

Accounting carbon in Rail infrastructure

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BORN AT

360.67ppm CO₂

38.36_{ppm}

Increase on 28 years before

55.76_{ppm}

Increase 28 years later (now)



We don't need to discuss
WHY we decarbonise – but
HOW ?



Spot the difference – Carbon in context

1

“I’ve bought an electric car so I’m now more sustainable and emissions free”

Switching tractive power to electricity, **doesn’t mean** the whole picture is carbon free, or sustainable.

2

“We’re electrifying the railway so we’re now more sustainable and emissions free”

The embodied carbon of electrification needs to be factored into the **life cycle** of the decarbonised railway.

**Network Rail's
highest emission
category:**

Scope 3
The Value Chain

97%

of its emissions from
Scope 3

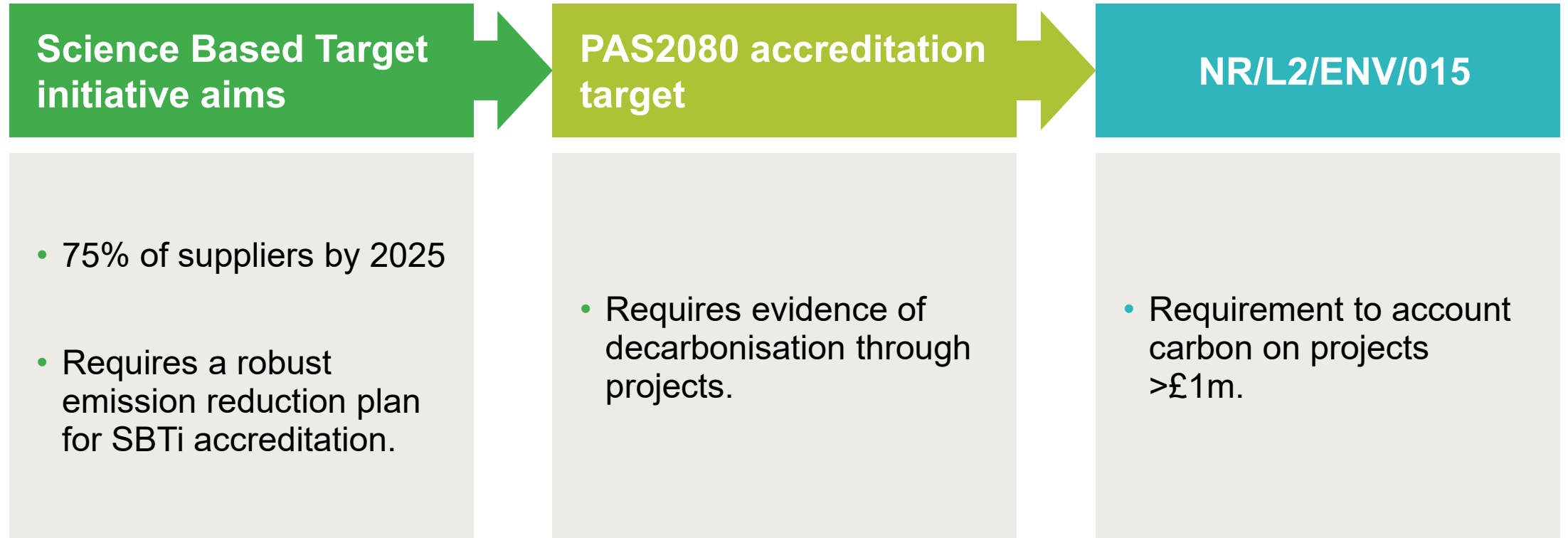
63%

Of Scope 3 from
'built and bought' items

Understanding the policy
and industry drivers will
help **direct** decarbonisation
efforts

Network Rail Drivers

Understanding the drivers



Governmental policy and targets

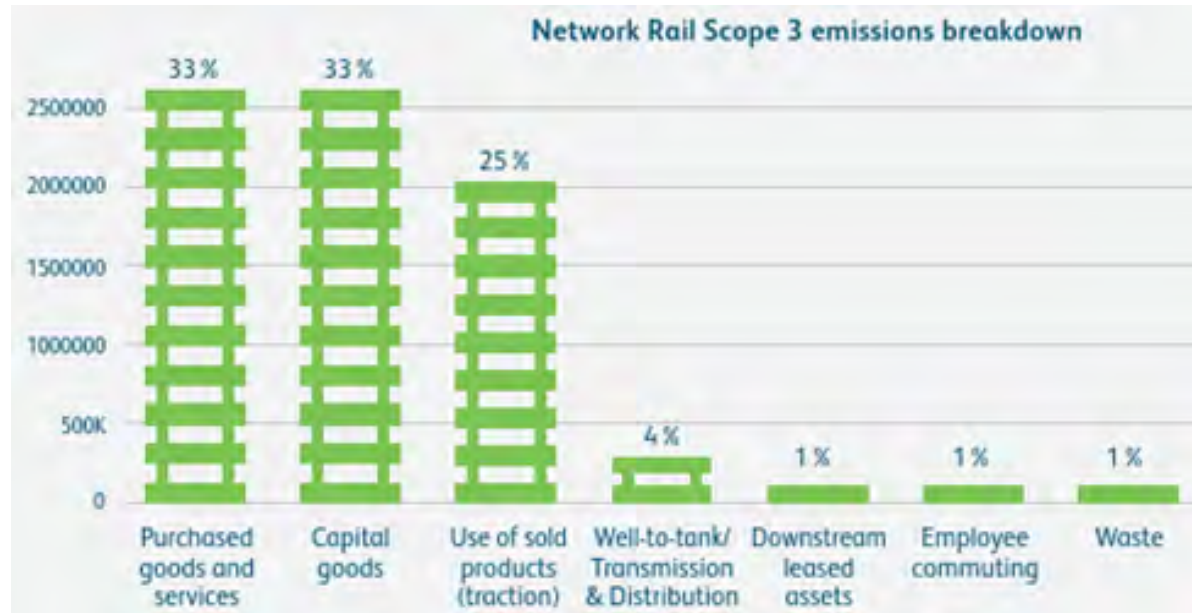
**Climate
Change Act
2019**

**Environments
Act 2021**

**PPN 06/20 &
06/21**

**No new diesel
- only traction
beyond 2030**

Electrification alone does not deliver a low carbon railway



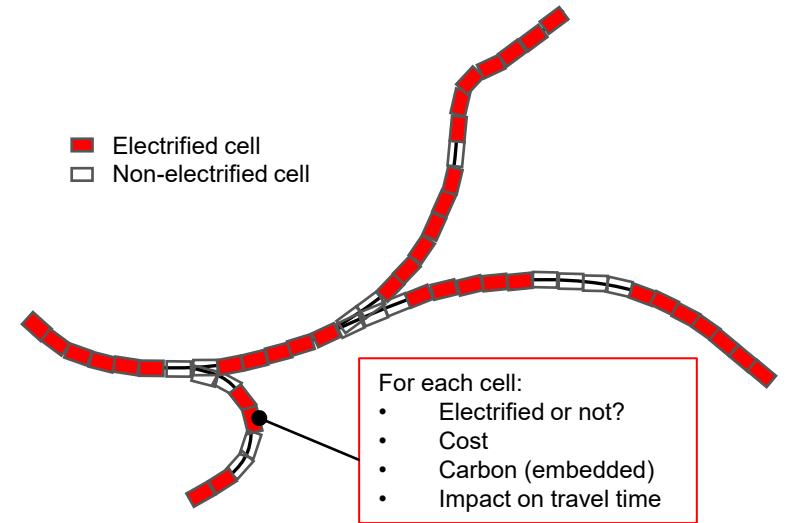
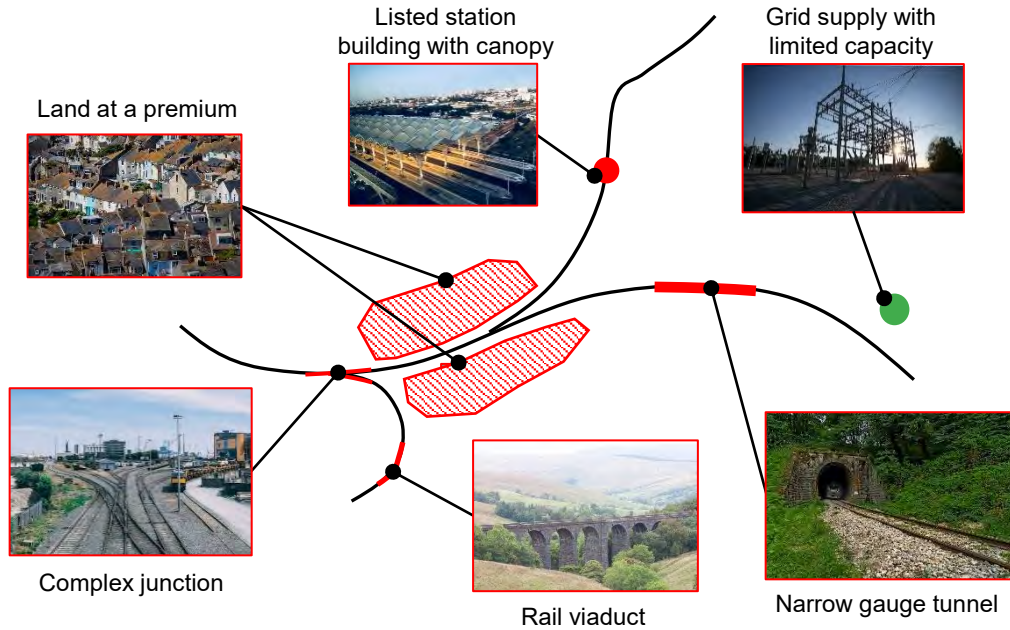
The vast amount of material and construction needed to electrify the railways – and procure new rolling stock – equate to large **embodied carbon** for routes.



The decarbonised rolling stock will '**payback**' in overall emissions, but large embodied scheme carbon will extend that payback period.



Electrification alone does not deliver a low carbon railway



Do we build less?

Do we build smarter?



2023

We are in a **CLIMATE
EMERGENCY** now





We are in a CLIMATE EMERGENCY now



We are **polluting** now, to reduce future emissions...



Is it acceptable to build schemes now with 'break even' **years into the future?**



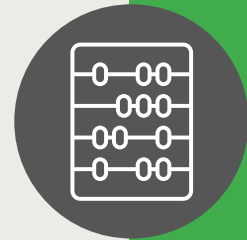
How do we bring down our embodied carbon **now** to combat climate change - bringing forward our payback period?



**How do we
decarbonise and
bring forward the
payback period?**



The primary tool in starting to decarbonise - **understanding** a project's embodied emissions sources



Fundamental to this first step - understanding **how** to account carbon

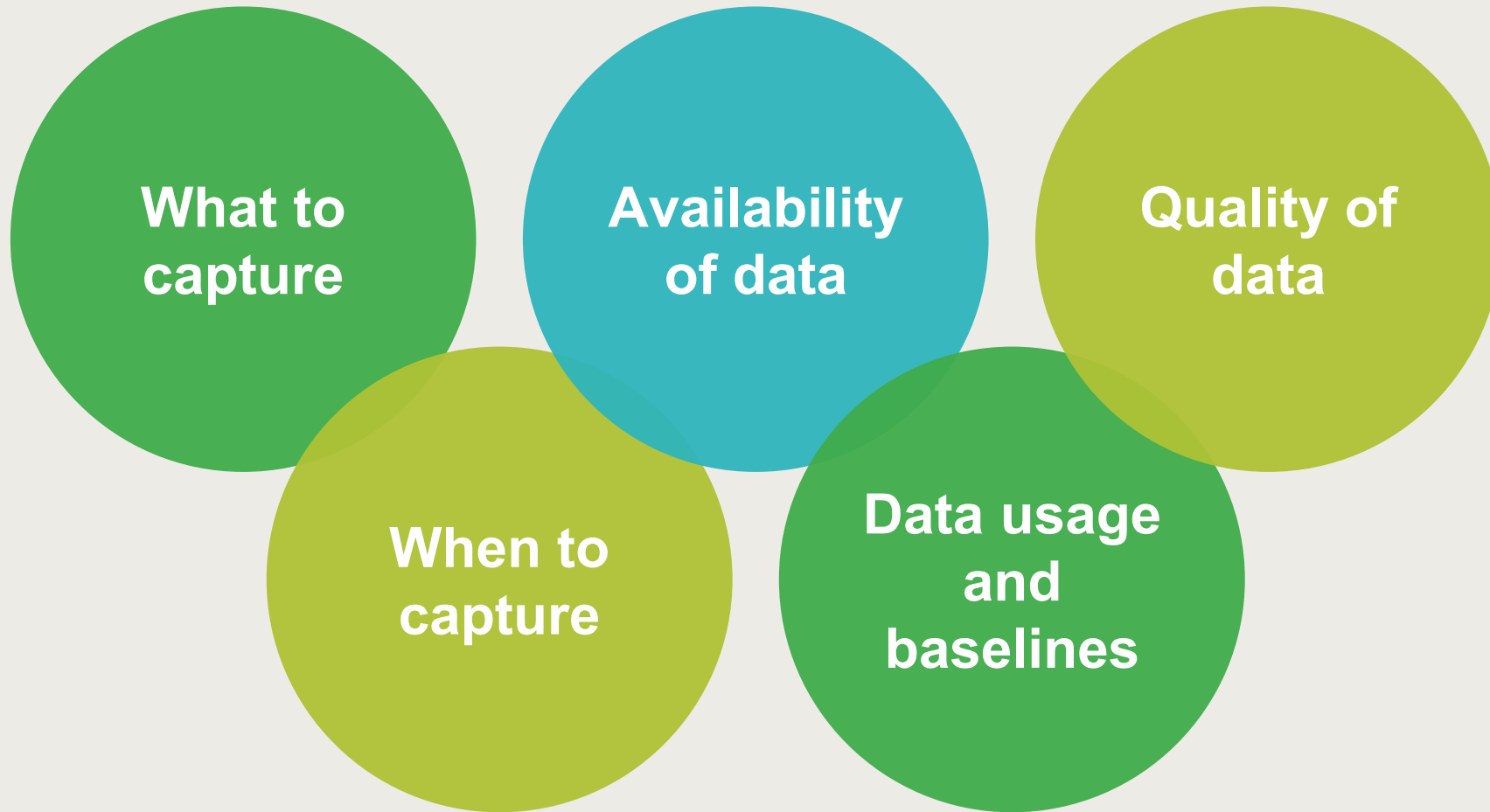


There are **5 main areas of confusion** when considering carbon...



Carbon considerations

There are 5 main areas of confusion





Carbon considerations

What to capture

Large and numerous materials and operations

Not every little nut and bolt

Availability of data

ICE Databases for common materials.

EPDs from suppliers. Online (with reference).

Quality of data

ICE gives cradle-gate values.

Detailed dives into common products/processes and input from contractors increases validity.

When to capture

PAS2080 provides a framework of what.

‘PACE’ can be broken down to incrementally build the project’s carbon image.

Data usage and baselines

Carbon hotspots should be evident and create baselines

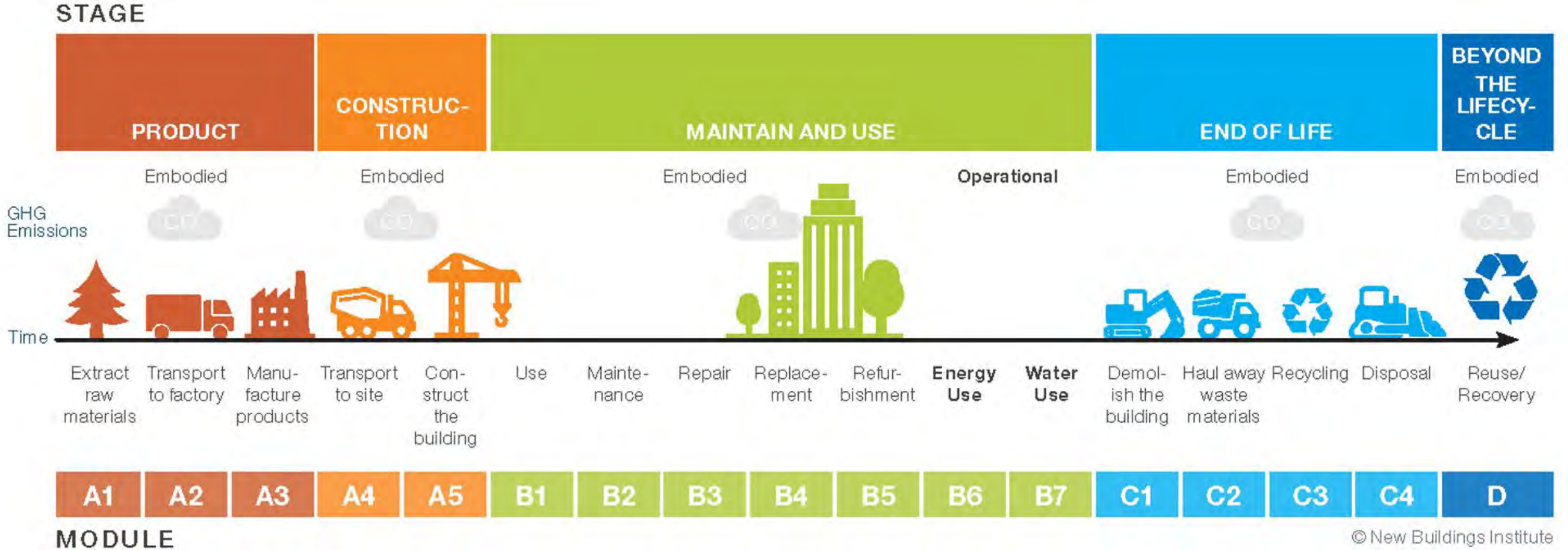
Per-design carbon (i.e. bridge reconstruction)

or;

Per-scheme carbon (i.e. kgCO₂e per STK electrification)



Data source: BS EN 15978:2011



We each impact the lifecycle

For large infrastructure projects – like electrification – the carbon intensity and data confidence reduces through the stages.



Where next?

Identifying carbon hotspots

Separate across life cycle stages, this shows the designers where carbon is predominantly coming from.

Target the 10% that gives 90% of emissions, and **not** the other way around.



Improve hotspot data

Refine data quality through **industry collaboration**

Identify what is already being done, and **begin conversations** on where to target decarbonisation efforts.



Knowledge and power

Knowledge of the designer and **purchasing power** of the installer/scheme owner can put more emphasis to the supplier to pursue decarbonised materials or processes.



Where next?

Efficiencies through collaboration

Collaborative knowledge of standards can identify where regulations may be limiting decarbonisation efforts.

New **safe, maintainable and efficient** solutions lead through industry refined approaches.



The power of digital

Refinement of design and construction planning tools which include carbon emissions can give real time data to users on the associated emissions within their designs and construction arrangements.



Communicate

Communicating **opportunities** and **costs** to scheme owners allows better understanding and targeted efforts to allocate changes that may impact programme and price.



Carbon is just one piece of the Sustainable railway puzzle...



Nature based
solutions

Accessibility and
resilience planning

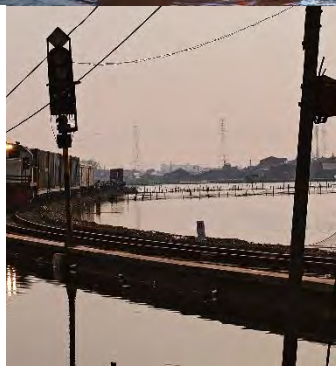


Social, Environmental
and Economic
sustainability



Design impacts of de-
vegetation and route
clearance

Bio-diversity

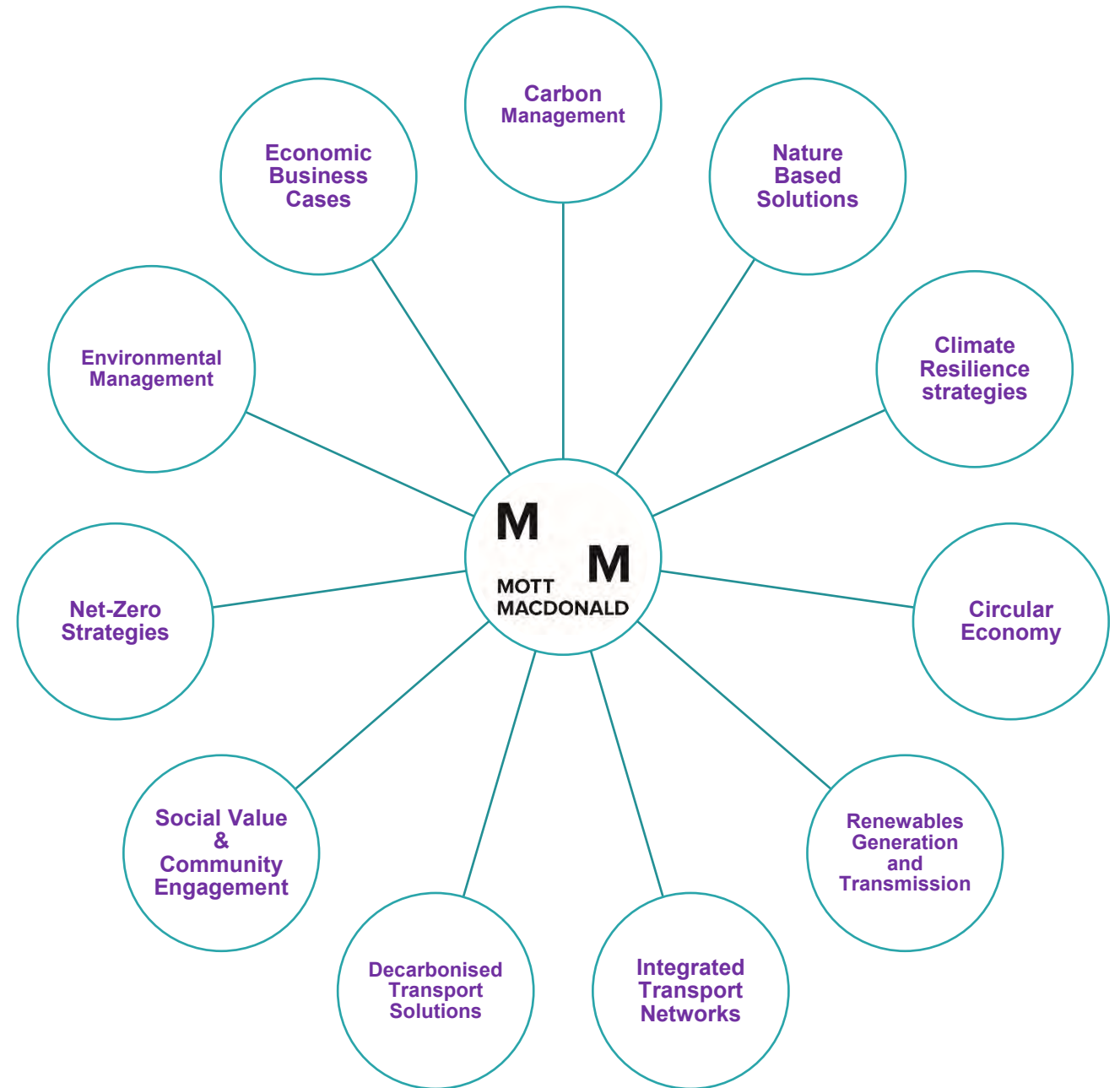




Bringing the expertise

Vast **Sustainability and Decarbonisation** capabilities exist within the organisations operating in the Rail Industry.

We can all use these capabilities to **create a better tomorrow.**





Summary

Accounting carbon in rail infrastructure

Decarbonisation

Begins with understanding how and what data to capture.

Not all data is equal

Understanding data quality and assumptions can lead to refinements.

Hotspots

Understanding hotspots so the larger contributors can be targeted more efficiently.

Collaborating

Collaborating to improve data, target emission sources and strategize on the decarbonisation of materials or processes.

Circular approach

Using the above approaches circularly to iteratively improve.

Future proof design

Providing designers and constructors with tools to better appreciate how carbon can bring change with what we use now.





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Thank you

