SUPPLY CHAIN SUSTAINABILITY SCHOOL

Carbon Reduction in Pavement Works – National Highways PDF

3rd October 2023, 2pm - 3pm

Please Participate!

Please ask your Questions via the Question and Answers and Speakers will respond during the session.

The session will be recorded and slides will be distributed afterwards.

Mark Emmett

Central Carbon Team Leader, National Highways

Net Zero Highways

Carbon Reduction in Pavement Works

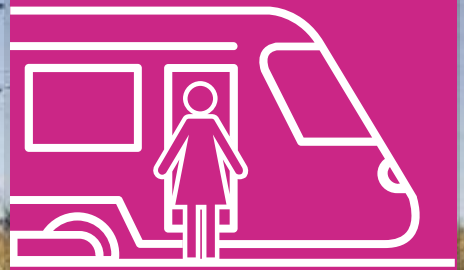
October 2023

Roads for Good: Our roads have economic and social value, both now and in a net zero carbon future

Average person travels

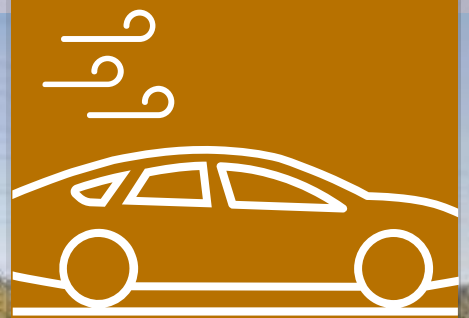
7x

farther by car than rail, ferry or air



68%

Commute to work by car



9x

More freight moved by road than rail

7.4m

employed by SRN-dependent industries

National Highways Net Zero Plan

CORPORATE EMISSIONS

Net Zero by 2030

- Our vehicle fleet
- Our offices and depots
- Corporate purchases
- Business travel

0.15% of NH emissions in 2022-23

MAINTENANCE & CONSTRUCTION EMISSIONS

Net Zero by 2040

- Material manufacture and usage
- Transport of materials
- On-site activities

1.9% of NH emissions in 2022-23

ROAD USER EMISSIONS

Net Zero by 2050

- Cars
- Buses and coaches
- HGVs
- Sustainable travel

~98% of NH emissions in 2022-23

*percentages do not total 100% due to rounding

Key achievements

The world's first roads organisation to be verified against PAS2080

Developed and embedded our Carbon Management System (CMS) in Business-as-Usual activities

We launched our:

- Innovation Programme
- Carbon in contract policy
- Low carbon opportunities register
- Roadmaps for Steel, Concrete and Asphalt

Net Zero Progress so far

Maintenance and Construction

Low carbon materials

Trailing new products;
- ‘Carbon Lock’ asphalt
- Retexturing technology

Reducing maintenance and construction emissions

Replacing construction plant with rechargeable, electric alternatives

Energy Management System

Trialling switching off non-essential assets when energy demand spikes

Road User

Energy storage solution at MSA's

7 Energy Storage Systems (ESS) on our strategic road network

Supporting active travel choices

Approx. £42M invested in active travel schemes

EV changing infrastructure

Support £950m of rapid charging infrastructure at MSAs (Project Rapid)

National Highways – PAS2080 verification

- We achieved PAS 2080:2016 verification in Dec 2022
- We have introduced new and updated processes and procedures to help consistently assess the carbon impacts of each of our projects.
- We will be audited annually to demonstrate year on year improvements in managing and reducing whole life carbon emissions – next audit is taking place in October and November 2023.
- We are asking our supply chain partners to implement their own PAS 2080:2023 verified carbon management systems by the end of 2025.

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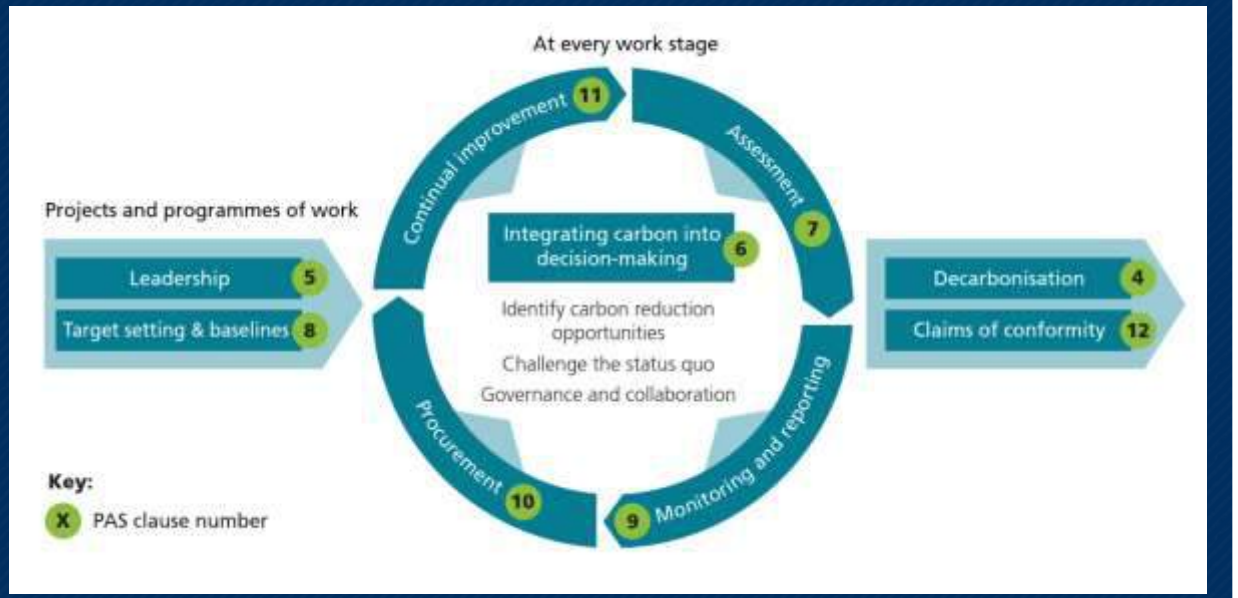
What is covered by the updated PAS 2080: 2023 standard?

- PAS2080: '*Carbon Management in Buildings and Infrastructure*' 2023 – specifies the requirements for the management of whole-life carbon in buildings and infrastructure
- Enabler/accelerator:

Leadership	Collaboration	Systems thinking
Procurement	Risk-based approaches	Tools and data/ consistency

- Being compliant to PAS2080 means having the capability to deliver low-carbon solutions
- Updated PAS 2080 was released in April 2023



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What does this commitment mean for our supply chain?

Require large and medium suppliers to implement their own Carbon Management Systems that are verified to PAS 2080:2023 by the end of 2025

PAS 2080:2023 verification must be achieved through third party audit

Organisation or sector level (not project level)

Requirements for small and micro-organisations will differ – still expected to align with the binding principles and be able to evidence this

Applies to those suppliers who are procured through the relevant National Highways frameworks for construction and maintenance

Requirements are likely to evolve in line with any further developments of PAS 2080

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Indicative timeline for PAS 2080 verification

Net Zero Plan requires large and medium suppliers to be verified to PAS 2080 by 2025

The objective of a Stage 1 Audit is to determine an organisation's readiness for their Stage 2 Certification Audit

The updated version of PAS 2080 was released in April 2023. Organisations with an existing Carbon Management Process may have to amend it to reflect the updated specification

Note – the timescales will vary depending on the organisation's existing level of maturity, the size and complexity of the organisation and the scope of verification required (whole organisation or specific sectors)

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PAS 2080 is relevant to all parts of the value chain

Smaller organisations and other niche SMEs often bring great benefits to the decarbonisation of projects and programmes of work (PAS2080 Guidance document)

PAS2080 binding principles

Carbon Management Process

Integration of PAS 2080 in business management systems through the **Carbon Management System**

Leadership

Consideration of decarbonisation as primary business **objective**

Building capability

Empower personnel to take action on carbon reduction, encouraging to challenge and influence others

Whole Life Carbon (WLC)

Use whole life carbon data to inform **decision-making** at the asset, network and system level.

Procurement

Use commercial models and factor carbon in the decision making to **incentivise** decarbonisation.

Collaboration

Work collaboratively with the rest of the value chain promoting collaboration and sharing knowledge by contributing to the relevant **forums.**

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What is SBTi?

- Science-based Targets Initiative
- Science-based targets provide a clearly defined path to reduce emissions in line with Paris Agreement goals
- Show how much and how quickly you need to reduce your greenhouse gas (GHG) emissions to prevent the worst effects of climate change
- Companies who sign the SBTi commitment letter are recognised as ‘Committed’ on the SBTi website, as well as the CDP, UN Global Compact and We Mean Business websites

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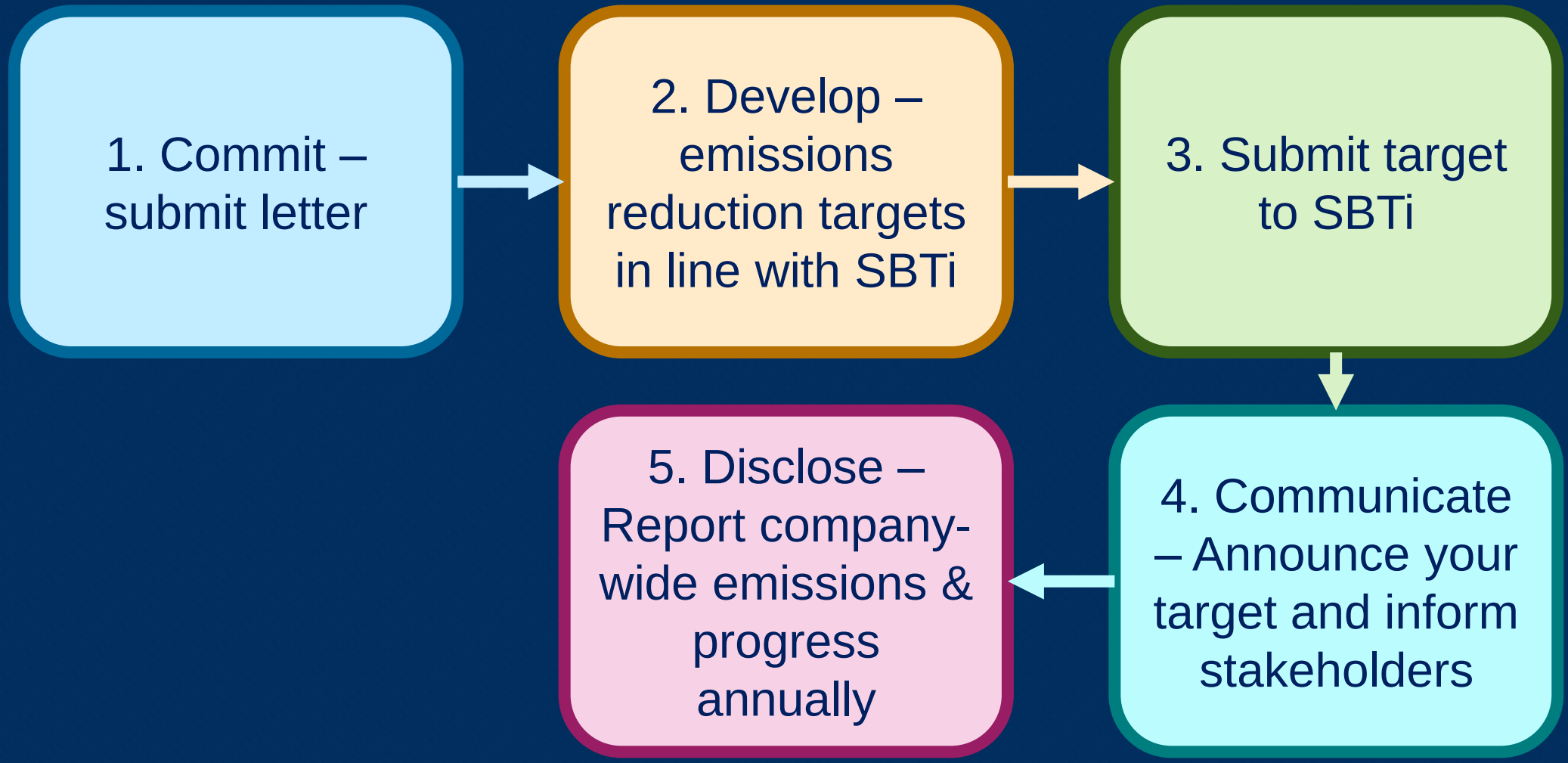
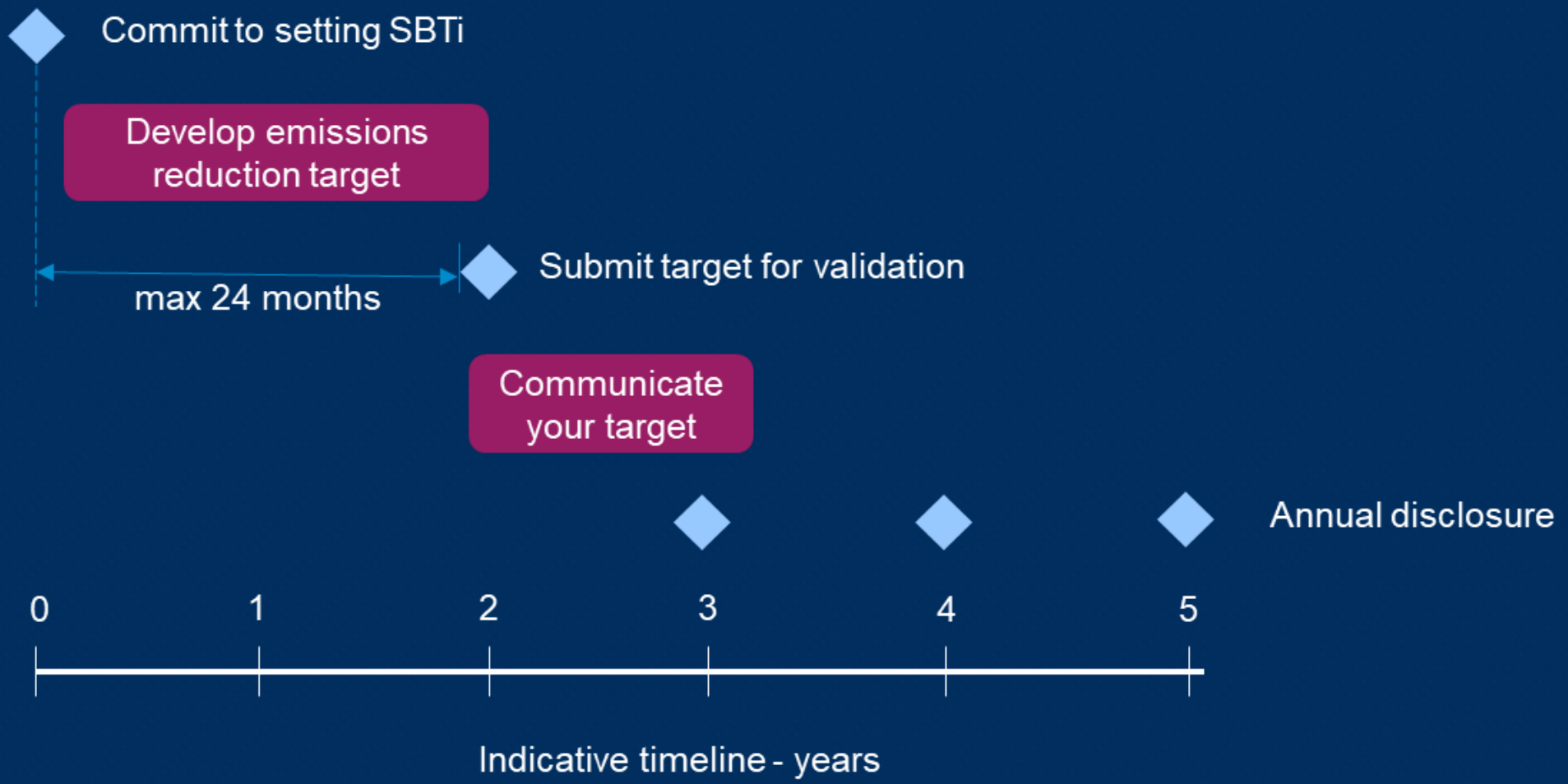
SBTi Accreditation – Steps



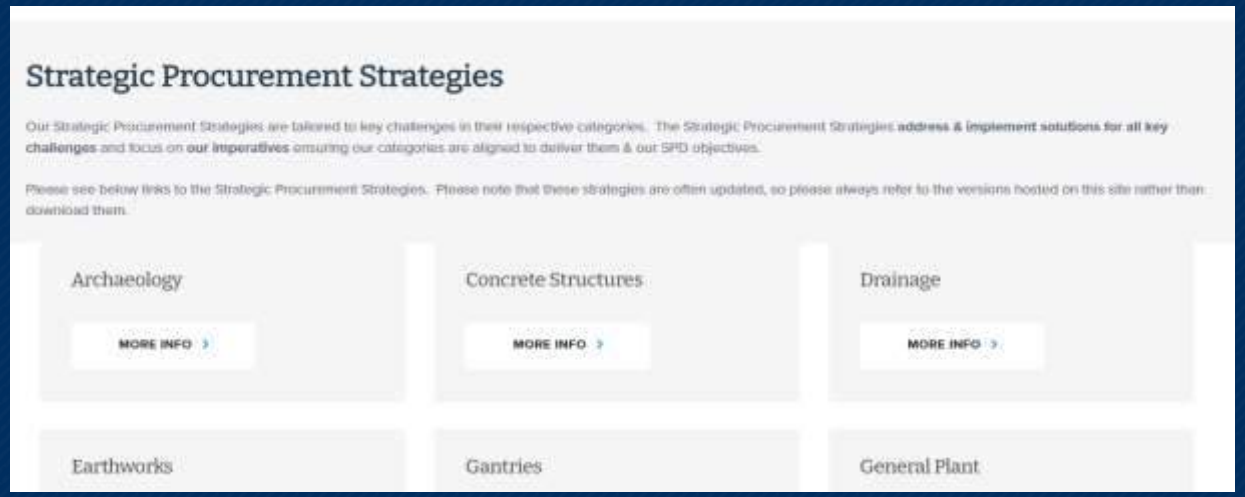
Indicative timeline for Science Based Targets initiative

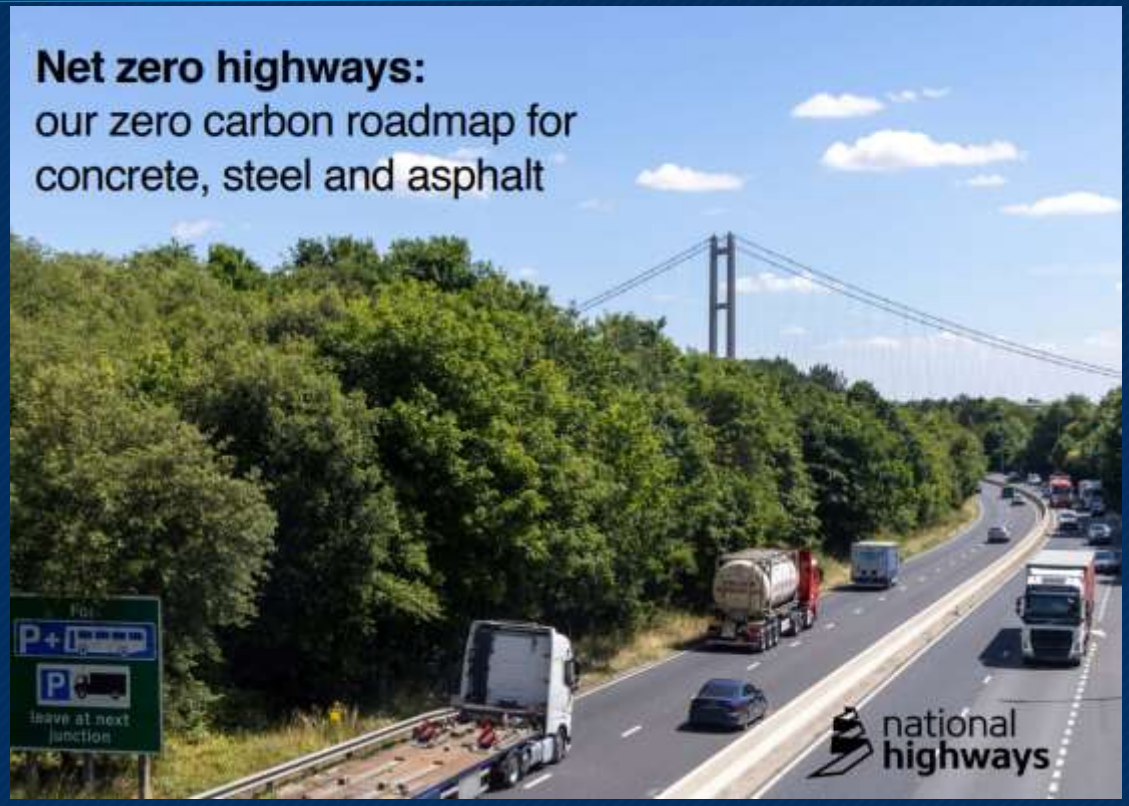
Within 5 years of National Highways submitting our SBTi baseline, we expect at least 75% of supply chain spend to be with suppliers who have set their own ambitious SBTi target



Net Zero Materials Roadmaps & Category Carbon Plans

- **We have developed and published roadmaps to help concrete, asphalt and steel reach net zero by 2040.**
- They set out the steps that we and our supply chain will need to take to achieve net zero emissions for each material.
- For all other procurement categories, a carbon plan has been developed, which outlines phased goals and deliverables to 2025 and beyond.





Roadmaps can be downloaded from our website:
https://nationalhighways.co.uk/netzerohighways/

Category Plans can be downloaded from the SCSS website

Carbon Construction Innovation Programme (CCIP)

This year we've started development of our Carbon Construction Innovation Programme (CCIP)

CCIP will oversee the implementation of trials on our projects and will help us develop an evidence base – We'll be able to identify which opportunities can be rolled out more widely across our network, without compromising safety.

Our new Net Zero Innovation Board will help identify and define those challenges and opportunities where innovation has a role to play.

Please contact Melissa Giusti (Senior Innovation Advisor, SES) for more information.

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Low Carbon Opportunities Register

In each Road Period we will identify which low/zero carbon products, technologies and opportunities we could use in construction and maintenance

Our ambition was: to develop and maintain a comprehensive register of all low carbon opportunities known to National Highways. This is designed to be a single source of reference.

115 opportunities have currently been validated for publication with additional opportunities to be included.

Potential **CO_2e reduction** captured qualitatively and against a clear baseline

All opportunities have been allocated 5 point scales for **innovation maturity** and **applicability to the SRN**

Updates or additions to the register can be logged via a form available on the landing page

Carbon reduction hierarchy and **opportunity type** to help users navigate the register

Opportunities mapped by:

- MCHW series no
- Asset class
- Procurement categories

Not a replacement for standards
Interpretation of which opportunities to pursue ultimately sits with the end user

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Innovation Maturity Level

This is an indication of the readiness of the technology and availability in the wider market

1

Initial Research
Understanding the problem and exploring possible solutions

2

Concept & feasibility
Developing or testing a concept, designing the solution and testing feasibility of solutions

3

Development and Verification
Developing the preferred solution, verifying the design through prototype demonstration in a real world

4

Validation and optimisation
Scaling up the solution for roll-out or commercialisation

5

Deployment and post-launch
Implementing or rolling out the solution and assessing its impact

Note this 1-5 scale is used with National Highways as an interpretation of the widely used 1-9 Technology Readiness Level scale

Applicability to the SRN Scale

This scale gives an indication of how viable the opportunity is within National Highways standards

1

Not Desired
National Highways is unable or unwilling to pursue this intervention.

2

Concept or scaling back
In concept level stage, with good potential to go to trial on the network or desire to limit or withdraw usage in the future.

3

Trial or departure
Used in trial on the network or used on the network successfully but requires a departure from standard to implement.

4

Approved and ready
No departures from standards required. Used already in places on the network, but no widespread use.

5

Used consistently
Already used consistently and widespread by National Highways, with a desire to continue use in the future. No departures required.

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NH Carbon Reduction Opportunities Register

Indicative visuals

National Highways Low Carbon Opportunities Register

Intervention	Details of inter...	Opportunity type	Carbon reducti...	Carbon reducti...	Innovation mat...	Innovation mat...	Applicability to ...	Applicability to ...	Approvals requi...	Standards	Additional com...
				less mathematical interventions are needed.							
Alternative fuels for heating and drying at asphalt plants	Asphalt production is a carbon hotspot and this is driven by the need to heat and dry aggregates. If this heating and drying can be completed using lower carbon fuels then a carbon reduction can be achieved in the production process.	Low carbon material	Build efficiently	Exact reductions will depend on the current technologies used. Alternatives such as hydrogen or hydrotreated vegetable oil (HVO), which can be used in conventional diesel engines, will reduce carbon emissions relative to the use of diesel.	4	Many suppliers are already beginning the transition to low carbon fuels like HVO.	5	Assigned a high applicability as it does not require the consent of National Highways. It is a supplier-side change that can help reduce carbon without impacting on product performance or compliance.	No	N/A	None
Lighting assessment	Review the requirement for road lighting at appropriate points within the life cycle of the installation when looking at an upgrade / when looking at end of life / new highway scheme.	Design approach	Build less	Carbon reduction achieved through reduced energy demand.	5	Possible to remove lighting, will need to go through standard decommissioning process	4	Potential to remove lighting on schemes, already built into TA501.	No	TA 501	TA501 assessment. Previous standard TA84/07 highlighted the need to remove lighting when not required and has been a requirement since 2007. However, some area maintenance teams have not yet implemented.
Energy assessment	Use energy performance assessments (BS EN 13201-5) and consider how the energy assessments could be set as KPI's.	Design approach	Build efficiently	Carbon reduction achieved through reduced energy demand.	5	In theory it is possible to add KPIs around energy efficiency	4	Good practice lighting approach, the BS EN 13201-5 is a fairly new approach, looks to ensure most energy	No	BS EN 13201-5	All lighting designs are required by standard to take into account Environmental, social and sustainability requirements. DMRB 501 series review is picking the up

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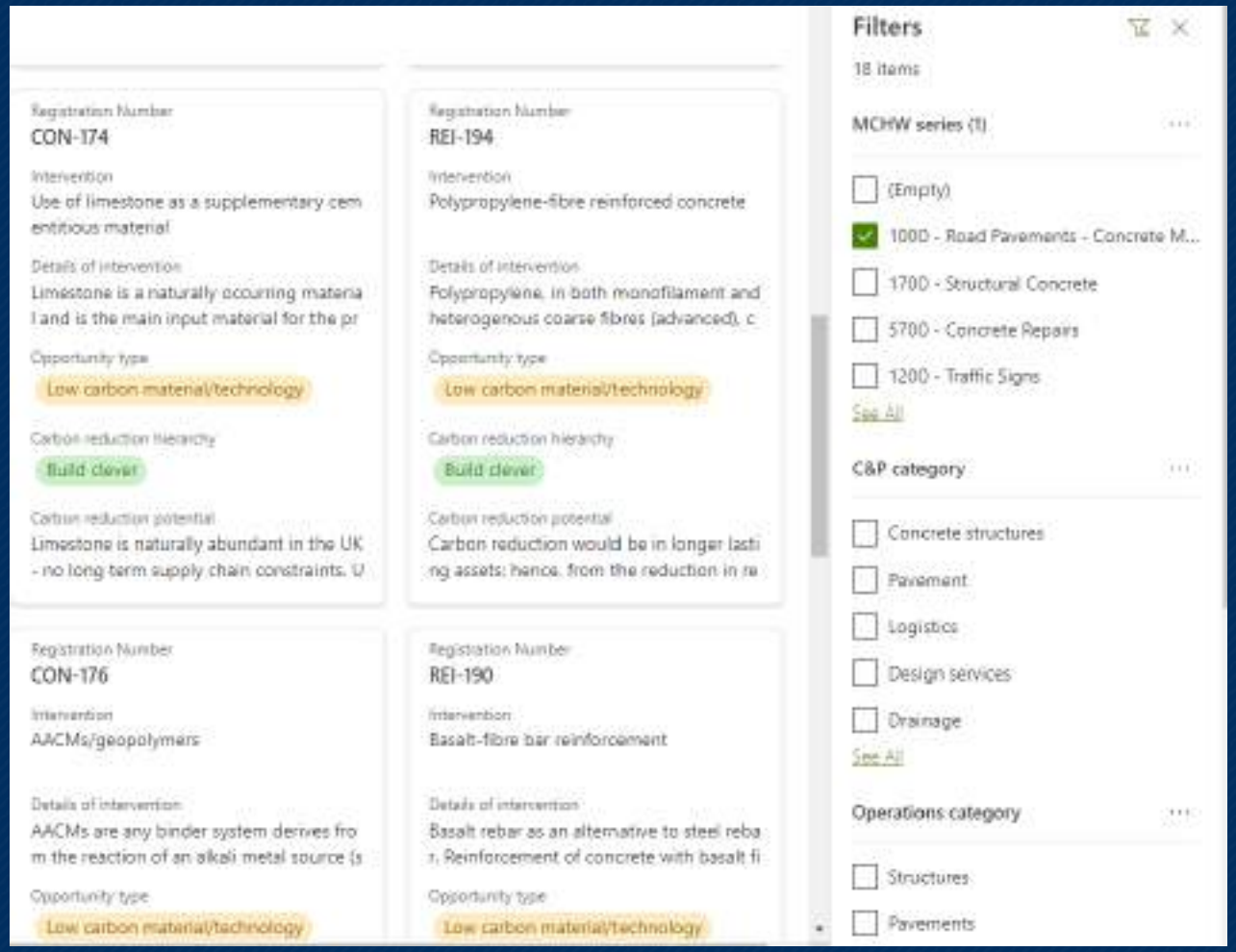
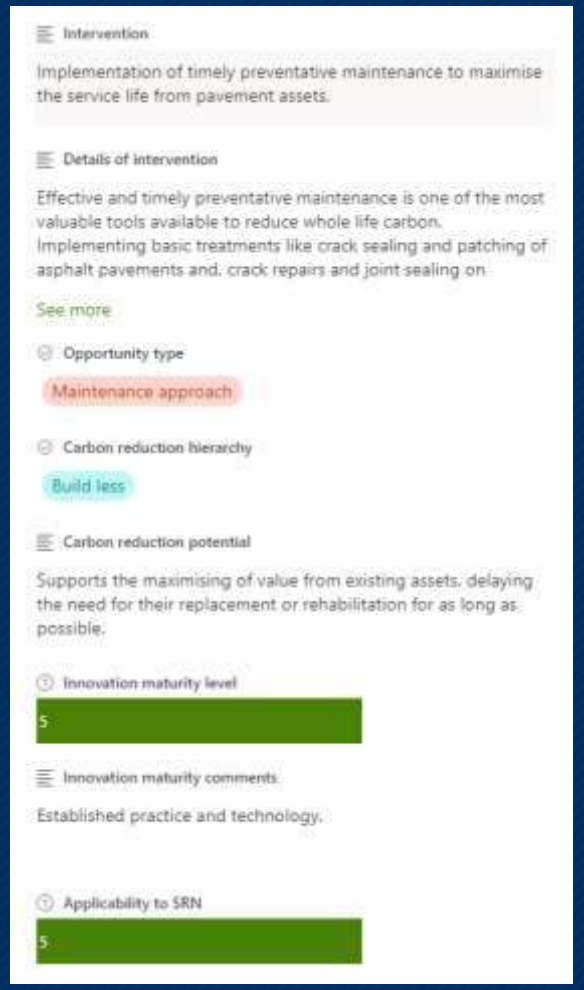
NH Carbon Reduction Opportunities Register – Deeper detail

Indicative visuals





You Said, We Did - Removing Blockers for Innovative Ideas

You said…	The Case for Change…	We did…
“That standards are a blocker to being able to implement low carbon innovations on our schemes”	Needed to change our concrete standards to permit a different type of mix	Speed up the process internally, and made the required changes to standards within two months

The largest contributor to NH’s construction footprint is concrete

Our concrete standards prevented us from using lower carbon mixes

In many cases we could reduce the amount of cement required by 30%

Reducing carbon emissions by around the same amount

Through work with Janet Lees (Professor of Civil Engineering, University of Cambridge)

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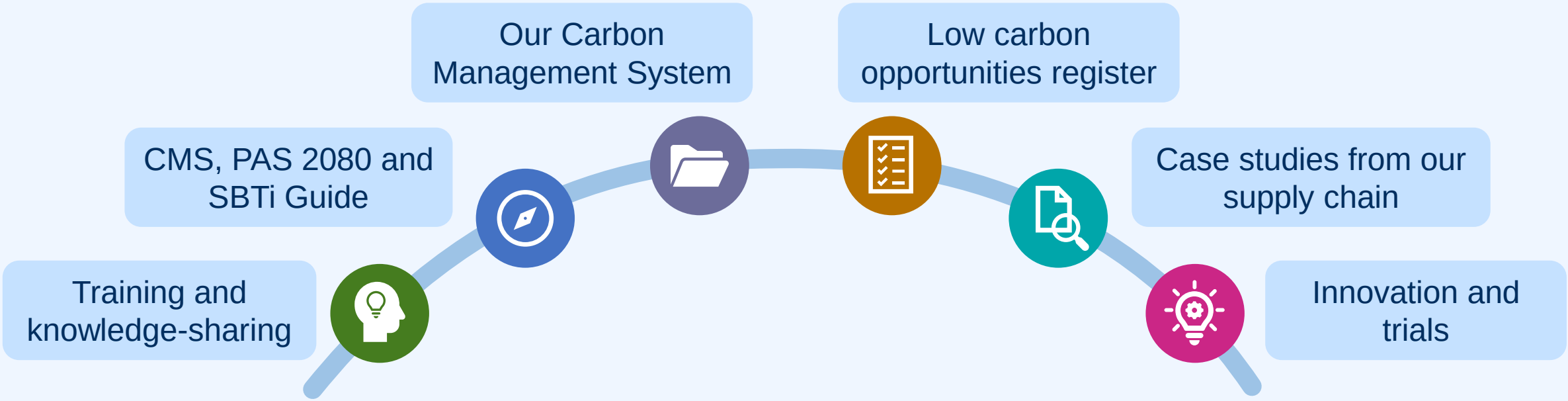
Our commitment to knowledge share and collaborate

Welcome to the National Highway's Carbon Hub

The centre for net zero resources at National Highways



https://highways.sharepoint.com/sites/NHEnvSusCarbon

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What we need from our supply chain

We need our supply chain to know your carbon

- ✓ We need to work together to reduce our whole life carbon
- ✓ NH 2040 Net Zero Target (Construction & Maintenance)
- ✓ Understand the carbon in contracts policy

Have your own CMS verified to PAS2080

- ✓ This will be mandated by end of 2025
- ✓ Proportionate approach for small and micro suppliers, but will still be expected to align with key principles

Set SBTi aligned targets

- ✓ Near and long term with Net Zero target
- ✓ Within 5 years of National Highways submitting their own targets to SBTi (2028)

Visit the Supplier Guide on the Carbon Hub

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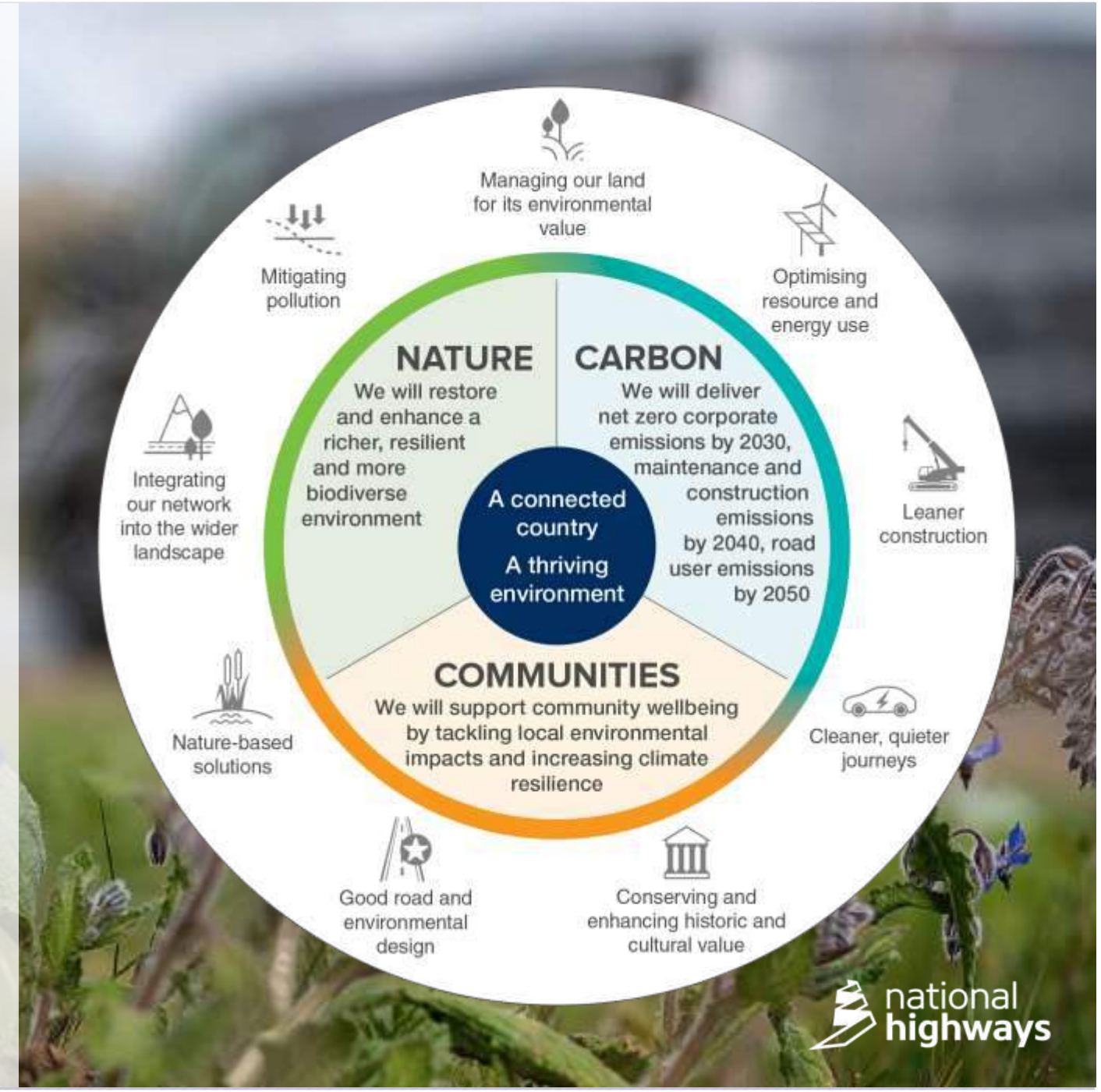
A connected country
A thriving environment

We define environmental sustainability as…

“The responsibility to conserve resources and enhance the environment to support health and wellbeing for current and future generations”



Thank you!

Carbon@nationalhighways.co.uk

Erusa Adizie

Net Zero Manager, Tarmac

Act

Sustainability Strategy

PDF Webinar

3rd October 2023

Tarmac Sustainability Strategy

People

Planet

Solutions

Our sustainability strategy

Carbon Reduction Target

30% reduction in absolute carbon emissions by 2030 (from a 2021 base year)

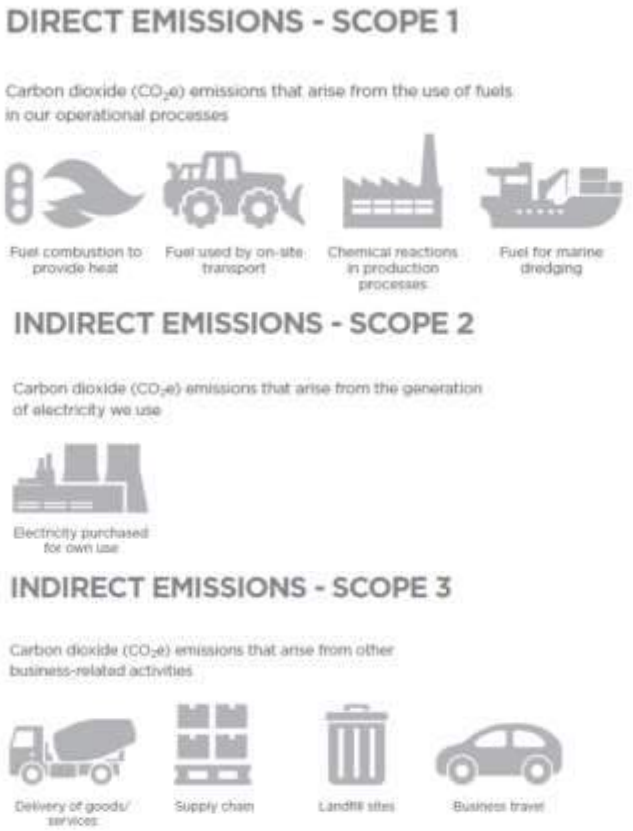
This target applies to our group-wide gross carbon emissions and covers total footprint across Scope 1, 2 and 3

Scope Emissions

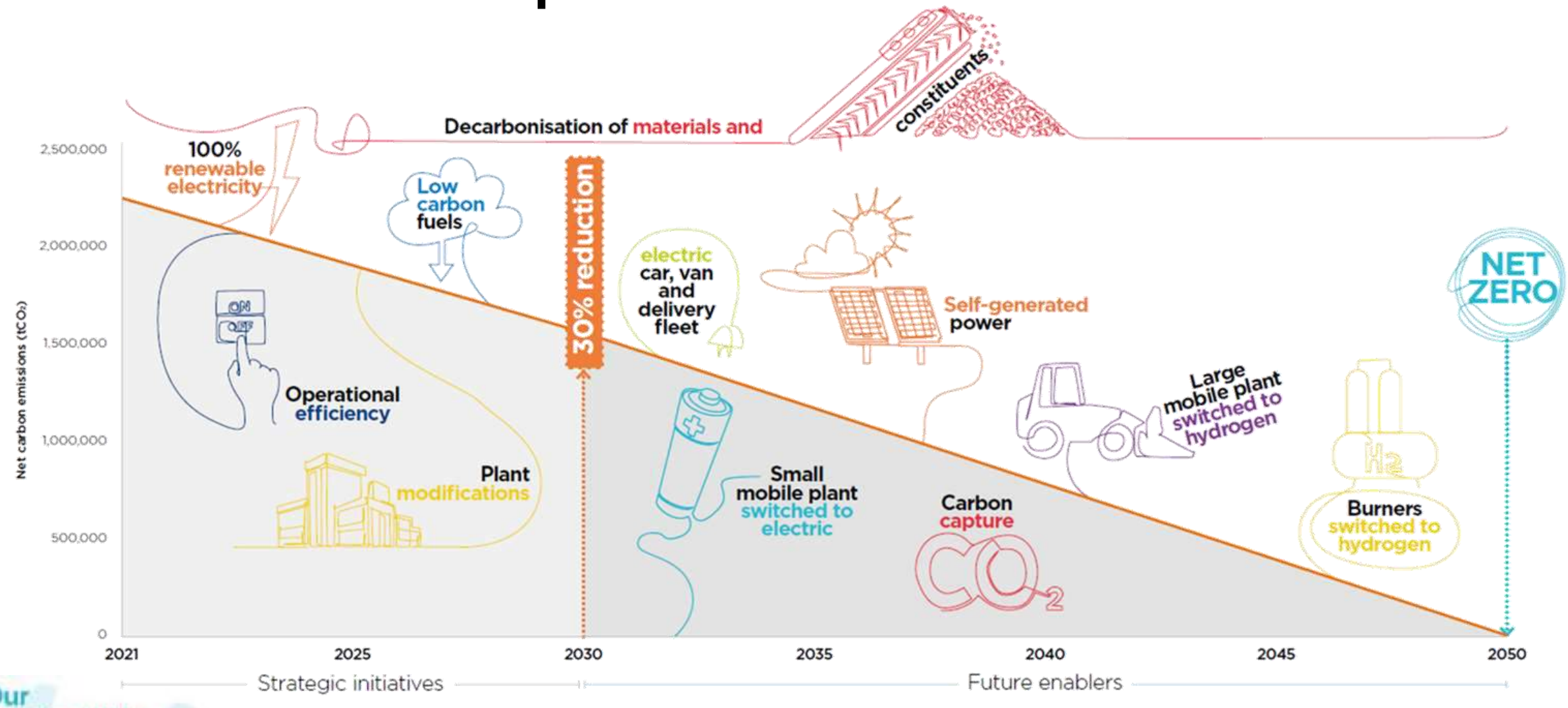
Direct Emissions
SCOPE 1
CO_2 emissions that arise from the use of fuels and raw materials

Indirect Emissions
SCOPE 2
CO_2 emissions that arise from the generation of electricity we use

Indirect Emissions
SCOPE 3
CO_2 emissions that arise from other business-related activities



Net Zero Roadmap



Our sustainability strategy

Strategic Initiatives

100% Renewable Electricity

Electricity Switching

We will electrify operational equipment where possible across all our sites

Energy Efficiency

We are also considering generating our own renewable power

Every site has an energy efficiency target and aims to reduce energy and improve performance

Strategic Initiatives

EV Cars and Vans

We are committed to transitioning our company car
and van fleet to electric before 2030

Product Design

Cement – Reduce the amount of CO_2-intensive clinker in cement and concrete by developing new products including Portland Limestone cement, cements that include calcined clay

Concrete – Optimising the use of cementitious materials like GGBS (Ground Granulated Blast furnace Slag), fly ash and limestone in concrete mixes

Developing our range of low carbon concretes, including the development of AACMs (Alkali Activated Cementitious Materials)

Strategic Initiatives

Lower Energy Manufacturing And Fuel Switching

Asphalt

- Switched over 60% of our plants from oil to lower carbon alternatives
- To lower the CO_2 of asphalt we have made warm mix asphalt (WMA) the default product
- Exploring the potential use of bio-binders to partially replace bitumen and achieve CO_2 reductions as well as polymer-modified bitumen to deliver longer lasting durability

Cement

- Investing in new technology that allows our kilns to use up to 70% waste derived fuels

Mobile plant

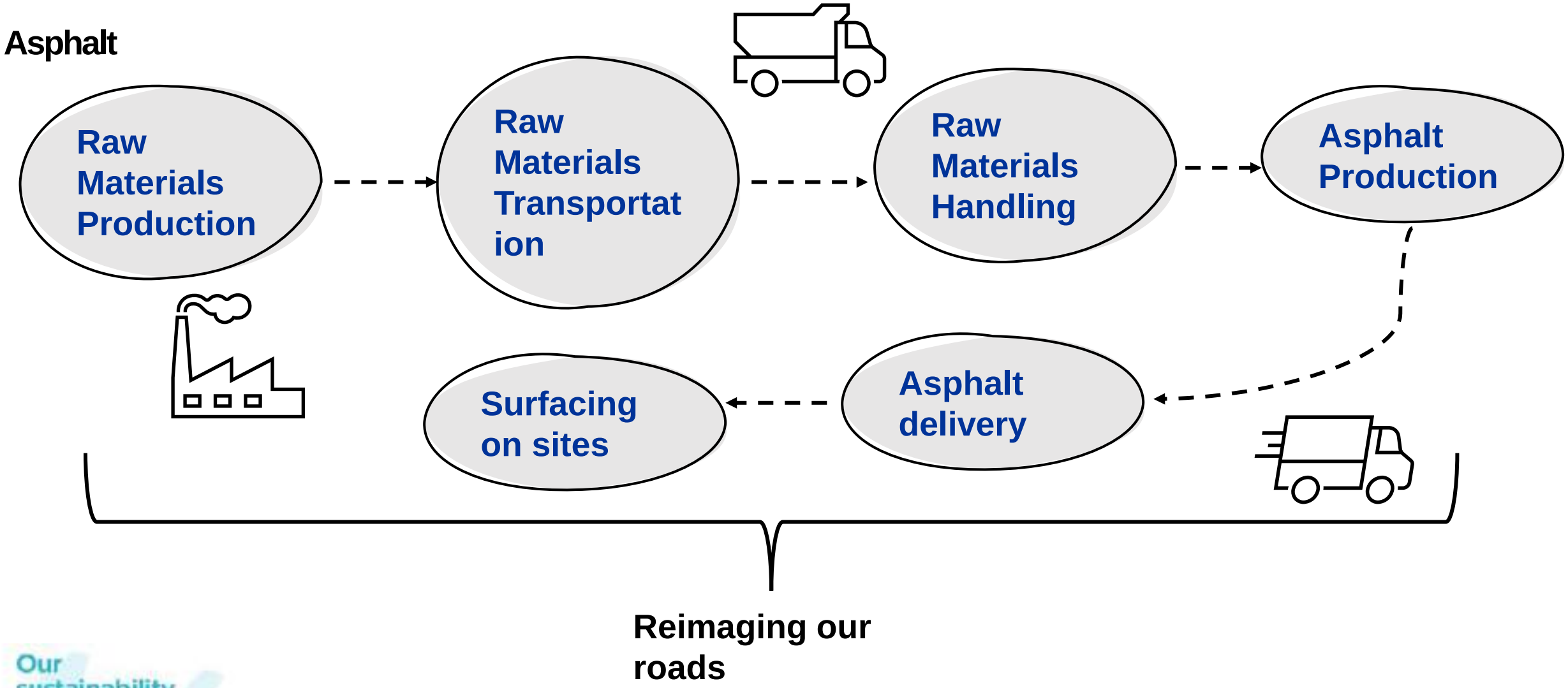
- Exploring the use of HVO (Hydrotreated Vegetable Oil) as a transition fuel

Increased Recycling

- Aim to optimise the use of recycled materials to avoid using the energy required for manufacturing primary aggregates
- Provide advice on the lowest CO2 material options for every project
- We use over 1 million tonnes of RAP in new asphalt and want to increase this further

Zero Carbon Potential

Asphalt



Additional Benefits Carbon Reduction Benefits

Safety

- Fewer interventions
- Improved wellbeing for communities

For customers

- Haulage reduction on the network
- Environmental improvement
- Reduced user carbon

Delivery

- Reduced use of virgin aggregates
- Reduced embodied carbon

Our sustainability strategy

Strategic Opportunities

Product Designs

1. Support changing specification to support material innovation

Plant and transport

1. Tier 1 collaborations to promote use of suitable artics on projects
2. Support for charging point infrastructure
3. Review working patterns to transition grid demand

Paving Technology

1. Develop R&D projects such as those to measure reduced rolling resistance and evaluate carbon savings
2. Agree trial sites

Innovation

CRH has launched an internal **Innovation Fund** in June 2022, supplementing the efforts already in place by our Operating Companies and is already supporting approved projects across our Group.

Innovation Fund

The Innovation Fund is designed to support the development of innovative ideas across the global Group

Projects include:

- Tarmac using the first electronic and emission-free e-mixer in the UK
- Trialling new Carbon Upcycling technologies at Ash Grove's Mississauga Plant (US)
- Using Artificial Intelligence to improve management of performance

Innovation

Priority areas for the Innovation Fund

Innovation around the materials used


Asphalt & Road of the Future


Low / Zero-C Offers


Water Management


Material Science

Low carbon solutions


Circular Economy


Construction Industrialisation


Technology & Digital

Review opportunities to expand product ranges and embrace low-carbon solutions


TARMAC
A CRH COMPANY

James Bailey

Chief Executive, Road-ways

CARBON REDUCTION: PAVEMENTS

ROADWAYS: SELF DELIVERY CAPABILITY

ASPHALT SURFACING & TM

- Pavers, planers & by hand
- 100% with sonic levels & digital QA
- In-house traffic management

CIVIL ENGINEERING

- Highways & streetworks
- Road recycling
- Structures & groundworks
- Mains drainage
- Town centre improvements

LOW CO2 & CIRCULAR ECONOMY

- 70% less carbon concrete
- 40% less carbon asphalt
- Low carbon HBM / CBGM
- Tar planings, Type 1 & capping

ADDED VALUE

- Collaboration & value engineering
- Sustainability
- Innovation
- Social value













CONCRETE: THE LOW HANGING FRUIT OF CO2 REDUCTION

- **Cement is 8% of global man made co2**
- Concrete has 20,000 car kms per 8m3 load: Or a football pitch of trees two years
- Can cut by 30-50% with no impact
- Can cut by 70% with a small amount of extra curing
- Standards compliant
- **Not more expensive**
- **No issues with availability but specify volumes at tender stage**

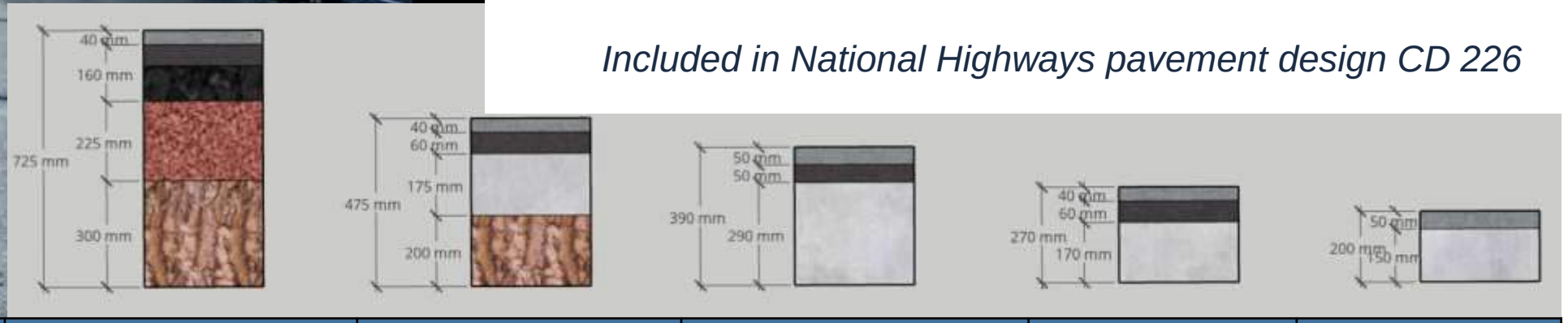
"At 30% GGBS this is an easy way to save 3.5 billion car kilometres of CO2 per year: the same saving as driving around the world 90,000 times"

University of Brighton

ROAD WAYS HAILSHAM

ROADWAYS THE RIGHT WAY

CEMENT BOUND SUBBASE: HBM / CBGM



"A faster, cheaper and more environmentally friendly way to construct roads for a 20-40 year design life"

"Save at least 20% cost time and carbon"

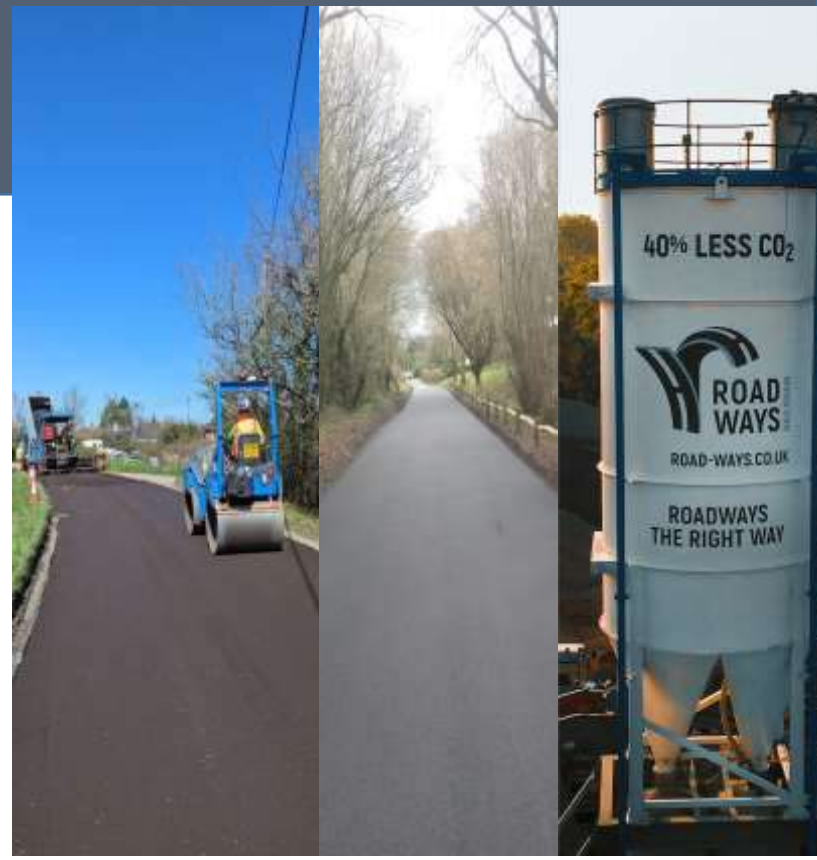
Included in National Highways pavement design CD 226

	Trad	HRC	Project 1 - Croft	Project 2 - Kingsclere	Project 3 - Cornwall
Excavation and disposal (total depth)	725	475	390	270	200
CO_2 saving	**0%**	**32%**	**35%**	**45%**	**62%**
Car km saving	0	61,000	67,000	86,000	116,000

COLD ASPHALT

SHOULD BE THE DEFAULT BASE AND BINDER COURSE

- Each truck load saves as much CO2 as driving from London to Lebanon - 40%!!!
- Cheaper than hot / warm mix.
  - Even larger cost savings if made with tar planings
- Not going cold so no quality risk from site / transport delays
- Same design thickness of layers when moving from hot / warm to cold
  - No redesign needed
  - A direct replacement for hot/warm AC20/AC32
- Uses 100% local recycled aggregates - less transport and primary materials quarried
- Meets highways specification 948. Been used in the UK and globally for decades
- It is very workable, easy on backs - health benefit
- Certain mixes can be used for up to 2 weeks so there is less waste and logistical challenges
- 95% less particulate matter & volatile organic compounds emitted
  - Major issue in city centres



Sussex Innovation Centre making ideas happen

CARBON TRUST

ROADWAYS THE RIGHT WAY

ROADWAYS THE RIGHT WAY

SUPPLY CHAIN SUSTAINABILITY SCHOOL

REGISTER NOW

Decarbonising Transport Together (Part 2): Net Zero and Science Based Targets

WEBINAR - WEDNESDAY 1 NOVEMBER 2023 11:30 - 12:30

Supported by:

HS2 national highways NetworkRail

COP 28 - Climate Mitigation and Adaptation: Where are we in tackling both?

Wednesday, 13 December 2023, 10:00 AM - 12:30 PM (2.5 hours)

Online - Zoom

REGISTER NOW

This virtual conference will talk about to the issues of mitigation AND adaptation – how we are reducing our energy demand and the carbon emissions arising from that to keep on track with the Paris goals, but also, crucially, how we are adapting to the changing environment.

Aimed at: clients & supply chain organisations in the built environment, who wish to better understand tackling climate change and adaptation.

Featuring: Bouygues, HS2, Kier, and Wates

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Thank you for joining!

We really value your feedback, please do fill out our Feedback Form - click here before you leave it only takes 2 minutes!

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