Designer Embodied Carbon (EC) Calculation - Civil & Electrical

Build Table Most Contributing Materials 1%>. Embodied Carbon A1-5

Project Name:	**Prinny Hill**
Project Scope:	**T11 Replacement - In Situ**

Project Embodied Carbon Breakdown and Totals t(Co2e):	
Total A1-5w	119.8870615
A5a	3.99
Total A1-5 t(CO2e)	**123.87**

Note: Total A1-5t(CO2e): Total A1-5w + A5a = Ans

Calculation Date:	**01/10/2025**
Project Code:	**50016250**
Project Completed in Financial Year:	**2025**
Estimated Cost of Civil Build(£): (To Estimate A5a)	£569,455.95

Structural timber: in Tonnes, (To Calculate Sequstration Value)	0
Sequestration Value t(CO2e):	0

Design Values														
Embodied Carbon t(CO2e)					ECF kg(CO2e/kg)			Embodied Carbon t(CO2e)				Total EC t(CO2e)		Notes/ Comments
Stage of works	**Material**	**Units values to input in conversion to tonnes cell**	**Conversion to Tonnes**	**Quantity(t)**	**A1-3**	**A4**	**A5w**	**A1-3**	**A4**	**A5w**	**A1-5w**	**A1-5w**		
Foundation Excavation & Backfill	**Soil assumed 5% cement content.** 1m3 = 1.9 tonnes of clay soil. Ref:	**input value in m3** (in 'conversion to tonnes' cell)	29.029	67.405338	0.061	0.005	0.004452	4.1117	0.337	0.3001	4.748840873	**Foundation Excavation & Backfill**	4.748840873	
Foundation	Asphalt, 8% (Bitumen) binder content (by mass) weight @ 2322kg / m3	**input value in m3** (in 'conversion to tonnes' cell)	0	0	0.086	0.005	0.005777	0	0	0	0	**Foundation**	0	
	PVC Pipes (Waste water) weight @ 0.72kg / m	**input value in meters** (in 'conversion to tonnes' cell)	0	0	3.23	0.005	0.172409	0	0	0	0		0	
	Concrete Slab weight @ 43kg per slab ref: (https://buildingshop.co.uk/product/concre	**input value in m3** (in 'conversion to tonnes' cell)	0.817	0.817	0.188	0.005	0.00211	0.1536	0.0041	0.0017	0.15940487		0.15940487	
	Limestone Aggregate, 2650kg/m3	**input value in m3** (in 'conversion to tonnes' cell)	36.4	96.46	0.005	0.005	0.001484	0.4823	0.4823	0.1431	1.10774664		1.10774664	
Reinforced Concrete	**Ready mix concrete 32/40**. 2350kg / m3	**input value in m3** (in 'conversion to tonnes' cell)	4.7951	11.268485	0.132	0.005	0.008215	1.4874	0.0563	0.0926	1.636353049		1.636353049	
	Rebar (New) weight @ H10 = 0.62kg / m	**input value in kg** (in 'conversion to tonnes' cell)	0	0	2.77	0.032	0.14946	0	0	0	0		0	
	Rebar (New) weight @ H12 = 0.89kg / m	**input value in kg** (in 'conversion to tonnes' cell)	24.92	0.02492	2.77	0.032	0.14946	0.069	0.0008	0.0037	0.073550383	**Reinforced Concrete**	0.073550383	
	Rebar (New) weight @ H20 = 2.47kg / m	**input value in kg** (in 'conversion to tonnes' cell)	0	0	2.77	0.032	0.14946	0	0	0	0		0	
	A393 mesh (New) weight @ = 6.2kg / m	**input value in kg** (in 'conversion to tonnes' cell)	28.52	0.02852	2.77	0.032	0.14946	0.079	0.0009	0.0043	0.084175639		0.084175639	
Steel works	Stainless Steel Windposts Grade 304 weight @ 37.5kg / m	**input value in meters** (in 'conversion to tonnes' cell)	0	0	6.15	0.032	0.062	0	0	0	0		0	
	Steel General (New) weight @ 7900kg / m3 (contractor weights for materials on steel is a must)	**input value in kg** (in 'conversion to tonnes' cell)	0	0	2.89	0.032	0.0294	0	0	0	0	**Steel works**	0	
	Mild Steel Fencing weight @ 25kg per linear meter	**input value in meters** (in 'conversion to tonnes' cell)	1	0.025	1.53	0.005	0.01553	0.0383	0.0001	0.0004	0.03876325		0.03876325	
Superstructure	**Clay Brick** (2000kg / m3)	**input value in kg** (in 'conversion to tonnes' cell)	0	0	0.24	0.005	0.06575	0	0	0	0		0	
	Louvres RSH5700 edition / weight @ 25kg/m2 (Assumed alluminium frame)	**input value in kg** (in 'conversion to tonnes' cell)	0	0	12.79	0.032	0.1284	0	0	0	0	**Superstructure**	0	
	Mineral wool insulation, Rockwool RW3, weight at 60kg/m3	**input value in kg** (in 'conversion to tonnes' cell)	0	0	1.28	0.005	0.069059	0	0	0	0		0	
	Autoclaved Aerated Concrete Block 600kg / m3	**input value in kg** (in 'conversion to tonnes' cell)	430	0.43	0.375	0.005	0.0995	0.1613	0.0022	0.0428	0.206185		0.206185	
Roof	**Timber truss** weight @ 3kg / m	**input value in kg** (in 'conversion to tonnes' cell)	0	0	0.42	0.005	0.12847	0	0	0	0		0	
	Concrete roof tiles weight @ 3kg / m2	**input value in kg** (in 'conversion to tonnes' cell)	0	0	0.1	0.005	0.00123	0	0	0	0	**Roof**	0	
	Concrete Roof Columns weight @ 355kg / m	**input value in meters** (in 'conversion to tonnes' cell)	0	0	0.188	0.005	0.00211	0	0	0	0		0	
	PVC Pipes (weight @ 0.72kg / m)	**input value in meters** (in 'conversion to tonnes' cell)	0	0	3.23	0.005	0.172409	0	0	0	0		0	
Cable Excavation & Backfill	**Soil assumed 5% cement content.** 1m3 = 1.9 tonnes of clay soil. Ref: (https://coolconversion.com/volume-mass-construction/~1~cubic-meter~of~clay-soil~to~tonne)	**input value in m3** (in 'conversion to tonnes' cell)	0	0	0.061	0.005	0.004452	0	0	0	0	**Cable Excavation & Backfill**	0	
	Cable Ducts PVC-3 Phases -ave weight 3.3kg / m	**input value in meters** (in 'conversion to tonnes' cell)	55	0.1815	3.23	0.005	0.172409	0.5862	0.0009	0.0313	0.618444734		0.618444734	
	Single Core Cable 33kV - 3 Phases : ave weight @ 15.6kg/m	**input value in meters** (in 'conversion to tonnes' cell)	11	0.1716	3.81	0.032	0.0386	0.6538	0.0055	0.0066	0.66591096		0.66591096	
	Single Core Cable 6.6 / 11kV - 3 Phases : av weight @ 13.6kg/m	**input value in meters** (in 'conversion to tonnes' cell)	44	0.5984	3.81	0.032	0.0386	2.2799	0.0191	0.0231	2.32215104		2.32215104	
	Muilticore Cable : av weight @ 1.5kg/m	**input value in meters** (in 'conversion to tonnes' cell)	150	0.225	3.7	0.032	0.0375	0.8325	0.0072	0.0084	0.8481375		0.8481375	
Transformers	**Transformer 33kV**	**input value in Tonnes** (in 'conversion to tonnes' cell)	38.73	38.73	2.67	0.032	0.0272	103.41	1.2394	1.0535	105.701916	**Transformers**	105.701916	
	Transformer 132kV	**input value in Tonnes** (in 'conversion to tonnes' cell)	0	0		0.16	0.00178	0	0	0	0		0	
	Transformer EAT	**input value in Tonnes** (in 'conversion to tonnes' cell)	0	0		0.16	0.00178	0	0	0	0		0	
Switchgear	**Protection Panels:** ave weight 260kg	**input quantity** (in 'conversion to tonnes' cell)	2	0.52	3.03	0.16	0.03208	1.5756	0.0832	0.0167	1.6754816		1.6754816	
	Switch Gear 2	**input value in Tonnes** (in 'conversion to tonnes' cell)	0	0		0.16	0.00178	0	0	0	0		0	
	Switch Gear 3	**input value in Tonnes** (in 'conversion to tonnes' cell)	0	0		0.16	0.00178	0	0	0	0		0	
	Switch Gear 4	**input value in Tonnes** (in 'conversion to tonnes' cell)	0	0		0.16	0.00178	0	0	0	0	**Switch Gear**	0	
	Switch Gear 5	**input value in Tonnes** (in 'conversion to tonnes' cell)	0	0		0.16	0.00178	0	0	0	0		0	
	Switch Gear 6	**input value in Tonnes** (in 'conversion to tonnes' cell)	0	0		0.16	0.00178	0	0	0	0		0	

Calculation Notes:	
Weight of structural Timber (Excluding temp works):	tonnes
Weight of Temporary Timber (formworks, Assumed reuse):	tonnes
Foundation -Trench Excavations	At Length[ ] m x Width[ ] m x Depth[ ] m = [ ] m3
Cables - Trench Excavtions	At Length[ ] m x Width[ ] m x Depth[ ] m = [ ] m3
Power Cable circuit lengths	[ ] meter lengths

Important note:	**All materials calculated in above sheet, includes only imported materials**

Key:		
	A1-3	Caculation are based on **Embodied Carbon Factors (ECF)** to **Extract & Manufacture** the material Calculated as: **Tonnes x ECF kg(CO2e/kg) = Embodied Carbon t(CO2e). Sourced IstructE**
	A4	Calculation based on **kg of CO2e produced** by Distance travelled in **km**, ECF based on: **Tonnes x ECF kg(CO2e/kg) = Embodied Carbon t(CO2e)**. Distances referenced from **IStructE: Locally sourced within 50km = 0.005kg(CO2e) / Nationally Sourced within 320km = 0.32kg(COe) / European sourced within 1500km = 0.16kg(CO2e): Sourced IstructE**
	A5w	Calculation based on the **Waste Factor (WF) of Materials.** So **brick** has a **waste factor of 20%, Steel 1%** etc…: Material **WF**x(**Material ECF** x **Distance Travelled** x **Distance travelled forwaste material taken to lanfill (C2)** x **C02 used for processing disposal (C3-4)** = **A5w** / Example, assumed waste of concrete is : **0.053 x (A1-3 x x A4 x C2 x C3-4) = A5w : Sourced IStructE**
	5a	Typical assumed **costat stage A1-5 of build is 50% so: 700kg(CO2e) per £100,000** so: **0.7 x (cost of build ÷ 100,000)= Ans t(CO2e)**: **Soruced IstructE**

Key:						
	Designer to fill in all cells highlighted in light grey					
The 'Embodied Carbon t(CO2e)' cells are using a traffic light system to indicate, low- high contributing materials. Below this cell in an example of how the colour format works and what they indicate.						
Low		**Medium**		**High**		
0	12.5	25	37.5	50		
The **notes table** to the left can be used to help **breakdown** and **review calculations**. The **structural timber** values in **tonnes** can be used to **calculate** the **sequestration value**, this is used to calculate the **amount** of **carbon storage throughout the builds life cycle** **Example: 20 tonnes of structural timer x -1.64 kg(CO2e) = -32.8t(CO2e).** For more information see notes calculation A1-5 on the tab below.						

Reference note:	**Calculations & Embodied Carbon factors for materials used in the tableare sourced from the Brisa (ICE) & IstructE**
Ref for material Emobdied Carbon Factors:	**A BSRIA guide: Hammond.G etal., 'Embodied Carbon'., The inventory of Cabon and Energy., (ICE).**
	Embodied Carbon - The Inventory of Carbon and Energy (ICE) (greenbuildingencyclopaedia.uk)
Ref for calculating Embodied Carbon A1-5& Cell colour formatting:	**The Institution of Structural Engineers 'How to calculate embodied carbon'.**
	A brief guide to calculating embodied carbon (istructe.org)

Project Photographs / Drawings