

Lower Carbon Concrete

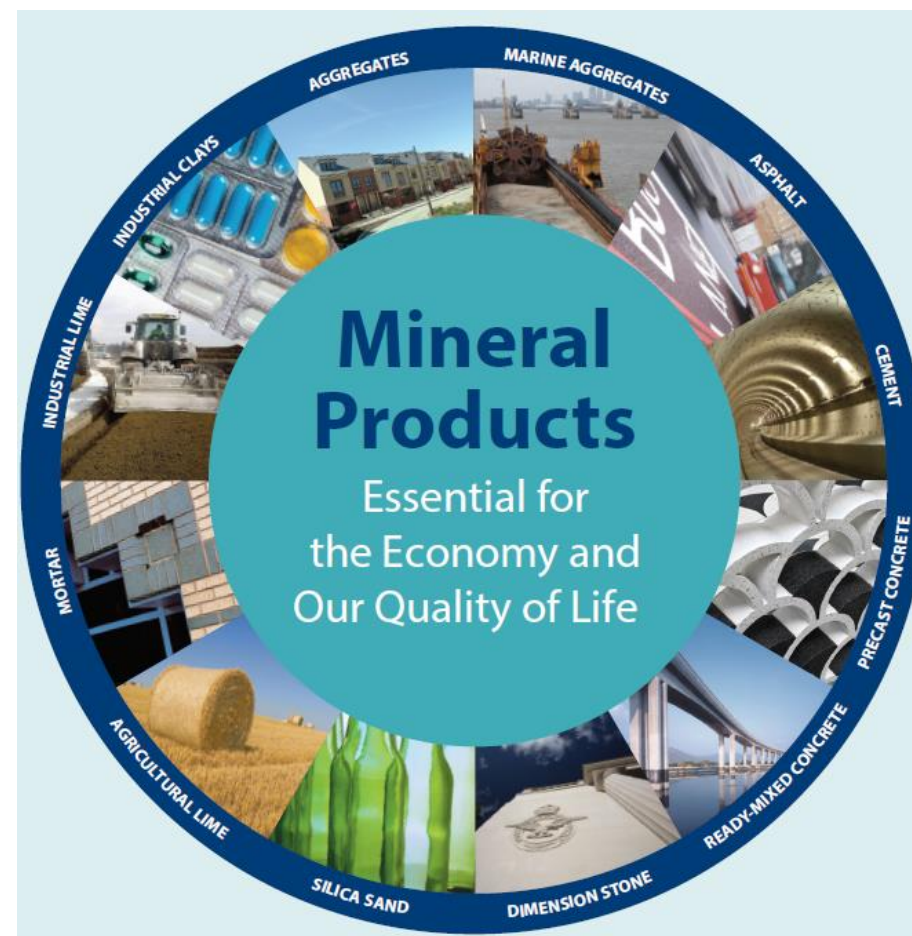
Liam Forde

Construction Manager
Mineral Products Association

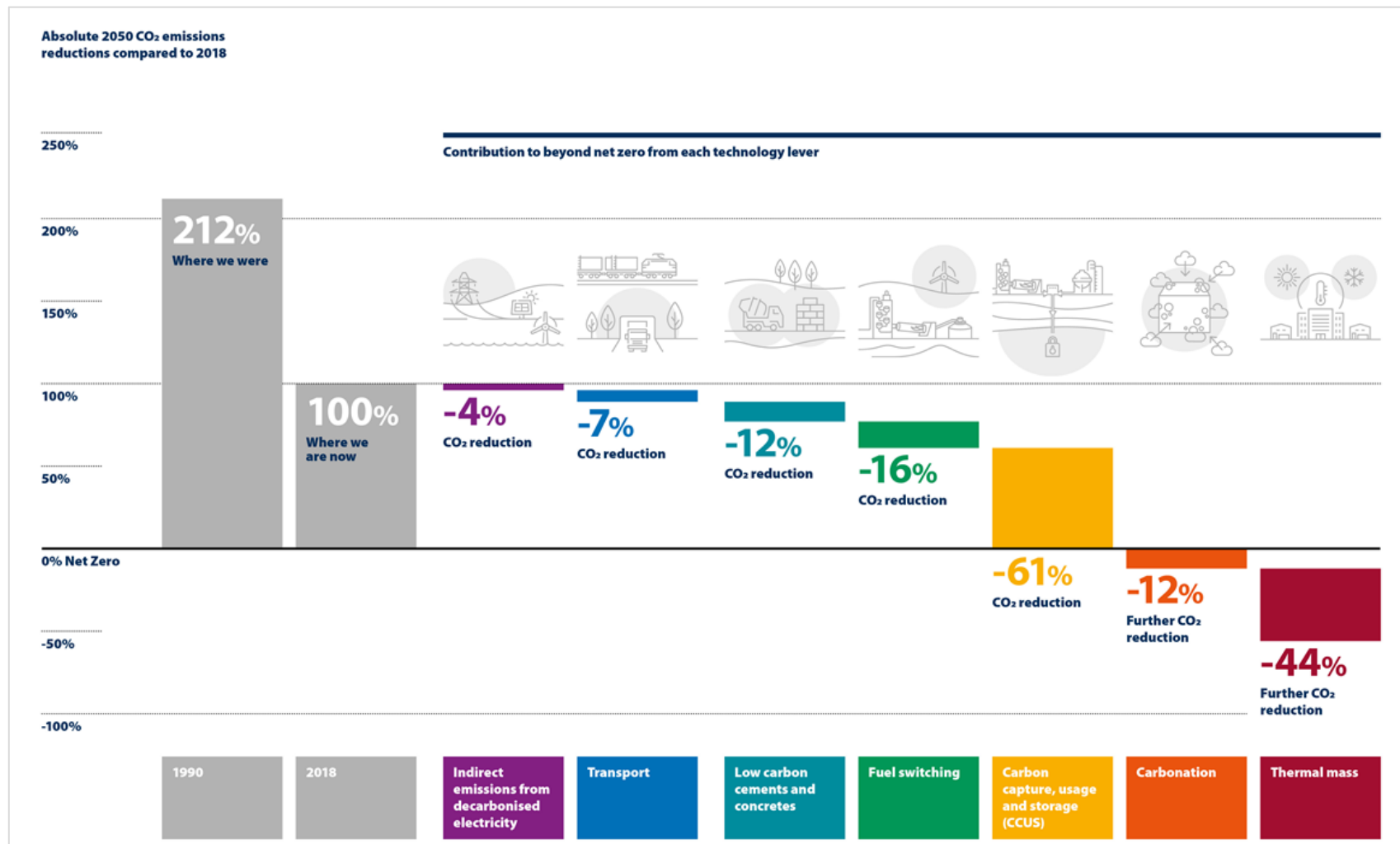
Mineral Products Association

- Trade association for aggregates, asphalt, cement, concrete, dimension stone, lime, mortar & silica sand
- Growing membership of 520 companies
- 100% UK Cement and Lime production
- 90% Aggregate production
- 95% Asphalt
- Over 70% of Ready-Mixed Concrete and Precast Concrete production

<https://www.mineralproducts.org/Homepage.aspx>



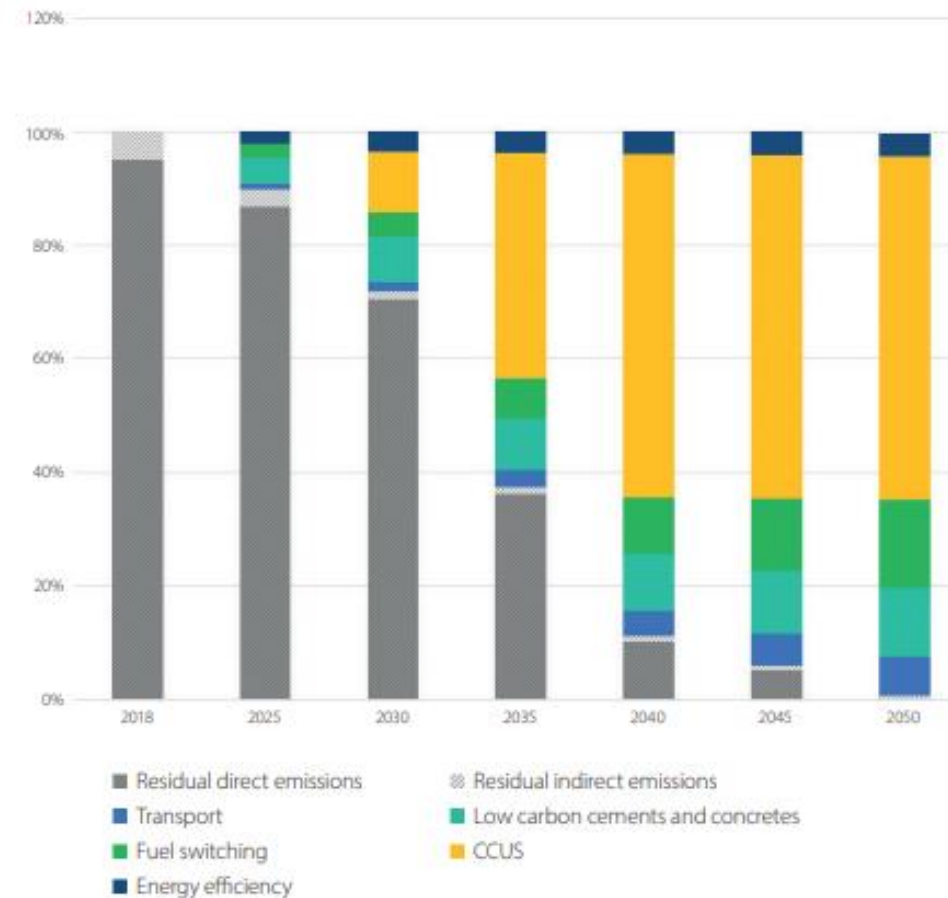
UK Concrete Construction Industry Roadmaps



UK Concrete Possible Trajectory

- Estimate based on published information and knowledge of current Government policies.
- Aligns with levers within the roadmap
- CCUS (Carbon, Capture, Use or storage) is key to the decarbonisation of cement and concrete. This trajectory shows CCUS projects announced but in early development.
- 50% of cement net zero by 2035

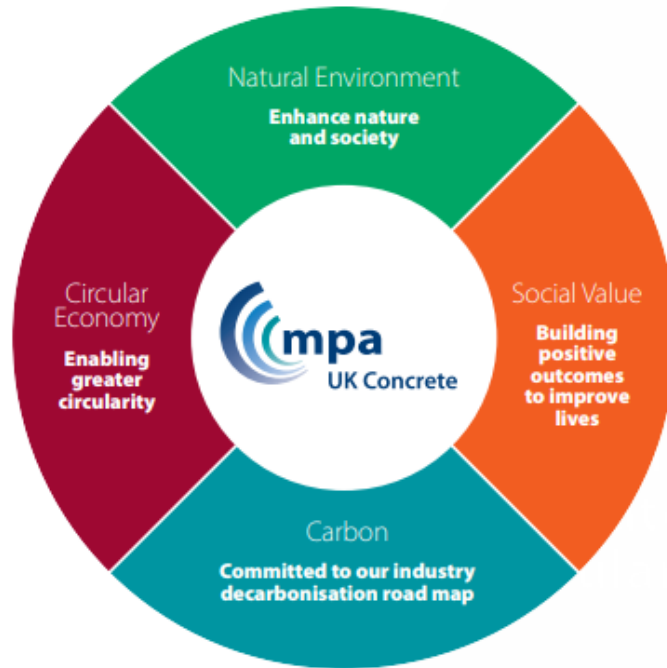
UK Cement and Concrete Possible Decarbonisation Trajectory to 2050



* The roadmap, including the pathway shows only one possible route to net zero for the sector as a whole. It does not reflect the opinion of individual member companies of the MPA. The forward-looking trajectories and statements in this publication are subject to change and do not reflect any individual company's results or forecasts which may differ significantly.



UK Concrete Construction Industry Roadmaps

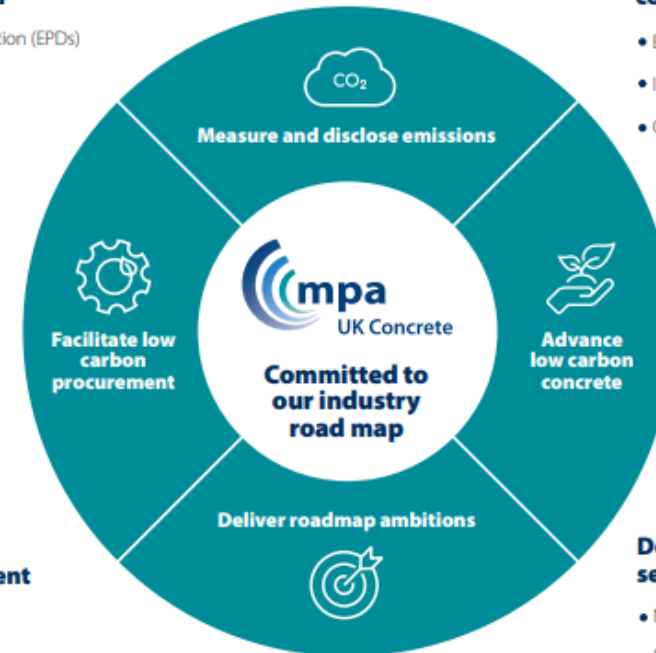


Measure and disclose GHG emissions associated with UK concrete production

- Environmental product declaration (EPDs)
- Concrete benchmarking
- Digitalisation and data sharing

Enable standards and specifications of low carbon concrete solutions

- Evolution of concrete standards
- Innovative products
- Guidance to accelerate adoption

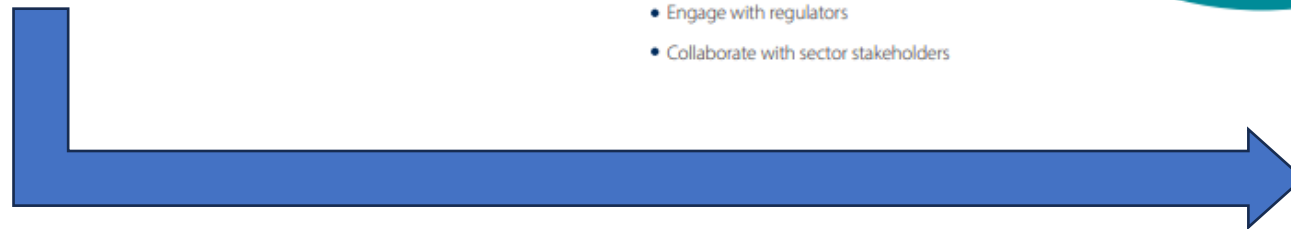


Facilitate low carbon and resilient procurement

- Engage with value chain
- Engage with regulators
- Collaborate with sector stakeholders

Deliver the ambitions set out in the roadmap

- Net zero pathway
- Roadmap lever progress
- Policy requirements



Concrete - common constituent parts



Air 1.5%

Hydraulic binder
(Cement) 10%

Water 18.5%

Fine Aggregate (sand)
25%

Coarse aggregate
(crushed stone or
gravel) 45%

Approx proportions
of a 'typical' concrete mix

ECO₂ Cementitious binder:
252-840 kg/tonne **

ECO₂ Aggregates:
6.6 kg/tonne *

UK average ECO₂ of constituent
materials *

*From Table 10 in Specifying Sustainable Concrete, The Concrete Centre, 2020

** From The Concrete Centre website

<https://www.concretecentre.com/Structural-design/Standards/Standards-for-concrete.aspx>

Table 2: Indicative embodied carbon (modules A1-A3) for different cements and combinations

Cement types			
Cement factory	Combined at concrete plant	Supplementary cementitious material (%)	Embodied carbon (kgCO ₂ /t)
CEM I / Portland cement	n/a	n/a	840
CEM II/A-L Portland limestone cement	CIIA-L	6-20	791-673
CEM II/A-M (S-L) Portland composite cement	CIIA-SL		
CEM II/A-V Portland fly ash cement	CIIA-V		
CEM II/B-V Portland fly ash cement	CIIB-V	21-35	693-553
CEM II/B-S Portland slag cement	CIIB-S		
CEM II/B-M (S-L) Portland composite cement	CIIB-SL		
CEM II/C-M (S-L) Portland composite cement *	CIIC-SL	36-50	569-452
CEM III/A Blast-furnace cement	CIIIA	36-65	575-362
CEM III/B Blast-furnace cement	CIIBB	66-80	355-252
CEM IV/B-V Siliceous fly ash cement	CIVB-V	36-55	545-390
CEM VI (S-L) Composite cement *	CVI-SL	51-65	459-342

* New cements

Portland cement

840 kgCO₂/tonne

Additions

finely-divided-inorganic constituent used in concrete in order to improve certain properties or to achieve special properties (EN 206)

Ground granulated blastfurnace slag
Fly ash

Limestone fines

Natural calcined pozzolana (calcined clay)



Portland cement



Binary cement



Ternary cement

<https://www.concretecentre.com/Structural-design/Standards/Standards-for-concrete.aspx>

Other future developments

CONCRETE FUTURES
 SPRING 2024

In the loop
 The UK Concrete Industry Sustainable Construction Strategy goes circular

BLUE SEA THINKING
 GEARING UP TO DELIVER FLOATING OFFSHORE WIND

MIX MARKERS
 THE LATEST RATING TOOLS FOR LOW-CARBON CONCRETE

EVER INCREASING CIRCLES
 PUSHING BACK THE BOUNDARIES OF WASTE CONCRETE

MANUFACTURE 9

1 ART, SCIENCE AND 70% LESS EMISSIONS
 This dramatic, 23m-tall sculpture in Glasgow, built to tie in with the COP26 climate conference, was a collaboration between artist Stuart Padwick, Aggregate Industries, Ramboll, Urban Union and Keltray. To meet the sustainability credentials for the project, the columns and pile caps were made from Aggregate Industries' ECOPact Max 4, which has 70% lower carbon emissions than a standard CEM I mix. This bespoke mix included 20% recycled glass as well as a light-coloured aggregate from Skye, which were exposed through power washing to create a rustic finish.

2 LOW-CARBON CEMENTS CEMENT2ZERO

3 CARBON CAPTURE, USE AND STORAGE PEAK CLUSTER

4 LOW-CARBON CONCRETE PRECAST AND BASALT FIBRES

5 LOW-CARBON CONCRETE FIRST GRAPHENE

6 FUEL SWITCHING RIBBLESDALE HYDROGEN TRIAL

7 CCUS PADESWOOD CARBON CAPTURE CEMENT PLANT

8 FUEL SWITCHING 100% RENEWABLE FUELS

9 CCUS CARBONCURE IN CONCRETE BRICKS

10 LOW-CARBON CEMENTS SERATECH

11 LOW-CARBON CONCRETE ROBOTIC FORMWORK

12 LOW-CARBON CONCRETE SILVERTOWN TUNNEL

13

14 LOW-CARBON CEMENTS CALCINED CLAY TRIALS

concretecentre.com

<https://www.concretecentre.com/Resources/Publications/Concrete-Futures,-2024.aspx>

Supply Chain Publication

- MPA publication focussing on concrete supply chain - discussing opportunities & considerations
- Aim to be published in 2024
- Covers transport, constituent materials, carbon, social outcomes and construction considerations
- Sign up to the Concrete Centre <https://www.concretecentre.com/> for free and you will receive an E-news when published.

Thank you for listening

<https://www.concretecentre.com/>