



FuturZement | FuturBeton

nanostructured green cement/concrete

high strength ☀ CO₂-low ☀ super durability

all advantages for EUR 7,00 / ton of concrete

(additional full cost, Simoloyer® CM900, Germany 2012-10)



CO2-Emission vs. Government

CO₂-savings cover ~1/3 of equipment cost

CM900 in one year super-activates **2.160 t** GGBS while saving **395 kg** CO₂-emission per ton HKP-GGBS. Resulting CO₂-saving is about **850 t**. Including the 40% performance increase (mass production), the direct CO₂-saving results in **1.190 t**. Generated HKP-GGBS then **3.024 t** is good for **10.080 t** FuturZement or **60.480 t** FuturBeton.

In one year, the pro rata 50% saving in construction material relevant to a single CM900 would save **60.480 t** OPC-concrete (OPCC). 1 ton OPCC contains **170 kg** (17%) OPC that is responsible for **97.75 kg** CO₂-emission representing 9.8 wt% of the concrete. Resulting indirect CO₂-saving is **5.927 t**.

In 20 years lifespan, CM900 (mass production) super-activates **60.480 t** HKP-GGBS good for **0.2 Mt** FuturZement or **1.21 Mt** FuturBeton while saving **23.800 t** CO₂-emission.



Direct + indirect CO₂-saving (Σ a+b) in one year add up to **7.117 t** and in 20 years lifespan (Σ c+d) to **0.14 Mt** for one CM900.

in one year	HKP-GGBS [t]	CO ₂ -saving [t]	FuturZement [t]	FuturBeton [t]
CM900 capability basic p. a., CO ₂ & resulting products	2.160	850	7.200	43.200
CM900 capability mass production (+40%)	3.024	1.190 (a)	10.080	60.480
50% saving construction material (4xHS, 4xLD)		5.927 (b)		(60.480)
CO₂-emission saving (Σ a+b) p.a.		7.117 (Σ)		
<i>CO₂-saving 395 kg per ton HKP-GGBS 30% HKP-GGBS + 70 % OPC = FuturZement 1 ton FuturBeton contains 170 kg (17%) FuturZement higher strength [HS] x longer durability [LD] 1 ton OPCC contains 170 kg (17%) OPC, CO₂-emission 97.75 kg (9.8 wt% of concrete)</i>				
in 20 years lifespan	HKP-GGBS [t]	CO ₂ -saving [t] (Mt)	FuturZement [t] (Mt)	FuturBeton [t] (Mt)
CM900 capability basic 20Y, CO ₂ & resulting products	43.200	17.000	144.000	0.86 Mt
CM900 capability mass production (+40%)	60.480	23.800 (c)	0.2 Mt	1.21 Mt
50% saving construction material (4xHS, 4xLD)		118.540 (d)		(1.21 Mt)
CO₂-emission saving (Σ c+d) 20Y		0.14 Mt		

UBA [20] recommends the cost approach of 201/698 €/t CO₂ (time preference rate 1% / 0%) for 2021. The cost by law was fixed as of 2021 at 25 €/t increasing to 55€/t in 2025. For the next 20 years, an average of min. **60 €/t CO₂** is announced by the German Government [21].

CO ₂ , emission cost vs. cash contribution for savings in 20 years lifespan, one CM900	CO ₂ -emission cost [€/t]	CO ₂ -savings cash contribution direct [€]	CO ₂ -savings cash contribution indirect [€]
CO ₂ savings CM900, (c) direct / (d) indirect		23.800 tons (c)	118.540 tons (d)
recommendation UBA [20], tpr 1%	201	4.8 Mio	23.8 Mio
recommendation UBA [20], tpr 0%	698	16.6 Mio	82.7 Mio
fixed by law Fed Gov Germany [21], average 20Y	60	1.4 Mio	7.1 Mio
[20] publication Federal Environment Agency of Germany (UBA) [10.08.2021]; [21] publication Federal Government of Germany [10.11.2020]			

One single CM900 in mass production contributes **23.800 t** direct CO₂-saving in lifespan. Acc. to UBA this should generate 4.8/16.6 Mio€ but will not. Acc. to German Government, it will generate **min. 1.4 Mio€** covering 1/3 of investment. Indirect-cost estimates so far do not represent any income.

Once CM900 is in mass-operation, this might open the window to the next generation HKP scale up to the CM30k.

Nanostructures – make more with less !