

Designer Embodied Carbon (EC) Calculation - Civil & Electrical	
Build Table Most Contributing Materials 1%>. Embodied Carbon A1-5	
Project Name:	Rochdale Grid
Project Scope:	GT1 & GT2 Replacement

Project Embodied Carbon Breakdown and Totals t(CO2e):		Calculation Date:	01/10/2025	
Total A1-5w	621.9900413	Project Code:	D.50015706.895	
A5a	23.63	Project Completed in Financial Year:	2025	Structural timber: in Tonnes, (To Calculate Sequestration Value)
Total A1-5 t(CO2e)	645.62	Estimated Cost of Civil Build(£): (To Estimate A5a)	£3,376,184	Sequestration Value t(CO2e):

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

Design Values														Notes/ Comments
Embodied Carbon t(CO2e)				ECF kg(CO2e/kg)			Embodied Carbon t(CO2e)				Total EC t(CO2e)			
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)	20	46.44	0.061	0.005	0.004452	2.8328	0.2322	0.2068	3.27179088	Foundation Excavation & Backfill	3.27179088	
	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	
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 Kerb 26.74 linear meters per m3		input value in m3 (in 'conversion to tonnes' cell)	0	0	0.188	0.005	0.00211	0	0	0	0	0		
DTP type 1, 2200kg/m3 (compacted)		input value in m3 (in 'conversion to tonnes' cell)	58	127.6	0.005	0.005	0.001484	0.638	0.638	0.1894	1.4653584	1.4653584		
Reinforced Concrete	Ready mix concrete 32/40. 2350kg / m3	input value in m3 (in 'conversion to tonnes' cell)	161	378.35	0.132	0.005	0.008215	49.942	1.8918	3.1081	54.94209525	Reinforced Concrete	54.94209525	
	Rebar (New) weight @ H10 = 0.62kg / m	input value in kg (in 'conversion to tonnes' cell)	253	0.253	2.77	0.032	0.14946	0.7008	0.0081	0.0378	0.74671938		0.74671938	
	Rebar (New) weight @ H12 = 0.89kg / m	input value in kg (in 'conversion to tonnes' cell)	479	0.479	2.77	0.032	0.14946	1.3268	0.0153	0.0716	1.41374934		1.41374934	
	Rebar (New) weight @ H16 = 1.58kg / m	input value in kg (in 'conversion to tonnes' cell)	3964	3.964	2.77	0.032	0.14946	10.98	0.1268	0.5925	11.69958744		11.69958744	
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	Steel works	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)	8528.54	8.52854	2.89	0.032	0.0294	24.647	0.2729	0.2507	25.17113296		25.17113296	
	Mild Steel Fencing weight @ 25kg per linear meter	input value in meters (in 'conversion to tonnes' cell)	0	0	1.53	0.005	0.01553	0	0	0	0		0	
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	Superstructure	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		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)	0	0	0.375	0.005	0.0995	0	0	0	0		0	
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	Roof	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		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)	88	167.2	0.061	0.005	0.004452	10.199	0.836	0.7444	11.7795744	Cable Excavation & Backfill	11.7795744	
Cables	Cable Ducts PVC-3 Phases -ave weight 3.3kg / m	input value in meters (in 'conversion to tonnes' cell)	160	0.528	3.23	0.005	0.172409	1.7054	0.0026	0.091	1.799111952	Cables	1.799111952	
	Single Core Cable 33kV - 3 Phases : ave weight @ 15.6kg/m	input value in meters (in 'conversion to tonnes' cell)	440	6.864	3.8100	0.16	0.03988	26.152	1.0982	0.2737	27.52381632		27.52381632	
	Single Core Cable 6.6 / 11kV - 3 Phases : av weight @ xxkg/m	input value in meters (in 'conversion to tonnes' cell)	0	0	3.8100	0.032	0.0386	0	0	0	0		0	
	Multicore Cable : av weight @ 1.5kg/m	input value in meters (in 'conversion to tonnes' cell)	2180	3.27	3.7000	0.032	0.0375	12.099	0.1046	0.1226	12.326265		12.326265	
Transformers	Transformer 33kV	input value in Tonnes (in 'conversion to tonnes' cell)	0	0	2.67	0.16	0.00178	0	0	0	0	Transformers	0	
	Transformer 132kV	input value in Tonnes (in 'conversion to tonnes' cell)	160.4	160.4		0.032	0.0272	428.27	5.1328	4.3629	437.76368		437.76368	
	Transformer EAT	input value in Tonnes (in 'conversion to tonnes' cell)	10.1	10.1		0.16	0.02848	26.967	1.616	0.2876	28.870648		28.870648	
Switch Gear	Protection Panels: ave weight 260kg	input value in Tonnes (in 'conversion to tonnes' cell)	4	1.04	3.0300	0.032	0.0308	3.1512	0.0333	0.032	3.216512	Switch Gear	3.216512	
	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		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 Excavltions	At Length[] m x Width[] m x Depth[] m = [] m3
Power Cable circuit lengths	[] meter lengths

Key:	Designer to fill in all cells highlighted in light grey				Reference note:
The 'Embodied Carbon (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.					Calculations & Embodied Carbon factors for materials used in the table are sourced from the Brisa (ICE) & IstructIE
Low		Medium		High	Ref for material Embodied Carbon Factors: A BSRIA guide: Hammond, G et.al., 'Embodied Carbon', 'The inventory of Carbon and Energy', (ICE).
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 timber x -1.64 kg(CO2e) = -32.8t(CO2e). For more information see notes calculation A1-5 on the tab below.					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)

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

Key:	A1-3	Calculation 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 IstructIE
	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 IstructIE: Locally sourced within 50km = 0.005kg(CO2e) / Nationally Sourced within 320km = 0.32kg(COe) / European sourced within 1500km = 0.16kg(CO2e): Sourced IstructIE
	A5w	Calculation based on the Waste Factor (WF) of Materials. So brick has a waste factor of 20%, Steel 1% etc...: Material WFX(Material ECF x Distance Travelled x Distance travelled forwaste material taken to landfill (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 IstructIE
	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 IstructIE

