

An aerial photograph of a dense green forest with a winding road. Sunlight filters through the trees, creating a hazy, golden glow. A white sunburst logo is positioned to the left of the text.

Low Carbon Materials

Combating Climate Change
through **Material Innovation.**





THE EARTHSHOT PRIZE

Global Carbon Management Certification – PAS 2080

LCM is the first start-up in our sector to achieve PAS 2080 certification.

This certification validates our mission to decarbonise the built environment.



ACLA[®]

CARBON NEGATIVE AGGREGATE TO
ACHIEVE **NET ZERO ASPHALT AND
CONCRETE**



Introduction to ACLA[®]

What is ACLA[®]?



Carbon-Negative Aggregate

ACLA[®] is a carbon-sink, utilising the carbon removal technology of sequestration to permanently remove carbon dioxide from the atmosphere.



Low Volume Requirements

3-7% substitution for typical aggregate required to achieve net-zero



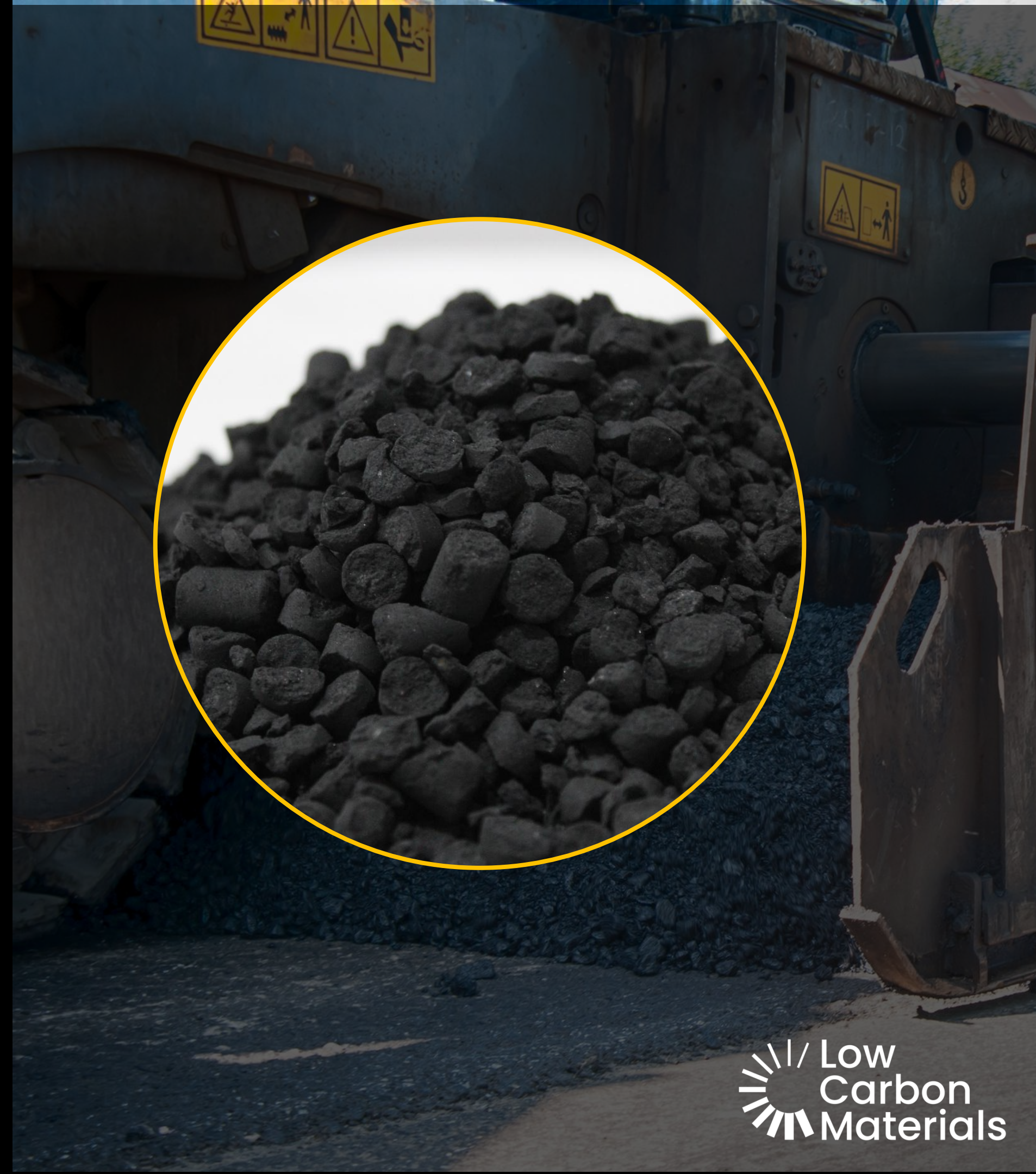
A Drop in Solution

Requires no changes to existing asphalt production methods making it easy to adopt.



Diverse Range of Applications

Roads, footpaths, cycle paths and more.
Majority of focus has been on roads.



Permanent **carbon** **removal** solution

- Manufactured Biochar–Mineral matrix
- Biochar is a permanent carbon removal solution
- Mineralisation sequesters carbon dioxide

-798 kg CO₂e per tonne (GWP A1–A3)



ACLA Carbonation – in real time

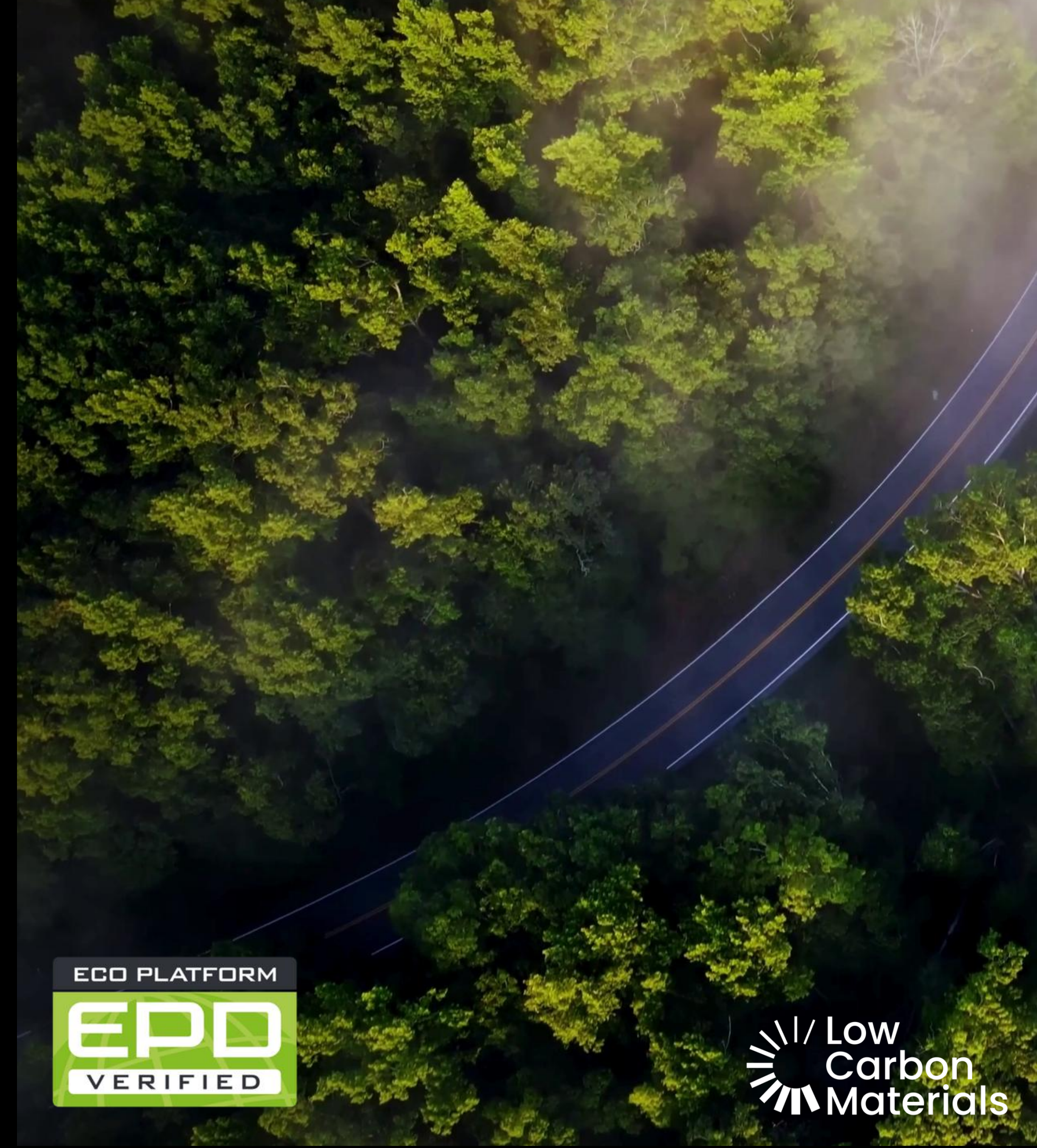


Introduction to ACLA®

EPD

ACLA has a third party verified EPD

Confirms 1 tonne of ACLA® has permanently removed **798kg CO₂e** from the atmosphere.



ACLA validated in Asphalt

Through **strategic collaborations** we have demonstrated our technologies are easily **adoptable, scalable** and can have a huge impact.

"Within an eight month period a new, unproven, untested material has been thoroughly tested against Highway Specifications and successfully trialled on the National Highways strategic road network. Eight months ago I didn't believe that would be possible. It is amazing what can be achieved through effective collaboration."

Paul Cole, Chief Engineer, Skanska

"ACLA is going to be a material that is likely to be used in the future to reduce the carbon potential in future projects."

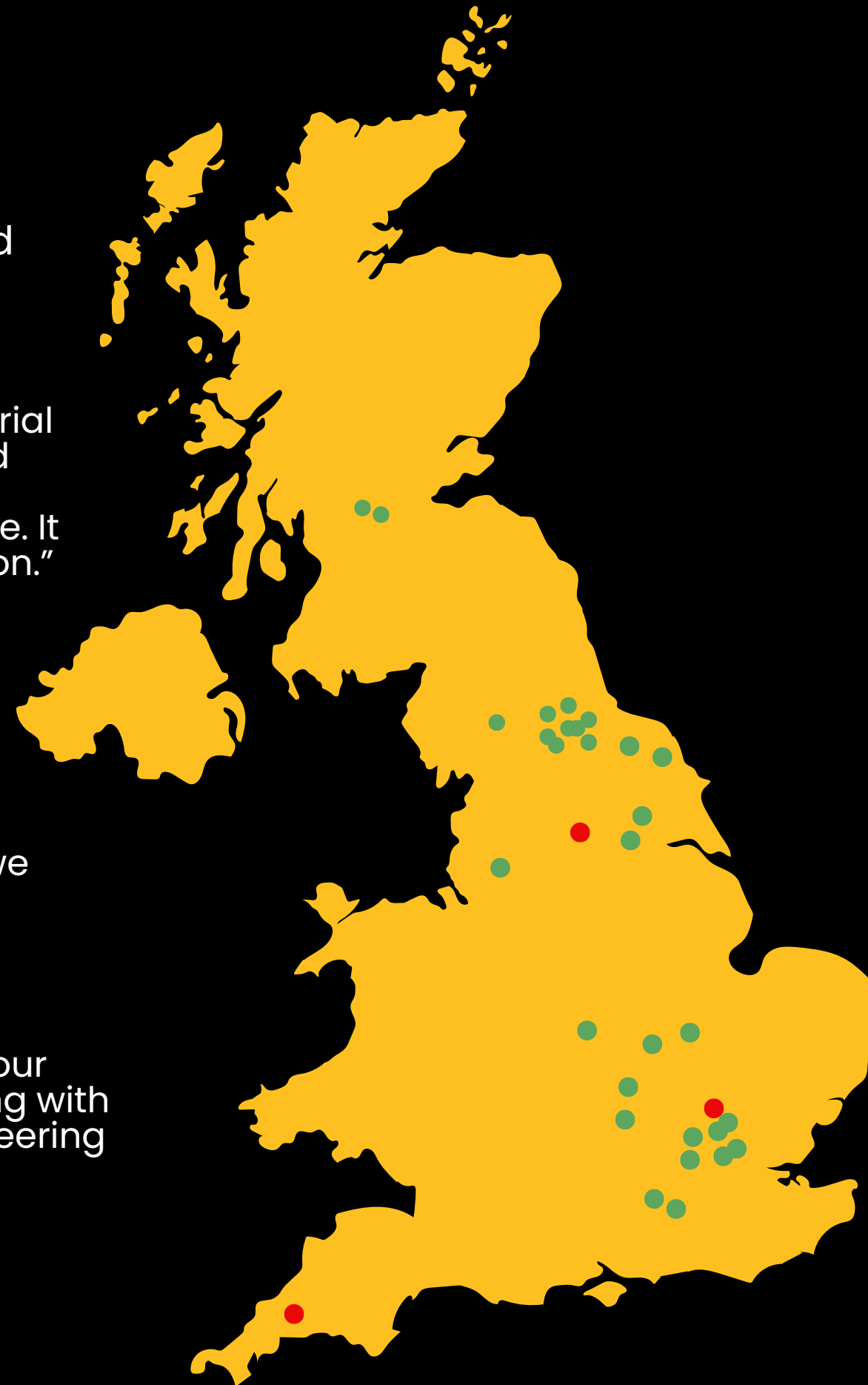
Melissa Giusti, Project Manager, National Highways

"The characteristics of the material seem very similar to what we expect compared to a conventional material"

Robert Syer, Project Manager, Tarmac

"Redbridge is always striving to find innovative ways to reduce our emissions. We're proud to be the first London borough partnering with Kensons, Low Carbon Materials, and Tarmac to deliver this pioneering new trial."

Redbridge Council's Cabinet Member for Environment and Sustainability, Cllr Jo Blackman



National Highways Trials

- Deployed in National Highways live trial in permanent works on SRN – **M11**
 - Approval via DfS
 - 20 tonnes of net-zero asphalt
 - AC 20 binder course (Tarmac)
 - Trial results positive



National Highways Trials

A64 Case Study

- Second National Highways trial on **A64/A1** as part of wider low carbon exemplar scheme (Oct 24)
 - Test results indicate no non-conformances
 - SATS test – 5% ACLA/40% RAP – **passed!**
- **Low Carbon Opportunities Register** to include "Carbon Negative Aggregate for Asphalt"



National Highways Trials

A64 Case Study

- Test results indicate no non-conformances
- Saturated Ageing Tensile Stiffness (SATS) test.
 - 5% ACLA/40% RAP - passed
- ITSr net zero mix with ACLA outperformed control
- Do these indicative tests point to ACLA enhancing durability?

THE RESULTS HIGHLIGHT NO DETRIMENTAL EFFECTS ON THE PERFORMANCE OF THE ASPHALT ON ACCOUNT OF THE INCLUSION OF ACLA®

	Reference >>>	WARM BIO AC 20 DBM 40/60 DES	WARM BIO AC 20 DBM 40/60 DES + ACLA
		24/0884	24/0882
Grading	31.5	100	100
	20	96	98
	14	80	74
	10	69	59
	6.3	52	46
	4.0	42	37
	2.0	30	28
	0.5	18	18
	0.25	13	13
	0.063	7.0	6.6
Bitumen	Found B/C (%)	4.4	4.5
Voids	Refusal air voids (%)	0.7	0.5
	In situ gauge air voids (%)	3.9	3.1
Stiffness	ITSM (MPa)	9742	9996
Wheel tracking	WTS _{AIR}	0.05	0.05
	PRD (%)	4.1	3.7
Water sensitivity	ITSr (%)	86	95

Asphalt Durability Testing

	Control	3% ACLA	5% ACLA
WTS (mm/1000 cycles)	0.3	0.2	0.1
Rut Depth (mm)	4.6	4.2	3.2
PRD (%)	9.2	8.4	6.3
Bulk Density (Mg/m ³)	2.347	2.305	2.284

Wheel tracking results, BS EN 12697-22 Procedure B in air, 50°C (AC20 40/60) – Granite Aggregate

What each result means

Wheel tracking slope (WTS)

How quickly the rut keeps deepening once the slab has bedded in (measured between 5,000 and 10,000 wheel passes). Lower means the asphalt resists ongoing deformation better.

Rut depth (RD)

How deep a groove a loaded wheel has pressed into the slab after 10,000 passes at 50°C. Lower means less rutting.

Proportional rut depth (PRD)

Rut depth as a percentage of slab thickness, so slabs of slightly different thickness can be compared fairly. Lower is better.

- Durham County Council
- London Borough of Redbridge Council
- Central Bedfordshire Council
- Redcar & Cleveland Council
- East Riding of Yorkshire Council
- Surrey County Council
- North Lanarkshire Council
- Coventry City Council
- London Borough of Barnet Council
- London Borough of Enfield
- Milton Keynes City Council
- Oxfordshire County Council
- London Borough of Newham
- Newcastle City Council
- City of Bradford Council
- Aberdeen City Council





The First Net Zero Road Scheme using **ACLA**®

March 2024

MGL GROUP

 **Low Carbon Materials**

Durham
County Council 



 **Low Carbon Materials**

East Riding of Yorkshire



EAST RIDING
OF YORKSHIRE COUNCIL

- Edinburgh Street, Goole (Nov 24)
- 160 tonnes of net zero binder course supplied by Tarmac
- 8 tonnes of ACLA was used removing 6.348 tonnes of CO₂ from the environment



East Riding of Yorkshire



EAST RIDING
OF YORKSHIRE COUNCIL

- Limb Road, Pocklington (Feb 26)
- 190 tonnes of net zero binder course supplied by Tarmac
- 10 tonnes of ACLA was used removing 7.98 tonnes of CO₂ from the environment
- Grange Road, Goole (Feb 2027) – 21 tonnes ACLA



Impact to date

ACLA[®] has removed a total of approx.
800,000 kgCO₂e since it's launch in
March of 2024.

The equivalent of the av. UK petrol car
driving almost **5,000,000 km**.

c. 120 trips around the equator!



Impact to date

ACLA[®] has removed a total of approx.
800,000 kgCO₂e since it's launch in
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A few of our project partners:



<https://www.lowcarbonmaterials.com/casestudies>



Projects in private sector

- Targeting:
 - Transportation infrastructure (airports/railways)
 - Utilities infrastructure (water/energy)
 - Logistics/data centres
 - Property/housing developments
 - Schools/Hospitals



Beyond Asphalt

Additional opportunities to use ACLA:

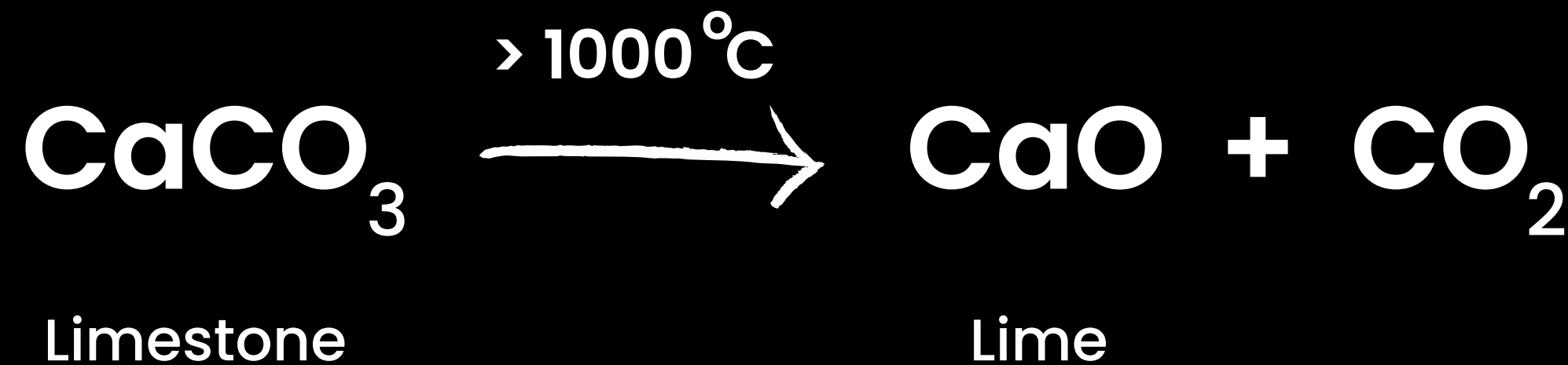
- **Concrete**
- Unbound
- Earth works
- Structural backfill
- Sub-base



Concrete alone is responsible for 8% of global CO₂ eq emissions.

It's the most widely used material on earth after water

The problem with cement



Beyond Asphalt

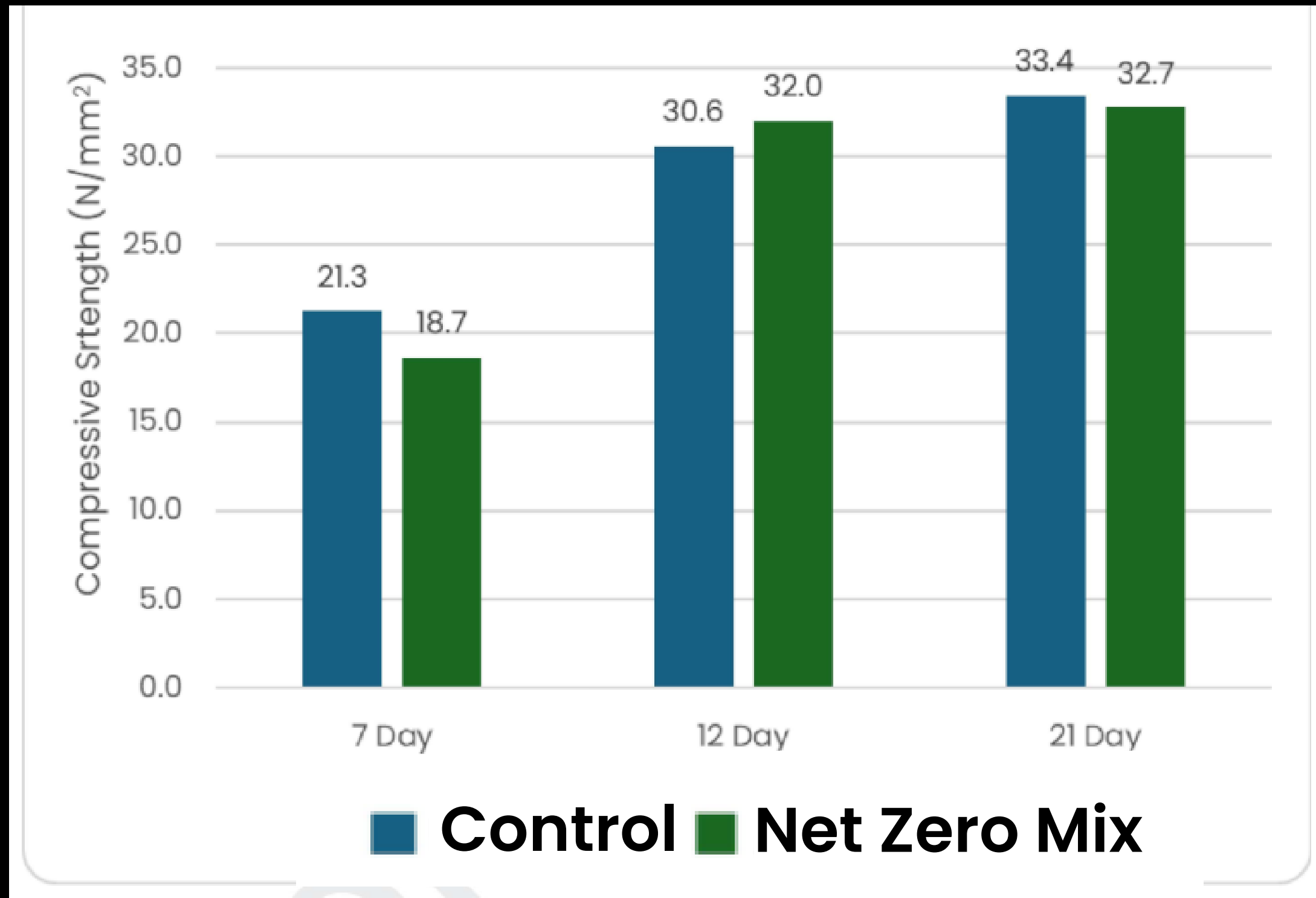
Net Zero Concrete

- Achieved 30N/mm^2 net zero concrete without strength reduction compared to control.
 - Both mixes utilised a 50:50 blend of CEM II and GGBS as binder.
 - Net zero mix included 11% of ACLA as a partial substitute for large aggregate



Beyond Asphalt

Net Zero Concrete

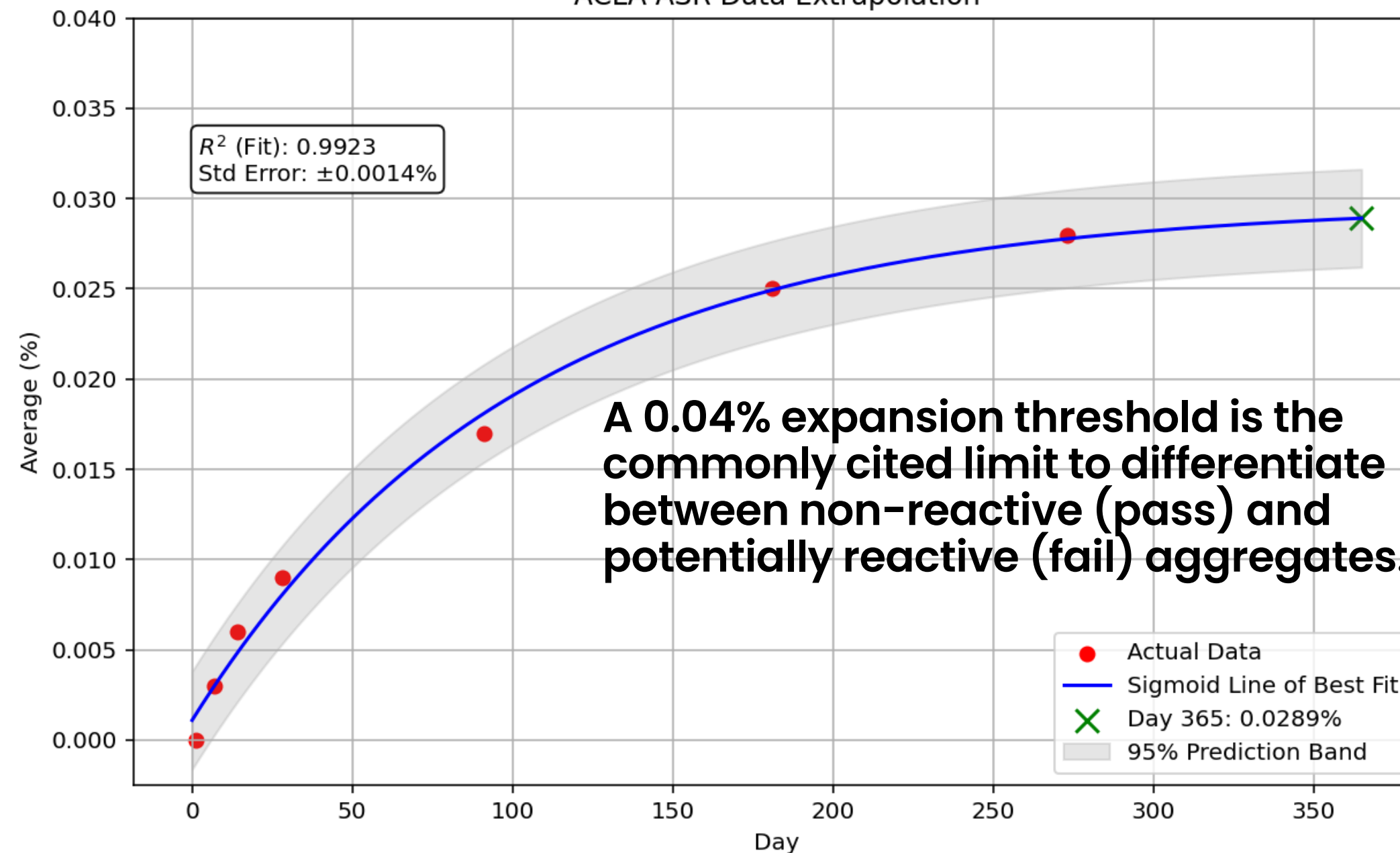


Beyond Asphalt

Net Zero Concrete

Alkali Silica Reaction - 273 days (12 wt% ACLA)

ACLA ASR Data Extrapolation



Beyond Asphalt

Net Zero Concrete

- We are currently quantifying the impact of **co-benefits** of ACLA beyond reduced embodied carbon
 - Enhanced thermal insulation – lower operational emissions
 - Accelerated curing in some precast mixes – enhanced cycle times



Chelsea Flower Show

Breathing Space Garden



- Reinforced concrete achieving 40N strength
- Net zero mix using 11% ACLA plus SCMs
- Supplied by Tarmac
- Further case studies in pipeline

Amazon **Go Build**

1 of **5** materials selected
for global scale in
concrete



Advancing CO₂-
mineralization
technologies for
building materials

Next steps

- Pipeline of projects with growing number of clients (public and private sector)
- Scale up manufacture of ACLA to deliver economies of scale
- ACLA for major infrastructure projects
- ACLA validated in concrete
- Optimise carbon benefits
- More projects!!!!



For more information

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