OCL regeneration ltd
SUSTAINABLE MATERIAL SOLUTIONS

REDUCING CARBON & MAXIMISING SUSTAINABILITY

A MEMBER OF HOLCIM

AGGREGATE INDUSTRIES & OCL REGENERATION
Low Carbon Asphalt Innovation

AGGREGATE INDUSTRIES

Introductions

Stuart Gready

Director – OCL & Sitebatch Technologies ®

Neil Leake

National Technical Manager

Agenda

- Our Strategic Pillars
- AI/OCL Business update
- Local Authority Solutions – The Toolkit
- Green Growth – Circular Economy for Highways
- Low carbon Asphalt Innovation
    - Warm Mix Asphalt
    - Superlow Carbon
    - Foamix
    - Foamix Eco
- Local Authority Insights and Summary

Our Strategic Pillars

Our strategy is simple, to create value for our customers by offering superior products, created with efficient, sustainable operations and materials in a safe environment.

GREEN GROWTH

- PRODUCTS & SOLUTIONS
- CIRCULAR ECONOMY
- INNOVATION

COMMERCIAL FOCUS

- VALUE
- SERVICE
- CUSTOMER

SUSTAINABILITY

- CLIMATE
- NATURE
- COMMUNITIES

CONTINUOUS IMPROVEMENT

- PEOPLE
- PROCESSES
- PLANTS

ECOPlanet The Green Cement

ECOPact The Green Concrete

FOAMIX

Aggneo

SUPERLOW

Masterblock eco

JOURNEY TO ZERO HARM

VALUING PEOPLE AND PLACES

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A New Offering – OCL & Sitebatch

Bringing two leaders together

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Recycling based solutions, Local Authority Frameworks, Circularity in Highways, Agility, Depots

SITEBATCH
TECHNOLOGIES

Major Contracts, High Outputs, Long History Ports, Airfields, SRN, Industrial

More resource for an improved service

- Technical Expertise
- Availability of people and plant
- Efficiencies of scale / Seeking new opportunities
- A rich history of experiences and lessons learnt
- Synergies with other group activities
- Improved customer experience

Focusing on Local Authority Solutions

Local Authority Contracts:

- Somerset
- North Somerset
- Oxfordshire
- Hampshire
- Lincolnshire
- Northumberland
- Medway
- Cambridgeshire
- Suffolk

- New depot in Leicestershire at Croft Quarry – Stoke next

Focusing on Local Authority Solutions – Toolkit

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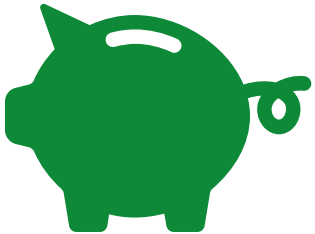
Reducing Carbon

- Low Carbon Materials
- Reduced “caused carbon” through smart working, less disruption
- HVO Fleet
- Green tariff energy usage
- Circular methods

Reducing Cost



- Cost avoidance – Disposal
- Creation of “in authority” facilities
- “More for Less” – Density savings
- Reducing waste
- Cost of Compliance
- Managing duty of care – best practice

Collaboration

- Innovation Frameworks
- Blueprint / Toolkit
- Targets & Reporting
- Shared Risk
- Regular review structure
- Commercialisation of model – alignment to sold / professional services

Here to Help - Recycle First!

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Assessment

How can we use recycled or low carbon products in this scheme?

Design

Work up an equivalencies matrix for the alternative materials.

Planning

Integrate into the Annual Plan and optimise resources.

Programming

Balance the supply & demand, road space and weather constraints.

Delivery

Collaborating with specialist suppliers and supporting sub-contractors,

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NB: Single use aggregate cn also be generated

Green Growth – Circular Economy

RECYCLING FOR A CIRCULAR ECONOMY

Aggregate Industries is committed to finding material and surfacing solutions to assist in the immediate and sustained action towards the decarbonization of Local Authority roads in order to bring significant benefits to motorists, communities and businesses in a net-zero future.

Keen to support our Local Authority clients in meeting the Government's Net Zero Emissions targets, we have been working hard to deploy the latest, high quality, material solutions and technical innovations that reduce carbon year-on-year across all our operations.

Our recycling solutions enable highway engineers to embrace the latest recycling alternatives when detailing future highway and footway scheme construction and therefore support Local Authority Net Zero Carbon ambitions.

Green Growth – Circular Economy

Green Growth – Circular Economy

General
Surfacing

Haunching & Edge
strengthening

Footways, Cycleways
and Shared use

Introduction

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SITEBATCH TECHNOLOGIES

INTRODUCING ECOCYCLE®

ECOCycle
The Circular Technology

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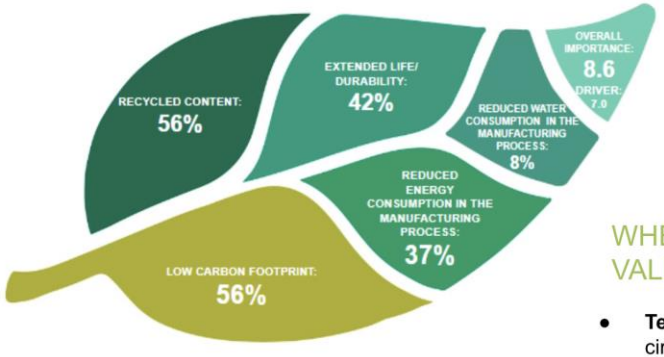
Introduction

Introduction

01

SUSTAINABILITY IS IMPORTANT FOR OUR CUSTOMERS



WHERE WE CAN ADD VALUE:

- **Technical competence** on circularity
- Good, accurate **data**
- **Validation of data** for key metrics including recycled content/ embodied carbon

ECOCycle The Circular Technology | AGGREGATE INDUSTRIES

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VALUE HIERARCHY

Facility to produce:

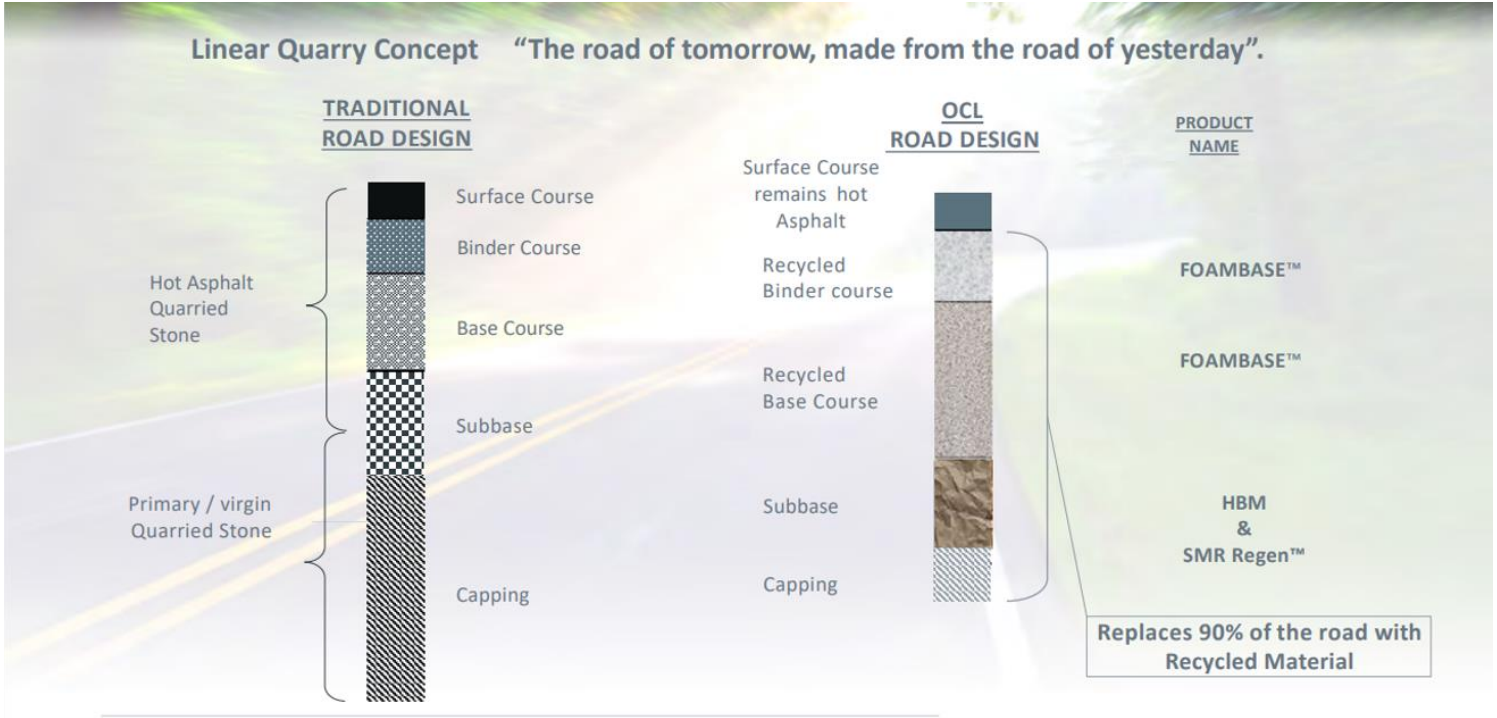
Recycled Arrisings Generated

Asphalt Planings	⇔	Foamix / HBM
100% Crushed Concrete	⇔	Foamix / HBM
100% Kerbs, Flags, Blocks & Edgings	⇔	Foamix / HBM
Excavated Sub Base & Capping	⇔	Recycled MOT T1 803 and 6F5 Fill
Crushed Brick	⇔	6F5 & Class 1a Fill

Most Cost Effective Product to Manufacture

NB: Single size aggregate can also be generated

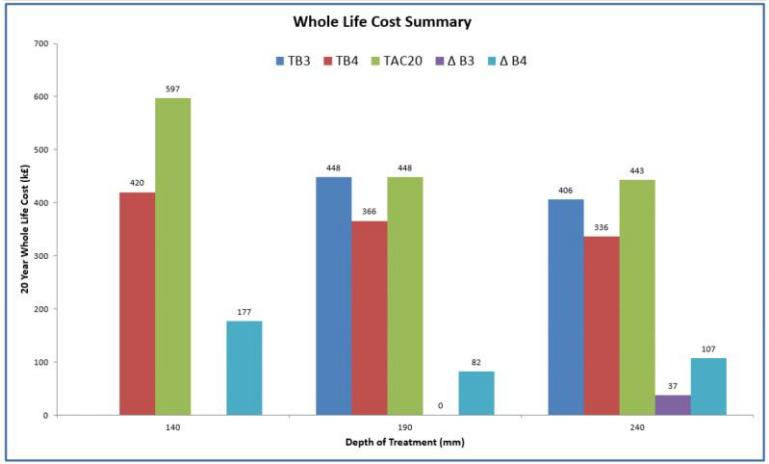
VALUE HIERARCHY



Whole Life Cost Benefits

Adept / Skanska / OCC / Carbon Trust
Whole Life Cost Study

20 Year Design Traffic (million std axles)	Depth of Treatment (mm)	Whole Life Costing 20 years (£'000)			Whole Life Costing Savings 20 years (£'000)	
		CBRM Class B3 TB3	CBRM Class B4 TB4	AC20 Dense binder course TAC20	CRBM Class 3 vs. AC20 Δ B3	CRBM Class 4 vs. AC20 Δ B4
2.5	140		420	597		177
5	190	448	366	448	0	82
10	240	406	336	443	37	107



Shows WLC savings using CRBM as Binder Course of:
2.5 msa = 30%
5 msa = 20%
10 msa = 25%

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NB: Single size aggregate can also be generated

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Decarbonising Our Products

Neil Leake
National Technical Manager

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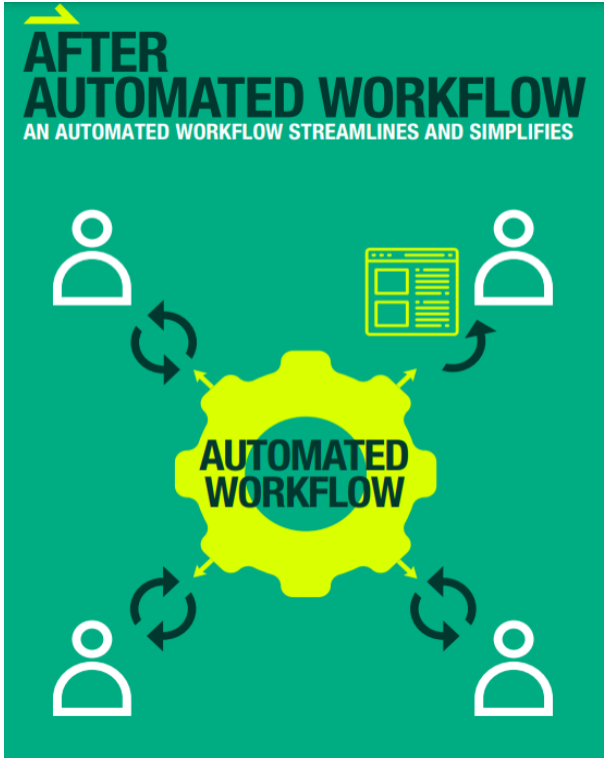
Your Carbon Report - Benefits



- Accuracy over averages
- Delivered with speed
- Robust carbon data
- Complete confidence
- Flexible use of data
- Collaborating for the future

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Your Carbon Report

YOUR CARBON REPORT

AGGREGATE INDUSTRIES

Date Range for Report: FY 2022

Project	Plant	Product	Qty m3	RM kgCO2e / m3 (A1)	RM Trnspt kgCO2e / m3 (A2)	Plant kgCO2e / m3 (A3)	kgCO2e Site / m3 (A1-3)	kgCO2e Site / m3 (A1-4)
LEADENHALL STREET - EC3	Bow	ECOPact	12,074	218.45	11.51	1.28	231.23	232.20
LEADENHALL STREET - EC3	Bow	ECOPact Prime	4,702	145.27	11.96	1.28	158.52	159.71
LEADENHALL STREET - EC3	Bow	Watertight	2,594	159.26	11.53	1.28	172.06	173.20
LEADENHALL STREET - EC3	Bow	Strike	229	274.79	11.05	1.28	287.13	288.23
LEADENHALL STREET - EC3	Bow	Agilia	31	264.53	11.75	1.28	277.56	278.21
LEADENHALL STREET - EC3	Bow	Standard Concrete	1,816	299.85	12.35	1.28	313.47	314.52
Total		**RMX**	**21,445**	**202.80**	**11.68**	**1.28**	**215.76**	**216.80**

Your Carbon Footprint was prepared using a bespoke calculation tool developed by Aggregate Industries UK Ltd. It follows the principles of EN 15804 and has been third party verified by Circular Ecology Ltd. The result is based on primary activity data from Aggregate Industries operations, secondary data comes primarily from the UK Government GHG emission factors for company reporting and Inventory of Carbon and Energy v3.0 by Circular Ecology and University of Bath, with additional data supplied by Carbon Trust.

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circular ecology

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Verification

circular ecology

Circular Ecology Ltd
Company Number: 08573120
Registered in England and Wales

www.circularecology.com
Email: info@circularecology.com

6 Sept 2022

Aggregate Industries UK Limited
Bardon Hill, Coalville,
LE67 1TL

To: Aggregate Industries UK,

RE: Verification of Automated Embodied Carbon Calculations

Circular Ecology are environmental consultants based in the UK. They have reviewed the automated embodied carbon calculation system developed by Aggregate Industries UK, known as "Your Carbon Report"

Circular Ecology were provided with detailed Excel models, containing carbon factors and calculations. They also visited Aggregate Industries head office to run spot checks against the data on the system. There were some minor anomalies found from those spot checks, which were well explained, and actions taken to resolve them within the system.

The reviewer completed a range of checks on the data and calculations, including:

- Checked the calculations against EN 15804 (A1 version) for embodied carbon from cradle to customer (A1-4);
- Embodied carbon factors for materials, transport, fuels;
- Transport distances;
- Calculation of A1-3 embodied carbon;
- Calculation of A4 carbon.

Based on the process and procedures conducted, Circular Ecology confirms there is no evidence that the GHG assertion:

- is not materially correct and is not a fair representation of GHG data of the products manufactured and delivered; and
- has not been prepared in accordance with the calculation principles of EN15804 (A1 – A4).

Yours Faithfully,

Dr Craig Jones

Director, Circular Ecology Ltd

To give assurance to our customers that the solution can be relied on to include all necessary material flows and to be consistent with industry best practice, it has been audited by an external sustainability consultancy including the IT solution and raw material carbon factors, in line with BS EN 15804 methodology.

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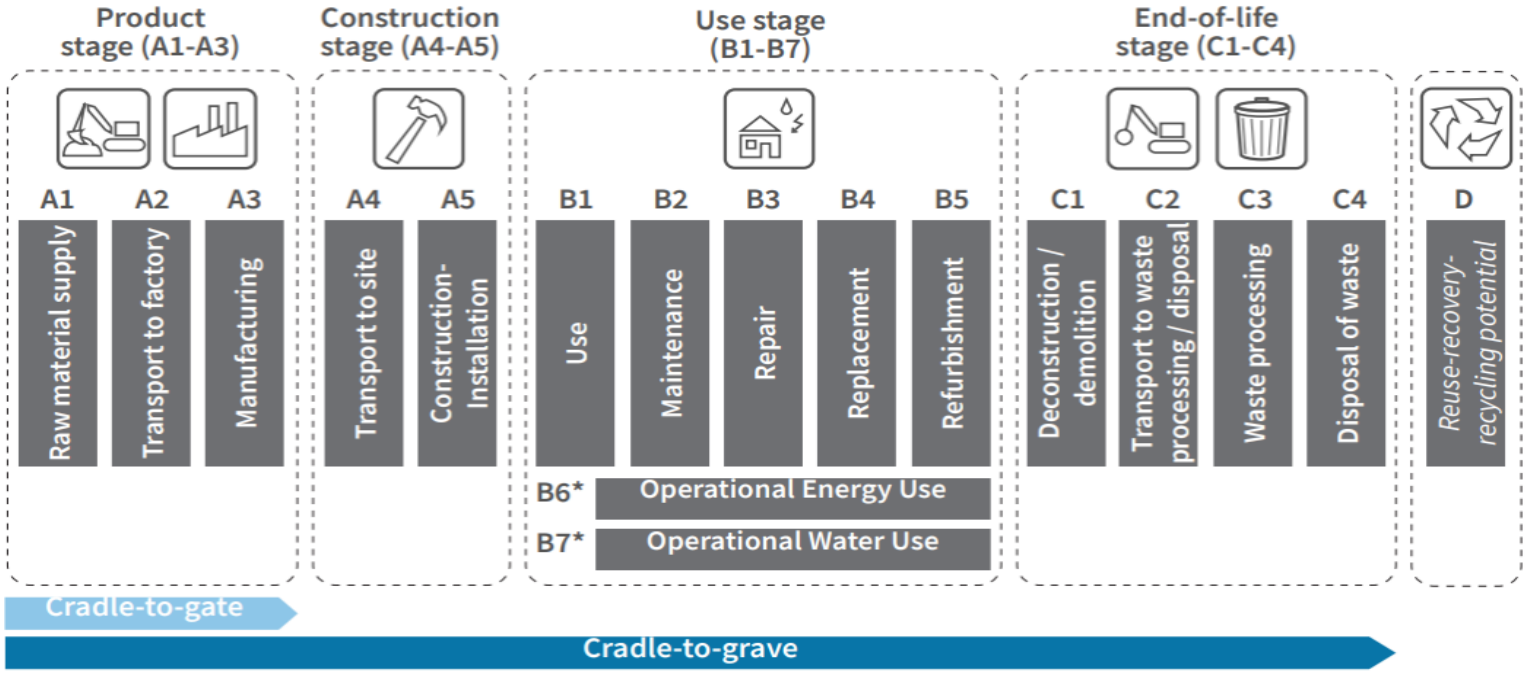
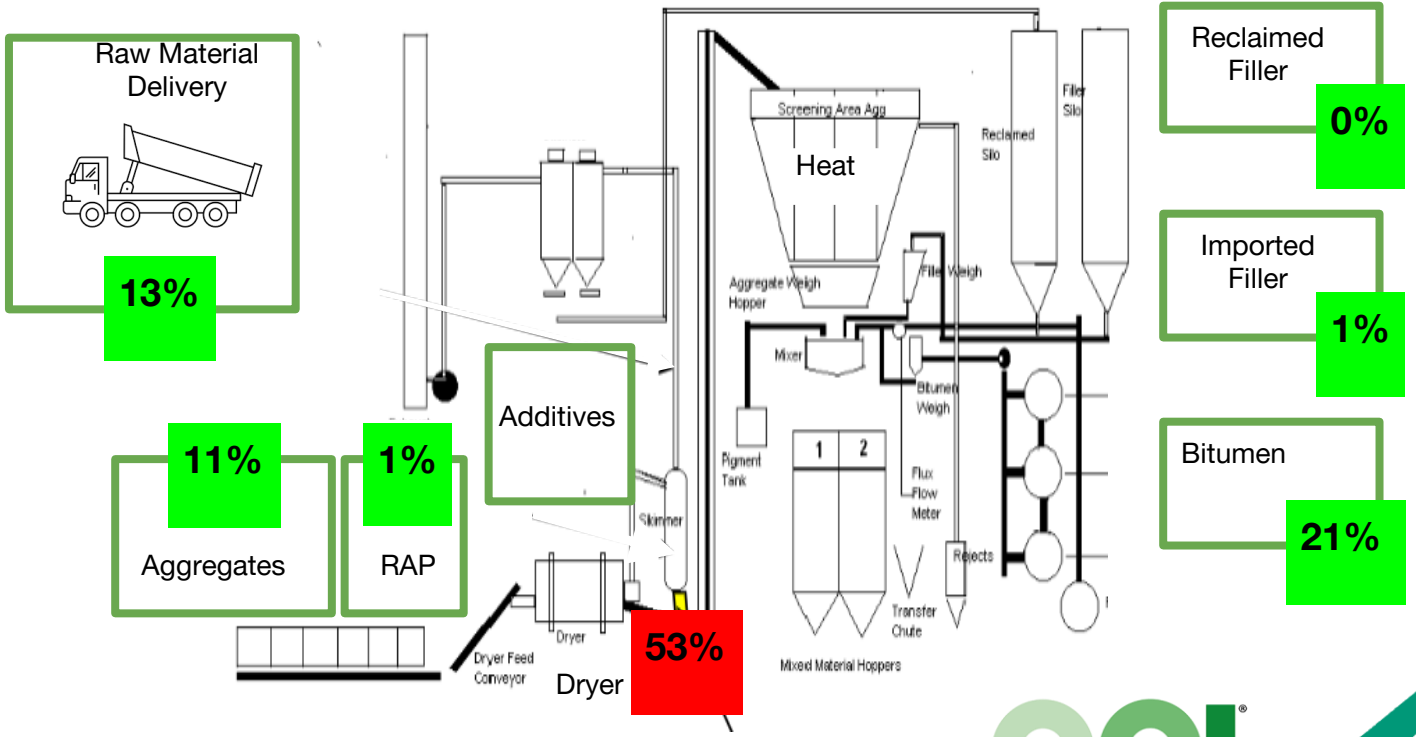
Life Cycle Assessment (LCA)



Understanding Carbon

Carbon Calculator - Standard Asphalt inputs for CO_2



Low Carbon Technology

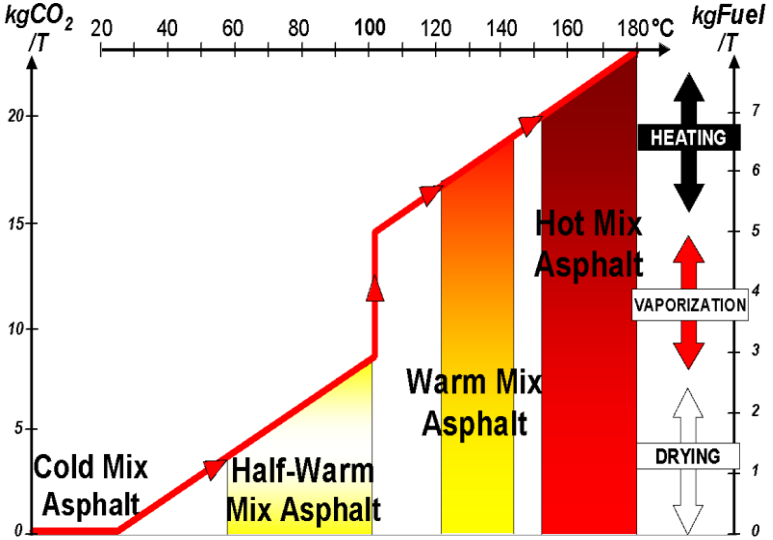
Mixing temps v Carbon

HMA 180°C = >20kg/CO_2/t

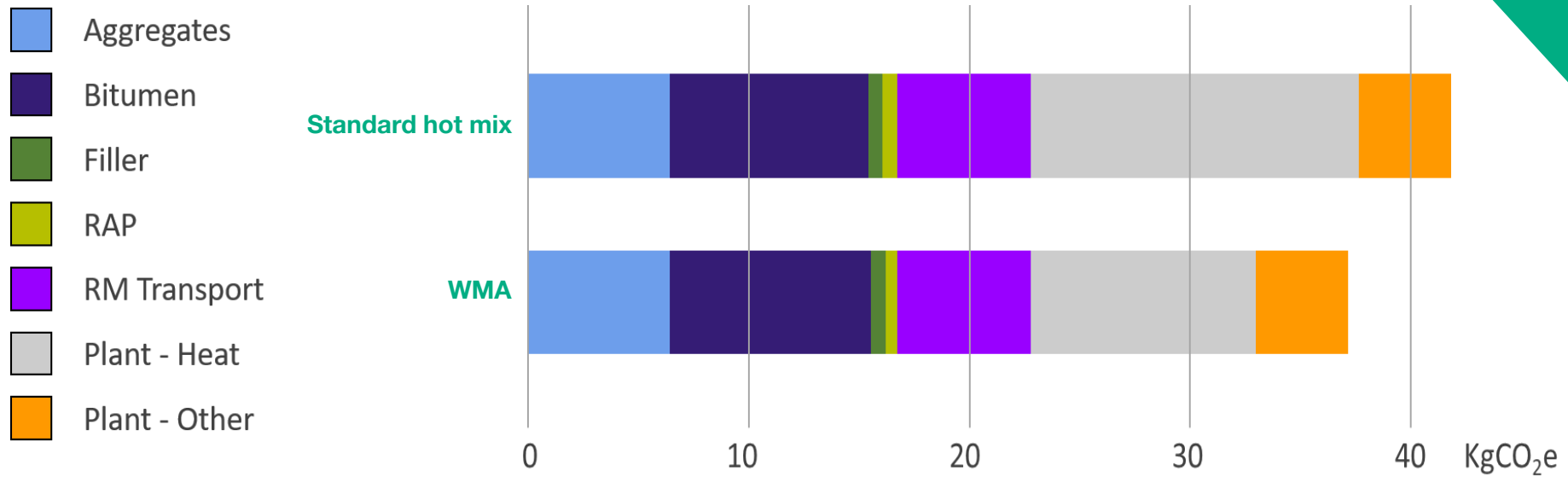
WMA 150°C = 17kg/CO_2/t

HWA 100°C = 7kg/CO_2/t

Cold Mix 0°C = 0kg/CO_2/t



Temperature Effect on Carbon - WMA



*Based on AC20 Pen grade Bitumen

8-10% Reduction Achievable = >5 kg CO_2e/T

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Biogenic Binder

SUPERLOW-CARBON

Biogenic materials, like trees, **remove carbon from the atmosphere** storing it as they grow.

The biogenic material is harvested, processed and used in the bitumen, replacing an element of the fossil fuel derived products.

The biogenic materials, are effectively stored in the asphalt throughout its life, even after it is recycled. **Locking the carbon away so it is not released into the atmosphere.**

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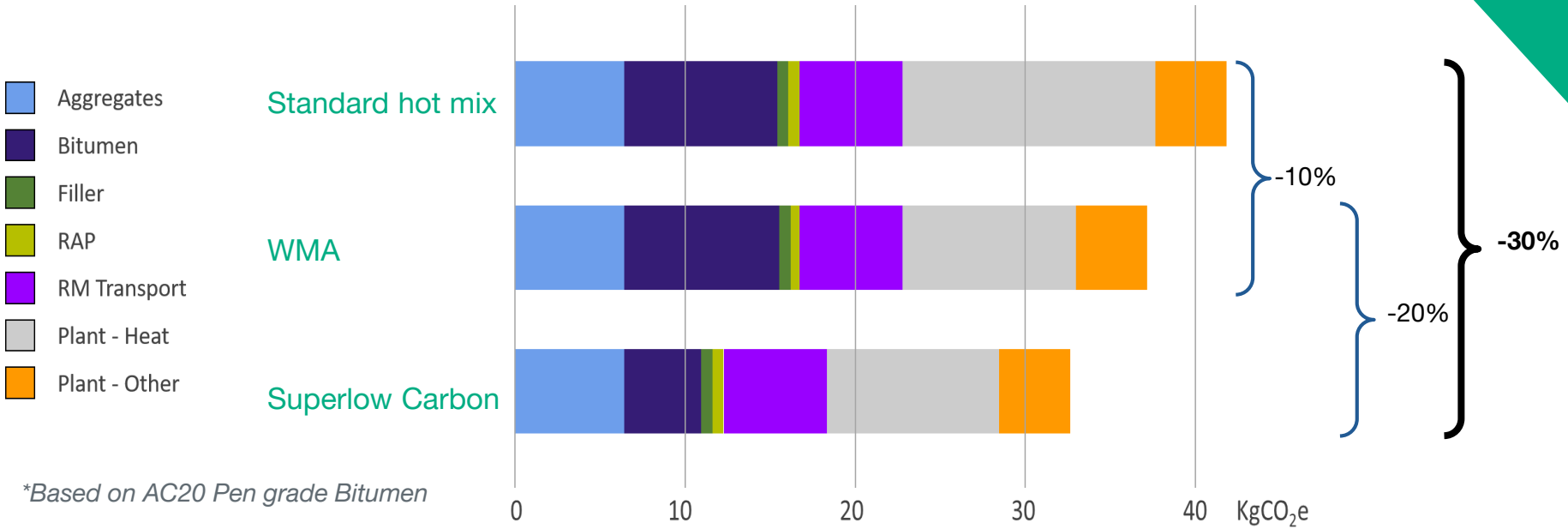
Carbon Comparison – Superlow Carbon



*Based on AC20 Pen grade Bitumen

30% Reduction = >10 kg CO_2e/T

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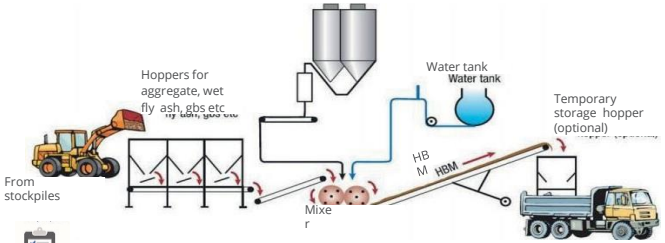
FOAMIX®

Leaders in low carbon, recycled cold-lay asphalt solutions

Foamix - Process

FOAMIX
Low Carbon Recycled Asphalt

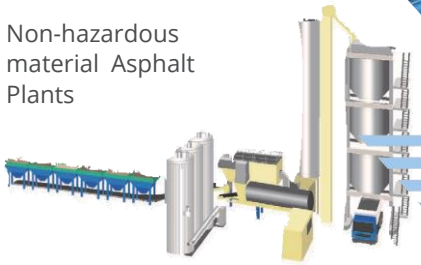
ROAD ASSET RECYCLED ACROSS LRN



Hazardous / Non-hazardous Material Foamix Plants

CO2

Non-hazardous material Asphalt Plants



MANUFACTURING ASSET SELECTION

PROCESSING ASSET

ASSET CYCLE

Quality control to check classification for stockpilling

HARVESTING ASSET

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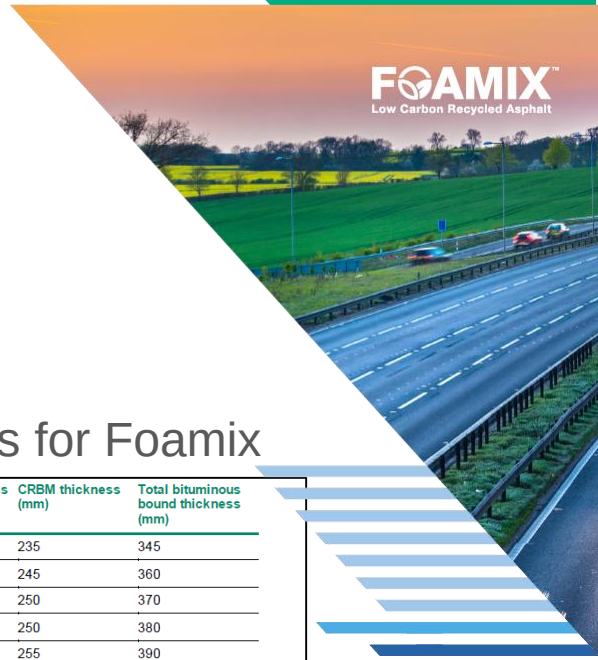
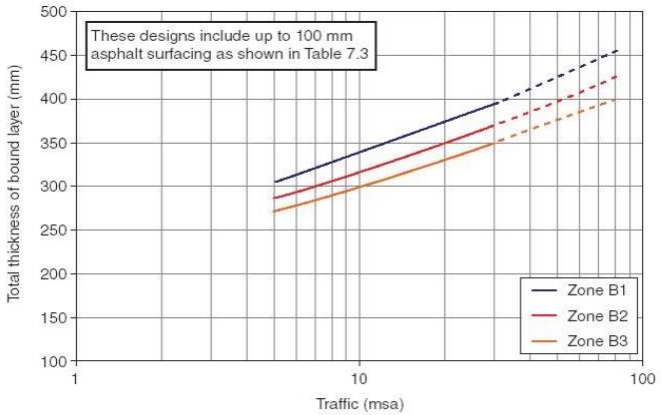
Foamix – Specification/Design



- Specify with confidence
- TRL 611
- SHW Clause 948 and BS 9228
- New design standards 2025, opens more opportunities for Foamix



7.8 Design curves for bitumen bound cold recycled material (Foundation Class 2)

CRBM Class	Foundation class	Design traffic (msa)	Asphalt thickness (mm)	CRBM thickness (mm)	Total bituminous bound thickness (mm)
QVE B4 (end-product ITSM 4700 MPa) equates to **Design Stiffness 3100 MPa**	FC2 (100 MPa)	30	110	235	345
		40	115	245	360
		50	120	250	370
		60	130	250	380
		70	135	255	390
		80	140	260	400
	FC3 (200 MPa)	30	110	215	325
		40	115	215	330
		50	120	215	335
		60	130	215	345
		70	135	215	350
		80	140	220	360

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Foamix – Specification/Design

- Long term stiffness value comparison to asphalt

Table 4.12 Elastic stiffness moduli for standard UK asphalt materials (at 20 degC and 5 Hz)

Material	Stiffness (MPa)
TSCS	2000
HRA binder course	3100
AC 40/60 des (binder course or base)	4700
EME2 (binder course or base)	8000

TABLE 9/27: (05/18) **Mix Design and End Product Requirements**

Property or Characteristic All Materials		Mean from Test Set
QVE and SVE Materials (360 days*)		
Indirect Tensile Stiffness Modulus	Class B1	1900 MPa
	Class B2	2500 MPa
	Class B3	3100 MPa
	Class B4	4700 MPa
QH and SH Materials (360 days*)		

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Foamix - Installation

- Laid like conventional asphalt
- Compaction using normal vibrator rollers. PTR can be used
- Lower density so increased spread rates (approx. +10%)
- Cold process eliminating fuming

Foamix - Applications

- Major and Minor Road Reconstruction
- Haunch Repair
- Trench Reinstatement
- Parking Areas
- Cycle Tracks and Footpaths
- Block Paving Base

Foamix - Sustainability Benefits

- Up to 90% of the constituents of Foamix are recycled
- Less energy intensive production process c.50% carbon reduction compared to hot mix asphalt
- Encapsulates hazardous tar-bound planings from site
- No Waste
- Safe onsite practices

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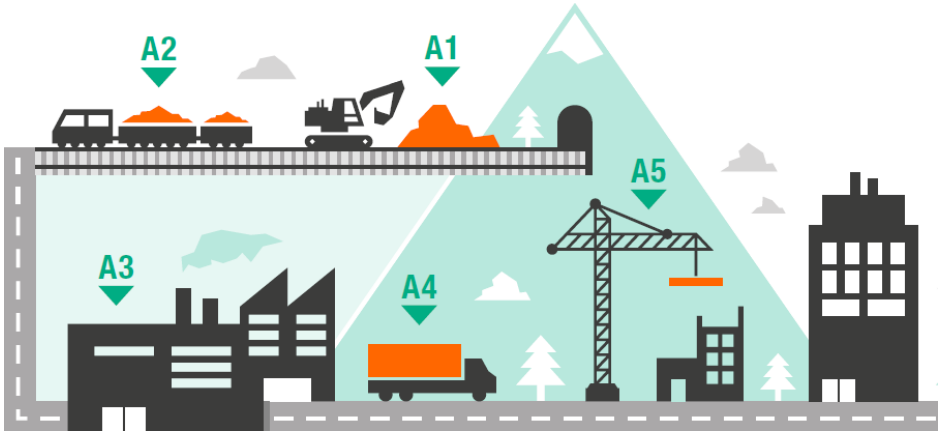
Asset Recycling

Next Generation - Foamix ECO

FOAMIX™ ECO

Carbon Neutral Asphalt

An Introduction to Foamix Eco



Each project will be assessed on an individual basis to ensure carbon neutral can be achieved.

FOAMIX Eco™
Carbon Neutral Asphalt

Foamix Eco™ is the groundbreaking carbon neutral evolution of Foamix.

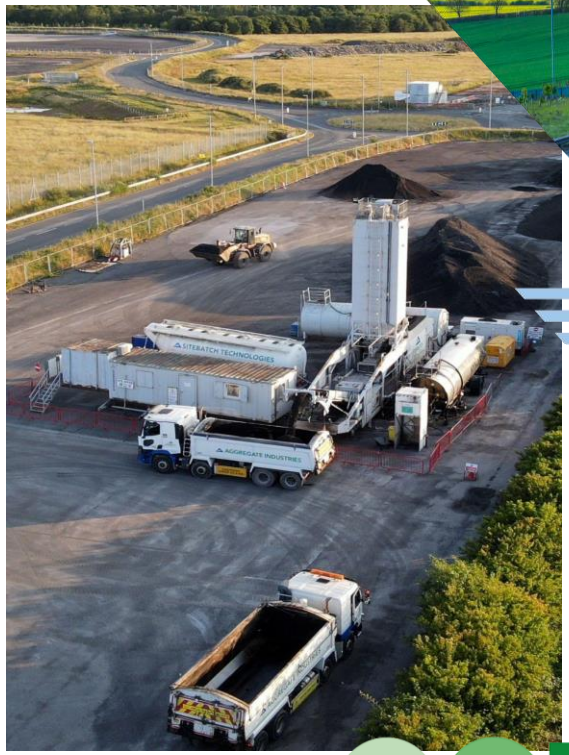
Made using carbon negative aggregates and biogenic binder, the reduced carbon footprint means we can deliver a carbon neutral status across A1-A3, with potential to offer stages A4 and A5.

Foamix Eco – R&D Design

- R&D design data
  - Initial pre validation design work undertaken at Nottingham University
  - Mix design used Wirtgen lab mixture to replicate on site plant mixing
  - Design looked at various bio bitumen's and additives to assess stiffness
  - Actual scheme design work completed at in house facility at Moordale
  - Design focused on chosen Bio Bitumen and carbon negative aggregate

Foamix ECO – Manufacture

- Constituents:
  - Recycled asphalt planings.
  - Added filler (PFA)
  - Hydraulic binder (Cement)
  - M-LS Carbon Negative Aggregate, -62.1kgco2e/t
  - Bio Bitumen, zero carbon bitumen
  - OMC



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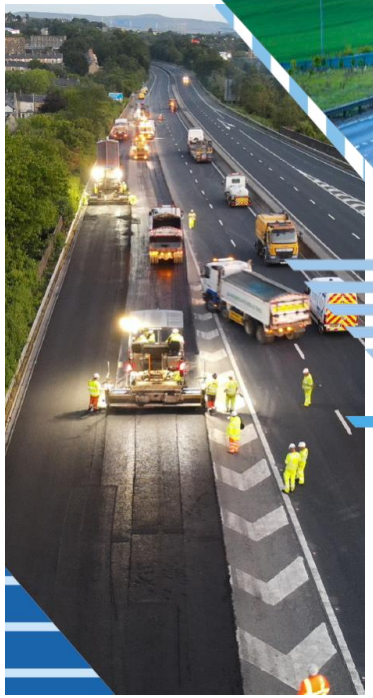
Foamix Eco – Site Trial

- Trial Construction
  - Trial undertaken June 23 on the M65 Slip Road
  - Formed part of the LCC Recycling Framework
  - Two pavers laying in echelon to reduce joints
  - Overlaid the same shift with 40mm SMA Surface Course
  - High IBI allowing same day overlay
  - TAR encapsulation, reducing waste and cost

  - ..\Videos\DJI_0772_W.mp4

Binder	Scheme Data ITSM (MPa)		
	7 day	28 day	Compaction (%)
Bio + MLS	3905	5823	98



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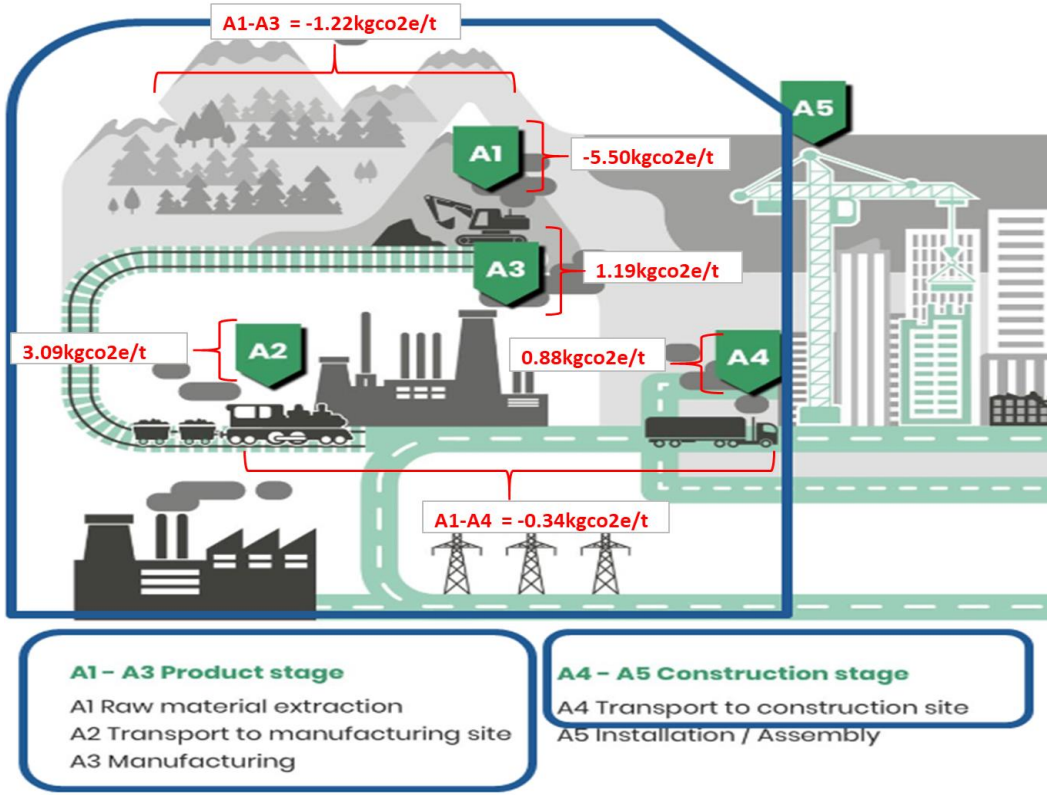
Foamix ECO – Carbon M65 Example

FOAMIX ECO
Carbon Neutral Asphalt



Carbon Data

- 6-mile round trip
- A1 = -5.50kgco2e/t
- A2 = 1.19kgco2e/t
- A3 = 1.19kgco2e/t
- A1 to A3 = -1.22kgco2e/t
- A4 = 0.88kgco2e/t
- A1-A4 = -0.34kgco2e/t

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Decarbonisation

Recycling in the infrastructure sector, what does it facilitate?:

- Reducing reliance on primary materials
- Circular economy methods – your network is your own virtual quarry
- Innovative treatments – doing more for less, creating value, cost avoidance
- Decarbonisation options – reducing carbon footprint – Social Value

Decarbonisation

- Science Based Targets (Paris Agreement) – Limit Global Warming to well below 2°C above pre-industrial levels
- To achieve this globally we need to achieve an annual decarbonisation rate of 12.9%. **5 times** that of the 2.5% achieved in 2021

Local Authority Insights

Breaking down the blockers

- Lack of product knowledge / confidence
- Lack of shared experiences with the products
- Scarcity of plants
- Shortage of candidate material
- Lack of design experience
- Focus of surface course interventions
- Fear of change

Local Authority Insights

Technical back-up and product development

- Bespoke asphalt R&D Facility
- Ability to do full mixture designs in-house
- Gives agility and the ability to over test
- Raising the bar by doing extra tests in the asphalt suite
- Giving customers the best possible quality and compliance

Local Authority Insights – Design

TRL 611 / 615 – 2004

↓

HD25 – Foundations
HD26 – Pavement Design - 2006
HD27 – Maintenance

SHW cl.948
SHW 800

↓

BS EN 14227 - HBM

CD225 – Foundations
CD226 – Pavement Design - 2020
CD227 – Maintenance

CD225,6 and 7 – LWD & Stiffness Modulus

↓

BS 9227 & BS9228 - 2021

DMRB 2025 – CRBM B4 Design Curve = Permitted in designs to 80 MSA

Local Authority Insights

DMRB designs are primarily used in major road design (Strategic Road Network – National Highways).
The table below shows that 13% of the GB network is SRN and **87% is minor roads.**
Minor roads are made up of ”B”, “C” and “U” roads. DMRB designs are over-engineered and hence prohibitive for minor roads which are often evolved with no previous strict design.
In order to maximise the recycling and low CO_2 opportunities in the network of Great Britain non-DMRB designs should be adopted for Minor Roads. These are often specific to the local authority that the assets are managed by.

	Major Roads						Minor Roads						Total	
	Trunk		Principal		All Major Roads		‘B’ Roads		’C’ and ‘U’ Roads		All Minor			
	Miles (000’s)	%	Miles (000’s)	%	Miles (000’s)	%	Miles (000’s)	%	Miles (000’s)	%	Miles (000’s)	%	Miles (000’s)	%
England	4.5	**2**	17.8	**9**	22.4	**12**	12.4	**7**	156.4	**82**	166.8	**88**	189.1	**100**
Scotland	2.1	**6**	4.6	**12**	6.7	**18**	4.6	**12**	25.6	**69**	30.1	**82**	36.9	**100**
Wales	1.1	**5**	1.7	**8**	2.7	**13**	1.9	**9**	16.4	**78**	18.3	**87**	21.0	**100**
Great Britain	7.7	**3**	24.1	**10**	31.8	**13**	18.8	**8**	196.4	**79**	215.2	**87**	247.1	100

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AGGREGATE INDUSTRIES

NB: Single size aggregate can also be generated

Case Study 1

Scheme: Somerset and North Somerset CC Campaigns

Spec: SHW cl.948 and BS 9228 - CRBM

Description: Foambase® as a method of re-use for AWCCT

Highlights: Circular method example. The councils tip their waste at OCL's Avonmouth depot and collect Foambase® CRBM for use back in the same schemes. Lorries are loaded in both directions which reduces disruption and caused carbon and the council saves money on disposal and asphalt materials for use in highway maintenance.

Cost savings of c20% and 50% CO_2e per scheme.

Case Study 2

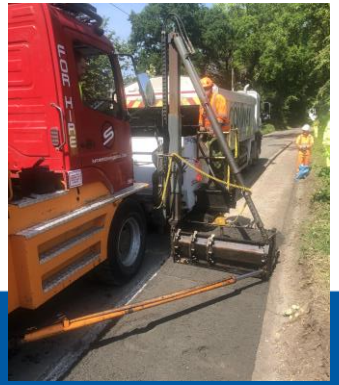
Scheme: Hampshire CC Carriageway, Haunching and Footway Campaigns for Milestone Infrastructure

Spec: SHW 821-823 and cl.948 / BS9228

Description: Foambase® CRBM as a low carbon material that facilitates the re-use for HCC AWCCT

Highlights: The supply of over 25,000t of CRBM, all through the recycling of AWCCT. Avoided HCC disposal costs and reduced the use of primary aggregates.

Savings of 50% CO_2e and 21% costs compared to traditional asphalt



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NB: Single size aggregate can also be generated

Case Study 3

Schemes: Northumberland inlay schemes and A189 Spine Road for DSD Construction and NCC direct

Spec: SHW cl.948 / BS9228

Description: Foambase® CRBM as a low carbon material that facilitates the re-use for county AWCCT

Highlights: The supply of 16,500t of CRBM, all through the recycling of AWCCT. Resilient and flexible offering delivered at night. Non-DMRB designs.

Savings of 50% CO_2e and 19% costs V's traditional asphalt

Case Study 4

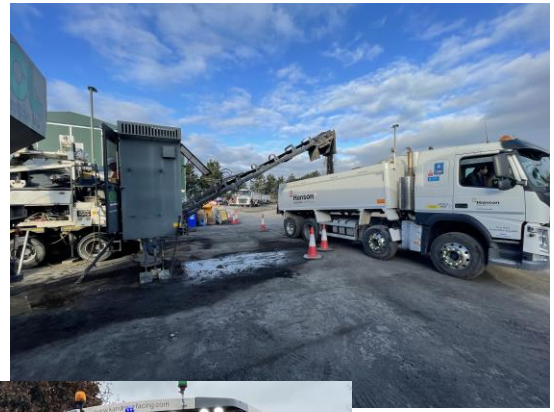
Schemes: OCC Annual structural patching programme for Aggregate Industries

Spec: SHW cl.948 / BS9228

Description: Foambase® CRBM as a low carbon material that facilitates the re-use for OCC AWCCT – preferred by end client

Highlights: The supply of 12,000t of CRBM. All through the recycling of AWCCT. Non-DMRB design.

Savings of 50% CO_2e and 18% costs V's traditional asphalt



Case Study 5

NB: Single size aggregate cn also be generated

Case Study 5

NB: Single size aggregate can also be generated

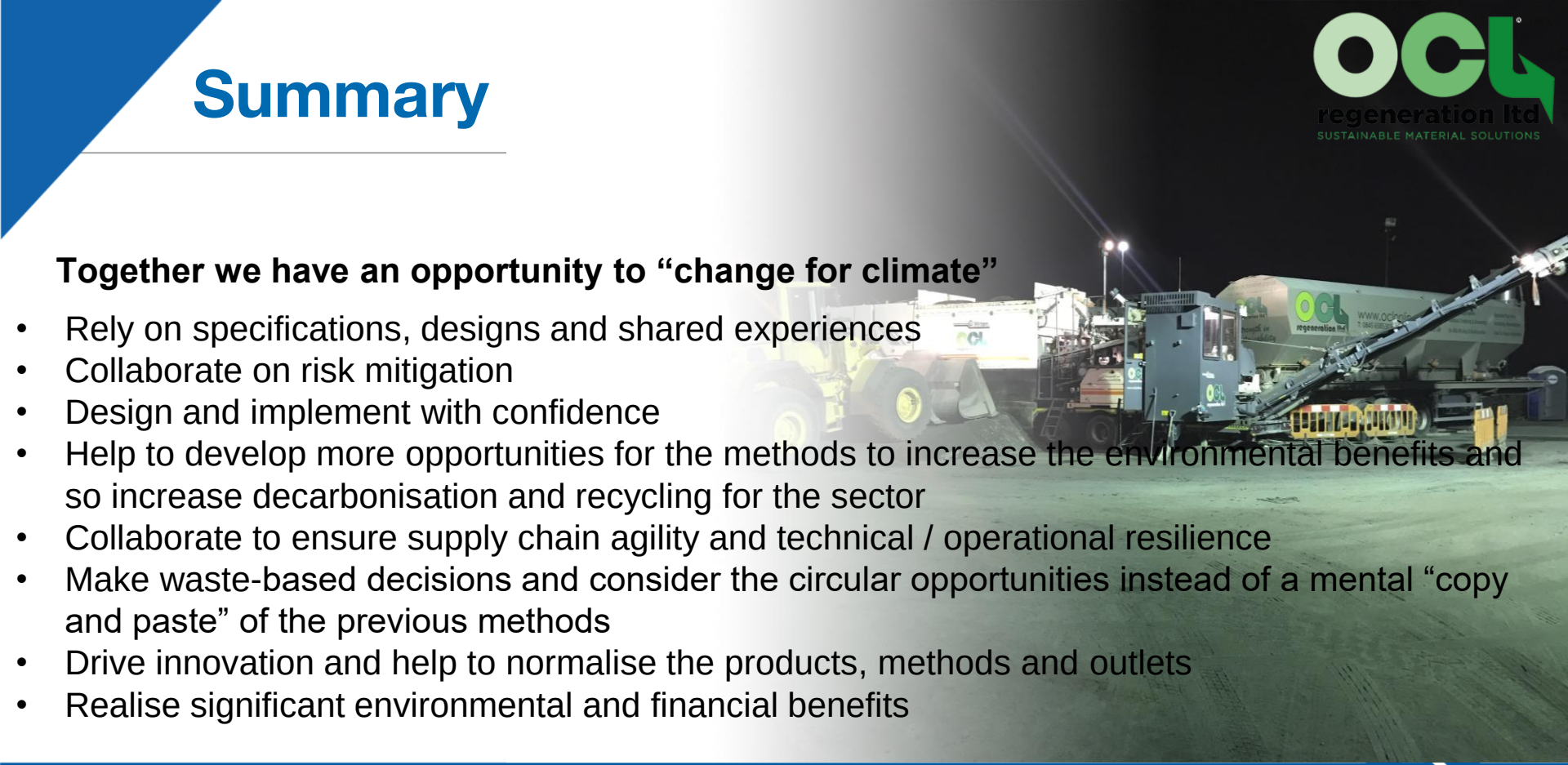
Case Study 5

NB: Single size aggregate cn also be generated

Case Study 5

NB: Single size aggregate cn also be generated

Summary



Together we have an opportunity to "change for climate"

- Rely on specifications, designs and shared experiences
- Collaborate on risk mitigation
- Design and implement with confidence
- Help to develop more opportunities for the methods to increase the environmental benefits and so increase decarbonisation and recycling for the sector
- Collaborate to ensure supply chain agility and technical / operational resilience
- Make waste-based decisions and consider the circular opportunities instead of a mental "copy and paste" of the previous methods
- Drive innovation and help to normalise the products, methods and outlets
- Realise significant environmental and financial benefits

Thank you

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