

Zero impact beton

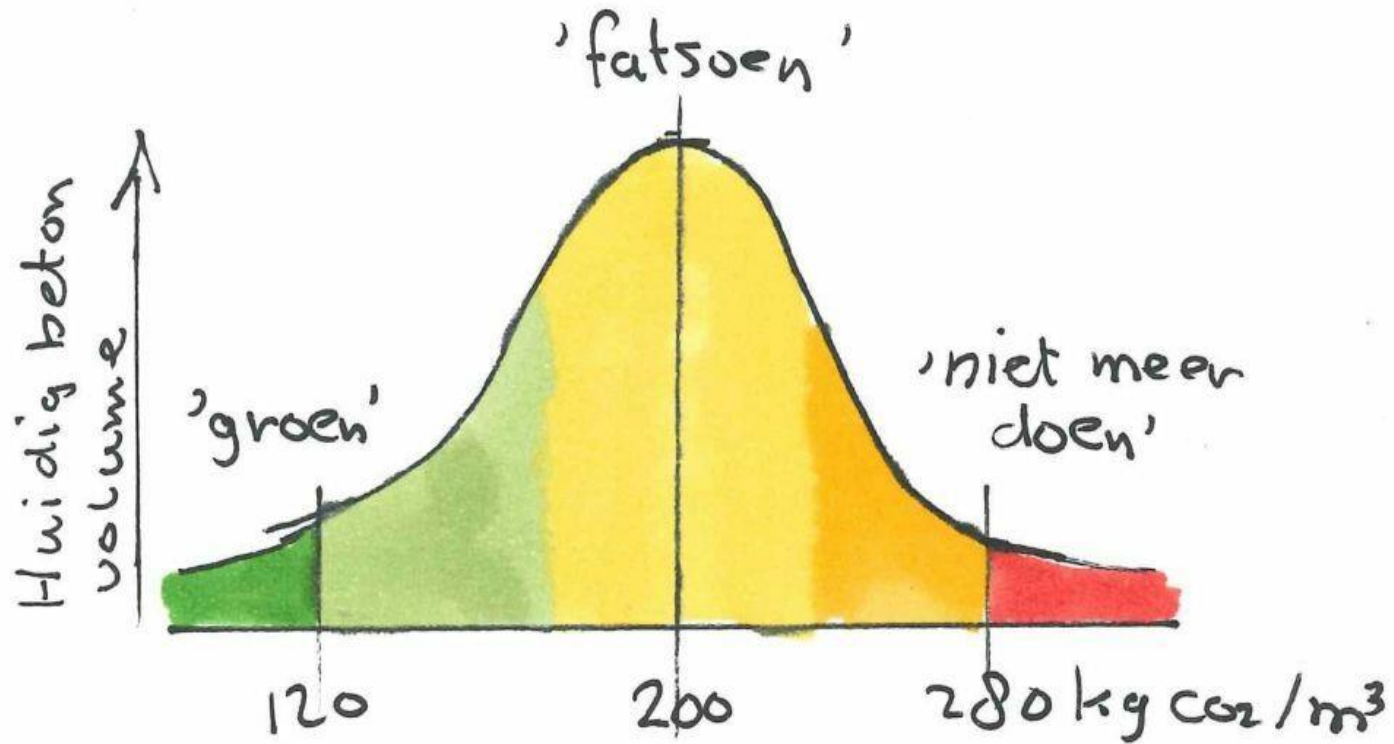
Niki Loonen

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- Half jaar bij TBI na 25 jaren bij ABT
- Docent CO₂ reductie (Betonvereniging)
- Arbiter (Raad van Arbitrage voor de bouw)
- Kennisgebieden:
 - Betontechnologie
 - Betonmechanica
 - Geotechniek
- Duurzaam beton advies
 - Roadmap CO₂ / koploper onderzoek BETON|AKKOORD
 - AACM beton Voorbij
 - Zelfhelend en basaltvezel gewapend beton Artis
 - Geopolymeer vloer RDM Rotterdam
 - Lange duur sterkte en innovaties KJ Plein



Groen beton, hoe doe je dat?



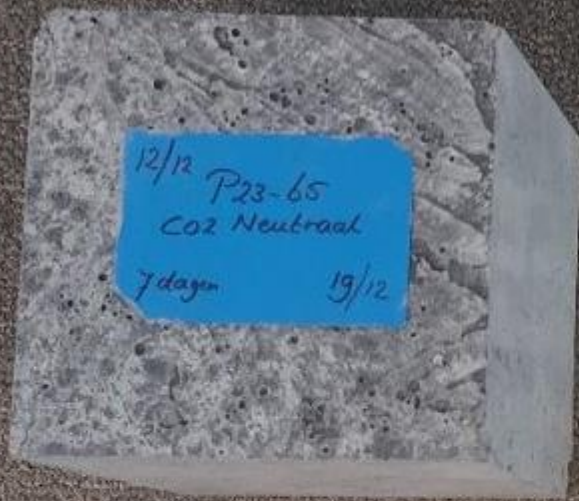
Milieuklasse	kg CO ₂ /m ³	kg CO ₂ /m ³
X0	106	143
XC1	118	159
XC2	126	170
XC3/XD1	135	180
XC4/XS1/XD2	147	196
XS2/XS3/XD3	162	216

Milieuklasse	Aandeel secundair	Aandeel secundair
X0	50%	35%
XC1	35%	23%
XC2	25%	17.5%
XC3/XD1	25%	17.5%
XC4/XS1/XD2	15%	12%
XS2/XS3/XD3	15%	12%

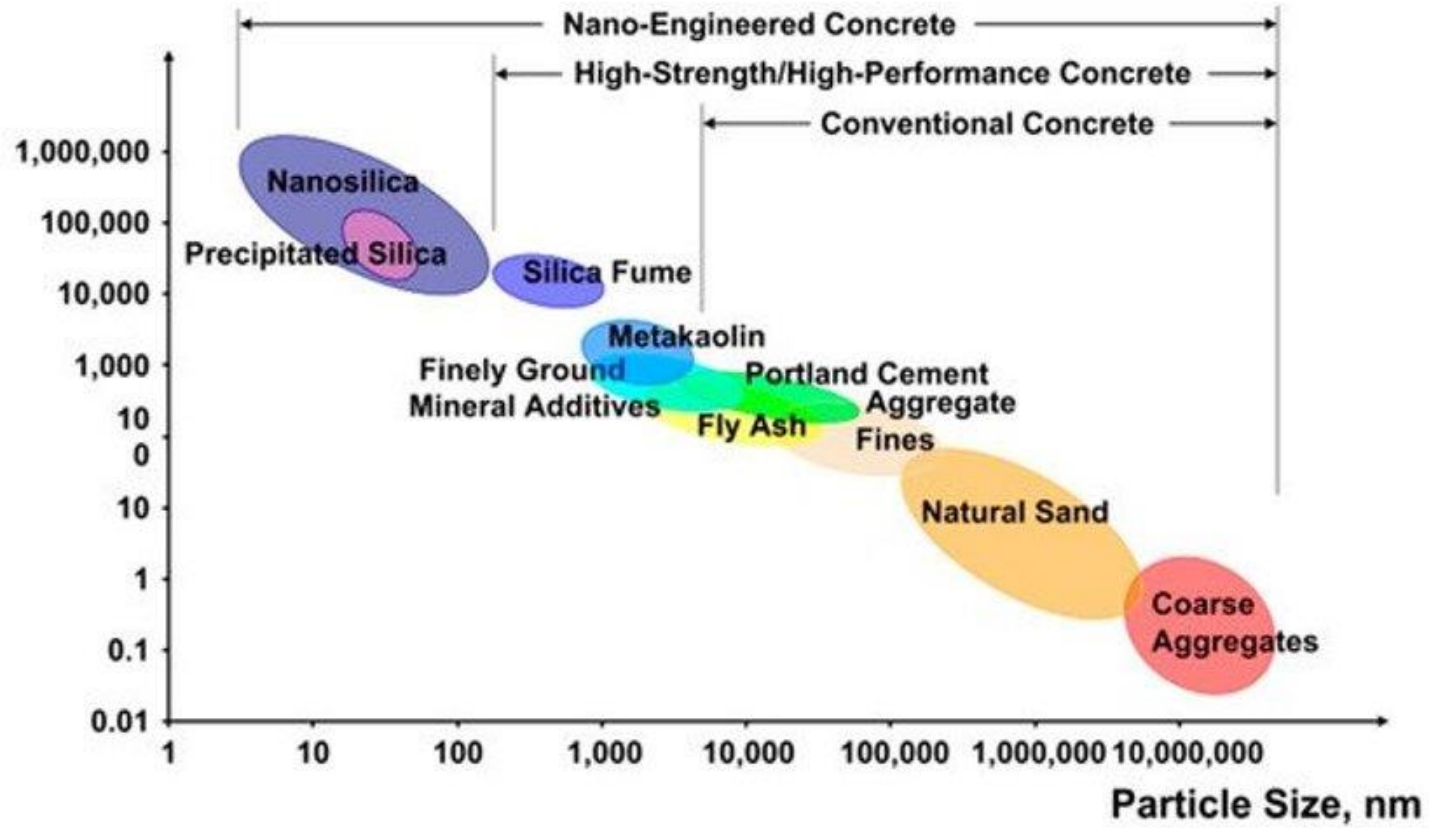






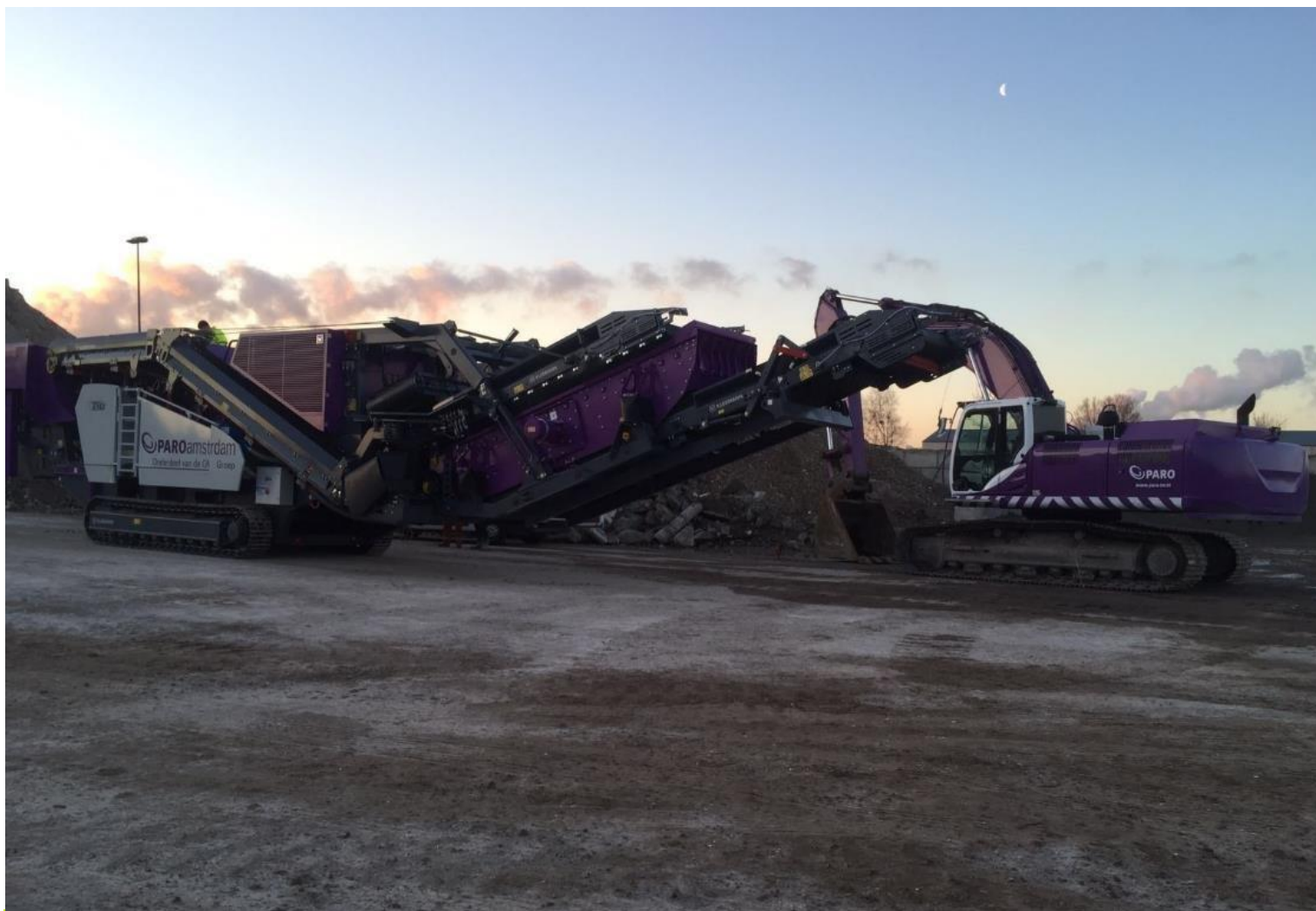


Specific Surface Area, m²/kg

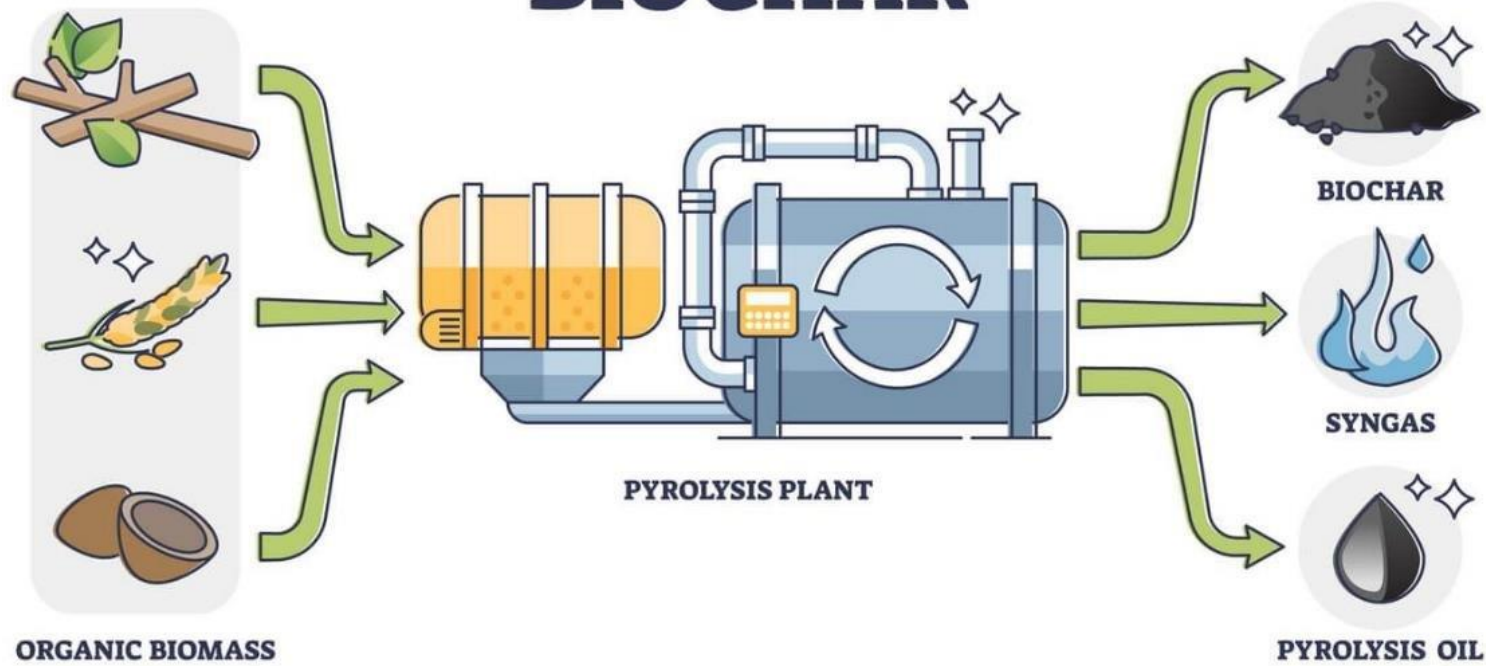








BIOCHAR





voorbij prefab

abt





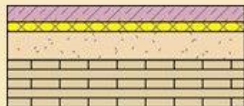
Houtbouw

CLT natte dekvloer CO₂ 41|-3*

↓ 390 ⬆ 385 € 235

34% | 66%

- Dekvloer anhydriet 70 mm
- Isolatie 20 mm
- Zand/ gravel 100 mm
- Folie
- CLT 200 mm

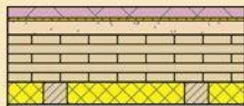


CLT droge dekvloer CO₂ 54|10*

↓ 410 ⬆ 250 € 305

50% | 50%

- Fermacell 25 mm
- Isolatie 20 mm
- Zand/ gravel 60 mm
- Folie
- CLT 200 mm
- Isolatie 75 mm
- Gipsvezelplaat 30 mm

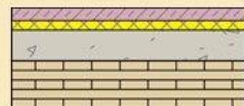


CLT schuimbeton CO₂ 59|15*

↓ 390 ⬆ 385 € 240

54% | 46%

- Dekvloer anhydriet 70 mm
- Isolatie 20 mm
- Schuimbeton 100 mm
- Folie
- CLT 200 mm

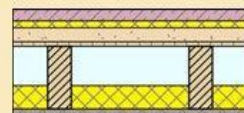


Balklaag CO₂ 52|40*

↓ 480 ⬆ 305 € 230

54% | 46%

- Dekvloer anhydriet 70 mm
- Folie
- Isolatie 30 mm
- Zand/ gravel 40 mm
- Folie
- Underlayment 18 mm
- Hout + Isolatie 270 mm
- Bekleding + regelwerk 27 mm
- Gipsplaat 2x12,5 mm



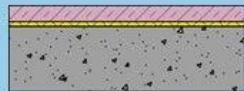
Duurzamer beton

Duurzamer in-situ beton CO₂ 58

↓ 340 ⬆ 745 € 200

22% | 78%

- Anhydriet dekvloer 70 mm
- Isolatie 20 mm
- In situ beton 250 mm C30/37, XC1, CEM III B (ecocem)
- Wapening 60 kg/m³

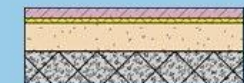


Kanaalplaatvloer CO₂ 58

↓ 390 ⬆ 605 € 155

26% | 74%

- Anhydriet dekvloer 70 mm
- Isolatie 20 mm
- Zand/ gravel 100 mm
- Kanaalplaat 200 mm



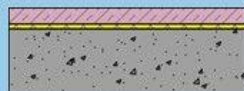
ECO beton CO₂ 43

nu mogelijk, maar wijkt af van de norm

30% | 70%

↓ 340 ⬆ 745 € 205

- Anhydriet dekvloer 70 mm
- Isolatie 20 mm
- Duurzaam beton 250 mm (AACM/ Urban Mine/ geopolymeer)
- Basalt/glasvezel wapening 20 kg/m³



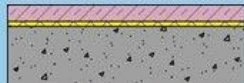
CO₂-neutraal beton CO₂ 23

in de toekomst mogelijk

57% | 43%

↓ 340 ⬆ 745 € 215

- Anhydriet dekvloer 70 mm
- Isolatie 20 mm
- Beton met CC(S)U technologie 250 mm, C30/37, XC1
- Basalt/glasvezel wapening 20 kg/m³



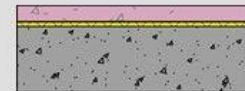
Traditioneel

Volledig in-situ CO₂ 95

↓ 340 ⬆ 745 € 180

34% | 66%

- Cement dekvloer 70 mm
- Isolatie 20 mm
- In-situ beton 250 mm C30/37, XC1, NL gem. mengsel
- Wapening 70 kg/m³



Breedplaat CO₂ 101

↓ 340 ⬆ 745 € 190

32% | 68%

- Cement dekvloer 70 mm
- Isolatie 20 mm
- In-situ beton/ druklaag 190 mm C20/25, XC1, NL gem. mengsel
- Breedplaat 60 mm C30/37, XC1, prefab snel
- Wapening 70 kg/m³



Appartementen-vloer CO₂ 107

↓ 350 ⬆ 650 € 150

30% | 70%

- Cement dekvloer 70 mm
- Isolatie 20 mm
- Appartementenvloer 260 mm



PPI budget 2030: 50-55 kg CO₂-eq/m²

CO₂ PPI [kg CO₂-eq/m²] (LCA fase A1-A5)
* zonder biogene opslag
PPI waarin 30% biogene CO₂ opslag is meegenomen [kg CO₂-eq/m²]

% | % aandeel PPI: bouwkundig | constructief

↓ dikte [mm]

⬆ gewicht [kg/m²]

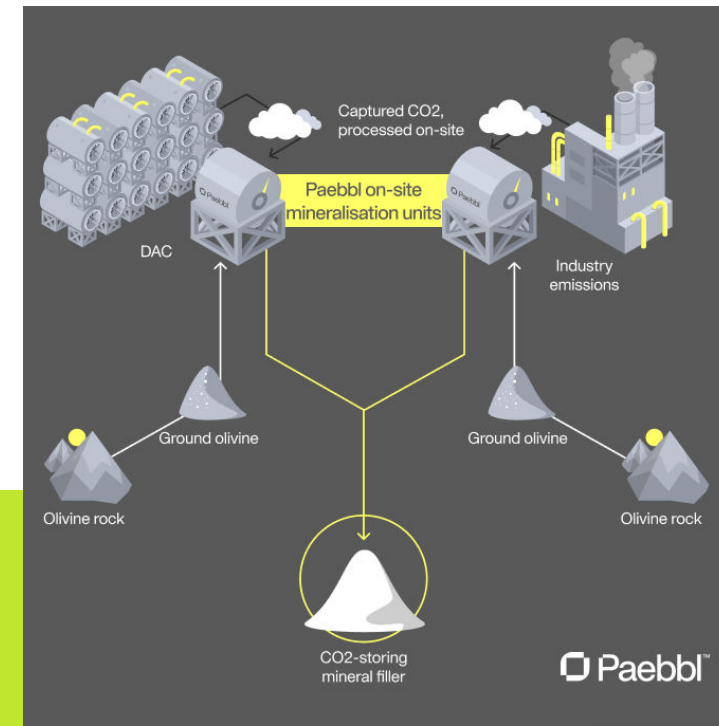
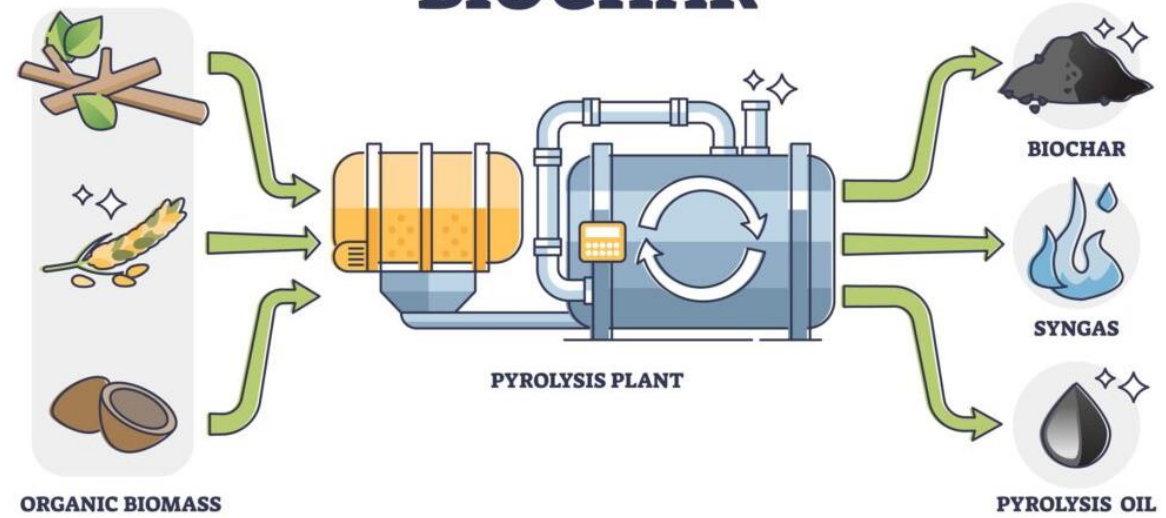
€ directe bouwkosten [€/m²]

🔥 60 minuten brandwerendheid

NB vloerverwarming overal mogelijk

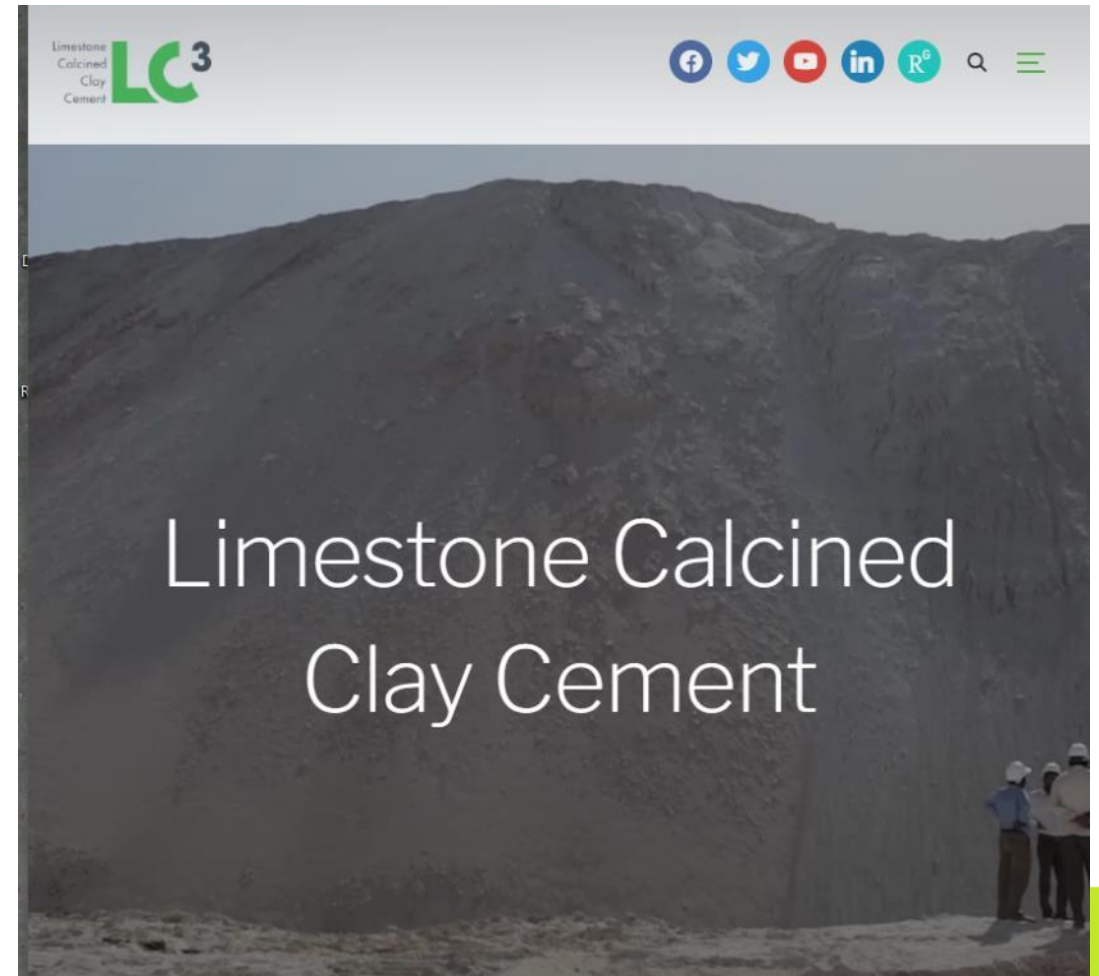


BIOCHAR



Cement made with volcanic ash can make cities stronger and greener

By Nick Lavars
February 07, 2018





concrefy*



JUST DO IT.