment

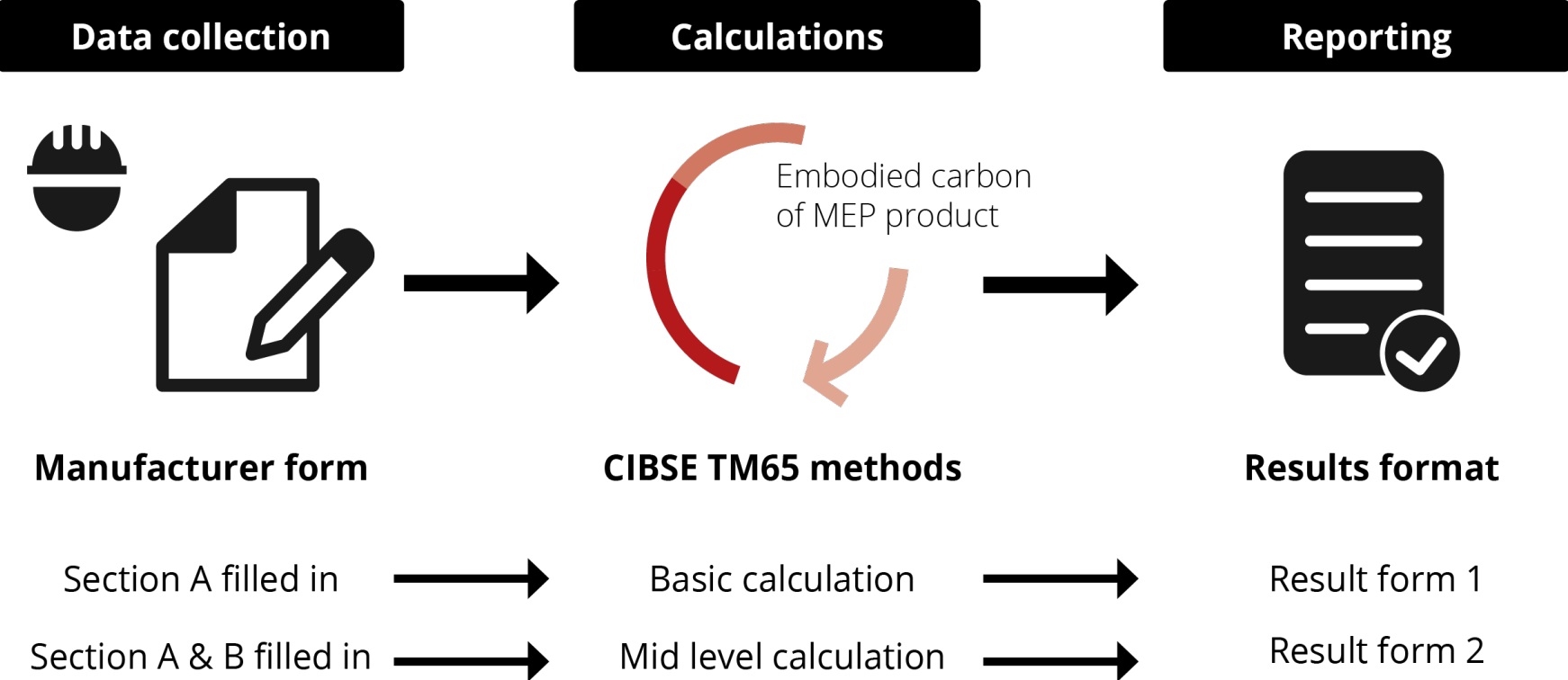
Service
life



CIBSE TM65 enables embodied carbon calculations for Building Services products



TM65 - process



TM65 – method comparison

	'Basic' calculation				'Mid level' calculation				EPD			
Easy	●	●	●	○	●	●	○	○	●	○	○	○
Manufacturer involvement	●	○	○	○	●	●	●	○	●	●	●	●
Detailed	●	●	○	○	●	●	●	○	●	●	●	●



TM65 versus EPD

Table 4.1 Comparison of the life cycle stage modules needing to be calculated and the type of information required per life cycle stage module for the two calculation methods and an EPD

Preliminary information		'Basic' calculation	'Mid-level' calculation	BS EN 15804+A2 compliant EPD*
Capacity of equipment/size		Mandatory	Mandatory	Mandatory
Product service life (years)		Mandatory	Mandatory	Optional
Refrigerant used, GWP, charge (kg)		Mandatory	Mandatory	Mandatory
Stage	Module	'Basic' calculation	'Mid-level' calculation	BS EN 15804+A2 compliant EPD*
A	A1 (material extraction)	Mandatory	Mandatory	Mandatory
	A2 (transport to factory)	Scale-up factor	Mandatory	Mandatory
	A3 (manufacturing)		Mandatory	Mandatory
	A4 (transport to site)		Mandatory	Optional
	A5 (installation)	—	—	Optional
B	B1 (use)	Mandatory for refrigerant based system	Mandatory for refrigerant based system	Optional
	B2 (maintenance)	Scale-up factor	Optional	Optional
	B3 (repair)	Mandatory	Mandatory	Optional
	B4 (replacement)	—	—	Optional
	B5 (refurbishment)	—	—	Optional
	B6 (operational energy)	—	—	Optional
	B7 (operational water)	—	—	Optional
C	C1 (deconstruction)	Mandatory for refrigerant based system	Mandatory for refrigerant based system	Mandatory
	C2 (transport)	Scale-up factor	Mandatory	
	C3 (waste processing)		Mandatory	
	C4 (disposal)		Mandatory	
D	D (reuse, recover, recycle)	—	—	

* Compliant with BS EN 15804:2012+A2:2019, therefore modules C and D are mandatory whereas they are optional for BS EN 15804:2012+A1:2013

Legend:

Mandatory: calculations are mandatory for this life cycle stage module

Optional: calculations are optional for this life cycle stage module

Scale-up factor: life cycle stage module included through a scale-up factor

— Not included in calculation

Type of information needed for the calculations:

Manufacturer product-specific information
Product generic assumption unless manufacturer information available
Product generic assumption
Scale-up factor based on product complexity (no manufacturer information needed)
Not included in the calculation, therefore no information needed

More detailed information can be found in Appendix C.

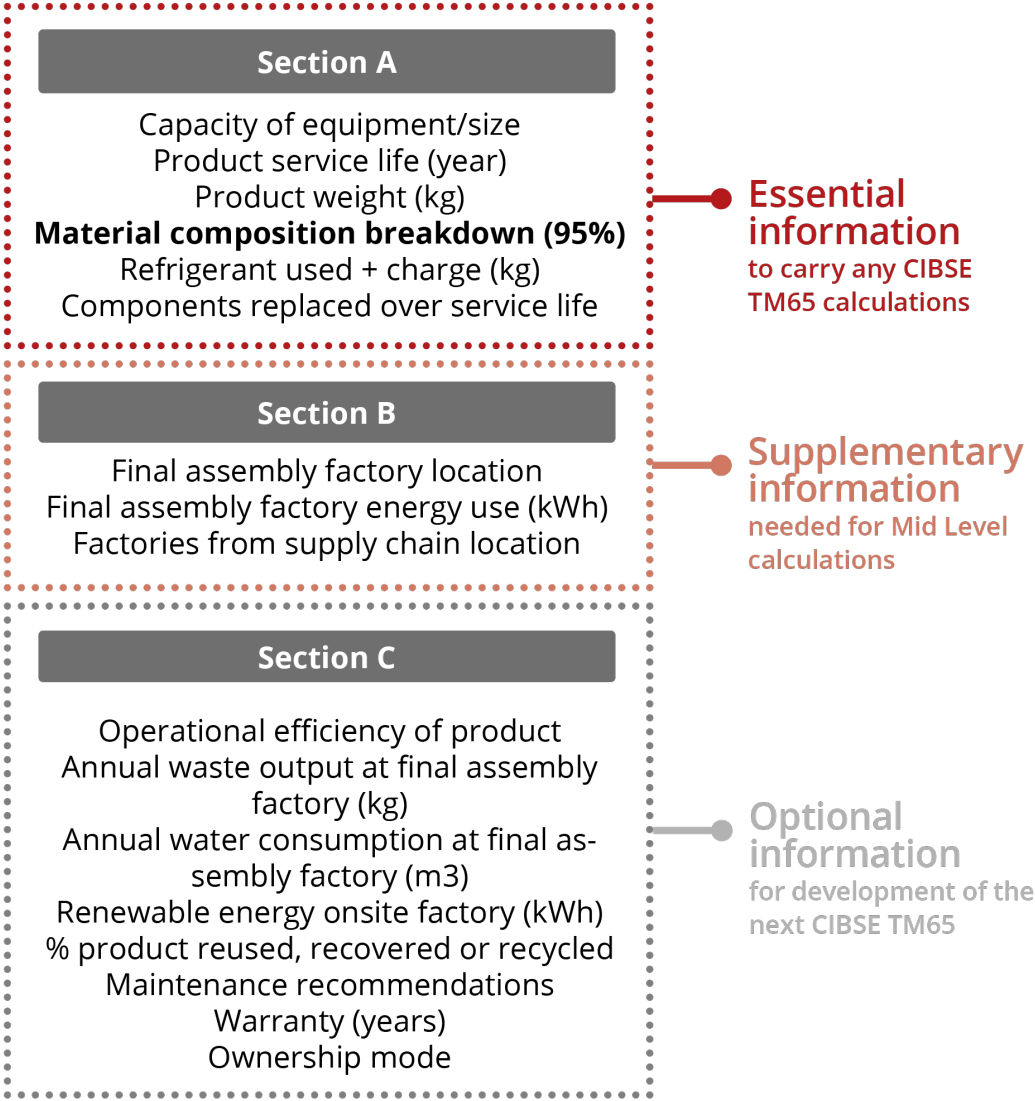


TM65 – manufacturer form

Data collection

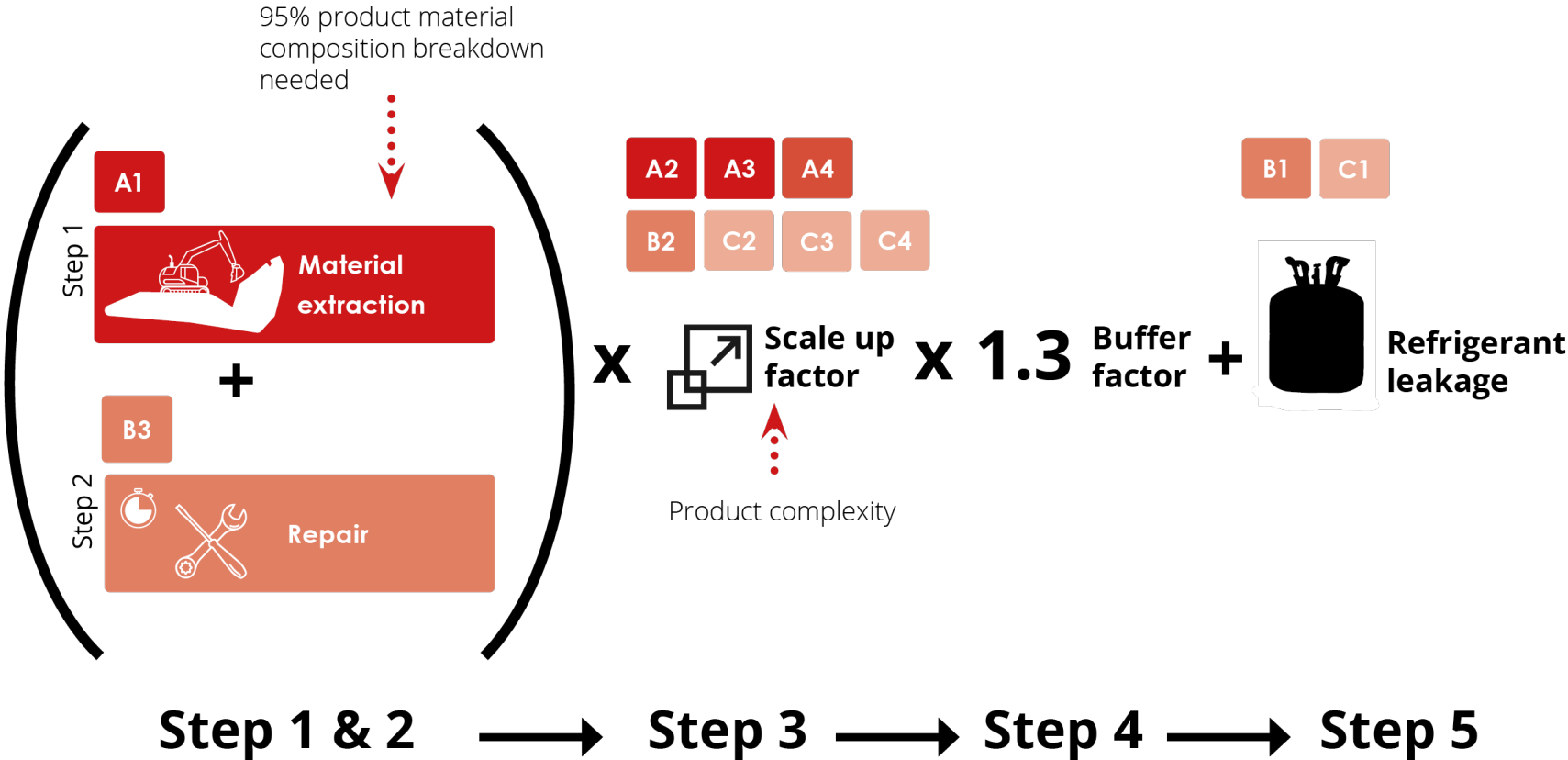
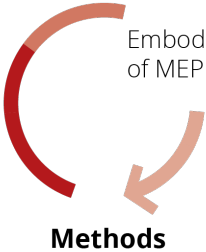


Manufacturer form



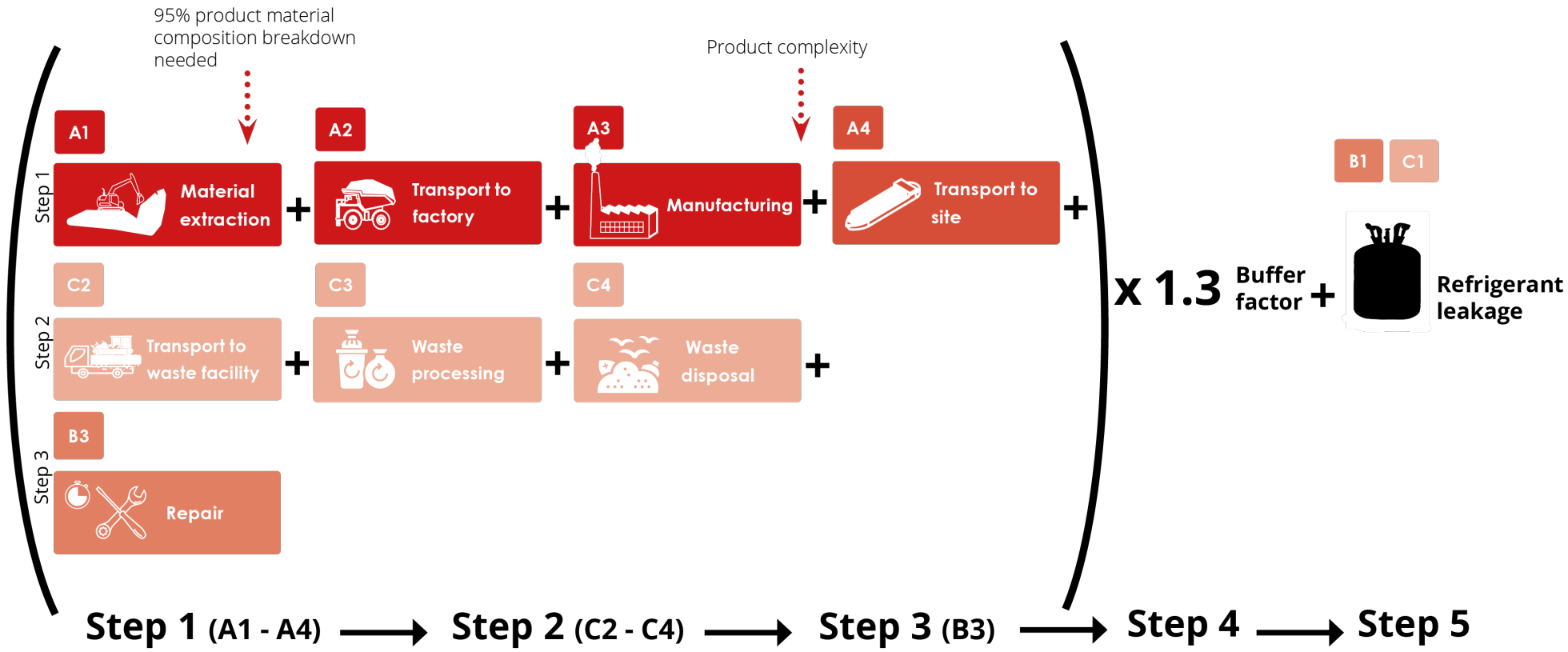
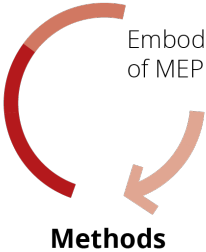
TM65 – basic calculation method

Calculations



TM65 – mid-level calculation method

Calculations



TM65 – reporting results

Reporting



Results format

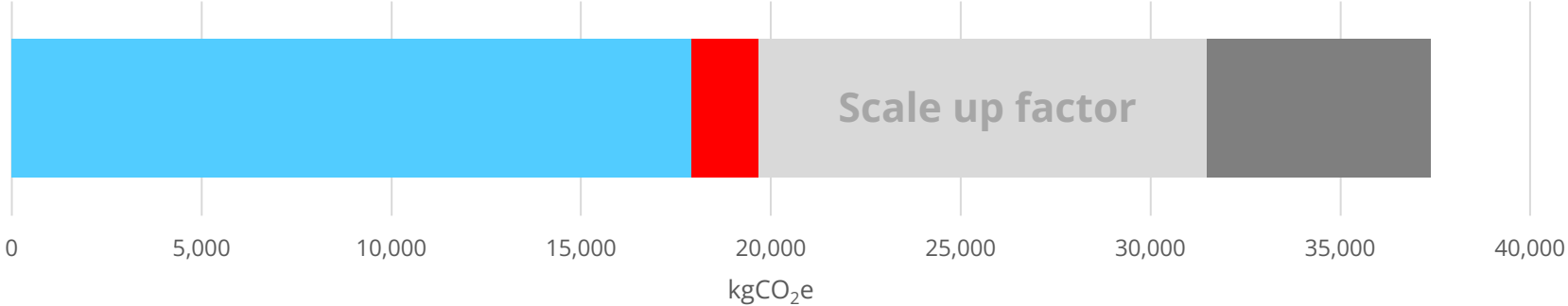
Basic calculation		Notes/source
Date of assessment	dd/mm/yy	
Name of assessor and assessor organisation	A N Other	
Contact details of assessor	A N Other	
Product information		
Type of product	Heat pump	
Capacity/size of equipment (kW; m ³ ; litres; etc.)	100 kW	
Product weight (kg)	1000 kg	
Material % breakdown for at least 95% of the product weight? (Y/N)	Y	
Product service life (years)	15	
If refrigerant based, type of refrigerant used and GWP	R410a (GWP = 2088)	
Refrigerant charge (kg)	35 kg	
Product complexity category	3	
GWP results (kg CO ₂ e) — without refrigerant leakage		
A1: Material extraction (original product)	5319	
A1: Material extraction (components that are replaced in B3)	532	
A1–A4, B3, C2–C4: Total embodied carbon with scale-up and buffer factors (excluding refrigerant leakage)	12,170	
GWP result (kg CO ₂ e) — refrigerant leakage only		
B1 (refrigerant leakage during use) + C1 (refrigerant leakage end of life)	45,310	
GWP result with 'basic' calculation method (kg CO ₂ e) — total		
Result of 'basic' calculation	57,479	
Assumptions		
A1: Material carbon coefficient source		TM65 assumptions
B1: Refrigerant annual leakage rate (%)	4%	Type 2 (TM65 Table 4.13)
C1: Refrigerant end of life recovery rate (%)	98%	Type 2 (TM65 Table 4.13)
B3: Materials replaced as part of repair (%)	10%	As per TM65 Step 2.1
Details		
Please provide any relevant details		

Mid-level calculation		Notes/source
Date of assessment	dd/mm/yy	
Name of assessor and assessor organisation	A N Other	
Contact details of assessor	A N Other	
Product information		
Type of product	Heat pump	
Capacity of equipment/size (kW; m ³ ; litres; etc.)	100 kW	
Product weight (kg)	1000	
Material % breakdown for at least 95% of the product weight? (Y/N)	Y	
Service life of the product (years)	15	
If refrigerant based, type of refrigerant used	R410a (GWP = 2088)	
Refrigerant charge (kg)	35	
Energy consumption of the factory per unit of product	200 kW-h	
Location of manufacture	France, Europe	
Product complexity category	3	
GWP results (kg CO ₂ e) breakdown		
A1: Material extraction	5319	TM65 assumptions
A2: Transport	792	TM65 assumptions
A3: Manufacturing	272	TM65 assumptions (Europe)
A4: Transport to site	198	TM65 assumptions
A5: Construction	n/a	
B1: Use	43,848	TM65 leakage type 2
B2: Maintenance (if information given by manufacturer)	n/a	
B3: Repair	666	TM65 assumptions
B4: Replacement	n/a	
B5: Refurbishment	n/a	
B6: Operational energy	n/a	
B7: Operational water	n/a	
C1: Deconstruction	1462	TM65 leakage type 2
C2: Transport	13	
C3: Waste processing	68	
C4: Disposal	3	TM65 assumptions
GWP results (kg CO ₂ e) — without refrigerant leakage		
A1–C4 (excluding B1, C1)	7331	
A1–C4 with buffer factor (excluding B1, C1)	9531	
GWP result (kg CO ₂ e) — only refrigerant leakage		
B1 (refrigerant leakage during use) + C1 (refrigerant leakage end of life)	45,310	
GWP result with 'mid-level calculation' method (kg CO ₂ e) — total		
Result of 'mid-level calculation'	54,840	
Assumptions		
B1: Refrigerant annual leakage rate (%)	4%	TM65 leakage type 2
C1: Refrigerant end of life recovery rate (%)	98%	TM65 leakage type 2
B3: Materials replaced as part of repair (%)	10%	TM65 assumptions
C4: Percentage of product going to landfill (%)	30%	TM65 assumptions
Details		
Please provide any relevant details		



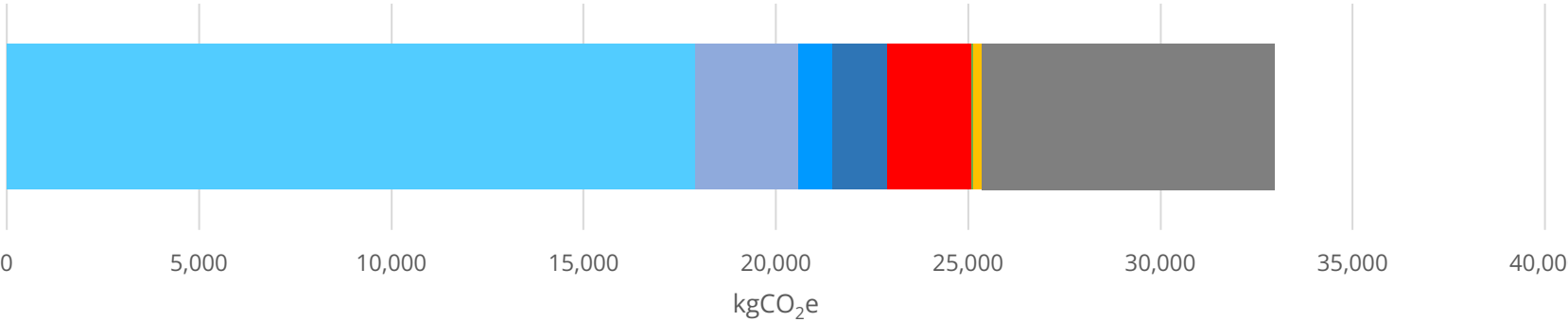
TM65 - 542 kW heat pump example

Basic calculation method



- A1: Material extraction
- B3: Repair
- Scale up factor
- Buffer factor

Mid-level calculation method



- A1: Material extraction
- A2: Transport
- A3: Manufacturing
- A4: Transport to site
- B3: Repair
- C2: Transport
- C3: Waste processing
- C4: Disposal
- Buffer factor



System-level assessment

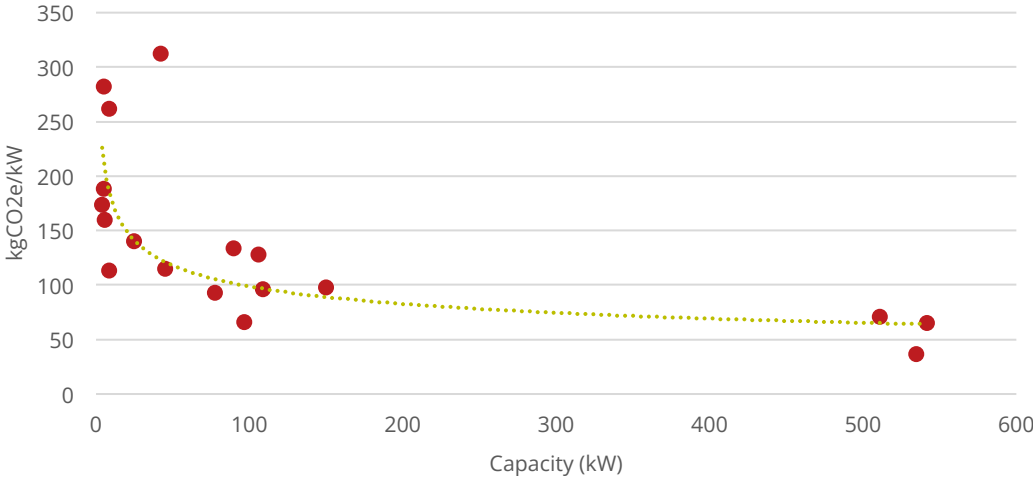


TM65.1: Embodied carbon of building services: residential heating

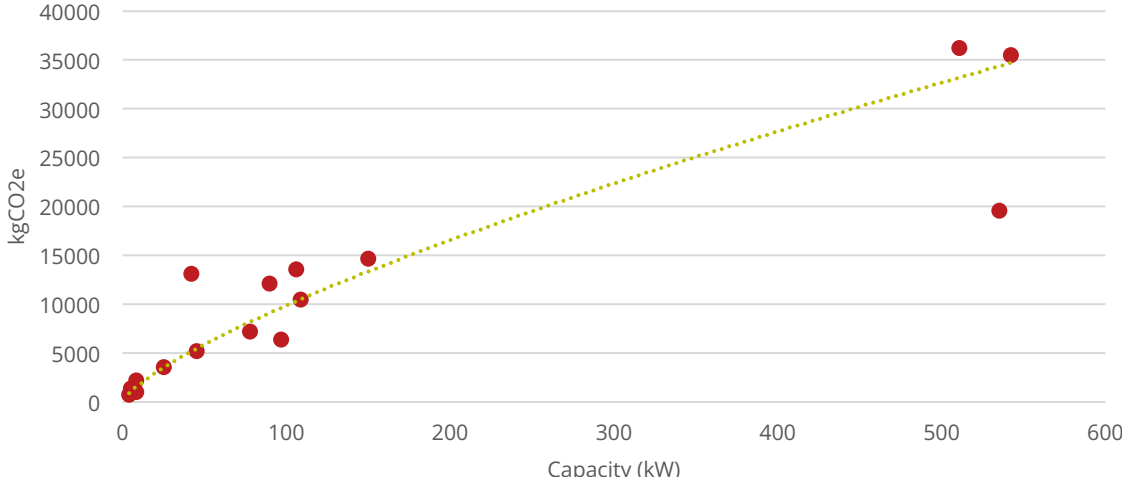


Heat Pumps

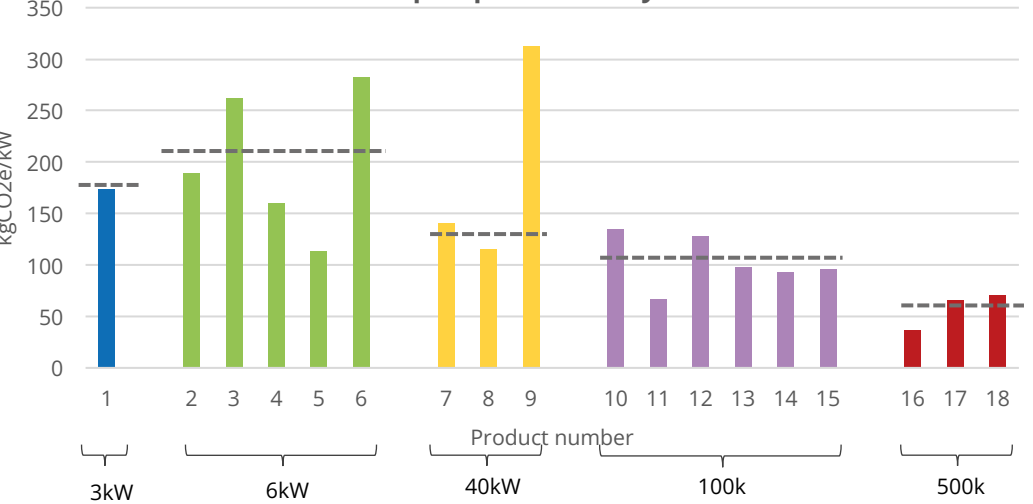
1. Heat pumps - results by kW



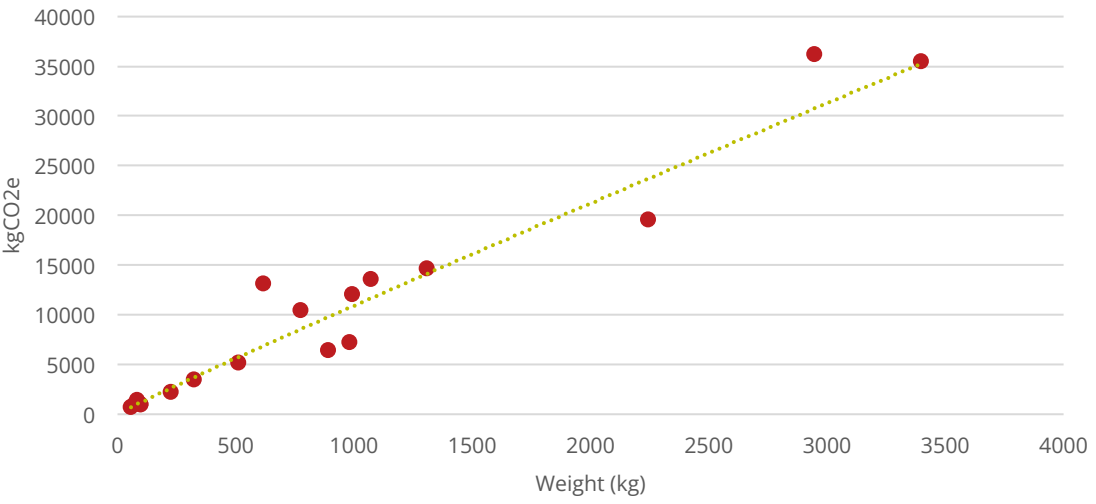
3. Heat pumps - absolute results against capacity (kW)



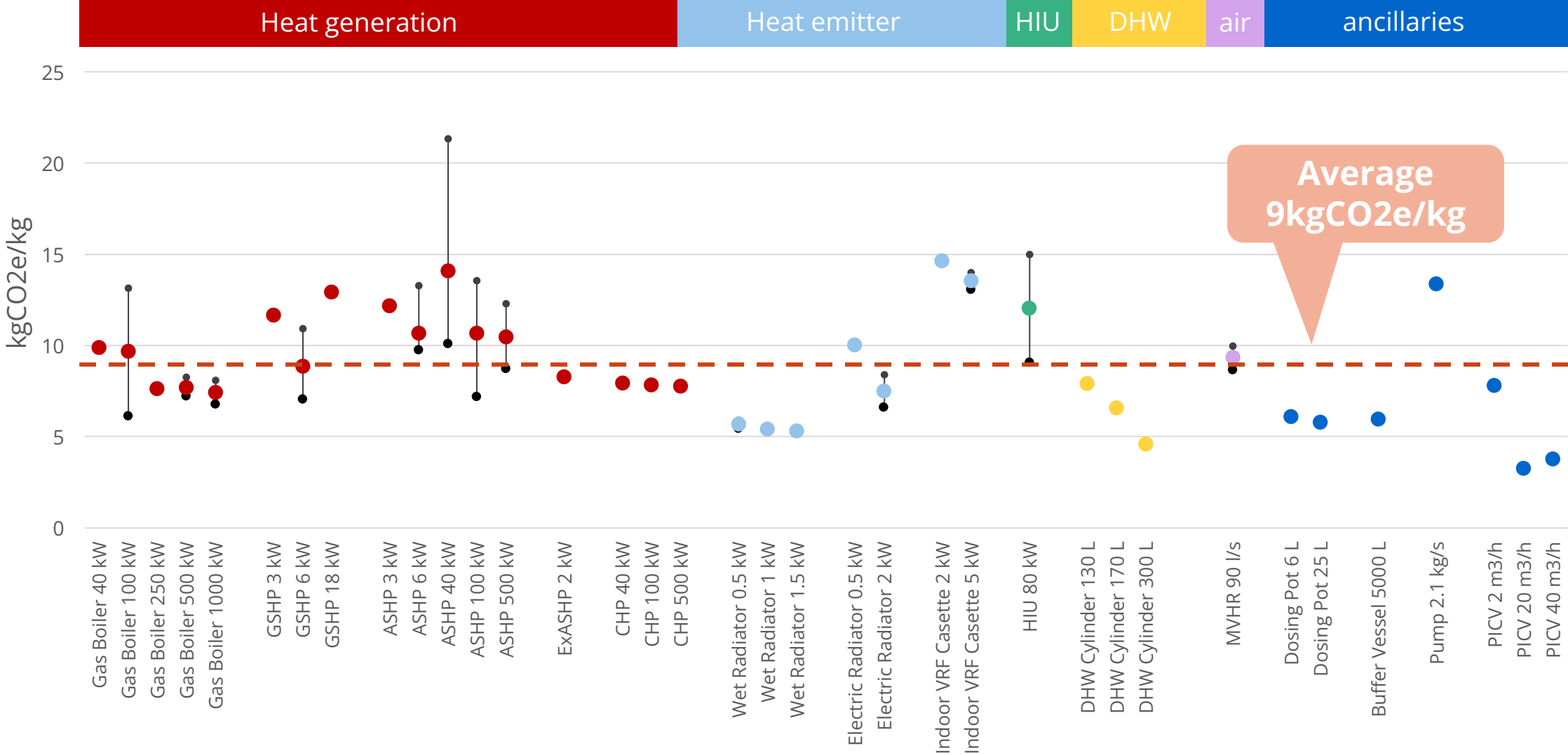
2. Heat pumps - results by kW



4. Heat pumps - absolute results against weight (kg)

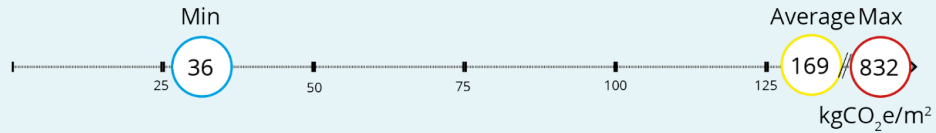


Products findings - Average kgCO2e/kg

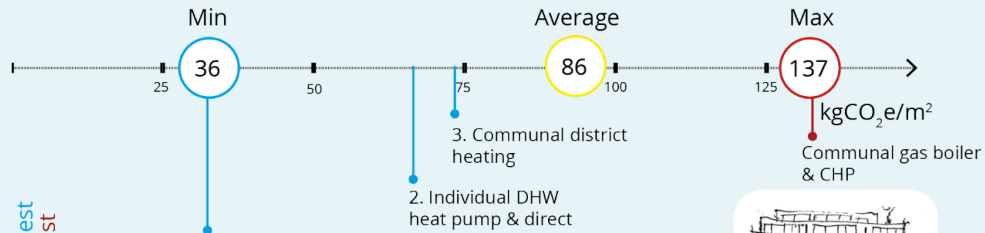


Results - 100 apartment scheme

Embodied carbon results WITH refrigerant leakage (A1-A4, B1, B3-B4, C1, C2-C4)

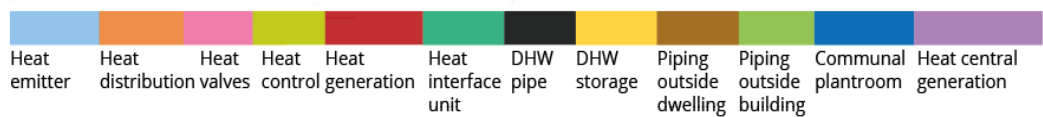
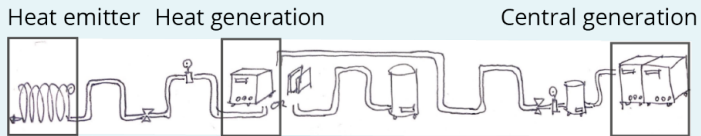


Embodied carbon results WITHOUT refrigerant leakage (A1-A4, B3-B4, C2-C4)

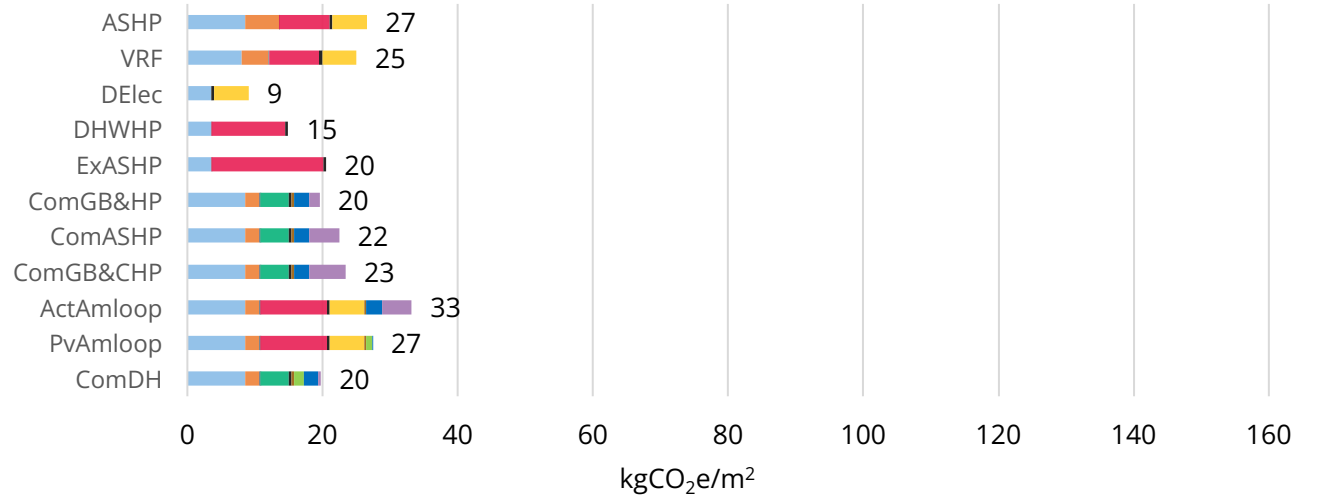


3 Lowest Highest

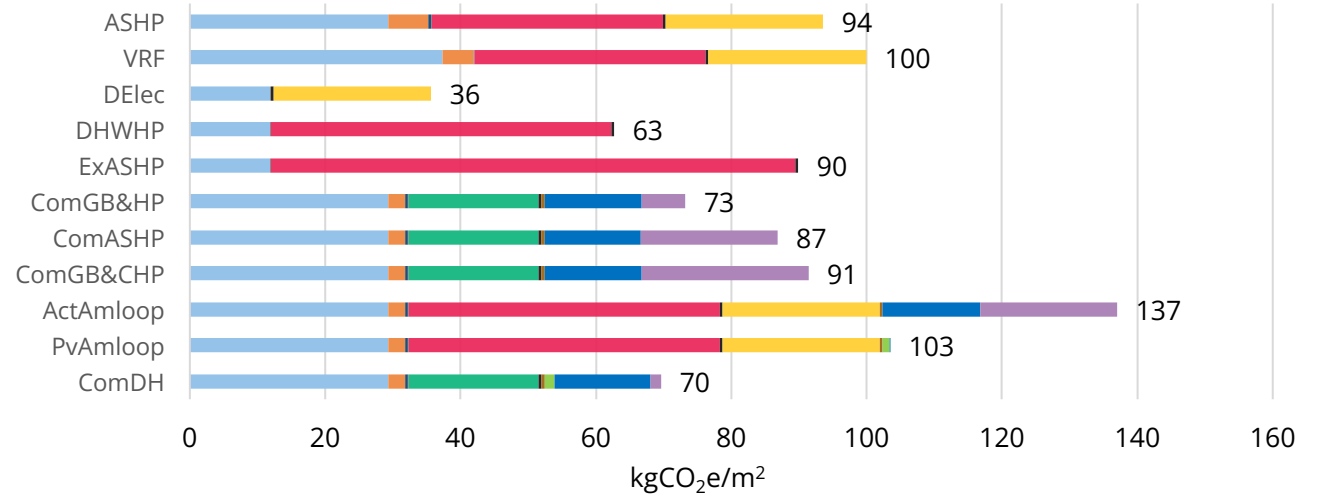
TOP 3 most impactful elements



100 Units Residential Development: Upfront Embodied Carbon (A1-A4) in kgCO₂e/m²



100 Units Residential Development: Embodied carbon (A1-A4, B3-B4, C2-C4) excluding refrigerant leakage in kgCO₂e/m²



How to use in ANZ



TM65 ANZ addendum working group

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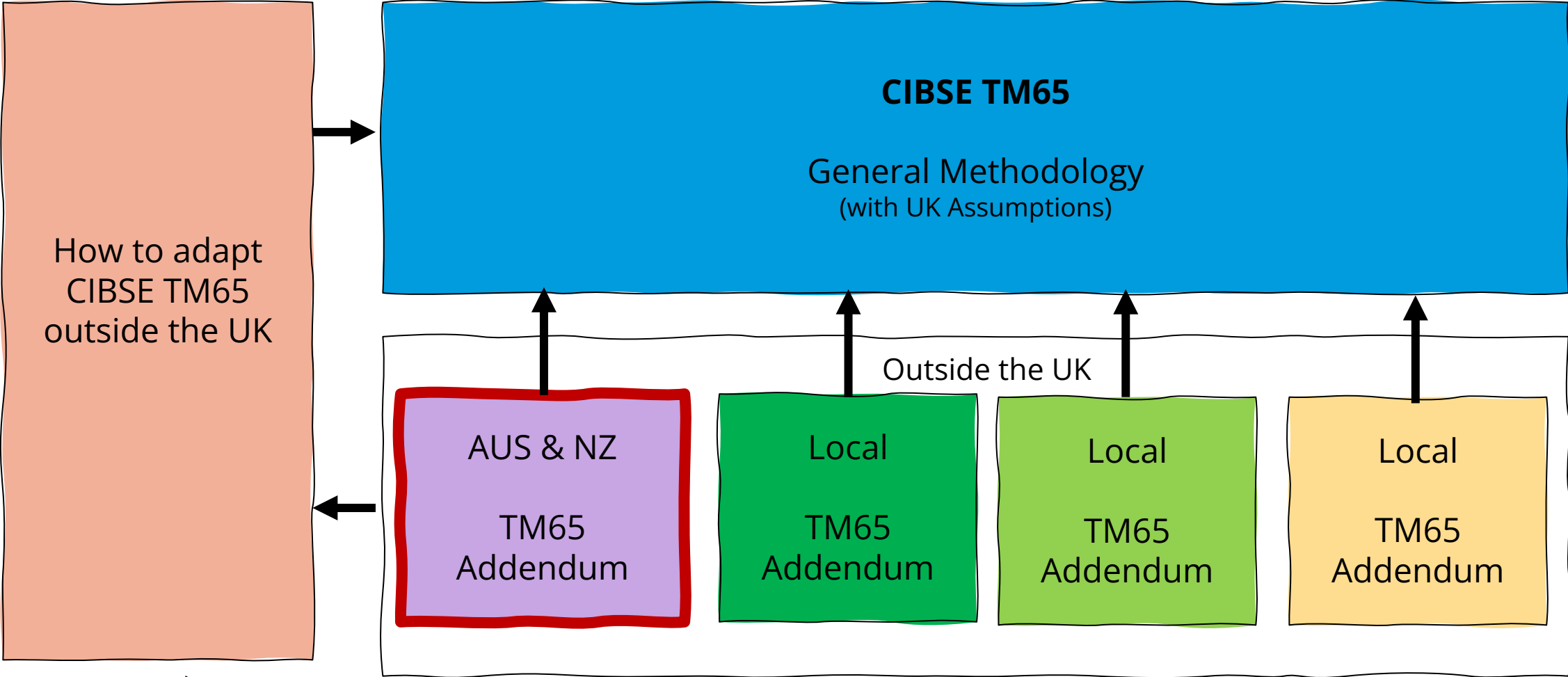
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TM65 ANZ Addendum

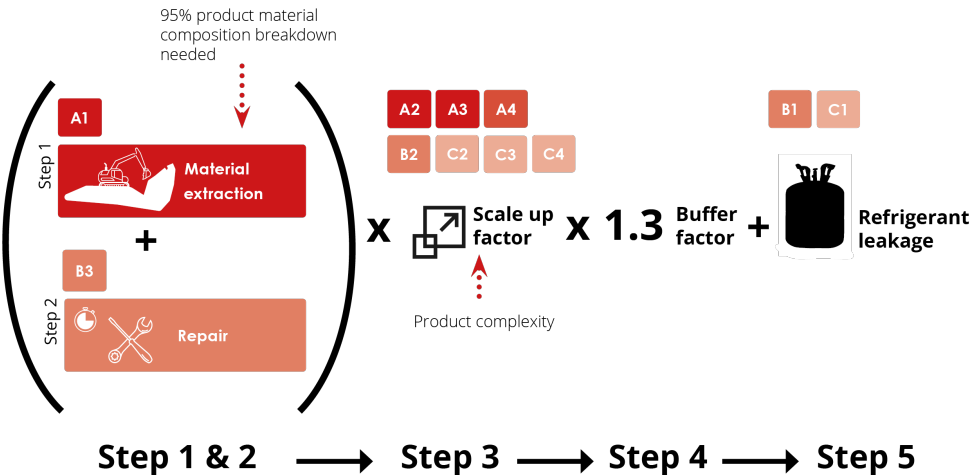


Refers to



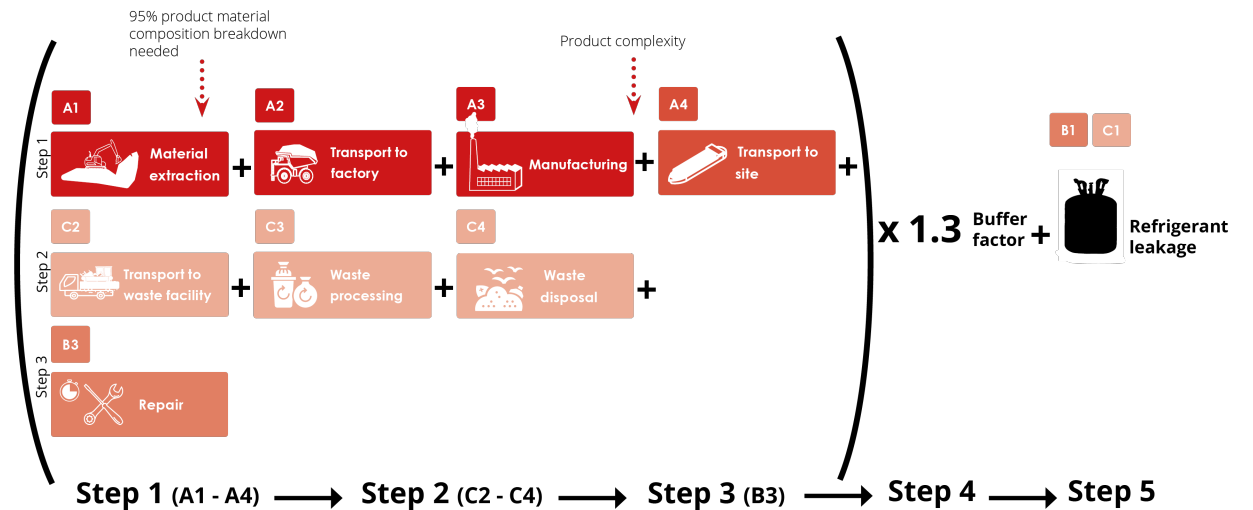
TM 65 basic method in ANZ - local assumptions

1. Refrigerant leakage scenarios



TM 65 mid-level method in ANZ – local assumptions

1. Carbon factors for transport (A2 – transport to factory, A4 -transport to site) are updated to 2021
2. Detailed carbon factors for electricity (A3 – manufacturing) to reflect regional factors in Australia and New Zealand
3. Local carbon factor for gas (A3 – manufacturing) to reflect regional factor in Australia and New Zealand
4. Local transport scenarios (A4 – transport to site)
5. Refrigerant leakage scenarios (B1 – use, C1 – Deconstruction) as per the basic calculation
6. Local carbon factor for landfill (C4 – disposal)



Green Star Responsible Systems



Green Star Buildings Responsible Systems

Responsible Systems

Responsible
Credit: 8
Points: 2

Outcome
 The building's mechanical, hydraulic, transportation and electrical systems are comprised of responsibly manufactured products.

Criteria

Credit Achievement	1 point	<ul style="list-style-type: none"> • 20% of all active building systems (by cost) meet a Responsible Products Value of at least 6.
Exceptional Performance	1 point	<p style="font-size: x-small; margin: 0;">In conjunction with the Credit Achievement:</p> <ul style="list-style-type: none"> • 5% of all active building systems (by cost) meet a Responsible Products Value of at least 11 or • 35% of all active building systems (by cost) meet a Responsible Products Value of at least 6.

Additional information

Stage implementation

Strategy	Brief	Concept	Design	Tender	Construction	Handover	Use
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Synergies with other credits

- Responsible Structure
- Responsible Envelope
- Responsible Finishes
- Life Cycle Impacts
- Upfront Carbon Emissions

Sustainable Development Goals

- Goal 9 (Industry, Innovation and Infrastructure)
- Goal 12 (Sustainable Consumption and Production)

Relevant reporting initiatives

- None

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CIBSE TM65 next steps



CIBSE TM65 ANZ – web-based tool



CIBSE TM65.2 – Embodied carbon of HVAC strategies in offices (UK)

TECHNICAL MEMORANDUM OF EMBODIED CARBON OF HVAC SYSTEMS IN OFFICES



CIBSE TM65 ANZ Addendum



Wrap-up



TM65 Key Takeaways

- We need to understand, measure and reduce embodied carbon
- Building Services equipment is a 'grey area'
- TM65 provides a methodology to benchmark equipment and establish industry averages when EPDs are not available
- Rules-of-thumb can be created for system types to help inform early engineering decisions and make embodied carbon a key design driver
- TM65 is a stepping stone... we hope that it encourages the Building Services equipment supply chain to adopt formal EPDs
- TM65 ANZ addendum will be released to industry this Spring



Thank you ;)

