Embodied Carbon Model for Concrete

This carbon calculator can be used to calculate the embodied carbon of concrete. mixtures. Boundaries are cradle to gate plus the option of transport to site.

1. Concrete Mixture

circular,

ecology

1a.	Mixture Name		Mix 1 Mix 1	Mix 2 Mix 2	Mix 3 Mix 3		
1b.	Cement type		Cement CEM I	Cement CEM I	Cement CEM I		
1c.	Quantity of cement type kg per m3	9	300.0	350.0	350.0		
1d.	Any additional cement r	eplacemer	nts		Mix 3 Mix 3 Cement CEM I 350.0 350.0 100.0% 0.0% 0.0% 0.0% 0.50 175.0 5.0		
	GGBS, kg per m3 Fly ash, kg per m3 Limestone fines, kg per m3		50.0				
	For information: Total cementitious content						
	Cementitious materials, kg per m3 of	which:	350.0	350.0	350.0		
		Cement	85.7%	100.0%	100.0%		
		GGBS	14.3%	0.0%	0.0%		
		Fly Ash	0.0%	0.0%	0.0%		
1e.	Water to cement ratio		0.50	0.50	0.50		
	For information: Water	content					
	Water, kg per m3		175.0	175.0	175.0		
1e.	Admixtures Average Admixture, kg per m3 concrete		5.0	5.0	5.0		
	Air entrainers, kg per m3 concrete						
	Hardening Accelerators, kg per m3 concrete						
	Plasticisers and Superpla kg per m3 concrete	sticisers,					
	Retarders, kg per m3 concrete						
	Set Accelerators, kg per m3 concrete						
	Water Resisting Admixtur kg per m3 concrete	es,					
	For information: Total a	dmixtures					
	Total admixtures, kg per m3		5.0	5.0	5.0		

1f.	Aggregates Total coarse and fine aggregates, kg per m3 concrete	1,850.0	1,850.0	1,850.0		
	For information: Total materials TOTAL material, kg per m3 concrete	2380.0	2380.0	2380.0		
2. 2a. 3.	In-situ or precast Concrete type Steel reinforcement	Mix 1 in-situ	Mix 2 in-situ	Mix 3 in-situ		
За.	Amount of steel kg per m3	20.0	20.0	20.0		
	For information: Volume of steel Volume steel	0.3%	0.3%	0.3%		
3b.	Type of steel	Europe recycled	Custom EPD	Europe recycled		
4.	4. Transport from concrete producer to construction site					
	Delivery distance, from concrete					

Delivery distance, from concrete	11.0	11.0	11 0
producer to construction site - km	11.0	11.0	11.0

5. Summary Charts

A result graph of the three concrete mixtures is shown below



5. Embodied Carbon

H = 11				
Material		MIX 1	MIX 2	MIX 3
RESULTS - kg CO2e / m3 concrete		329	368	373
Embodied carbon of concrete per kg concrete				
RESULTS - kg CO2e / kg concrete		0.138	0.155	0.157
Results - Contribution %				
	Mi	ix 1	Mix 2	Mix 3
Material	Mi	ix 1	Mix 2	Mix 3
Cement	82	2.9%	86.4%	85.4%
GGBS	0.6	6%	0.0%	0.0%
Fly ash		0%	0.0%	0.0%
Limestone fines	0.0	0%	0.0%	0.0%
Water	0.0	0%	0.0%	0.0%
Admixture	2.5	5%	2.3%	2.2%
Aggregates		2%	3.7%	3.7%
Transport of constituents		6%	3.2%	3.2%
Concrete batching plant operations		5%	0.5%	0.5%
With mixing waste		5%	0.5%	0.5%
Precasting	0.0	0%	0.0%	0.0%
Steel reinforcement		4%	2.7%	3.9%
Transport to site	0.8	8%	0.7%	0.7%

5. Summary Calculations

Concrete calculations - Embodied Carbon Contribution - kg CO2e / m3 concrete

		Mix 1	Mix 2	Mix 3
Material		Mix 1	Mix 2	Mix 3
Cement		272.9	318.4	318.4
GGBS		2.1	0.0	0.0
Fly ash		0.0	0.0	0.0
Limestone fines		0.0	0.0	0.0
Water		0.1	0.1	0.1
Admixture		8.3	8.3	8.3
Aggregates		13.8	13.8	13.8
Transport of constituents		11.8	11.8	11.8
Concrete batching plant operations		1.7	1.7	1.7
With mixing waste		1.55	1.76	1.76
Precasting		0.0	0.0	0.0
Steel reinforcement		14.6	10.0	14.6
Transport to site		2.5	2.5	2.5
RESULTS - kg CO2e / m3 concrete		329	368	373
RESULTS - kg CO2e / kg concrete		0.138	0.155	0.157
	Mix 1	Mix 2	Ν	/lix 3
Custom EPD data for steel,		0.5		

3b. Custom EPD data for Steer, GWP - Mod A1-3 - kg CO2e per kg steel

0.5