An aerial photograph showing a two-lane asphalt road that curves through a rugged, mountainous landscape. To the right of the road, a river flows through a rocky, scree-covered valley. The terrain is a mix of grey rocks, brownish soil, and patches of green vegetation. The lighting suggests a bright day, casting soft shadows.

The value of low- carbon thinking

Decarbonising Transport 2021
Mott MacDonald Digital Ventures

Why am I here?

Representing Mott MacDonald

Mott MacDonald is a 17,000-strong global engineering consultancy firm with presence in over 150 countries, and just around the corner in Wynard Quarter.

We have been leaders in the reduction of emissions through every lens;

- At a policy level with UK Department for Transport
- At an operations level with Highways England
- At a contractor level with our MMB venture
- At a consultant level as PAS 2080 certified designers
- At an organisational level as PAS 2060 carbon neutral



Decarbonising Transport

Setting the Challenge



Embodied carbon

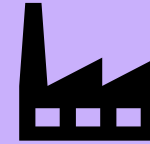
Operational carbon

Carbon negative

User carbon



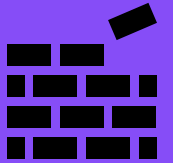
EXTRACTION



MANUFACTURE



LOGISTICS



CONSTRUCTION



LIGHTING



MAINTENANCE



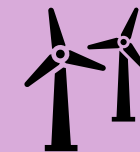
OFFICE



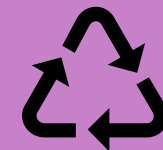
FUEL USE



CARBON SEQUESTRATION



ENERGY GENERATION



WASTE RECYCLING



CARBON OFFSETS



WALK



CYCLE

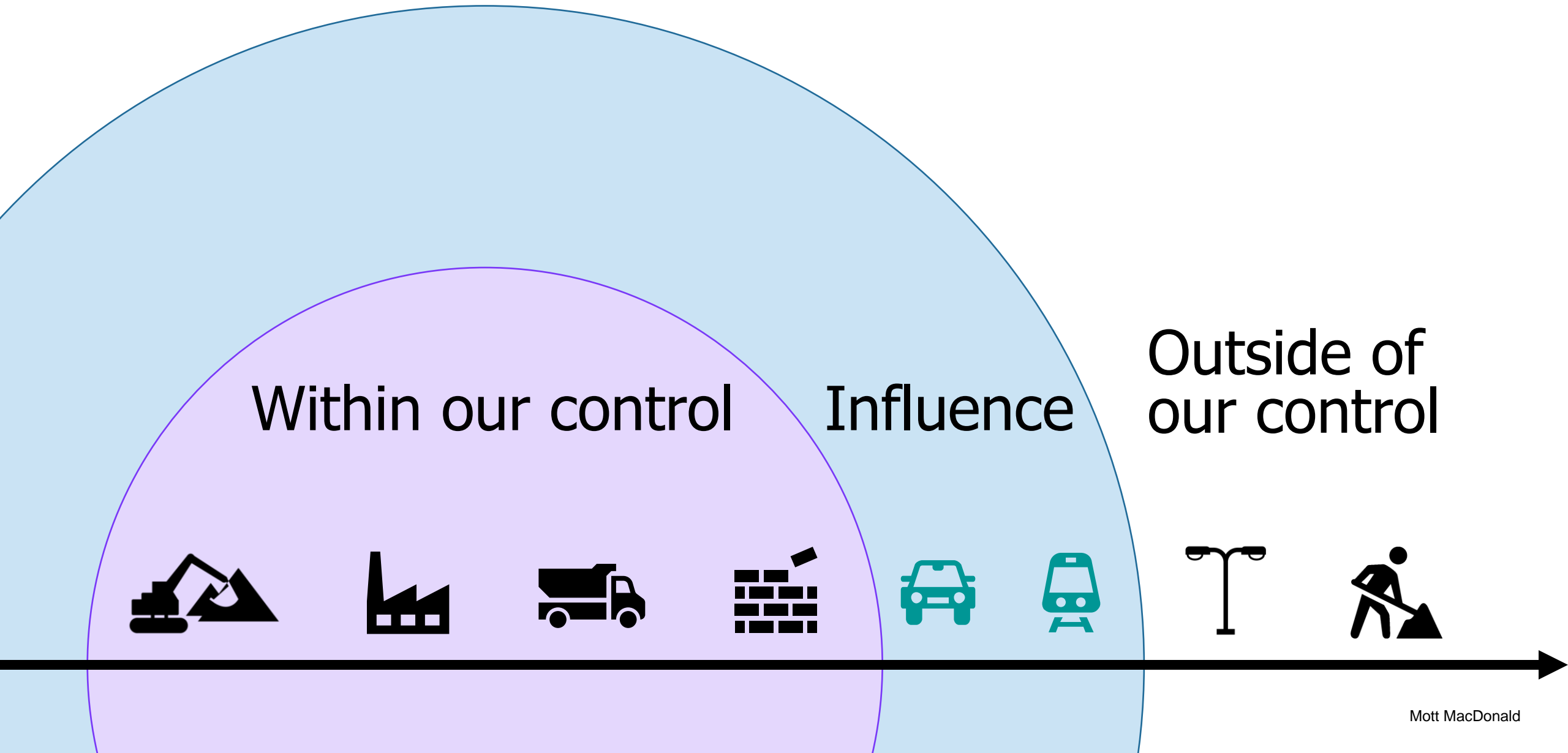


TRAIN

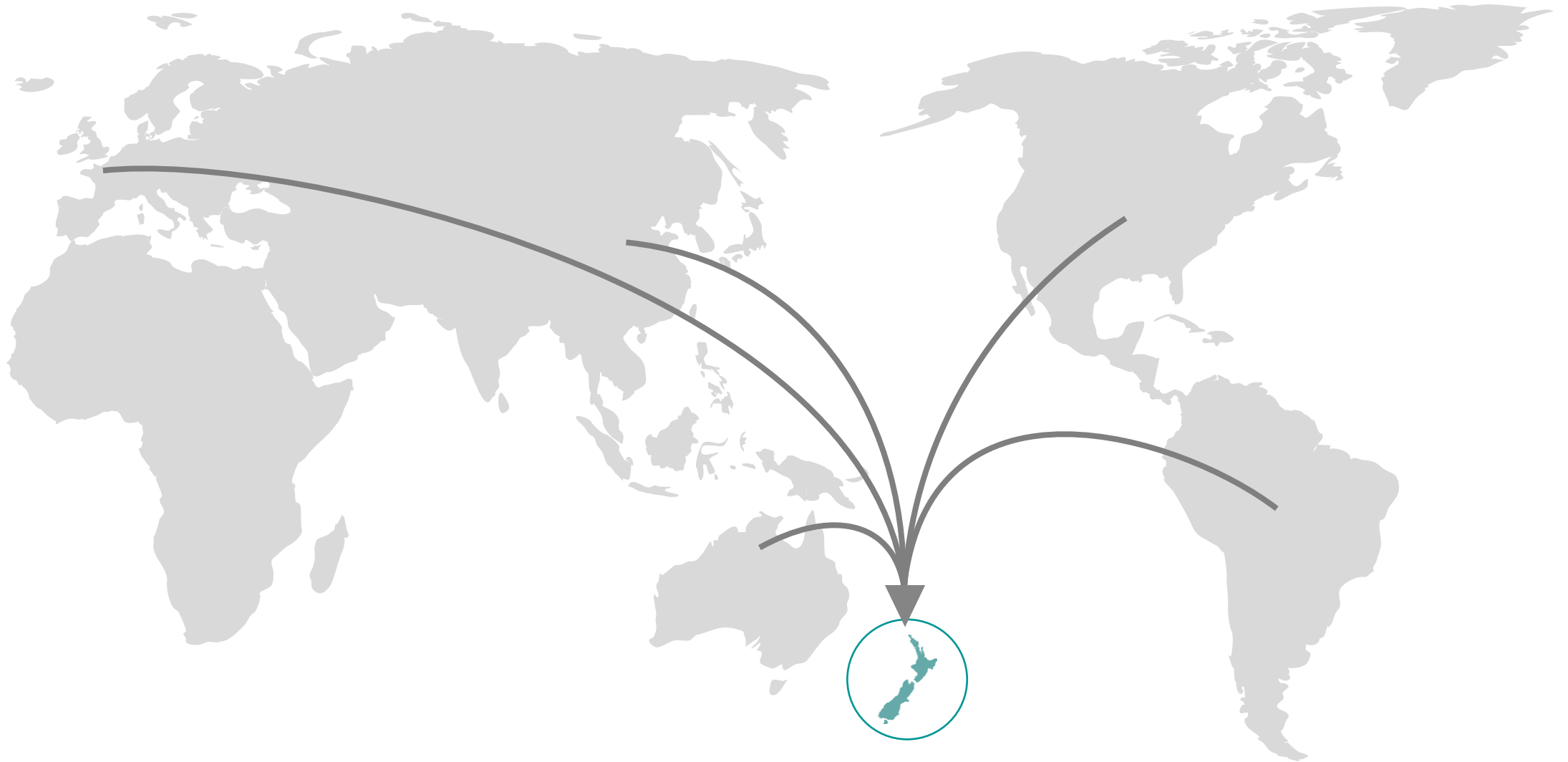


VEHICLE

Trichotomy of control



Production vs consumption carbon



PAS 2080

The worlds first standard for carbon management in infrastructure.

Developed in response to the recommendations in the UK Infrastructure Carbon Review report about the need for an agreement framework, terminology and standard.

PAS 2080 is applicable across the entire value chain with responsibilities set for

- Asset owners / managers
- Designers
- Constructors
- Product / material suppliers

Covering target setting, baselines, monitoring, reporting, quantification of GHG emissions and continual improvement mindset across the value chain.

[1 PAS 2080](#)

[2 PAS 2080 Guidance document](#)

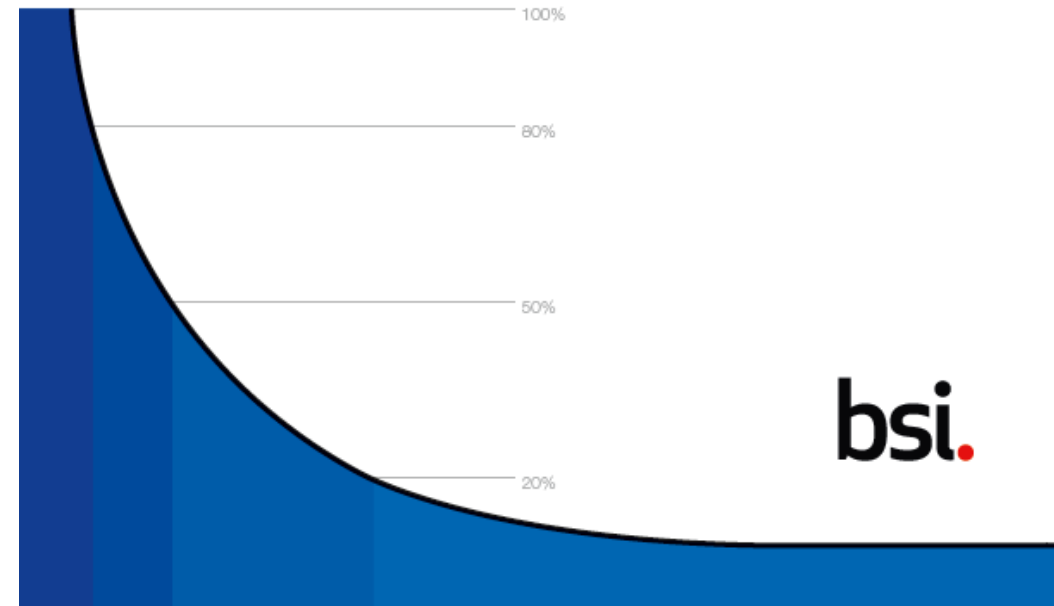
PAS 2080:2016

Carbon Management in Infrastructure

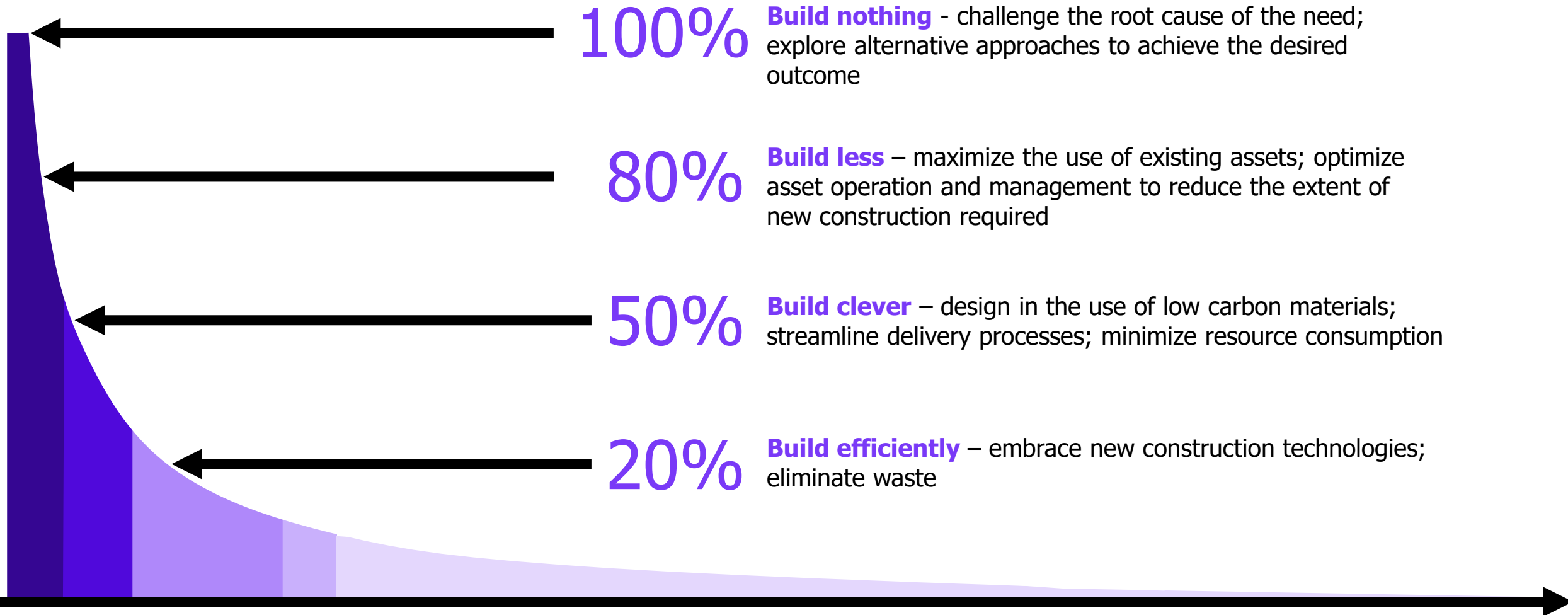


Construction
Leadership
Council

The Green Construction Board



Carbon reduction potential



Build less

Options analysis

Reductions found at every step

Mott MacDonald quantified the embodied carbon as part of the initial options analysis phase using Moata Carbon Portal. The two design options chosen for the A417 had carbon savings of 69% & 32% respectively through using less materials and minimizing any land use change by lessening the footprint of structures and junctions.

- Retaining walls were removed saving 26,200 tCO₂e
- Structural steel was reduced by 4,418t saving 8,290 tCO₂e

Moata Carbon Portal is integrated with Highway England's Bill of Quantities system to automatically quantify embodied carbon from options analysis through to construction.



Build clever

Northern line extension

80% embodied carbon savings for concrete

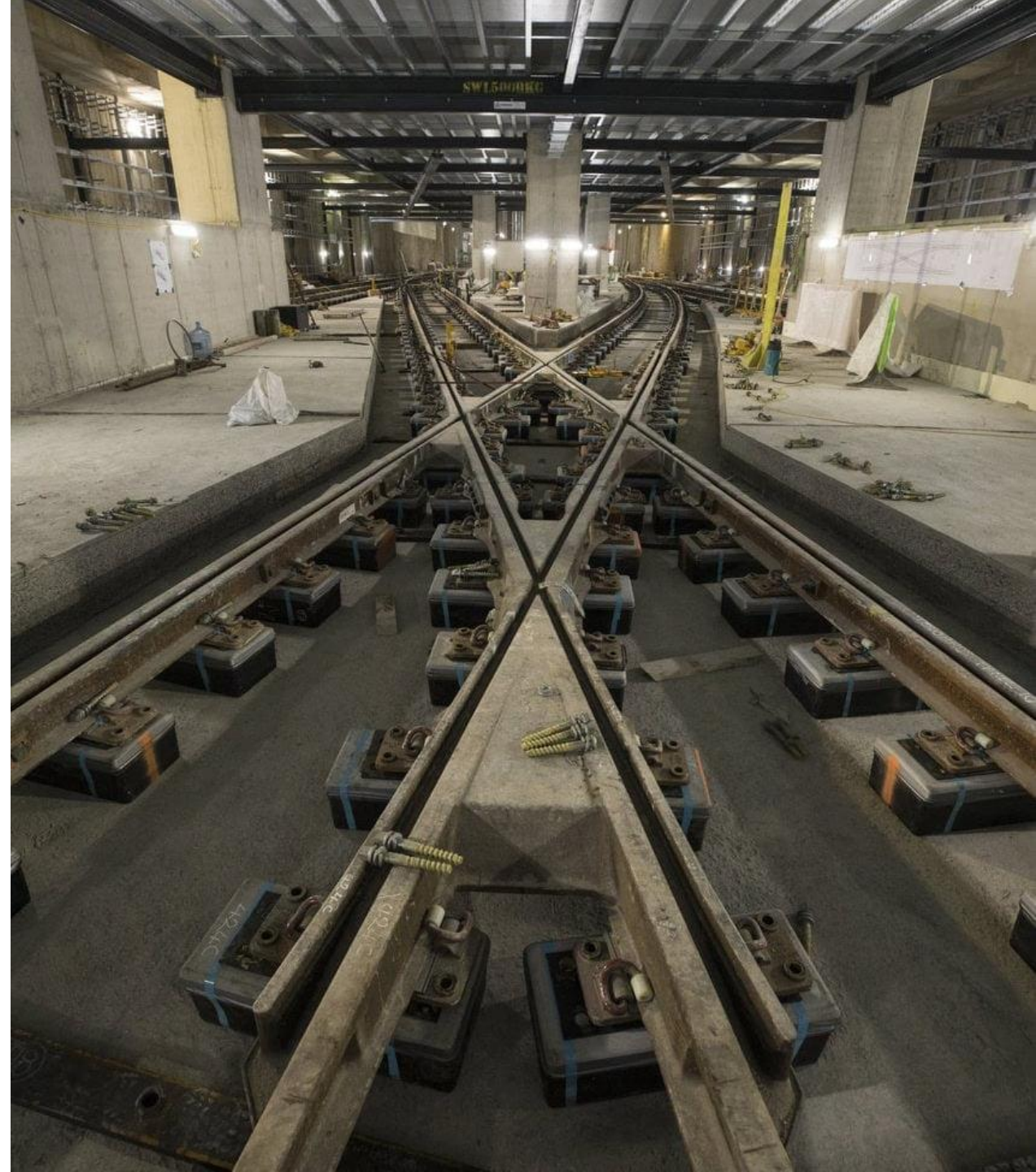
Mott MacDonald worked with contractors to identify potential resource and carbon savings. By reducing segments lining the tunnel walls from 280mm to 250mm it saved **1500t CO2**.

Replacing ordinary Portland cement with alternatives such as 95% GGBS for piles along provided huge carbon savings.

By rapidly quantifying embodied carbon of design options through Moata Carbon Portal it enabled all parties to quickly make sustainable and quantifiable decisions.

Engendering low-carbon thinking

Adopting a more sustainable approach led to financial savings also. Mott MacDonald collaborated with manufacturers and the client to deliver a more efficient lighting system providing **23,400t of carbon savings and \$5m energy savings per annum**.



Build efficiently

Carbon negative highway

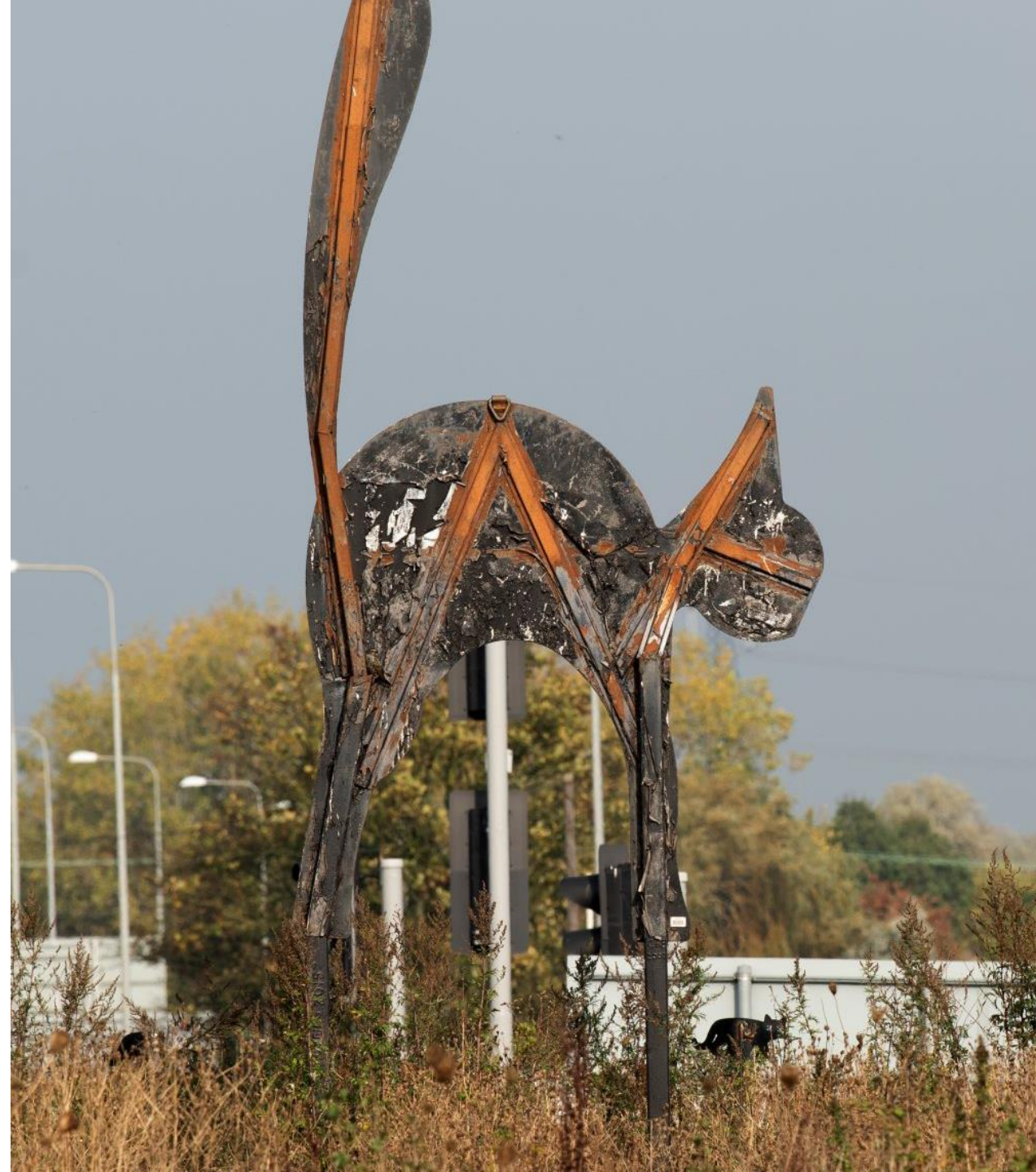
Achieving a net-zero future today

With the ambitious goal of net-zero by 2045 for all their projects including their supply chain, Skanska is taking charge to drive carbon down by focusing on four areas;

- **Carbon management** Net zero without offsets
- **Waste off site** Re-use of any waste
- **Waste in design** Use recycled materials
- **Sustainability** Environmental outcomes

Carbon as a driver for change

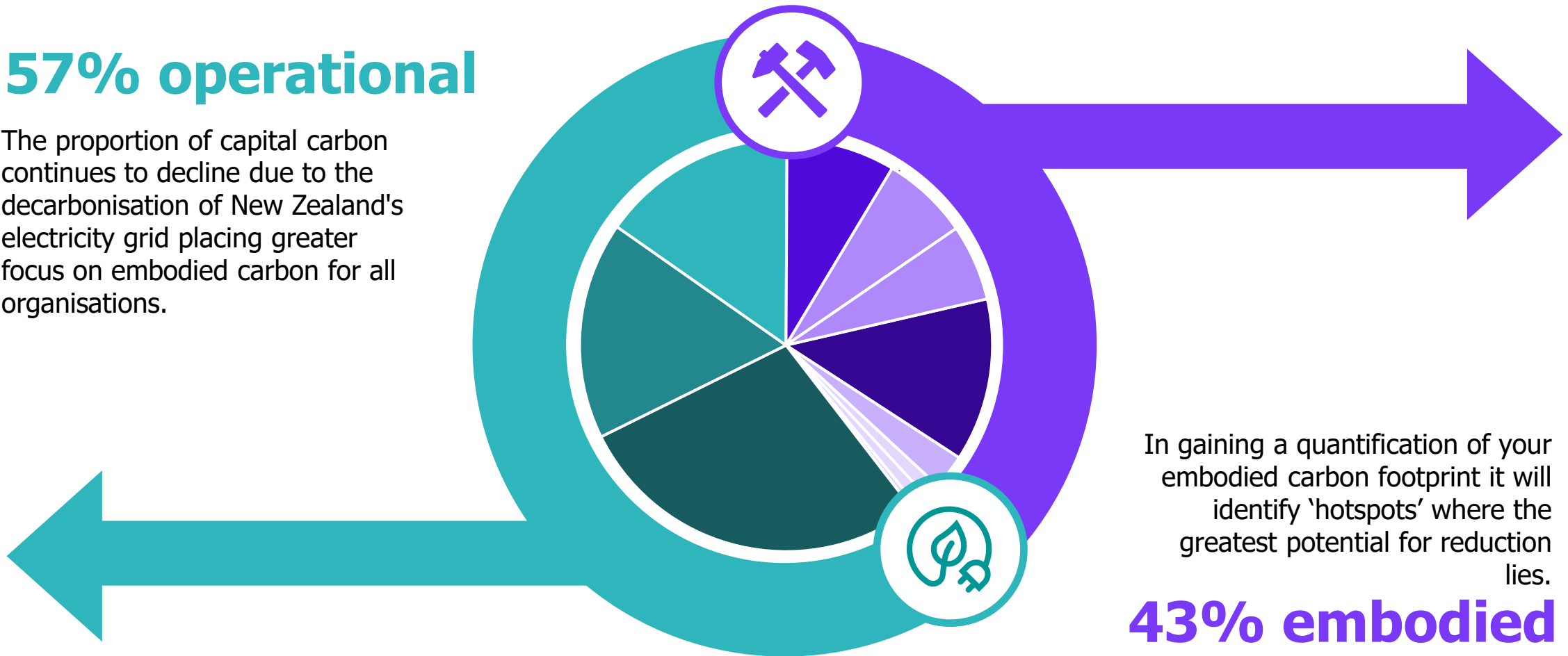
A \$1Bn A428 highway upgrade project covering 19km with the ambitious goal of being a carbon negative scheme led by three R's: **Reuse, Recycle, Reduce.**



Baseline your position

57% operational

The proportion of capital carbon continues to decline due to the decarbonisation of New Zealand's electricity grid placing greater focus on embodied carbon for all organisations.



In gaining a quantification of your embodied carbon footprint it will identify 'hotspots' where the greatest potential for reduction lies.

43% embodied

Lower carbon is lower cost

Carbon is a good proxy for resource efficiency.

1

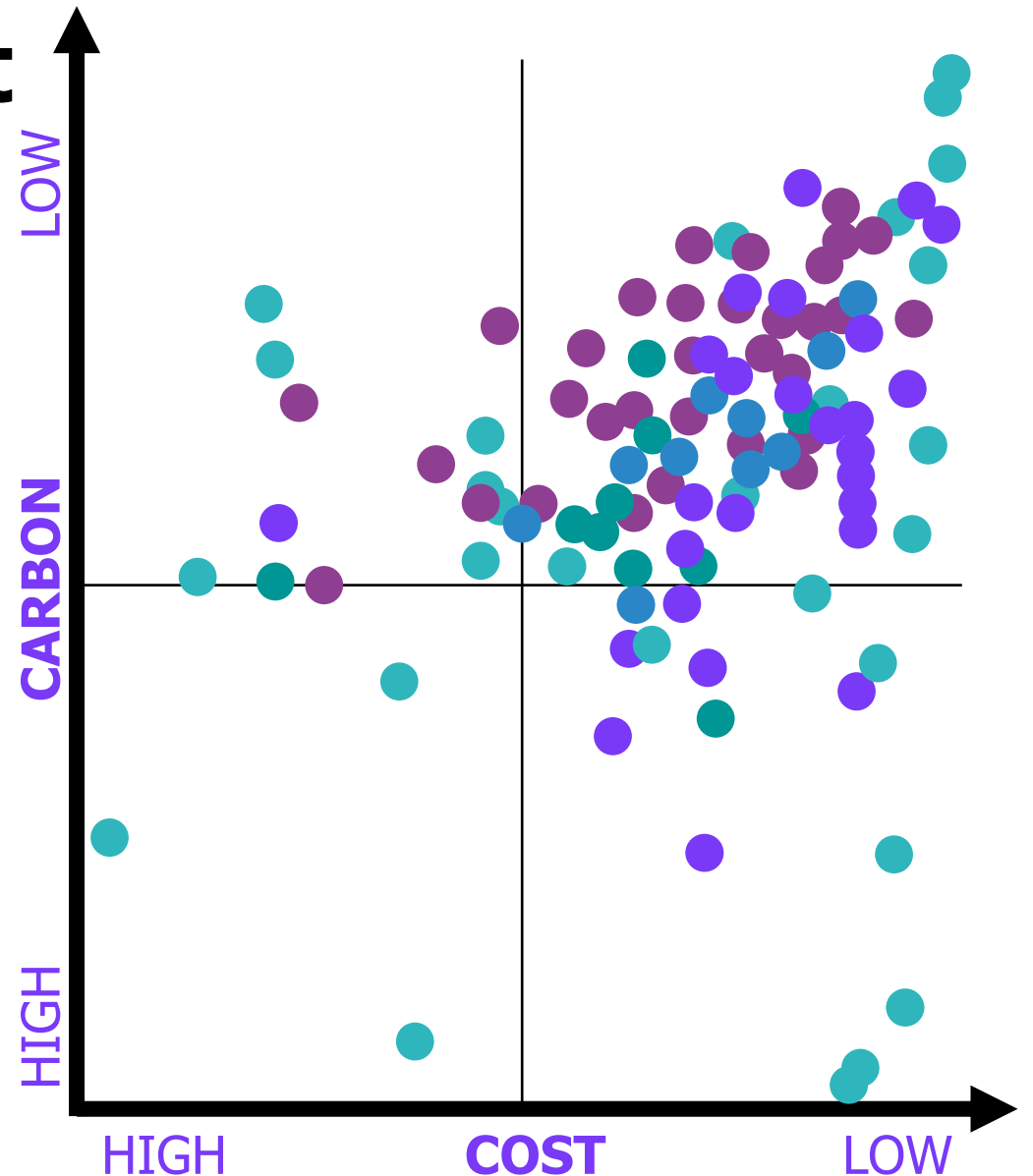
Building upon the Carbon reduction curve, it highlights the “Cutting the volume of materials consumed and using resources more efficiently will reduce cost as well as carbon.” 1

Clients who have tracked this on the journey to reduce embodied carbon have found this to be the reality when tracking cost against carbon for projects delivered.

The figure shows five years of water infrastructure projects for Anglian Water that have been benchmarked against their expected 'traditional' cost and carbon figures. 2

1 [UK Infrastructure Carbon Review 2013](#)

2 [Anglian Water 2010-2015 Carbon V Cost](#)



A system of systems

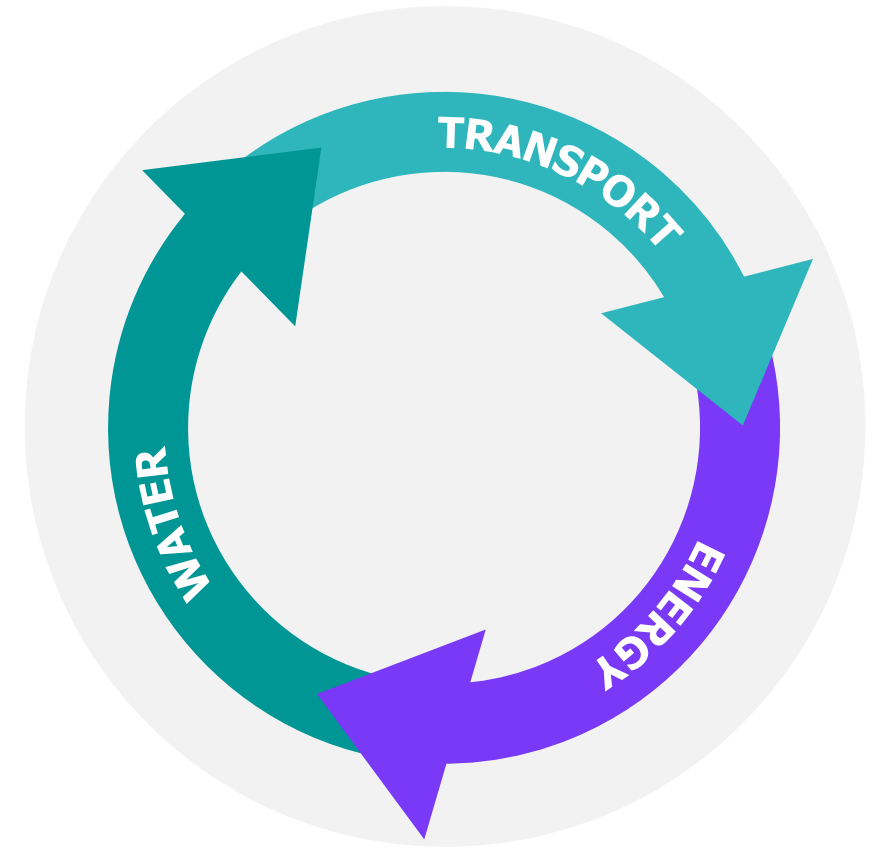
Transport has a significant role to play in the reduction of embodied carbon. There has never been a more pressing time with net-zero 2050 and an infrastructure program.

International infrastructure stimulus has been challenged in court citing “the strategy is incompatible with climate crisis commitments.” for Highway England’s \$52Bn Second Road Investment Strategy (RIS2). ¹

Other organisations within Water and Energy have;

- Quantified their embodied carbon
- Identified carbon hotspots
- Committed to reduction targets
- Utilized digital solutions to achieve this

¹ Carbon emissions '100 times greater than gov claims'



60% by 2030



40% by 2024

Moata Carbon Portal

See the unseen

The embodied carbon in the extraction, production and construction of materials and assets

Act with conviction

Identify hotspots in a projects embodied carbon footprint to target greatest savings opportunities

Impact progress

Realize the best use of materials and resources to achieve project and wider environmental outcomes



Thank you Questions?



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Baseline

Lower cost

The bigger picture

Carbon Portal