PAS 2080:2023 – Carbon Management in Buildings and Infrastructure.

Find out more ahead of the National Highways December deadline for compliance

Stephen Burt
Feb 2025

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GLOBAL NO.3

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INTRODUCTION TO STEPHEN BURT

Stephen Burt

Carbon & Sustainability Services Director

- Over 25 years' experience in carbon, energy and environmental management
- 15 years at NQA
- Extensive construction industry experience
- Chartered Environmentalist, BSc; MSc; PhD (net zero related, in progress)
- Lead GHG Verifier (ISO 14064-1, ISO 14068-1, PAS 2060)
- Lead Auditor (PAS 2080, ISO 20121, ISO 14001, ISO 50001)
- Member of SES/1/1 and SES/1/7, developing ISO standards for GHG and environmental schemes

WEBINAR OBJECTIVES

1. Introduction to the nature, background, purpose and intent of PAS 2080
2. Introduction to the structure of the specification's requirements
3. Appreciate the different Value Chain Member roles
4. Introduction to the standards used to identify Whole Lifecycle stages
5. Introduction to the differing methodologies used to quantify Whole Life Carbon (WLC) emissions and removals
6. Introduction to mitigation options in WLC

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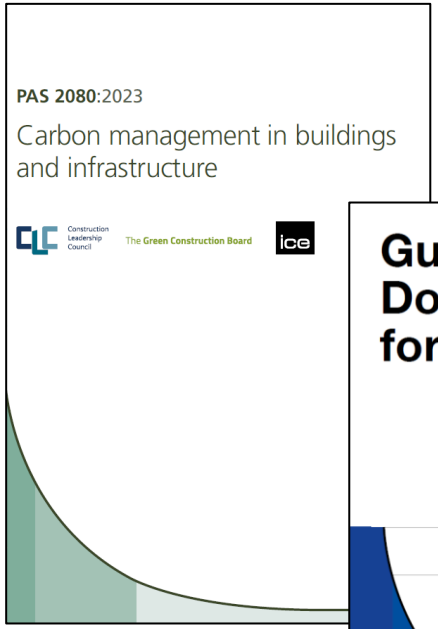
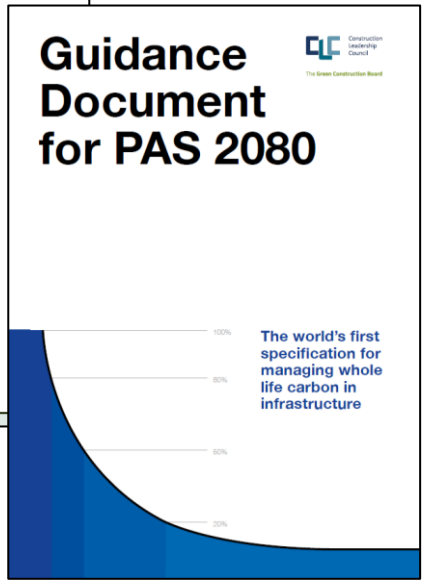
CONTEXT AND INTRODUCTION

PAS 2080:2023

- **PAS 2080 Certification (Carbon Management in Buildings and Infrastructure)**
  - Unaccredited, Accreditation is not currently possible
- **What is it?**
  - A standard for the management of carbon in buildings, focused on the construction ‘value chain’
- **Who is it for?**
  - Companies or organisations involved in the construction of buildings or infrastructure such as roads, bridges, power stations, water and wastewater treatment and pumping stations, etc
- **Why would companies be interested?**
  - Gain competitive advantage through meeting stakeholder expectations
  - Demonstrate their commitment to Net Zero by managing and reducing carbon
- **What types of companies might be interested?**
  - Companies of all sizes involved in the construction ‘value chain’
  - Highly relevant to contractors and sub-contractors to National Highways and other government agencies
  - Architects, designers, civil engineers, construction and demolition companies, building and asset owners and operators, product and material suppliers to the construction industry, insurers, financiers





PAS 2080

In 2020, scientists arrived at the astounding conclusion that the weight of human-made mass – all the world's concrete, bricks and steel – now exceeds that of all living biomass!

WHY?

- 'Buildings' accounted for **39%** of UK energy-related carbon emissions in 2022:
  - 28% from operational emissions (from energy needed to heat, cool and power them
  - 11% from materials and construction

- In 2022, domestic transport accounted for **28%** of total domestic emissions in the UK – 'user' emissions

Hence, due to the UK's statutory 2050 net-zero ambition, there is significant focus on Whole Life Carbon (WLC) emissions in buildings and infrastructure projects.

PAS 2080

WHAT IS IT?

- Publicly available specification (PAS) developed by BSI through a team of internal and external experts in this field
- Originally published 2016, revamped 2023
- Framework for managing and reducing the carbon emissions associated with buildings and infrastructure
- It focuses on the entire lifecycle (Whole Life Carbon, WLC) of developments including the need, the planning stages, the design and build, the operation and maintenance, and the final demolition / dismantling

PAS 2080

WHAT IS IT?

- It very strongly encourages collaboration, engagement, innovation and the challenging of the industry status quo
- Supported by a Guidance document
- Does not specify documentation requirements (very often)
- It is NOT an ISO standard

PAS 2080

WHAT IS IT?

- It is a powerful tool in the supply chain
- Applies a ‘Value Chain’ approach, and applies to each member of that Value Chain……

PAS 2080

The Value Chain

- ‘**Asset Owners / Managers**’, eg:
  - Local Authorities
  - Developers
- ‘**Constructors**’, eg:
  - Construction companies
  - Civil Engineering companies
  - Demolition companies
- ‘**Designers**’, eg:
  - Architects
  - Civil Engineers
  - Consulting Engineers
- ‘**Product and Material Suppliers**’, eg:
  - Cement
  - Asphalt
  - Aggregate
  - Bricks
  - All other materials

There is a clear ‘snowball effect’ due to the need for ‘collaboration’ and ‘innovation’,
ie if one Value Chain Member seeks PAS 2080, the others will feel the pressure being applied…..

PAS 2080 includes requirements for all of the above, as well as individual value chain member requirements.

Organisations can have one or more Value Chain roles.

PAS 2080

WHAT IS IT?

- Is it a:
  - Management System standard?

- Or a:
  - A Carbon Verification standard?

It’s a bit of both, involving a combination of……..

- Management system development and implementation
- Carbon quantification and reduction

UKAS don’t yet offer Accreditation: NQA operate it as a Verification

PAS 2080

WHAT DO WE MEAN BY….?

- Infrastructure:
  - Transport (eg highways, road bridges, rail network)
  - Energy (eg power generation and distribution)
  - Water (eg water supply and wastewater treatment)
  - Waste (eg waste contractors)
  - Communications (eg masts, fibre)
    - as defined in the UK National Infrastructure Plan 2014

- Buildings:
  - ‘General’ building construction / demolition
  - Think of this as being different from ‘infrastructure’

PAS 2080

WHY USE IT?

- Emission reductions and cost saving opportunities through identified reductions in material, energy, and labour
- Consistency in the industry and throughout the supply chain
- Commitment and recognition for environmental efforts, in turn enhancing brand image and reputation
- Competitive advantage
- Meeting tender, supply chain, and stakeholder expectations

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DRIVERS

PAS 2080

DRIVERS

- National Highways requires all of their contractors (and their sub-contractors) to be PAS 2080 certified by 31/12/2025
- The Environment Agency, Network Rail, National Grid, public water companies, and many local authorities are rumoured to be making similar announcements
- In the private sector, the big construction companies, the water companies and the power generators are all moving this way
- The ‘collaborative’ focus in PAS 2080 means the pressures in these supply chains will be felt

Quote from NQA client: ‘*It is no longer about Price and Programme. It is all about Price / Programme / PAS*’

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BACKGROUND TO CARBON MANAGEMENT IN BUILDINGS AND INFRASTRUCTURE

BACKGROUND TO CARBON MANAGEMENT IN BUILDINGS AND INFRASTRUCTURE

There are many opportunities to reduce WLC emissions in buildings and infrastructure when considering PAS 2080.

The ability to influence WLC reduces as the programme of works progresses…….

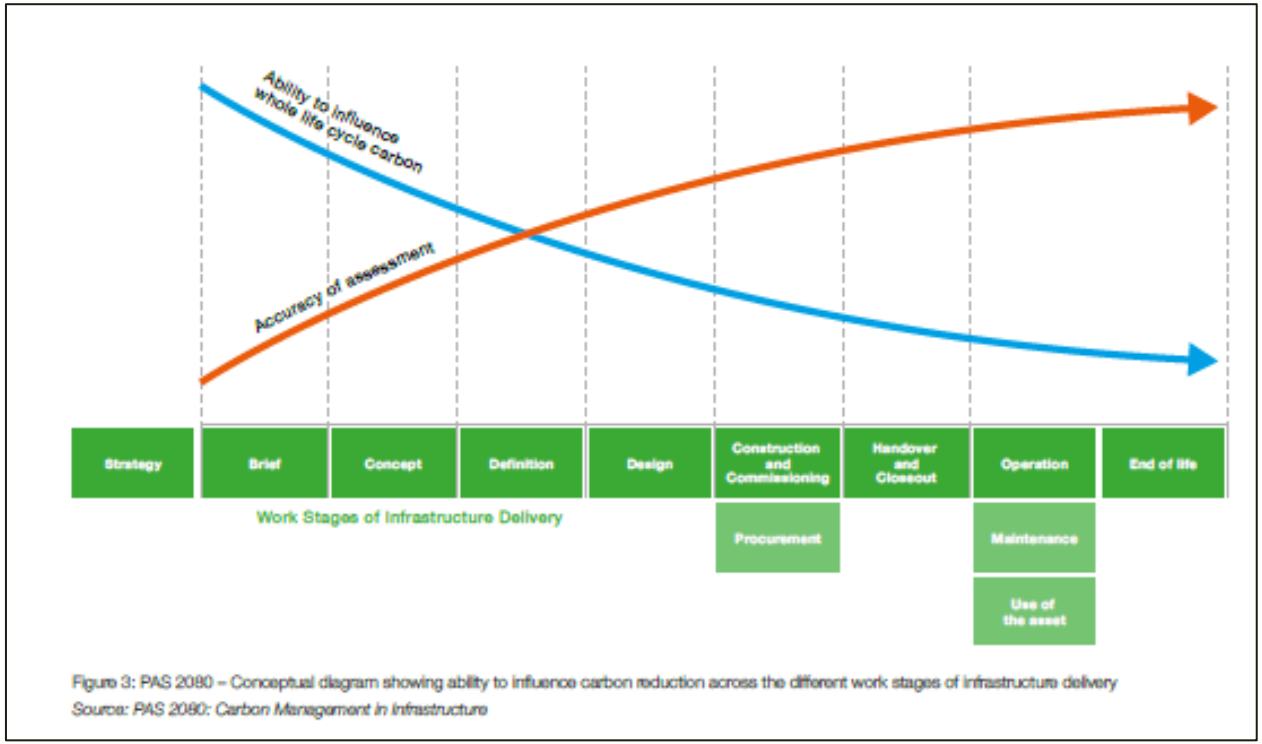
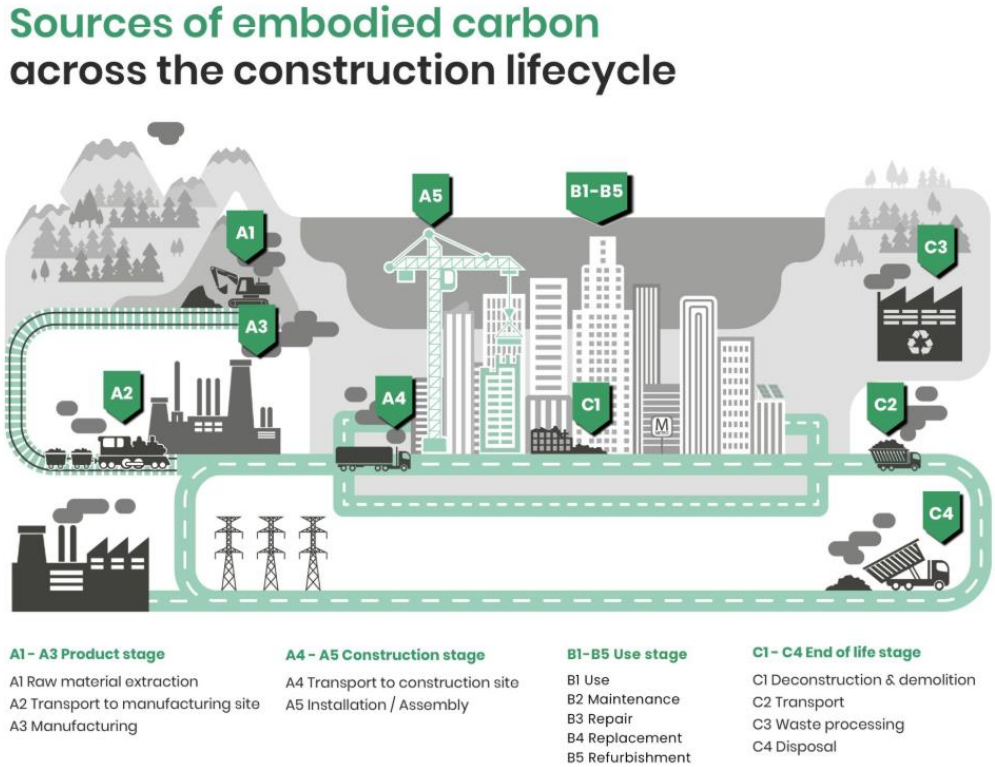


Figure 3: PAS 2080 – Conceptual diagram showing ability to influence carbon reduction across the different work stages of infrastructure delivery
Source: PAS 2080: Carbon Management in Infrastructure

BACKGROUND TO CARBON MANAGEMENT IN BUILDINGS AND INFRASTRUCTURE

Building life cycle stages are the different periods of a building's lifetime. For instance: raw material harvesting, manufacturing of products, use phase of the building, end of life. In the European markets, the building life cycle stages are defined by BS EN 15978 and BS EN 15804 standards.

These can be used to identify the extent of your company's control and influence.



BACKGROUND TO CARBON MANAGEMENT IN BUILDINGS AND INFRASTRUCTURE

Examples of opportunities based on the PAS 2080 ‘hierarchy’ of ‘Avoid, Switch, Improve’ include:

- ‘**Capital Carbon**’ (emissions associated with the creation and end-of-life treatment of an asset):
  - *Build nothing*: ‘sweat’ the asset (extend its life); avoid the demand for new space, eg an office (work from home); reinvent our road-centric towns and cities to take the road space back
  - *Build less*: maintain existing assets adequately; refurbish existing buildings; Circular economy – re-use where possible; Design for dismantle

BACKGROUND TO CARBON MANAGEMENT IN BUILDINGS AND INFRASTRUCTURE

Examples of opportunities based on the PAS 2080 ‘hierarchy’ of ‘Avoid, Switch, Improve’ include:

- ‘**Capital Carbon**’ (emissions associated with the creation and end-of-life treatment of an asset):
  - *Build clever*:
    - Where we have to build, building tall is better than building sprawl
    - Use low carbon alternative materials, eg GGBS cement, fly ash concrete, bio-fuel / HVO, recycled / reprocessed asphalt and aggregate, low temp asphalts, rubber containing asphalt
    - Recover steel rebar
    - Algae (cyanoskin) based paints

BACKGROUND TO CARBON MANAGEMENT IN BUILDINGS AND INFRASTRUCTURE

Examples of opportunities based on the PAS 2080 ‘hierarchy’ of ‘Avoid, Switch, Improve’ include:

- ‘**Capital Carbon**’ (emissions associated with the creation and end-of-life treatment of an asset):
  - *Build efficiently*:
    - Co-ordinate work to enable multi-service access to buried services
    - Avoid unnecessary wastage (materials, time, energy)

BACKGROUND TO CARBON MANAGEMENT IN BUILDINGS AND INFRASTRUCTURE

There are many opportunities to reduce WLC emissions in buildings and infrastructure when considering PAS 2080. Examples based on the PAS 2080 ‘hierarchy’ of ‘Avoid, Switch, Improve’ include:

- ‘**Operational Carbon’ / ‘User Carbon**’ (emissions associated with the operation and use of an asset):
  - Buildings: design for reduced energy consumption during the use stage: passive cooling / heating / lighting, insulation, BEMS
  - Roads: efficient lighting design, electric highways, minimise rolling resistance, improved maintenance
  - Rail: electrification

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INTRODUCTION TO PAS 2080

PAS 2080 STRUCTURE

- It is important to recognise that the requirements are organised as being applicable to all Value Chain Members, or individual Value Chain Members
- So, not all requirements apply to all companies
- We must base the application of the requirements on the Value Chain Member Role(s) applicable to the company's activities

1. Scope
2. Normative references
3. Terms and definition
4. Decarbonisation principles
5. Leadership
6. Integrating carbon management into decision-making
7. Whole life carbon assessment principles to support decision-making
8. Target setting and baselines
9. Monitoring and reporting
10. Procurement
11. Continual improvement
12. Claims of conformity

Annexes A, B, and C

PAS 2080 STRUCTURE

1. Scope

- Covers the intended outcome and the boundaries within which the standard applies

2. Normative References

- There are no normative references in this document

3. Terms and definitions

- For the purposes of PAS 2080 the terms and definitions given in PAS 2080 apply

PAS 2080 STRUCTURE

4. Decarbonisation principles

COMMENTARY ON CLAUSE 4

This clause sets out the fundamental principles underpinning the carbon management process presented in this PAS. Their application allows practitioners to demonstrate that a true and fair approach has been adopted when undertaking carbon management activities.

The carbon management principles apply to projects and programmes comprising buildings and infrastructure. At the core of the principles is the fact that no asset of the built environment can function in isolation from its surrounds: its construction, operation and use impacts on and is impacted by the functions of networks and systems of which it is part. Likewise, the decarbonization principles apply to all value chain members to a greater or lesser extent. More specific details are given in Clause 5 and Clause 6.

PAS 2080 STRUCTURE

5. Leadership

COMMENTARY ON CLAUSE 5

Leadership is recognized as a key enabler of carbon management. It provides the vision to drive carbon reductions across all levels of an organization and allows the right capabilities to exist across the value chain to plan for and drive decarbonization. Leadership is expected from all levels of the value chain in implementing the requirements in this clause.

PAS 2080 STRUCTURE

Carbon Management Policy & Strategy: Typical Contents:

1. Company Profile
2. Carbon Policy Statement
3. Scope of PAS 2080
4. Roles and Responsibilities
5. Life Cycle Analysis and its role in Carbon Reduction
6. Quantification of GHG emissions
    - Methodology
    - Data Collection & GHG Quantification Baseline Emissions
    - Carbon Assumptions used
    - Data Collection
7. Targets
    - Carbon Hierarchy
    - Sustainable Development Goals
    - Carbon Reduction Proposals
    - Carbon Reduction Options
    - Sustainable Procurement
    - Assessment of Carbon Reductions
    - Key Performance Indicators
    - Climate change Adaptation and Mitigation
8. Reporting
9. Continual Improvement

PAS 2080 STRUCTURE

Typical Training Arrangements:

1. General PAS 2080 Awareness Training for:
    - All staff?
    - Suppliers and sub-contractors?
2. Data collection training for:
    - Site Managers
    - Procurement Teams
3. Carbon quantification tool training for:
    - Bid Teams
    - Procurement Teams
    - QS Teams
    - Carbon Leads
4. Professional body training / CPD for:
    - Designers
    - QS roles
5. Carbon Strategy Training for:
    - Senior Leadership Team
6. Carbon Communication Training for:
    - Marketing team?

PAS 2080 STRUCTURE

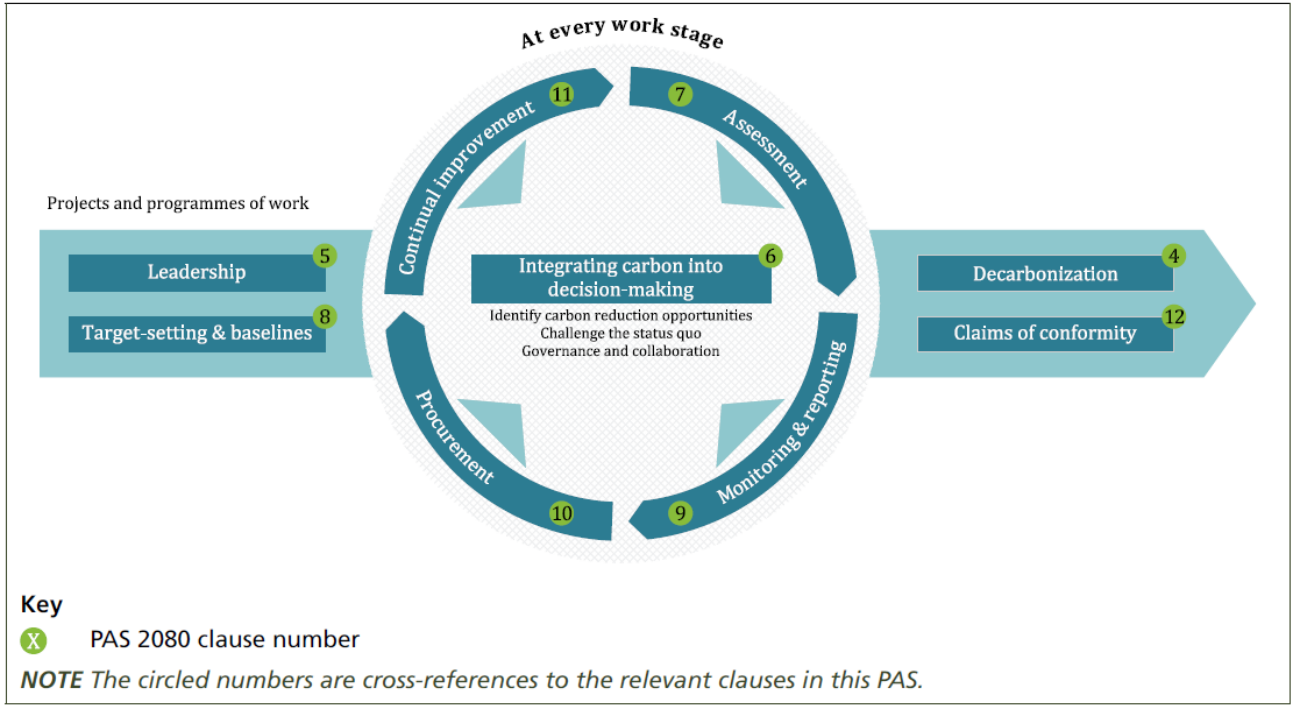
6. Integrating carbon management into decision-making

COMMENTARY ON CLAUSE 6

Integrating whole life carbon into decision-making requires the development and implementation of a carbon management process. The intention of a carbon management process is to drive the right behaviours at each work stage (both for infrastructure and buildings) to reduce whole life carbon in a project or programme of work. This process is to be developed and implemented by asset owners/managers. All value chain members, however, are responsible for specific requirements within the carbon management process.

PAS 2080 STRUCTURE

Figure 6: The Carbon Management Process:



PAS 2080 STRUCTURE

Table B.1, summarising the different Carbon Management Process requirements in each work stage for all value chain members:

Table B.1 – Carbon management process applied to a project or programme of work across work stages

	Need	Optioneering	Design	Delivery	Operation	Purpose/performance review
Opportunity to reduce whole life carbon	Highest ◄ ► Lowest					
Leadership (Clause 5)	Asset owners/managers set objectives, targets and outcomes for the project/programme of works aligned with the decarbonization principles (Clause 4). Map key collaborators/stakeholders for enabling whole life carbon management. Set governance structure and principles.		Make competent resources available. Align carbon management with other business processes (e.g. risk/cost management). Communicate and collaborate consistently with the relevant value chain members and stakeholders. Shape the incentives and culture. Recognize and reward innovation. Support development of skills and capability. Challenge the status quo and drive continual improvement through the assets, networks and systems. Support other value chain members to perform their role in decarbonization. Share current good practice with other value chain members.			
Integration into decision-making (Clause 6)	Asset owners/managers make alignment with net zero transition central to the scope and requirements of work. Identify activities and associated emissions/removals within control and influence across all work stages (as per Clause 4), and the necessary collaborations with value chain members and stakeholders that will enable whole life carbon reductions, and the network(s) and system(s) with which the project or programme of works interfaces. Integrate carbon management into the delivery processes to support system-level low-carbon outcomes. Prioritize implementation of carbon reduction opportunities within control and influence. Integrate the carbon implications of climate resilience (or lack of) in the carbon management at all levels. Prioritize nature-based solutions for reduced carbon and increased sequestration. Follow the carbon reduction hierarchy (Clause 4) across all work stages to identify potential opportunities to reduce whole life carbon emissions: Avoid – Switch – Improve.					
	Asset owners/managers consider the life of the solution, addressing the need for the asset to determine the lowest carbon outcome. Consider options that maximize the use of existing assets, future adaptability and material recovery.		Align standards and guidance with whole life decarbonization requirements. Demonstrate that proposed solutions are supportive of a net zero transition and whole life performance. Manage resources following circular economy principles.		Operate and maintain assets/networks in a way which supports the envisaged whole life carbon performance as a minimum, following circular economy principles.	
Assessment (Clause 7)	Establish a comprehensive study boundary to understand emissions impacts and reduction opportunities of the project in the wider system. Map emissions and removals using the PAS 2080 whole life carbon framework for decision-making (Clause 4). Select an appropriate assessment methodology using existing standards or other recognized sources. Select data sets to be used and understand data quality and uncertainties involved. Work with benchmarks and available carbon factors if detailed information is not available.		Follow an assessment methodology using recognized sources and/or existing standards so that all relevant sources of emissions and removals attributable to the project or programme of works are assessed and uncertainty is acknowledged. Include impacts to the network and system relevant for decision-making. Improve degree of accuracy in any assessment undertaken to provide the right insights to help decision-making. The primary focus of any assessment is to help decisions that promote low-carbon solutions. Assess whole life carbon emissions during design and construction to monitor progress against any targets set.	Capture assessment data in suitable format (i.e. by selecting appropriate functional units) and record for the development of future benchmarks and GHG assessments.	Select an appropriate methodology for assessing end-of-life emissions, particularly to consider and prioritize circular economy principles.
	Assess GHG emissions and removals associated with land use change, including nature-based solutions and climate resilience solutions. Report removal activities separately to prioritize GHG reduction efforts.					
	Select an appropriate level of accuracy and detail. Collaborate with the value chain and share data that supports the GHG assessment process. Adopt tools and data that increase consistency and accuracy of any assessment.					

Table B.1 – Carbon management process applied to a project or programme of work across work stages *(continued)*

	Need	Optioneering	Design	Delivery	Operation	Purpose/performance review
Opportunity to reduce whole life carbon	Highest ◄ ► Lowest					
Baselines and targets (Clause 8)	Set whole life carbon reduction targets that are aligned with targets set in the network or system. Any targets set need to demonstrate, as far as possible, that they are aligned to a net zero transition. Where network or system level targets do not exist, further engagement and challenge needs to take place with different stakeholders to identify ways of closing any gaps, if possible. Work towards consistent targets set for the project and/or programme of works. Develop the project/programme baseline and transparently describe assumptions, limitations and uncertainties. Use existing benchmarks where available. Where not, use first principles to develop a baseline and record uncertainties for improvement over time. Select appropriate functional units to develop the baseline.		Capture and communicate uncertainties in baselines as the project progresses. Challenge carbon targets where there is the potential for improvement. Set appropriate targets for different stages of delivery to drive the right behaviours. A project level whole life carbon target may need to be broken down into capital, operational targets for selective work packages that different value chain members may be leading. Capture design and construction GHG data using appropriate functional units to improve future baselines.		Capture operational data to inform future baselines and targets. Communicate and share improvements in benchmarks/ factors based on project/programme operation, use and end of life.	
Monitoring and reporting (Clause 9)	Asset owners/managers to define monitoring and reporting requirements and communicate.	Report to government and system-level stakeholders. Repeatedly review performance against targets throughout development. Use captured data to improve performance over the baseline. Share good practice outcomes, including non-carbon impacts and co-benefits.			Report actual emissions and performance against targets.	
	Identify roles and responsibilities and stakeholders to report to. Report carbon progress against the set targets and record identified carbon reduction opportunities throughout all stages of development. Share good practice outcomes and carbon data regularly with the value chain to enable wider decarbonization.					
Procurement (Clause 10)	Include carbon management process requirements (including objectives, targets and project outcomes) in contracts. Avoid prescriptive specifications and focus on outcomes. Consider types of incentives to include in contracts. Cascade requirements in sub-contracts. Identify and implement delivery models that support low-carbon outcomes and that promote collaboration.	Review performance against the agreed targets as well as cost and programme. Promote risk allocation approaches that support innovation and low-carbon outcomes. Where appropriate, include data management/information exchange requirements in contracts. Incentivize collaborative contractual arrangements that allow and encourage the successful implementation of the carbon management process. Promote, engage and communicate low-carbon solutions through the value chain. Identify areas of innovation when responding to tenders. Allow for challenge to asset standards and identify incentive mechanisms to reward whole life carbon reduction.		Establish procurement processes that reward suppliers at lower tiers of the value chain that deliver low-carbon solutions. Establish procurement mechanisms that promote innovation that follow the carbon reduction hierarchy of avoid, switch, improve, promoting repurposing and reusing existing assets.	

PAS 2080 STRUCTURE

Carbon Management Process Roles and Responsibilities:

Carbon Management Process activities during work stage	Asset Owner/ Manager	Designer	Constructor	Product/ Material Supplier
Activity 1	RA	R	R	R
Activity 2	RA	C	C	C
Activity 3	RA	C	I	I
Activity 4	A	C	R	I
Activity 5	R	A	C	C

Carbon Management Process activities during Strategy work stage	Asset Owner/ Manager	Designer	Constructor	Product/ Material Supplier
Demonstrate **leadership** to **reduce carbon**	RA	R	R	R
Define infrastructure service outcomes including statement of need (define functional unit)	RA	C	I	I
Set up corporate **governance** that will include a continual improvement process	RA	C	I	I
Set **carbon reduction targets**; or other relevant ambitions related to carbon management	RA	C	I	I
Early engagement with value chain partners	RA	R	R	R

Carbon Management Process activities during Brief work stage	Asset Owner/ Manager	Designer	Constructor	Product/ Material Supplier
Define the asset/programme **baseline** based on a notional solution	RA	C	I	I
GHG Quantification – Decide on carbon emissions quantification methodology;	RA	C	C	C
Decide on project **data quality** requirements	RA	C	C	C
Decide on carbon emissions **quantification tools** to use throughout the different work stages	RA	C	C	C
Develop brie				

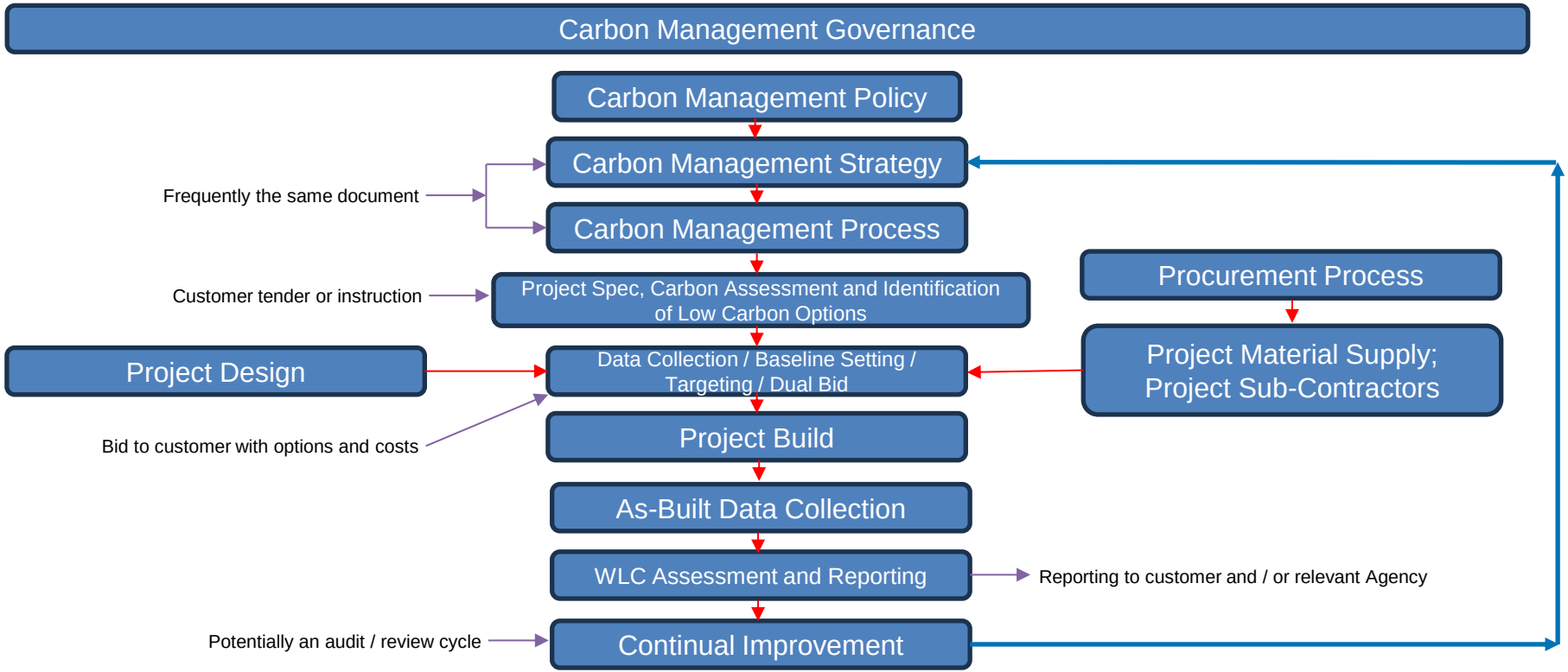
Carbon Management Process activities during Concept and Definition work stages	Asset Owner/ Manager	Designer	Constructor	Product/ Material Supplier
High level **quantification of all options** (and use of tools, where appropriate) against baselines	RA	R	C	C
Challenge the need for a new asset. Set and refine objectives for subsequent work stages	R	RA	R	R
Report on project activities, materials/components and carbon categories where the greatest emissions occur and where reductions can be made	I	RA	C	C
Engagement with value chain for carbon reduction of design options, focus on preferred solution and its identified **hotspots** (follow the carbon reduction hierarchy)	R	RA	C	C
Report and monitor progress against targets	R	RA	I	I

Carbon Management Process activities during Design work stage	Asset Owner/ Manager	Designer	Constructor	Product/ Material Supplier
Detailed **quantification** of anticipated project carbon emissions **against the baseline and target**	R	A	C	I
Engage with the value chain to seek innovation and cost efficiencies for reducing carbon and to use specific information where it is available in the quantification	C	RA	C	C
Report carbon hotspots to focus efforts for further reduction and **record carbon reductions** in pursuit of the targets	R	A	I	I
Set out **specification requirements** relating to carbon emissions and **set challeng**	A	R	C	C

Carbon Management Process activities during Construction and Handover work stages	Asset Owner/ Manager	Designer	Constructor	Product/ Material Supplier
Use procurement to help embed the identified carbon reductions and **challenge the value chain** to seek **innovation** and cost efficiencies over and above design intent for reducing carbon	R	C	A	C
Detailed quantification and record of project carbon emissions based on as built information	I	I	RA	C
Engage with the value chain to use specific information where it is available (this might be on materials manufacture from the supplier; material quantity from the QS; etc.)	C	C	RA	C
Monitor progress to ensure project design aspirations for carbon emissions are delivered	A	I	R	C
Report back to Asset Owner/Manager as part of the continual improvement process	I	C	RA	I

- **Responsible** – The doer of the activity.
- **Accountable** – The value chain member accountable for ensuring the activity is completed to the level required.
- **Consulted** – Value chain member who is actively engaged and contributes input to the doer of the activity.
- **Informed** – Value chain member who is kept aware of how and when the activity is being completed and ready to provide inputs if necessary.

PAS 2080 CARBON PROCESS: TYPICAL ARRANGEMENTS



PAS 2080 STRUCTURE

7. Whole life carbon assessment principles to support decision-making

COMMENTARY ON CLAUSE 7

The purpose of Clause 7 is to ensure that whole life carbon assessment is fit for integrating carbon reduction into decision-making in projects and programmes, in accordance with Clause 6.

This clause establishes key principles for consistency in the assessment approach throughout the value chain, encourages a level of detail commensurate with the decision-making at the stage considered, recognizes that the accuracy of assessment improves as the project/programme develops, and emphasizes the importance of assessing whole life carbon, even in the absence of detailed data during the early optioneering stage of the delivery process to drive low-carbon behaviours and decisions.

This clause references the whole life carbon framework (introduced in Clause 4) that for the assessment of emissions and removals within and beyond a project/programme boundary. The framework can be applied to projects and/or programmes of work at the asset, network or system level. The framework builds on life cycle assessment principles of existing standards and does not intend to replace those, while enabling a common carbon management language across different asset/network/system typologies.

The framework allows carbon hotspots both in the control and influence of the value chain to be identified and, in turn, support whole life carbon reductions. Central to the PAS 2080 whole life carbon framework is the importance of systems thinking for achieving decarbonization.

PAS 2080 CARBON ASSESSMENT PROCESS: TYPICAL ARRANGEMENTS

The GHG assessment methodology used should be derived from existing LCA standards and / or other recognised sources. It should be used consistently for all GHG assessments.

The GHG Assessment process may be based upon, for example:

- For **Asset Owners / Managers & Constructors**: BS EN 15978-1:2011 Sustainability of construction works - Methodology for the assessment of performance of buildings;
- For **Designers / Constructors:** BS EN 17472:2022 Sustainability of construction works. Sustainability assessment of civil engineering works - calculation methods;
- For **Product / Material Suppliers:** BS EN 15804:2012+A2:2019 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products

It is also likely that other standards and sources will be wholly or partly used, for example:

- Environmental Product Declarations (EPDs); UK Government Carbon Conversion Factors; National Highways Carbon Tool; TII Carbon Tool; ICE Database; RICS Whole Life Carbon Assessment For The Built Environment; The Built Environment Carbon Database; ISO 14067 Carbon footprint of products; PAS 2050 life cycle GHG emissions of goods and services; The GHG Protocol.

PAS 2080 CARBON ASSESSMENT PROCESS: TYPICAL ARRANGEMENTS

National Highways Carbon Tool:

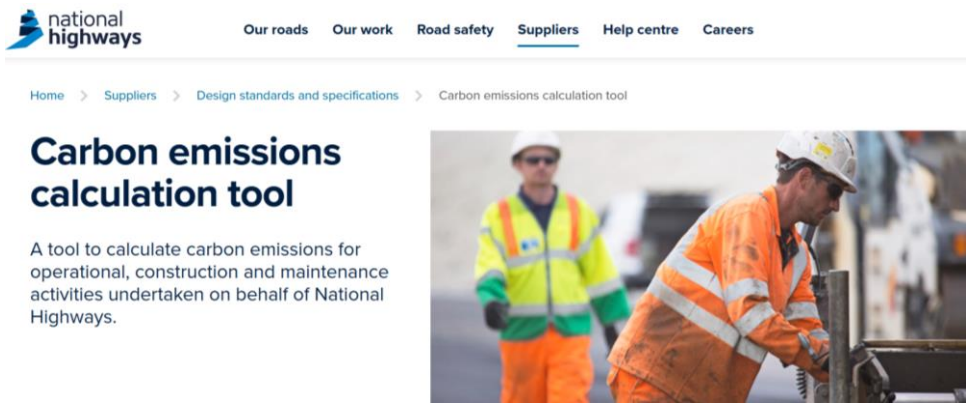
https://nationalhighways.co.uk/suppliers/design-standards-and-specifications/carbon-emissions-calculation-tool/

Includes E-Learning Training Programmes and Guidance Documents.

Transport Infrastructure Ireland:

- Provide a similar and equally useful tool, upon request

Remember that this is intended for National Highways projects only, although it may also be of use to the wider construction industry.



PAS 2080 STRUCTURE

8. Target setting and baselines

COMMENTARY ON CLAUSE 8

Setting carbon reduction targets provides clear direction and communicates intent for carbon reduction. It is important that targets are set against clear baselines so that performance against them can be determined. This clause focuses on target setting and baselines throughout the whole life of projects and/or programmes of work at the asset or network level. This PAS recognizes that net zero targets should be set at the system level and ideally all networks and assets should have targets that are aligned with the system net zero target. This PAS also recognizes the importance of asset owners/managers setting carbon targets against clear baselines at project and programme level so that the value chain can focus their efforts in delivering those targets.

*The purpose of asset-level targets is to deliver the required pace and scale of carbon reduction to support and enable a system-level net zero target. An isolated "net zero" target at asset level might cause unintended consequences of increased carbon elsewhere in the system and shift focus to offsetting carbon rather than whole life carbon reductions or activities that could result in significant carbon reductions at the network or system level. Asset-level targets should be ambitious and align to a system-level net zero target. Further context is provided in **4.1** and **4.2**.*

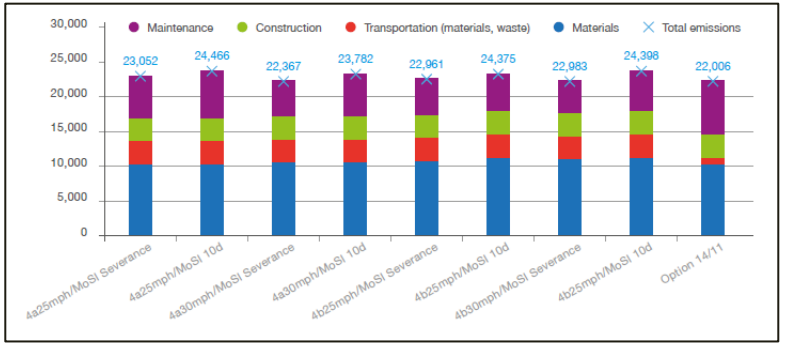
At the need stage through to construction, a whole life carbon target should be met which might then evolve to an operational emissions target from handover.

PAS 2080 TARGET AND BASELINE SETTING: TYPICAL ARRANGEMENTS

Note:

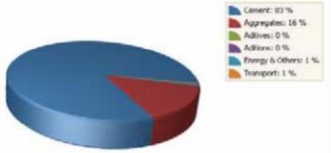
Baseline is defined as:

> '*scenario for what carbon emissions and removals would have been in the absence of planned measures aiming to reduce emissions*'.



CO2 FOOTPRINT RESULTS

Name	tCO2 eq/m3	%
Cement	0.280632	83.0
Aggregates	0.052845	15.6
Aditives	0.000000	0.0
Aditions	0.000000	0.0
Energy & Others	0.002548	0.8
Transport	0.001895	0.6
TOTAL	0.337920	
Density (ton/m3):		2.305000
Total (tCO2 eq/ton):		0.146603

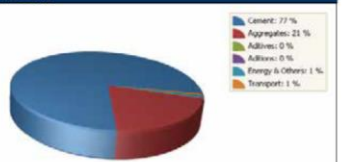


O_2 Footprint

0.338 tCO_2 eq/m^3

CO2 FOOTPRINT RESULTS

Name	tCO2 eq/m3	%
Cement	0.190259	76.9
Aggregates	0.052597	21.2
Aditives	0.000289	0.1
Aditions	0.000000	0.0
Energy & Others	0.002548	1.0
Transport	0.001864	0.8
TOTAL	0.247558	
Density (ton/m3):		2.268200
Total (tCO2 eq/ton):		0.109143



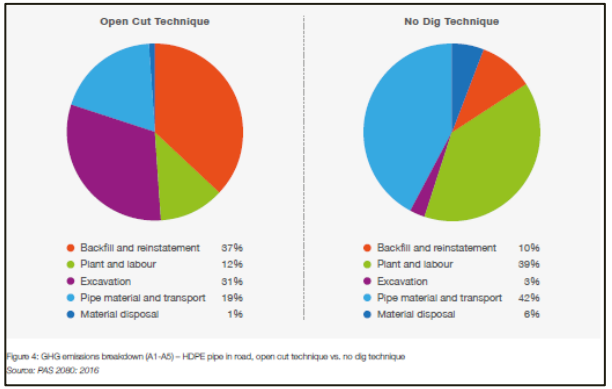


Figure 4: GHG emissions breakdown (A1-A5) – HDPE pipe in road, open cut technique vs. no dig technique
Source: PAS 2080: 2016

PAS 2080 TARGET AND BASELINE SETTING: TYPICAL MITIGATION ARRANGEMENTS

HVO / Bio-Fuels:

- HVO (from hydrocracking of vegetable oil, cooking oils):
  - 0.036kgCO2e / litre (2.51 for diesel)
  - Can be a 100% drop in replacement
- Biodiesel (from esterification of vegetable oils, animal fats, cooking oils, recycled greases etc):
  - 0.168kgCO2e / litre (2.51 for diesel)
  - Biodiesel usually requires a mix, 2% to 100%

Low Carbon Cement / Concrete / Asphalt (replacing some content with other compounds):

- Ground Granulated Blast-Furnace Slag (GGBS): byproduct of making iron / steel
- Fly Ash: byproduct from coal fired power stations
- Calcined clay: produced by heating clays which will then react with cement
- Magnesium Oxide: sequesters CO2 from the atmosphere as it cures
- Waste rubber materials for asphalt
- Recycled / reused aggregate for asphalt
- Lower temperature asphalt
- 10% to 70% lower CO2e compared to Portland Cement / virgin material asphalt

PAS 2080 TARGET AND BASELINE SETTING: TYPICAL MITIGATION ARRANGEMENTS

Carbon sequestration through paints:

- **Algae based paints**
- **Lime based paints**
  - Can absorb CO2 directly from the atmosphere

Energy reflective / absorbent paints

  - Can act to assist cooling / heating a building

Passive Design:

- Uses orientation, location, fabric and materials to reduce demand for mechanical cooling, heating, ventilation and lighting

PAS 2080 TARGET AND BASELINE SETTING: TYPICAL MITIGATION ARRANGEMENTS

Circular Economy Principles, eg:

- Material reuse and recycling (eg fittings, stone, steel, crushing on site, building fabric, high waste segregation levels)
- Use of recycled materials (eg aggregate, steel)
- Design for durability, flexibility and ease of disassembly

On-site energy generation, eg for welfare cabins / site office:

- PV and batteries
- Hydrogen fuel cells / boilers
- Renewable energy supply

PAS 2080 STRUCTURE

9. Monitoring and reporting

COMMENTARY ON CLAUSE 9

A carbon management process should have robust monitoring and transparent reporting at frequent intervals during the delivery of projects and/or programmes of work to highlight the progress of carbon reductions against targets. Reports should inform decision-making in managing whole life carbon, as well as provide information for future continuous improvement.

PAS 2080 STRUCTURE

10. Procurement

COMMENTARY ON CLAUSE 10

The procurement process is critical to accelerate whole life carbon reductions in the value chain when delivering projects and/or programmes of work. This PAS recognizes that procurement is not solely the development of a contract; it's a mechanism that will incentivize the right behaviours.

Organizations might want to consider the guidance of ISO 20400 and include carbon as part of a holistic approach to the integration of sustainability in all aspects of procurement activity.

nqa.
NEVER STOP IMPROVING

PAS 2080

11. Continual Improvement

COMMENTARY ON CLAUSE 11

Continual improvement is a core part of the carbon management process that allows lessons learned to improve the delivery of current and future projects and/or programmes of work; this should be targeted towards the end goal of decarbonization. Continual improvement also allows organizations to mature their carbon management experience and learn from each other about effective decarbonization approaches, including innovations.

PAS 2080 STRUCTURE

12. Claims of conformity

- Independent third-party certification, for example with NQA
- Other-party validation
- Self-validation

SUMMARY OF KEY LEARNINGS

- Understand the fundamental principles and concepts of carbon management in buildings and infrastructure
- Understand the structure, content and purpose of PAS 2080
- Understand how PAS 2080 helps to support net zero ambitions

YOUR NEXT STEPS

- Visit our sustainability microsite
- Join one of our free informative webinars
- Read our helpful sustainability blogs
- Get guidance from our Associate Partner Programme
- Contact our friendly team

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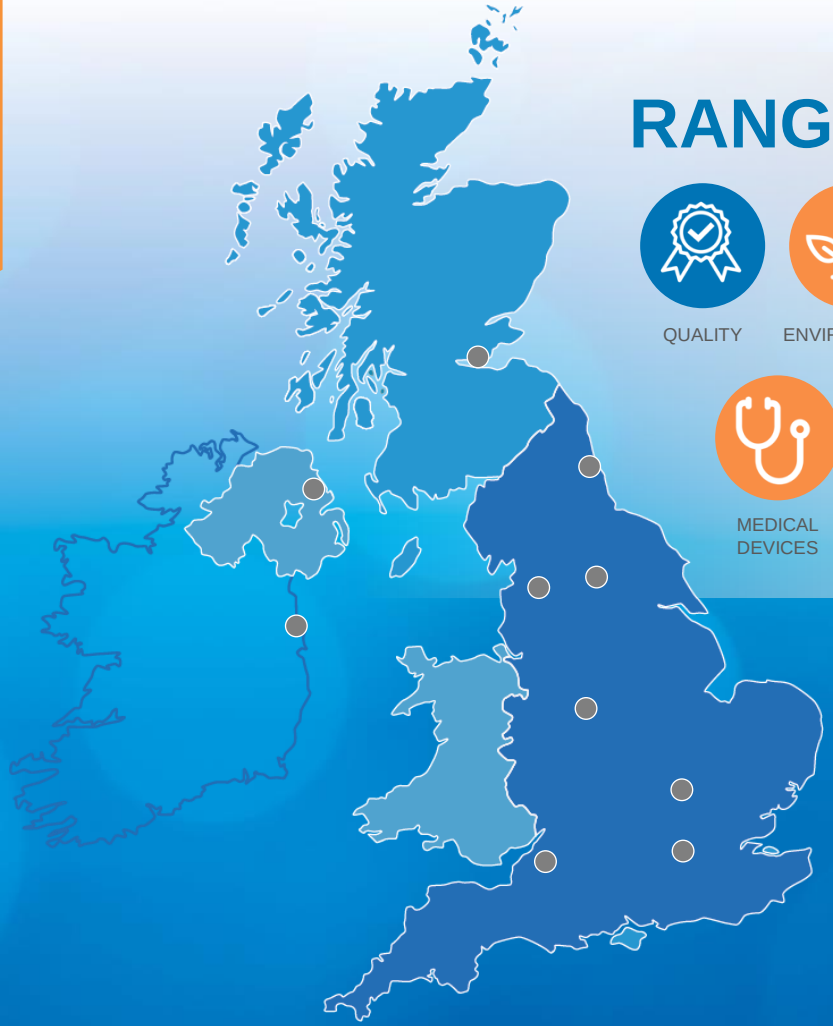

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