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Addressing Net Zero: Timber construction and whole life carbon

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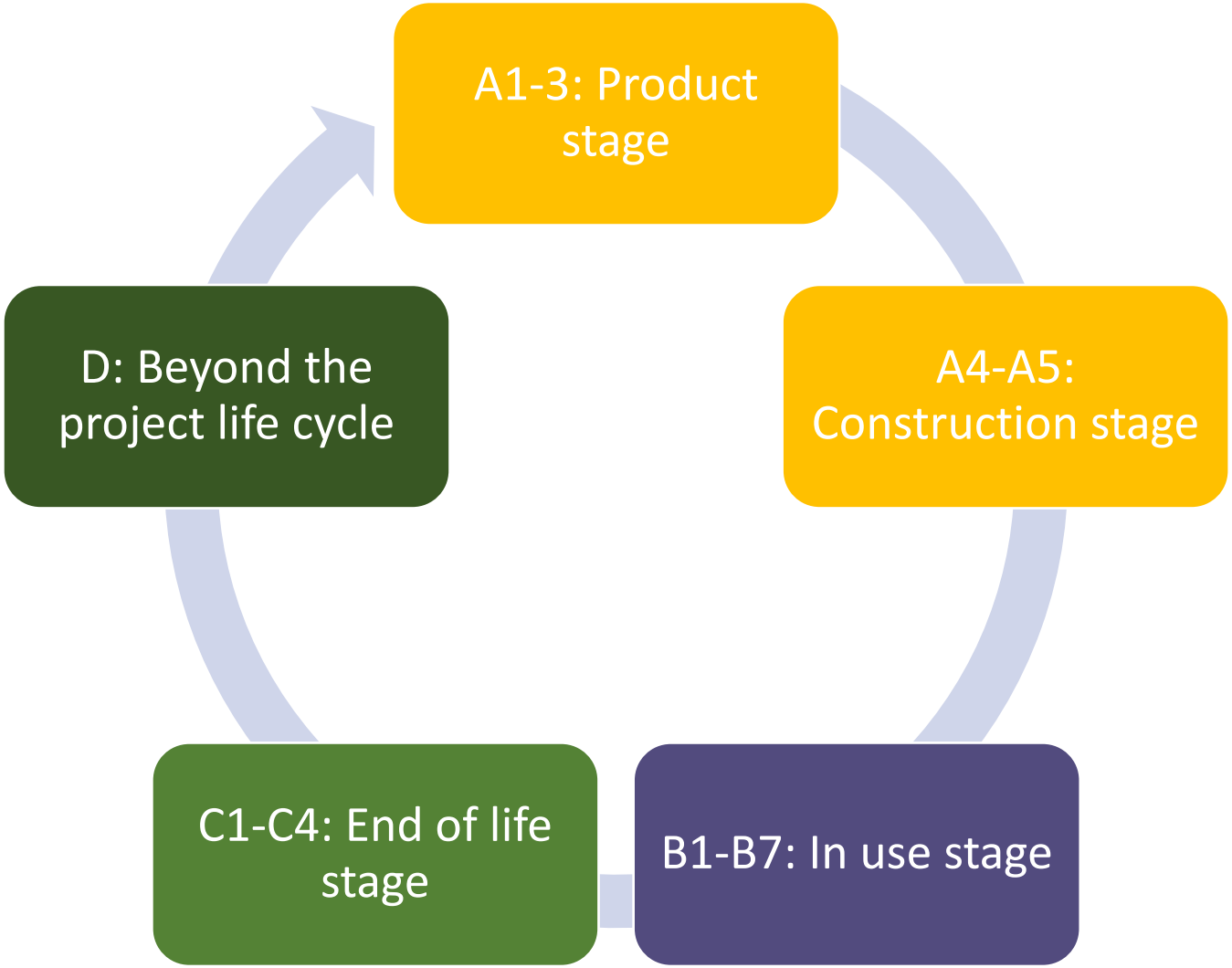
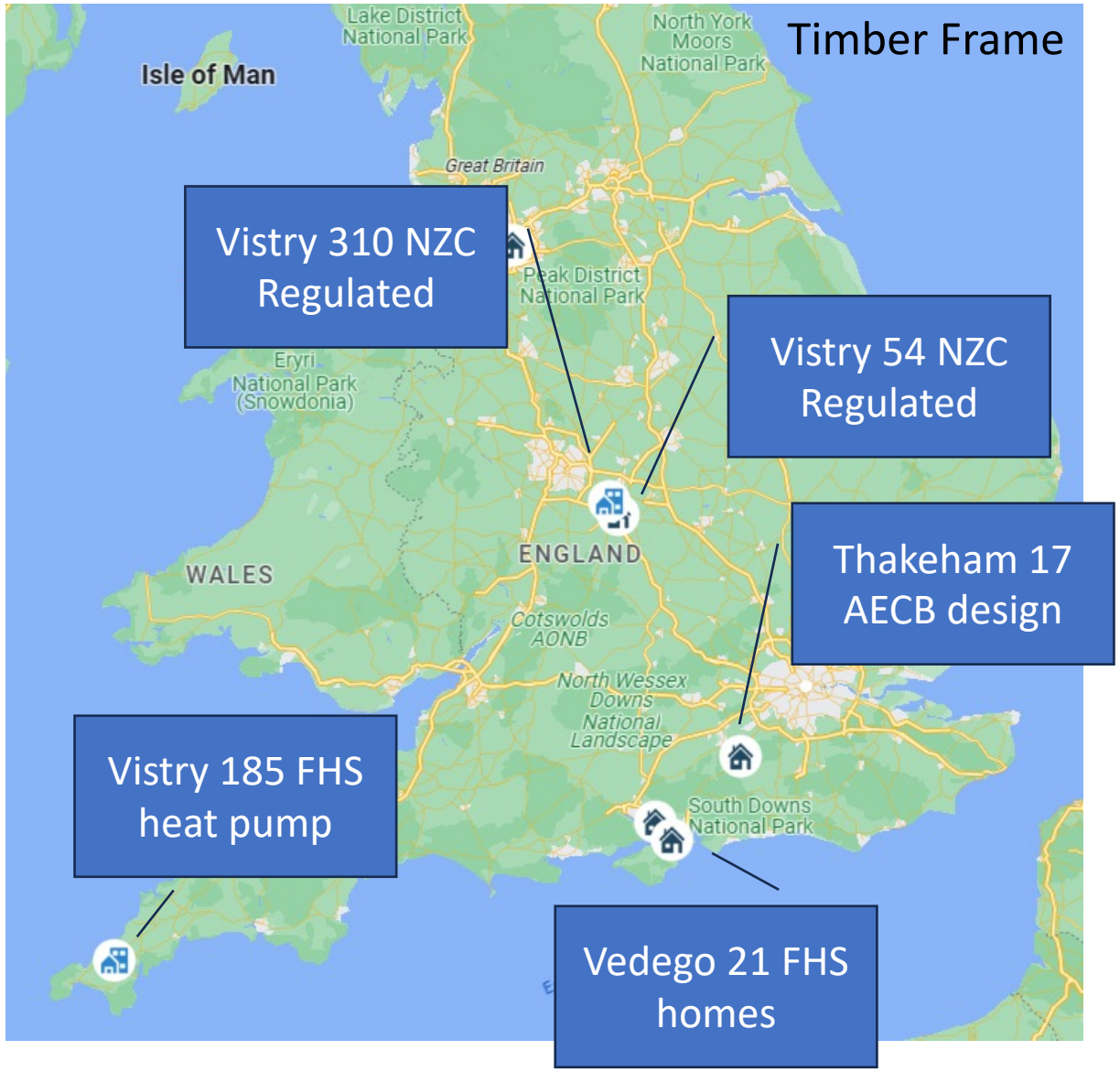
Whole life carbon

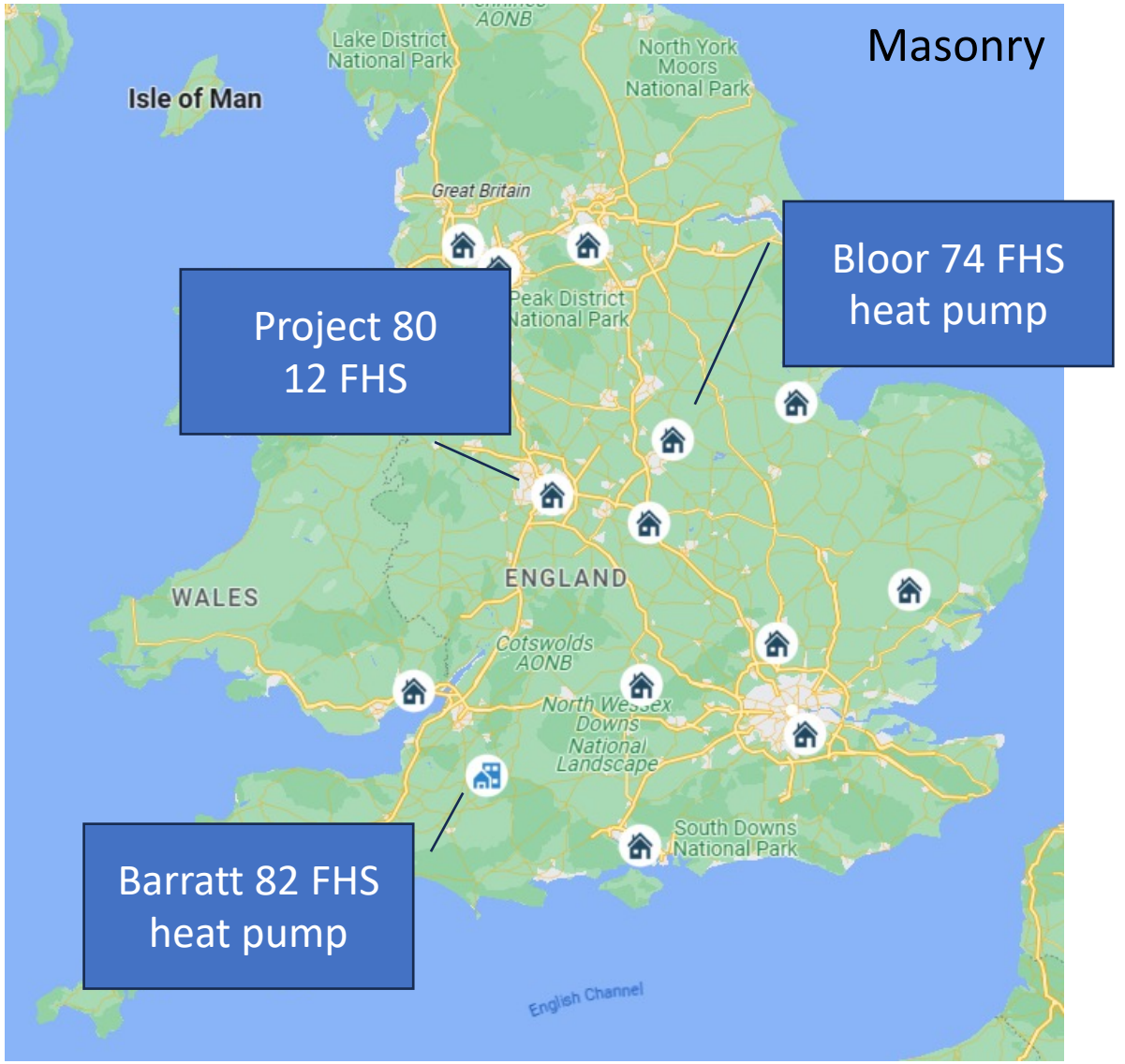


Carbon in use

B1-B7: In use stage

Carbon in-use: FHS Case Studies (see Future Homes Hub)





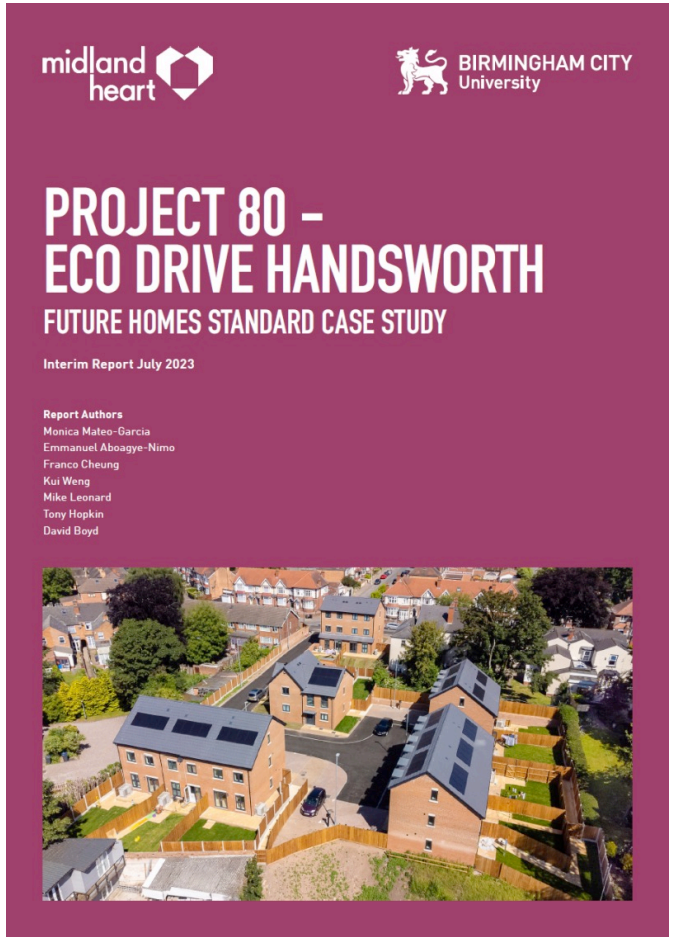
Project 80: Design Specification

	Type 1	Type 2	Type 3
External wall U-value (W/m2 K)	0.13	0.13	0.13
Air permeability (m3/h/m2)	1.5	1.5	5
Y-value	0.028	0.0274	0.028
Ventilation	MVHR	MVHR	IEF

As built: 2.43 & 2.46

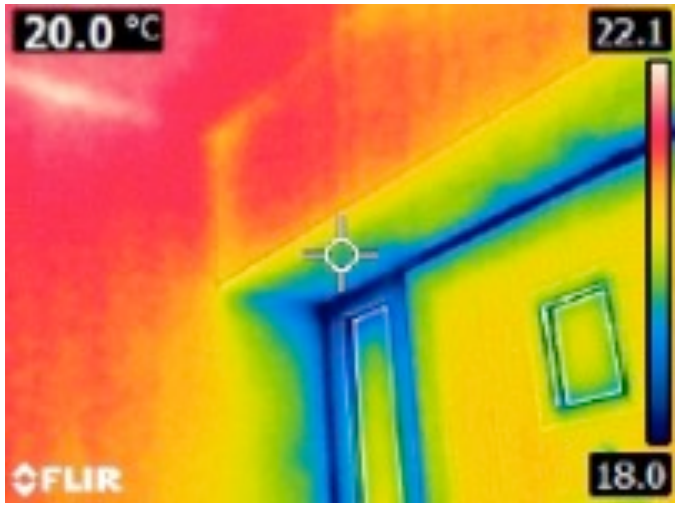
As built: 2.58 & 2.98

As built: 4.51 – 4.99 (8 homes)



Project 80: Construction and costs

- Fully filled 150mm cavities
  - Clean mortar from behind bricks
  - Placing solid insulation
  - Detailing around windows
  - Xtratherm insulation 382% additional cost (average £2900 per house)
- Type 1 & 2 non-permeable blocks
  - Average £1200 per house
- Type 1 & 2 polymer spray
  - No one else can work in the houses
  - Average £2900 per house
- Improvements will be made
  - Trades will improve
  - Costs will reduce



Future Homes Hub Details (see guides)

U-value	Insulation	Structure	Description (dims in mm)	Dim
0.19 15% timber fraction	Mineral wool λ=0.032	Lightweight blk	140mm full fill cavity	370
		Timber Frame	Int cavity, low-e BM, 140 stud	342
	PIR λ=0.022	Aircrete	75mm insulation & 50mm cavity	355
		Timber Frame	Low-e BM, 120 PIR in 140 stud	317
0.18 masonry/ 0.17 timber frame 15% timber fraction	Mineral wool λ=0.032	Aircrete	150mm full fill cavity	380
		Timber Frame	Int cavity, low-e BM, 25 PIR over boarding, 140 stud	367
	PIR λ=0.022	Aircrete	85mm insulation & 50mm cavity	365
		Timber Frame	Int cavity, low-e BM, 25 PIR over boarding, 90 PIR in 140	367
0.15 15% timber fraction	Mineral wool λ=0.032	Aircrete	185mm full fill cavity	415
		Timber Frame	Int cavity, low-e BM, 40 PIR over boarding, 140 stud	382
	PIR λ=0.022	Aircrete	85 insulation in cavity & 50 clear. 35 on plasterboard	390
		Timber Frame	Int cavity low-e BM, 25 PIR over boarding, 90 PIR in 140	367

28

38

13

2

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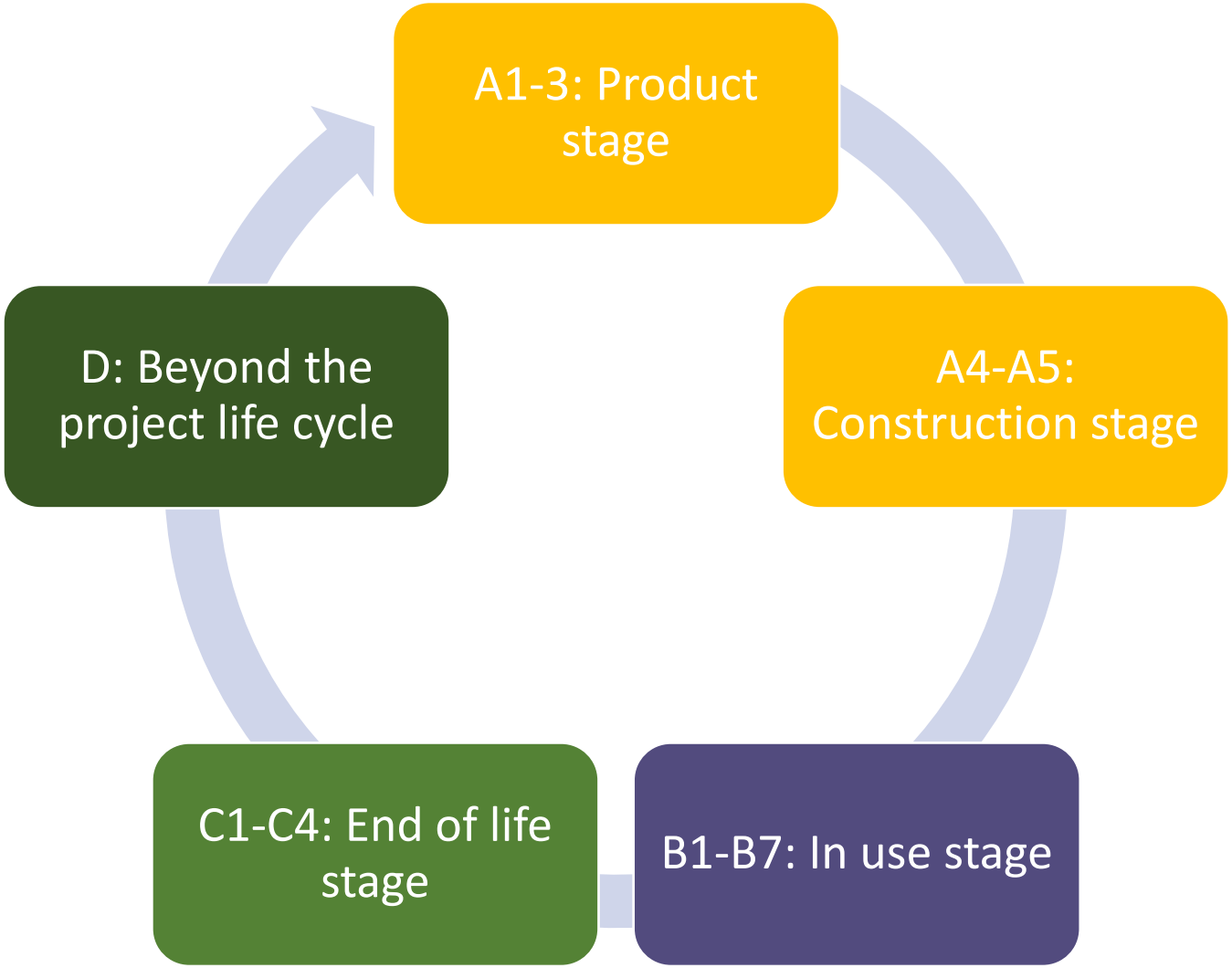
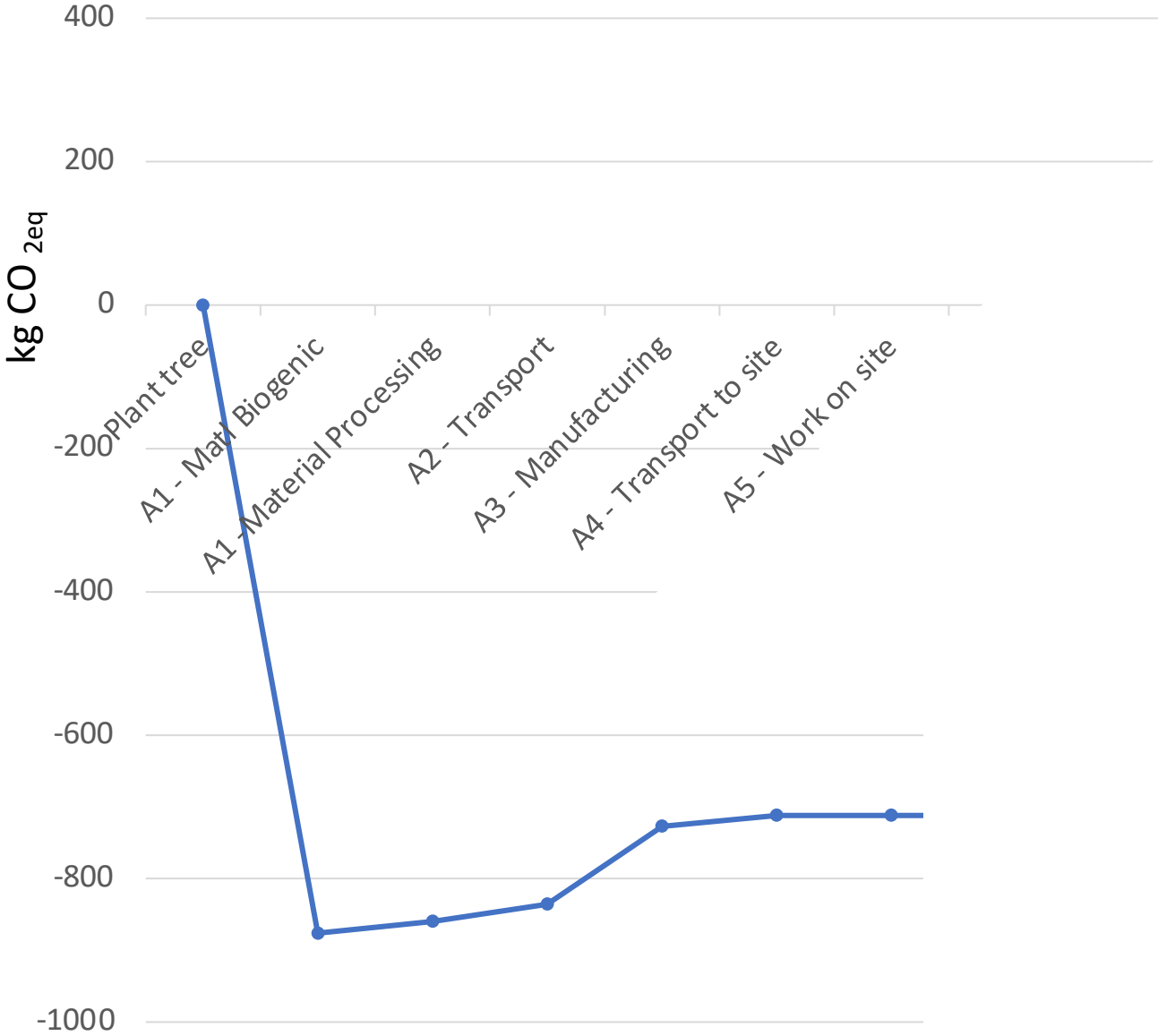
23

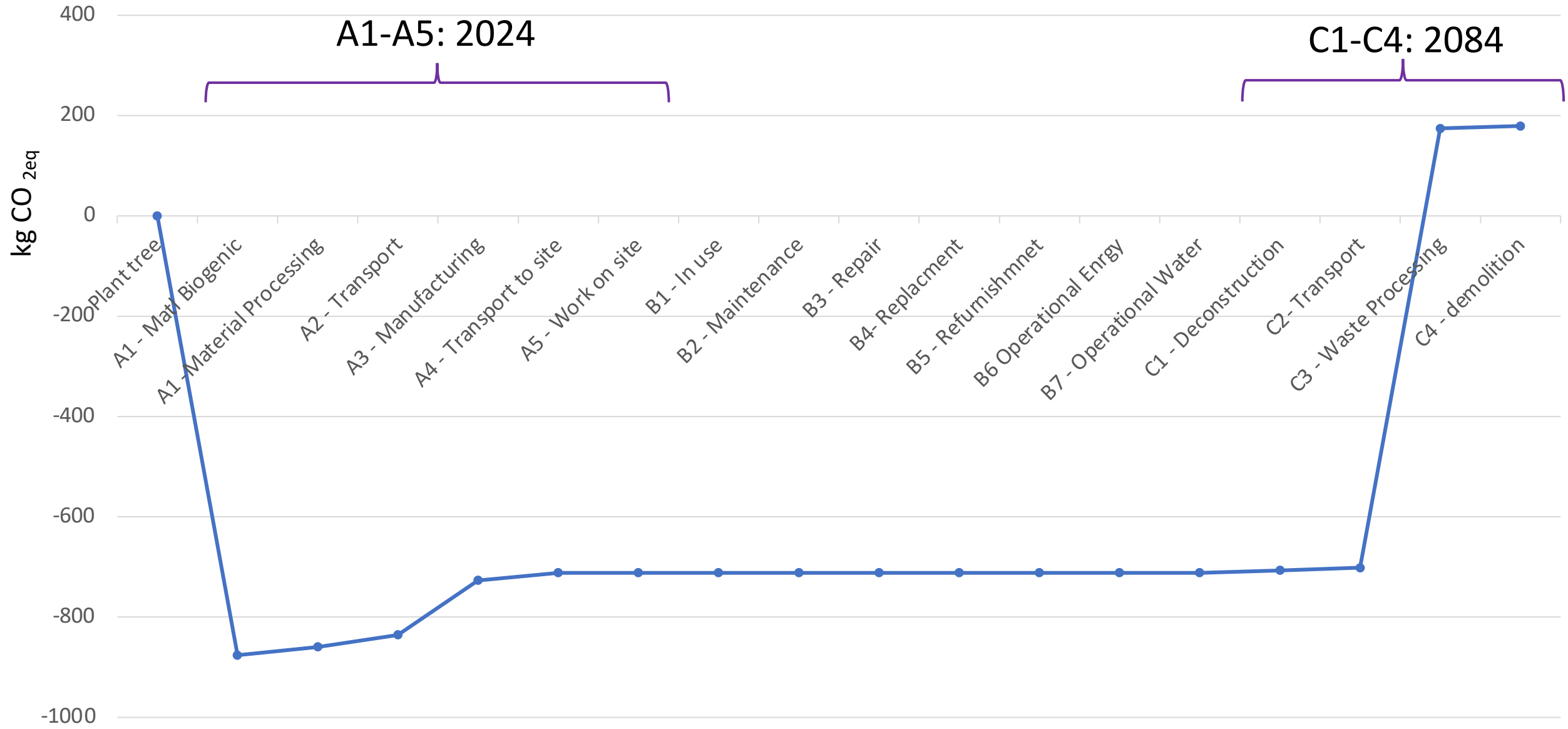
Whole Life Carbon vs Embodied carbon



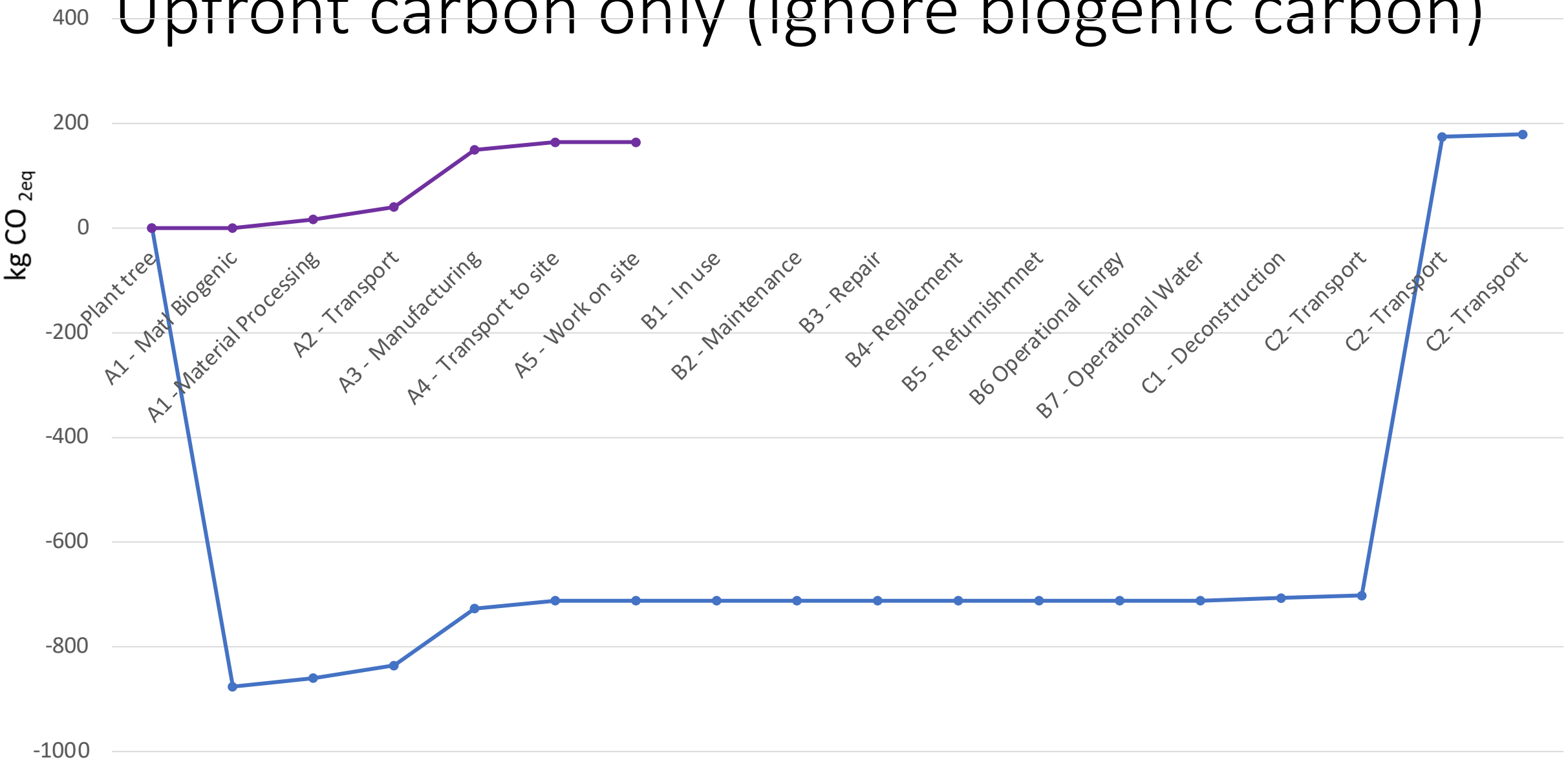
Whole Life Carbon for 1m^3 of timber (indicative only)



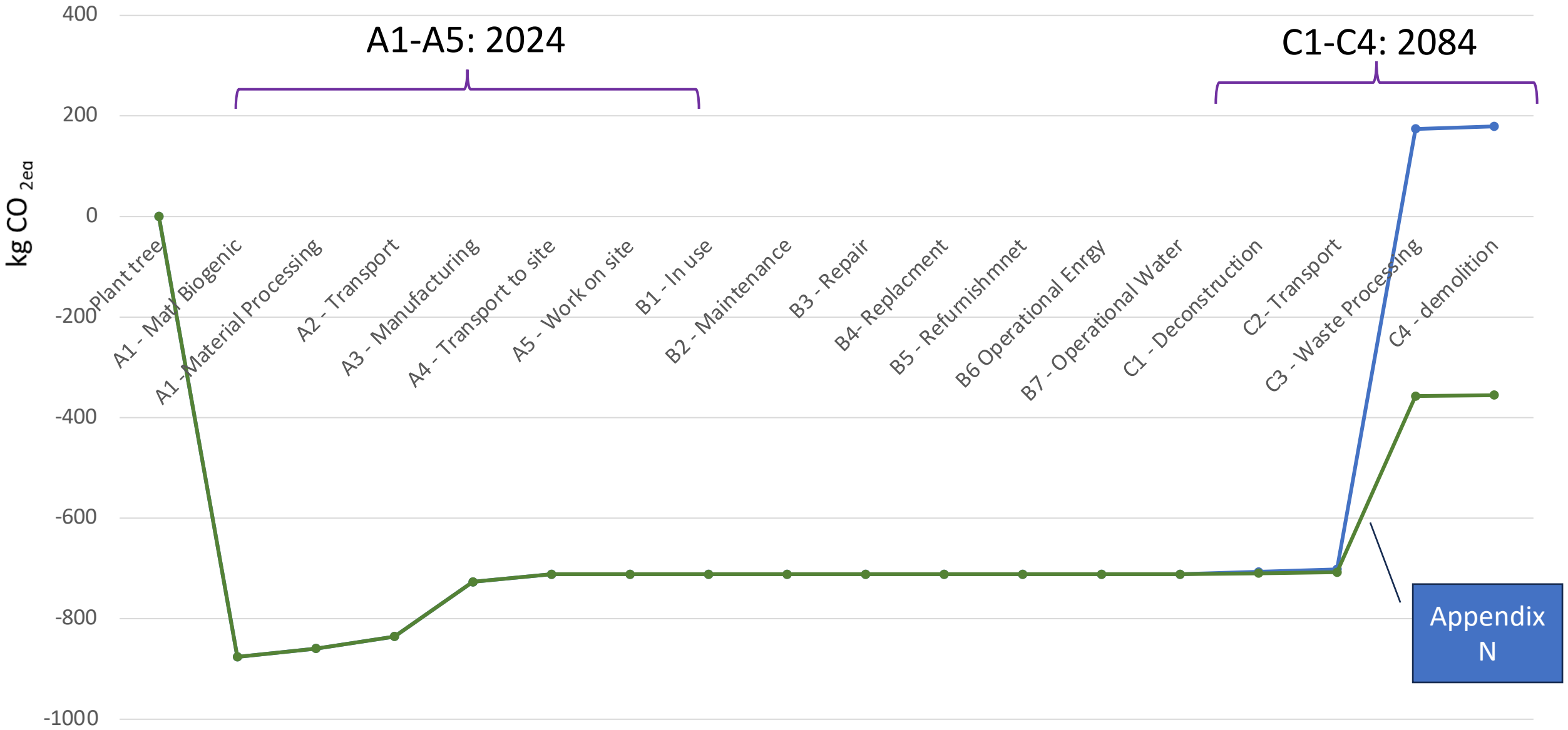
Whole Life Carbon for 1m^3 of timber (indicative only)



Upfront carbon only (ignore biogenic carbon)

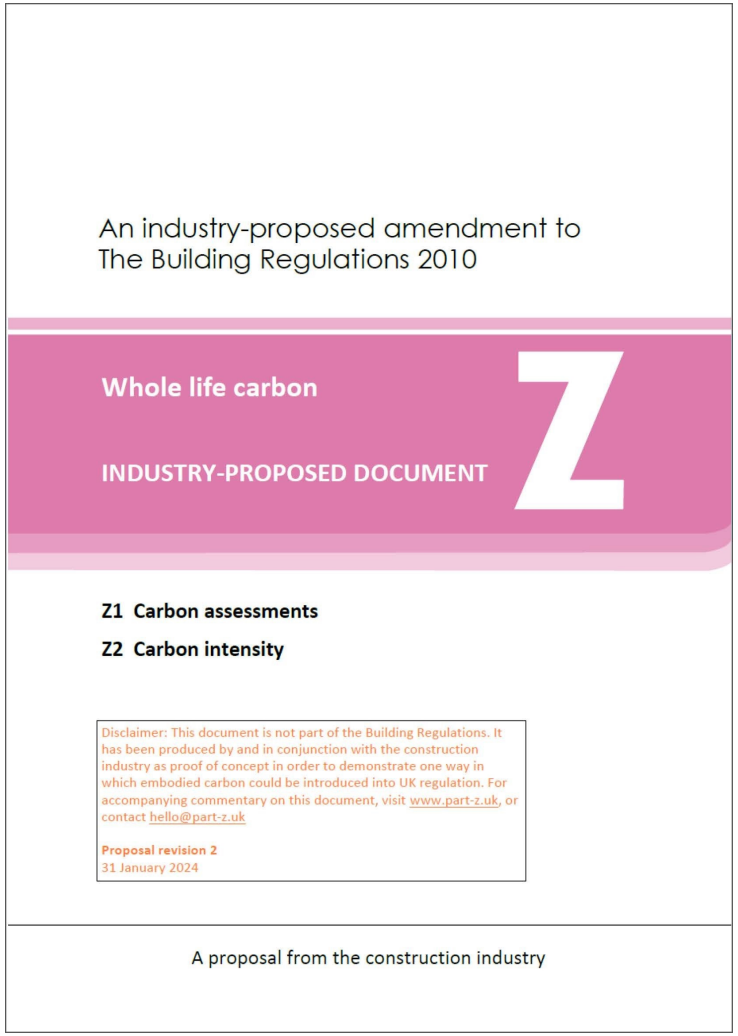


Time Value of Carbon over 60 years



Conclusion: Whole Life Carbon Calculation

- The RICS Professional Standard main calculation:
  - “cancels out” the advantages of sequestration, but you can use Appendix N
  - assumes end of life at 60 years regardless
- Benchmark yourselves – perhaps via the Future Homes Hub
- Look to reduce carbon wherever you find it



Conclusion: Carbon and Timber Frame

- Good whole carbon results
- Compact walls for a given U-value
- Airtight (if you want it to be)
- A dry process which quickly produces a weathertight shell