BOF

Bridge Owners' Forum

Net Zero Bridges Group

Accelerating progress towards Net Zero bridges

Bridge Owners Forum 69, 1st February 2022

Net Zero Bridges Group

To accelerate progress towards Net Zero carbon bridges by sharing knowledge and ideas, and shaping best practice

Our objective

AECOM
ARCADIS
Arup
Atkins
BEAM Architects
Cass Hayward
COWI
Hewson
Jacobs
Knight Architects
Mott MacDonald
Moxon Architects
Ramboll
Tony Gee
WSP

Net Zero Bridges Group

UK Architects Declare Climate and Biodiversity Emergency

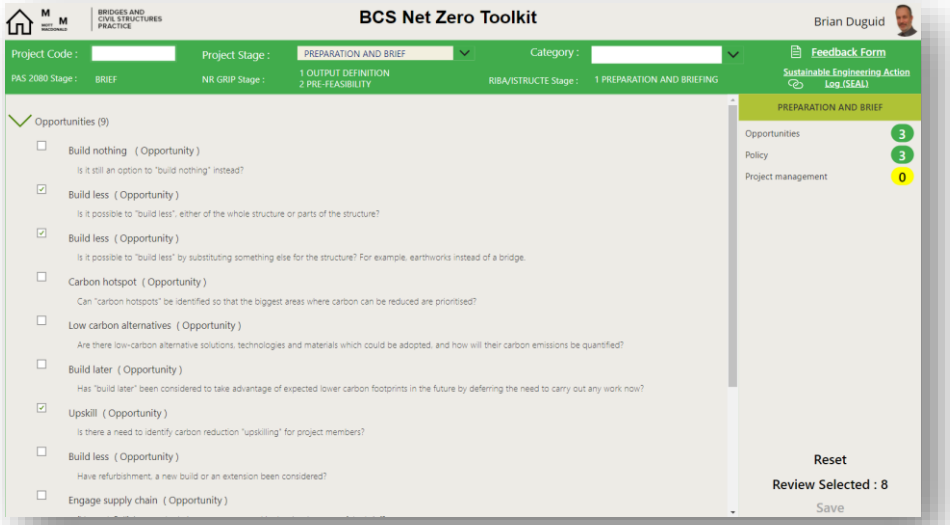
UK Structural Engineers Declare Climate & Biodiversity Emergency

UK Civil Engineers Declare Climate & Biodiversity Emergency

What is the NZBG doing?

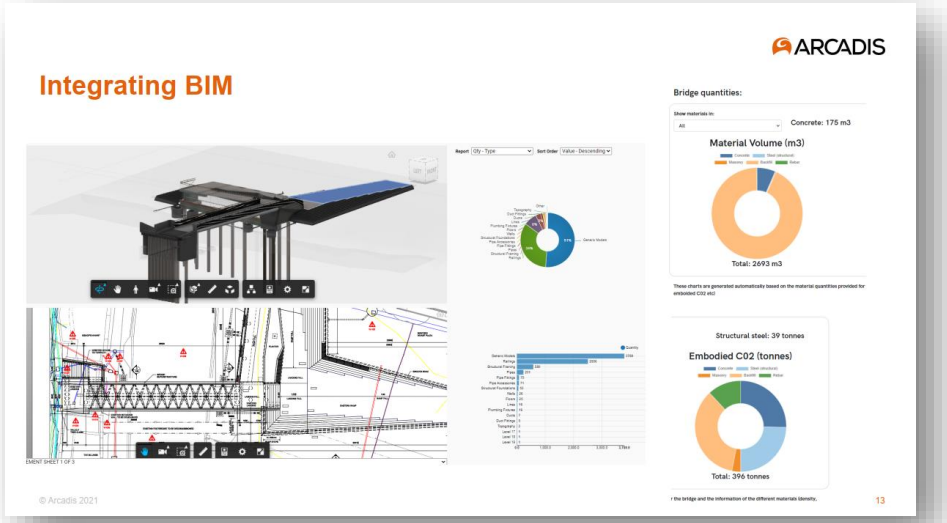
Show-and-tells

Arup: timber bridges



Mott MacDonald: net zero bridges toolkit

Atkins: FRP composite bridges



ARCADIS: carbon factor benchmarking

General updates and news

1. BD&E – article 11th October
Swiss researchers create footbridge from recycled concrete

2. Concrete Centre – 3rd November
Expanding the use of lower carbon concretes
Video now available

3. IStructE – 4th February to 4th March 2022
Net-zero structural design
REMINDER

4. IStructE
Design for Zero
NOW AVAILABLE
VERY GOOD!

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News and briefings

General updates and news

5. SCI – Annual Event – 9th November
IStructE presentation
SCI presentation
ArcelorMittal presentation, paper and climate action report

6. Concrete Centre – 3rd November
Expanding the use of lower carbon concretes
Video now available

7. UKGBC
Whole Life Carbon Roadmap
Report
Technical report
Summary
Stakeholder action plans

8. Low Carbon Concrete Group
Route Map Summary

General updates and news

9. BCSA
2050 Decarbonisation Roadmap

10. Bridges Scotland – 1st/2nd December
Decarbonisation of Bridges and Viaducts
Philip Chalk, Mott MacDonald

11. ICE R&D Enabling Fund
Requesting applications which address net zero carbon in infrastructure

1. Built Environment Carbon Database: White paper November 2021
2. IStructE Net Zero Structural Design: course 4 February – 4 March
3. CBDG: Call for presentations for conference 29 June, deadline 18 February
4. NEC Net Zero option to be published for consultation in February
5. Seminar: New Stone Bridges, launch of New Stone Bridges Network, 2 March
6. Bridges 2022 9-10 March:
    1. *Accelerating progress towards Net Zero Bridges*, Brian Duguid, NZBG
    2. *Sustainable procurement*, Valerie Diemel-Spruit, Rijkswaterstaat
    3. *Digital stone bridges*, Adrienn Tomor & Kevin Dentith
    4. *Decarbonisation of bridges and viaducts*, Tim Abbott, Mott MacDonald
    5. *Towards zero carbon steel*, Neil Tilley, ArcelorMittal
    6. *Leveraging BIM for design of low-carbon bridges*, Eric Pruvost, SYSTRA
    7. *A SCORS-style rating system for bridges*, Daniel Green & Cameron Archer-Jones, COWI
    8. *Practical tips for greener bridges*, David Collings, ARCADIS
    9. *Carbon neutral bridge management*, Sue Threader, Rochester Bridges Trust
    10. *Concrete and sustainability*, Valerie Diemel-Spruit, Rijkswaterstaat
7. BD&E: Request for articles on Net Zero bridges, deadline March
8. ICE: Forthcoming call for papers in ICE Bridge Engineering journal
9. IStructE CETG: End of year report 2021
10. IStructE: Sustainability Resource Map

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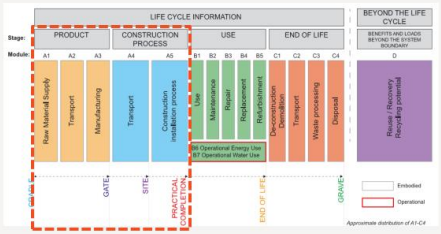
Life Cycle Scope



› Minimum life cycle scope: A1-A5

COWI

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Carbon data sub-group

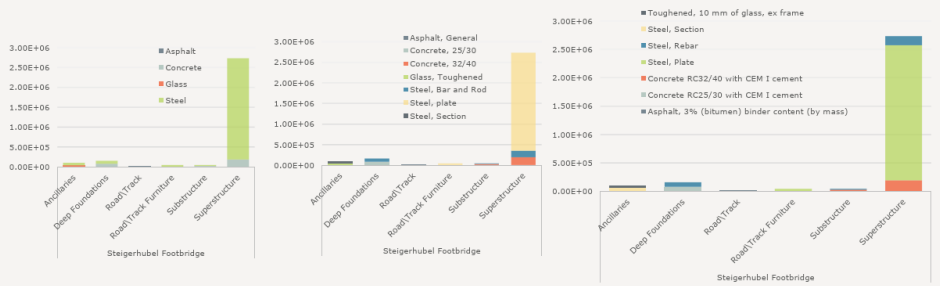
Bridge Scope

To discuss and agree

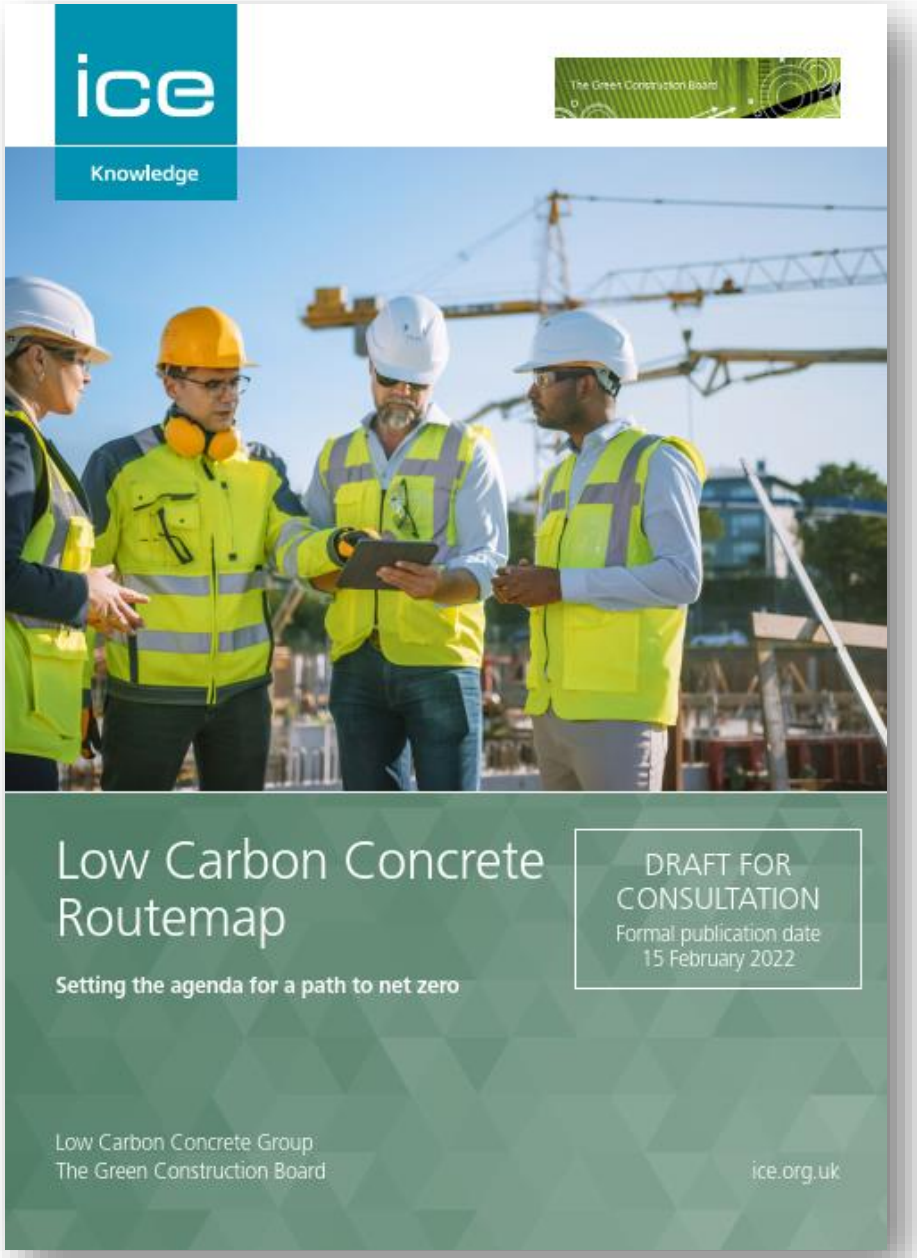
Element group	Element	Possible breakdown of structural elements for carbon analysis
Superstructure	Girder	Longitudinal girder(s)
		Transverse girder(s)
		Deck
	Truss	Truss
		Deck
	Cable System	Cable system
Substructure	Abutment	Foundations
		Abutment (excl. foundations)
		Transition slab
	Pier	Foundations
		Columns
		Walls
		Beams
	Arch (can be in super- or substructure depending on arrangement)	Arch
	Pylon (can be in super- or substructure depending on arrangement)	Pylon
Foundations	Shallow Foundations	Pad
	Deep Foundations	Pile Cap
		Piles
Ancillaries	Parapets	Structural parapets
	Expansion joints	Expansion joints
	Bearings	Bearings
	Roadway/walkway	Pavement
		Waterproofing
	Railway	Rails
		Sleepers
		Ballast
	Drainage	Drainage
Earthworks	Excavation	Excavation
	Fill	Fill

Sharing Data

Level of Detail



COWI



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Response to LCCG Routemap consultation (jointly with CBDG)

1. Website and email address: in progress via IStructE
2. Bridges 2022 9-10 March:
    1. *Accelerating progress towards Net Zero Bridges*, Brian Duguid, NZBG
    2. *Decarbonisation of bridges and viaducts*, Tim Abbott, Mott MacDonald
    3. *A SCORS-style rating system for bridges*, Daniel Green & Cameron Archer-Jones, COWI
    4. *Practical tips for greener bridges*, David Collings, ARCADIS
3. BD&E: Request for articles on Net Zero bridges, deadline March
    1. *SCORS-style rating scheme proposal for bridges*, Cameron Archer-Jones & Daniel Green, COWI
    2. Introducing the NZBG / overview of the decarbonisation challenge, NZBG (tbc)
    3. Others??? (tbc)
4. ICE: Forthcoming call for papers in ICE Bridge Engineering journal
    1. Possible briefing article on NZBG (tbc)
5. IStructE website and/or The Structural Engineer
    1. *What makes bridges different to buildings regarding Net Zero?*, Ian Palmer, NZBG
    2. Possible briefing article on NZBG (tbc)
    3. Contribution to IStructE guide on calculating carbon in structures, NZBG carbon data sub-group
6. New Civil Engineer
    1. Possible briefing article on NZBG (tbc)
7. CBDG Conference, 29 June
    1. Overview of the Net Zero challenge, NZBG (tbc)

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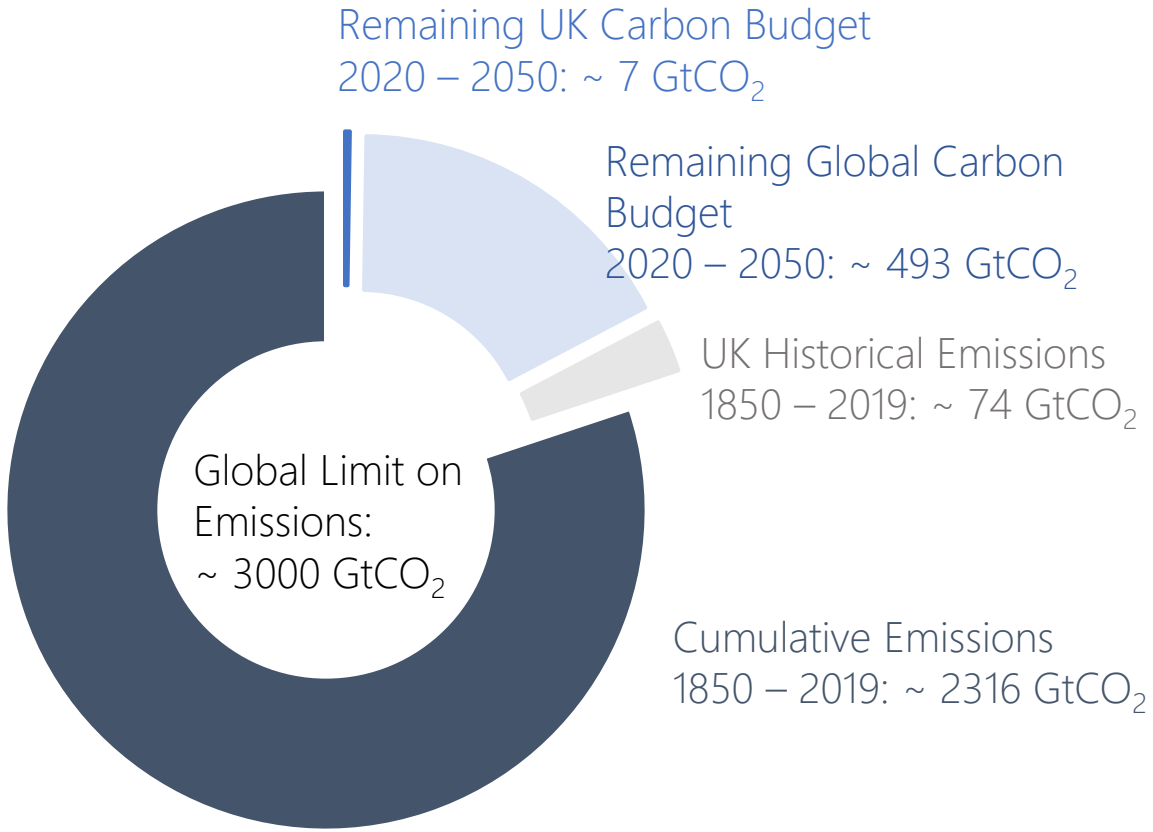
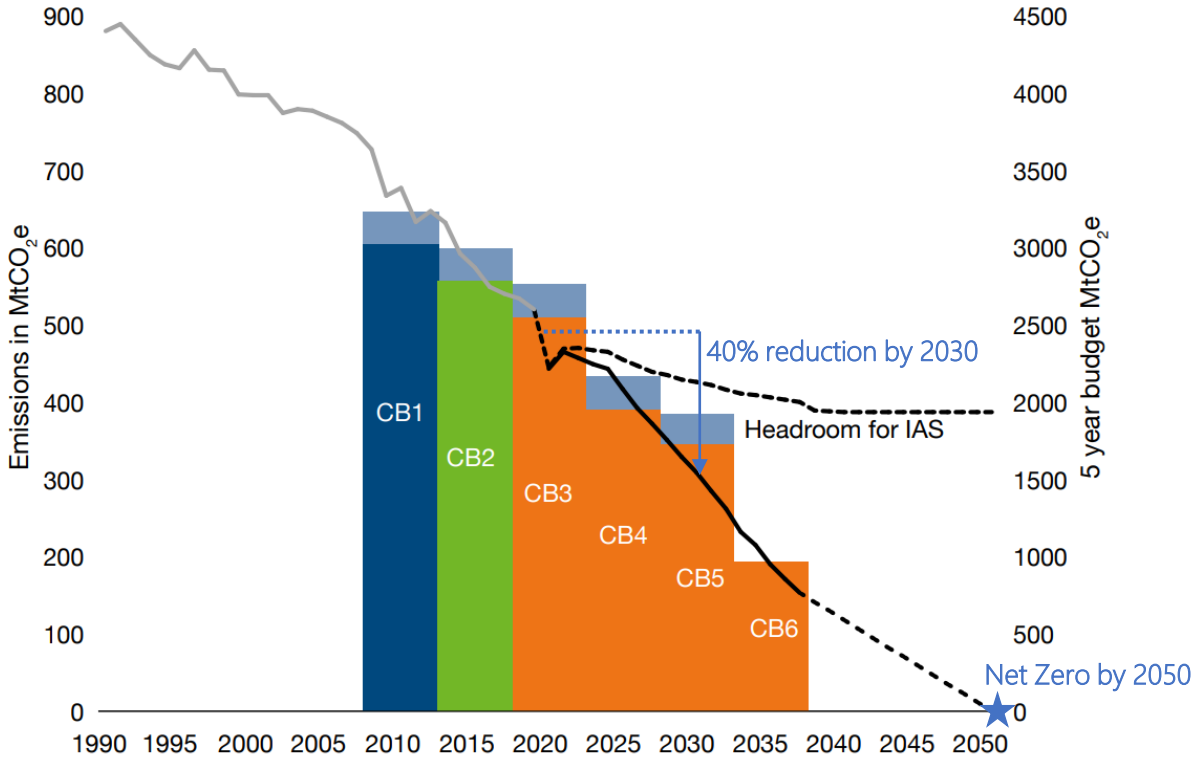
Context / timelines

UK: Carbon budget



Source: ???

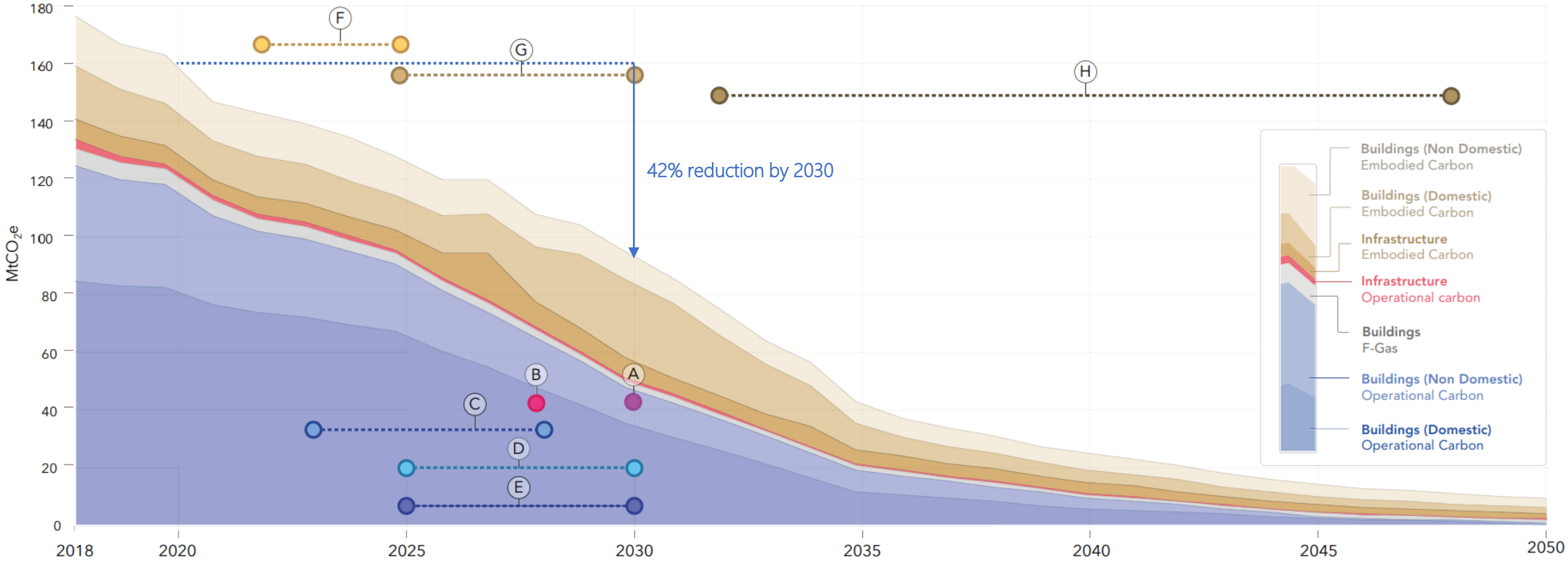
UK Government: Net Zero Strategy - Build Back Greener (Oct 2021)



Source: Net Zero Strategy: Build Back Greener, Figure 12: Indicative emissions reduction to meet UK carbon budgets and NDC.

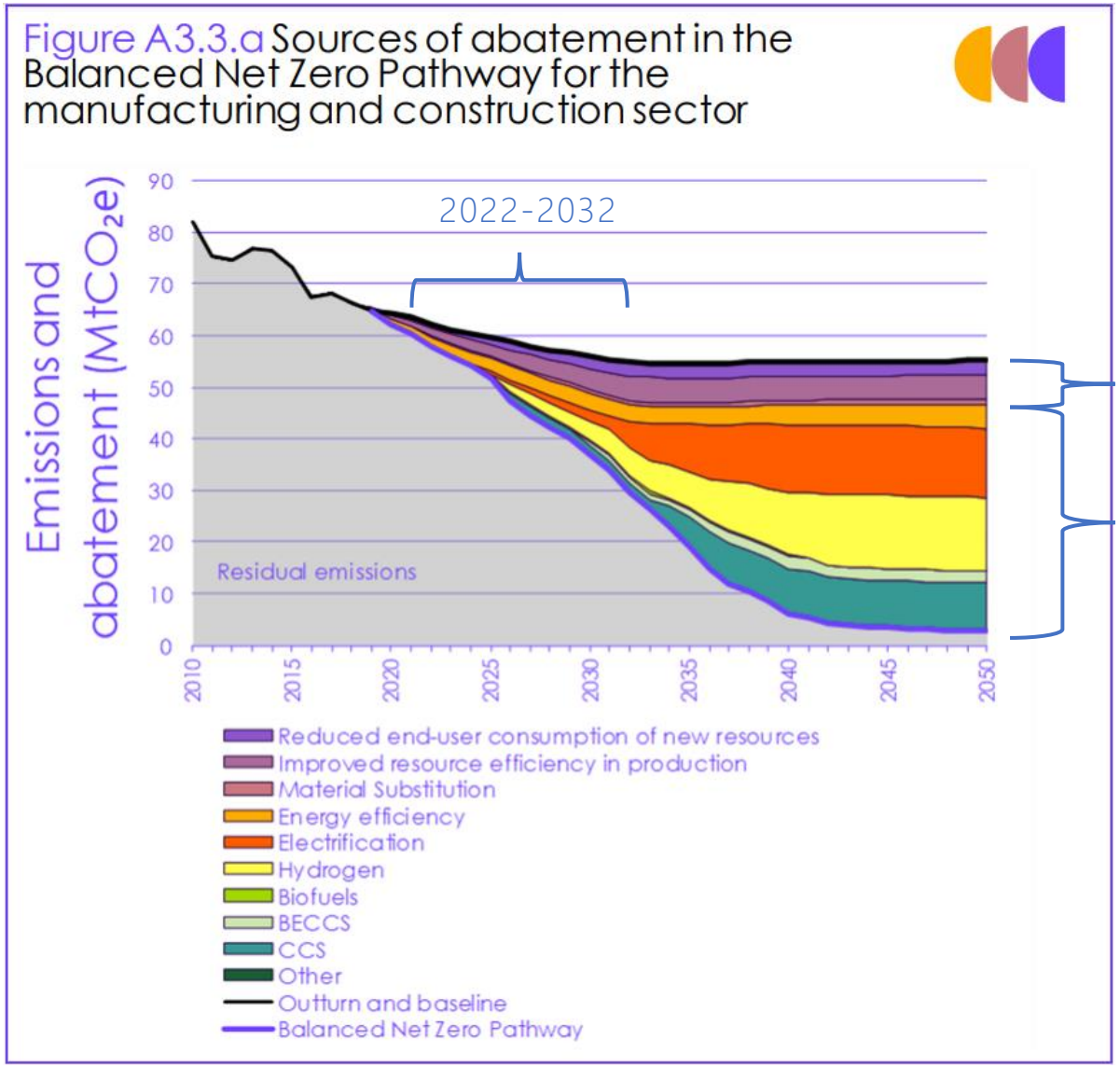
If our carbon footprint is unchanged, we only have **14 years left** before the budget is exhausted

UK: Built environment Net Zero trajectory



Source: UKGBC-Whole-Life-Carbon-Roadmap-A-Pathway-to-Net-Zero (Nov 2021)

UK: Where are the savings to come from?

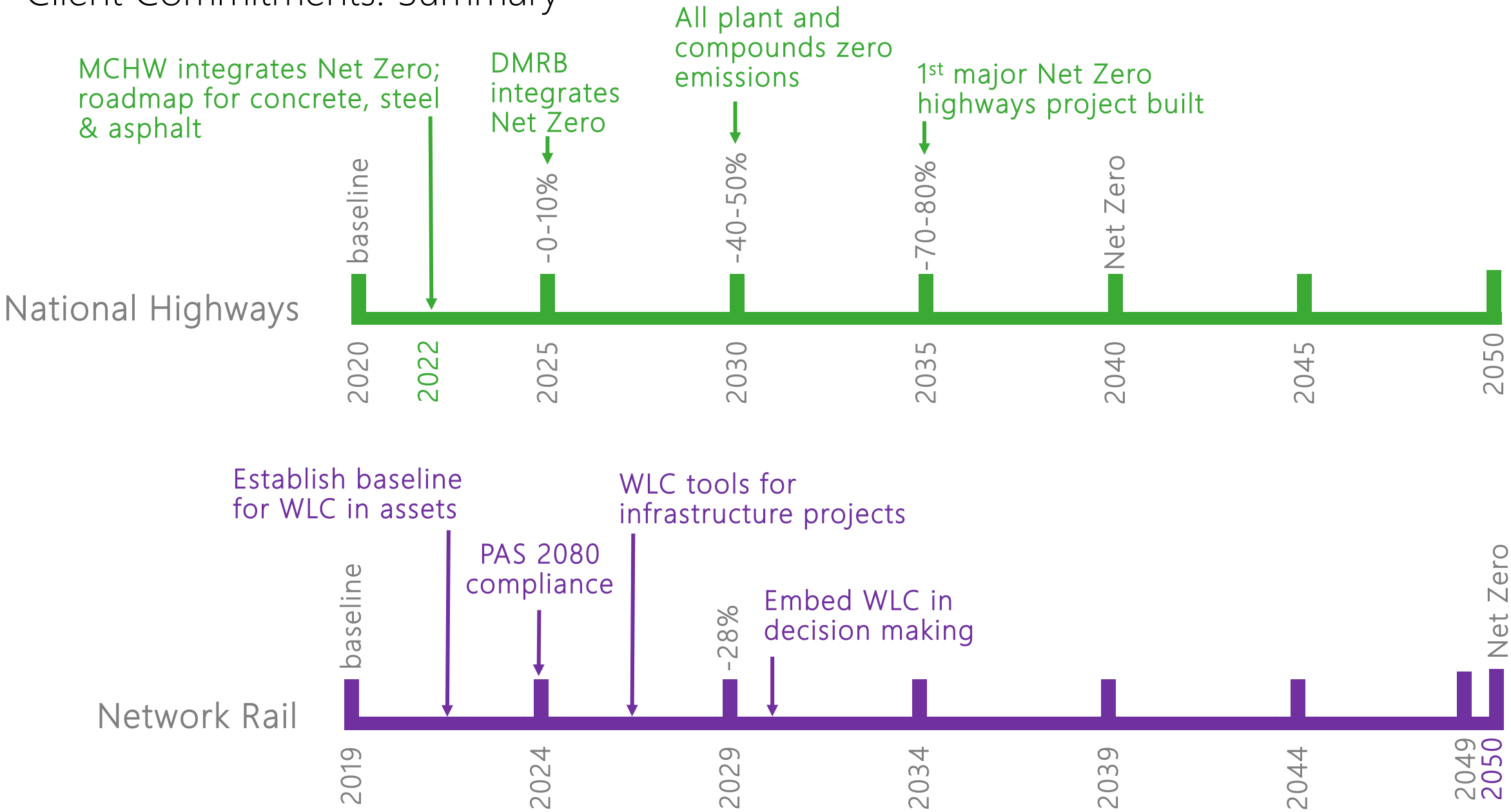


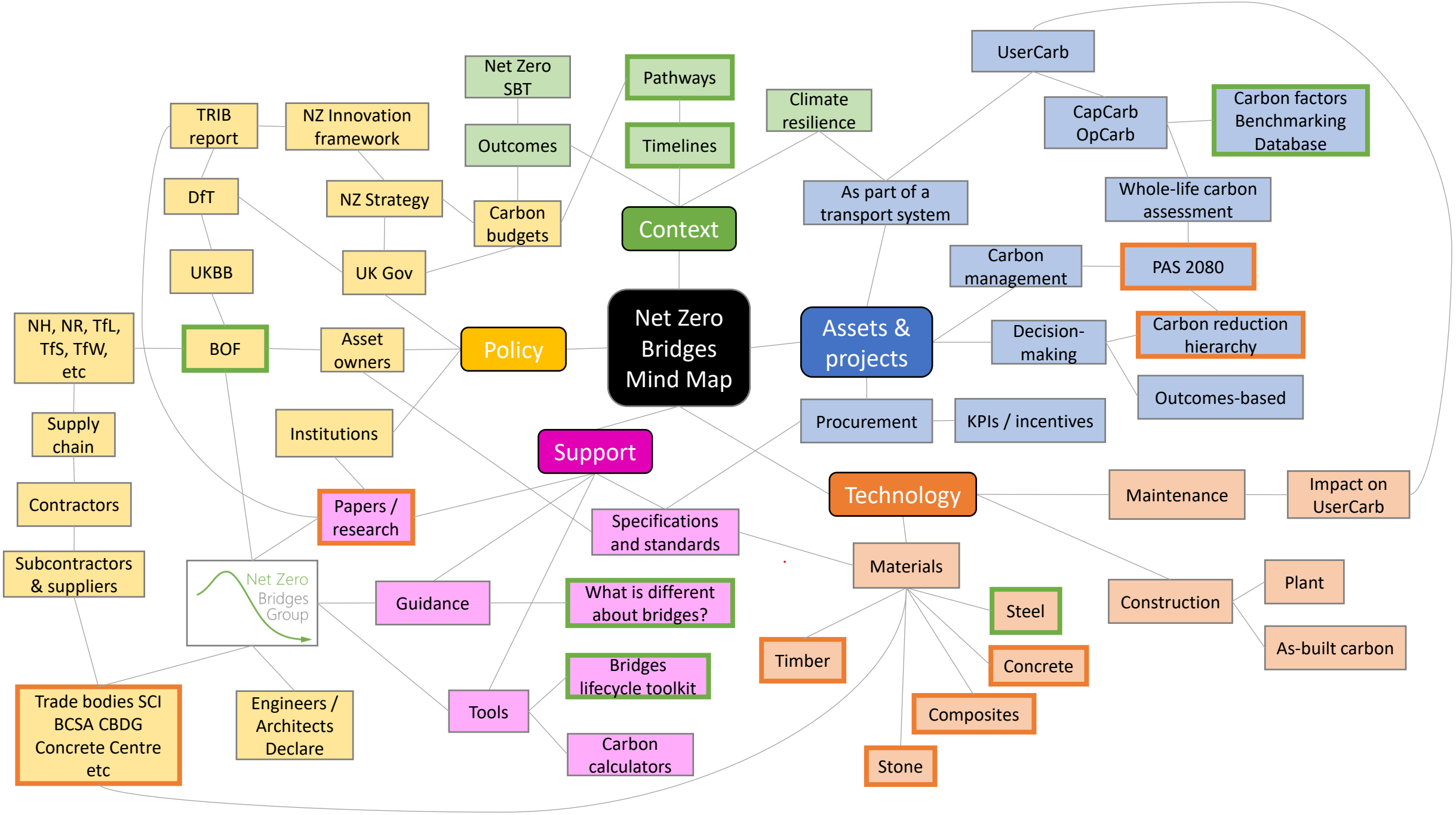
Clients, TAAs, designers, contractors etc: by 2030-35

Industry & manufacturing

Source: CCC - The Sixth Carbon Budget - Manufacturing and Construction (Dec 2020)

Client Commitments: Summary




Net Zero Bridges Mind Map
Context
Net Zero SBT
Pathways
Outcomes
Timelines
Carbon budgets
Climate resilience
Policy
TRIB report
NZ Innovation framework
DfT
NZ Strategy
UKBB
UK Gov
BOF
Asset owners
NH, NR, TfL, TfS, TfW, etc
Supply chain
Contractors
Subcontractors & suppliers
Assets & projects
UserCarb
CapCarb OpCarb
Carbon factors Benchmarking Database
As part of a transport system
Whole-life carbon assessment
Carbon management
PAS 2080
Decision-making
Carbon reduction hierarchy
Outcomes-based
Procurement
KPIs / incentives
Support
Institutions
Papers / research
Net Zero Bridges Group
Guidance
What is different about bridges?
Tools
Bridges lifecycle toolkit
Carbon calculators
Trade bodies SCI BCSA CBDG Concrete Centre etc
Engineers / Architects Declare
Specifications and standards
Technology
Maintenance
Impact on UserCarb
Materials
Steel
Timber
Concrete
Composites
Stone
Construction
Plant
As-built carbon

What do we want from the BOF / what does the BOF want from us?

What do we need?

1.

Carbon literacy at all levels

Net Zero training

Keeping up-to-date with it all!

2.

Clear timelines for changes in procurement, technical standards, specifications, targets

What do we need?

3.

PAS 2080 across all projects and procurement documents

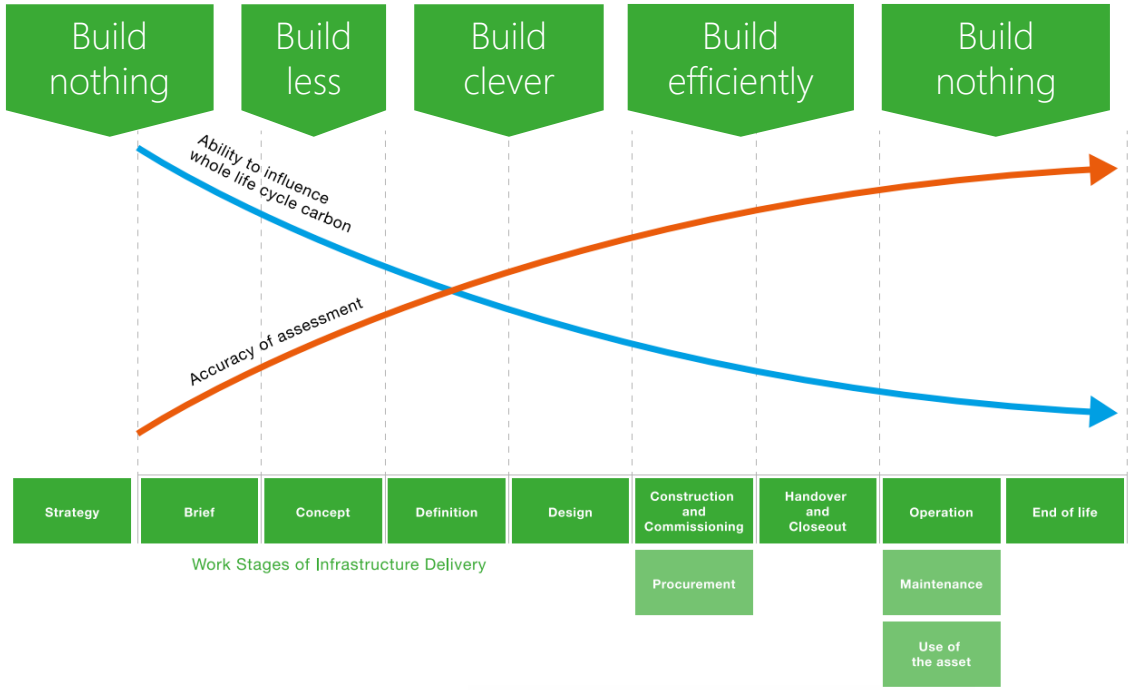
Use PAS 2080 to make decisions

4.

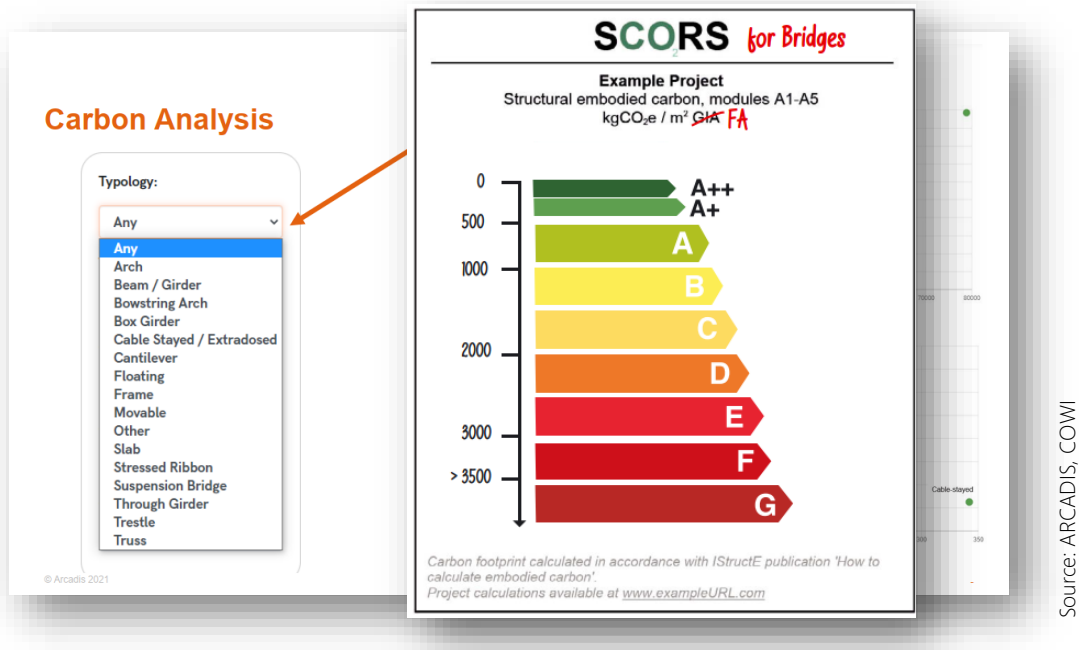
Common approach to carbon data

Mandatory carbon data reporting especially as-built including EPDs

Commit to sharing data as openly as possible



Source: Adapted from PAS 2080:2016 Figure 4



Source: ARCADIS, COWI

What do we need?

5.

Time

Doing new things takes time

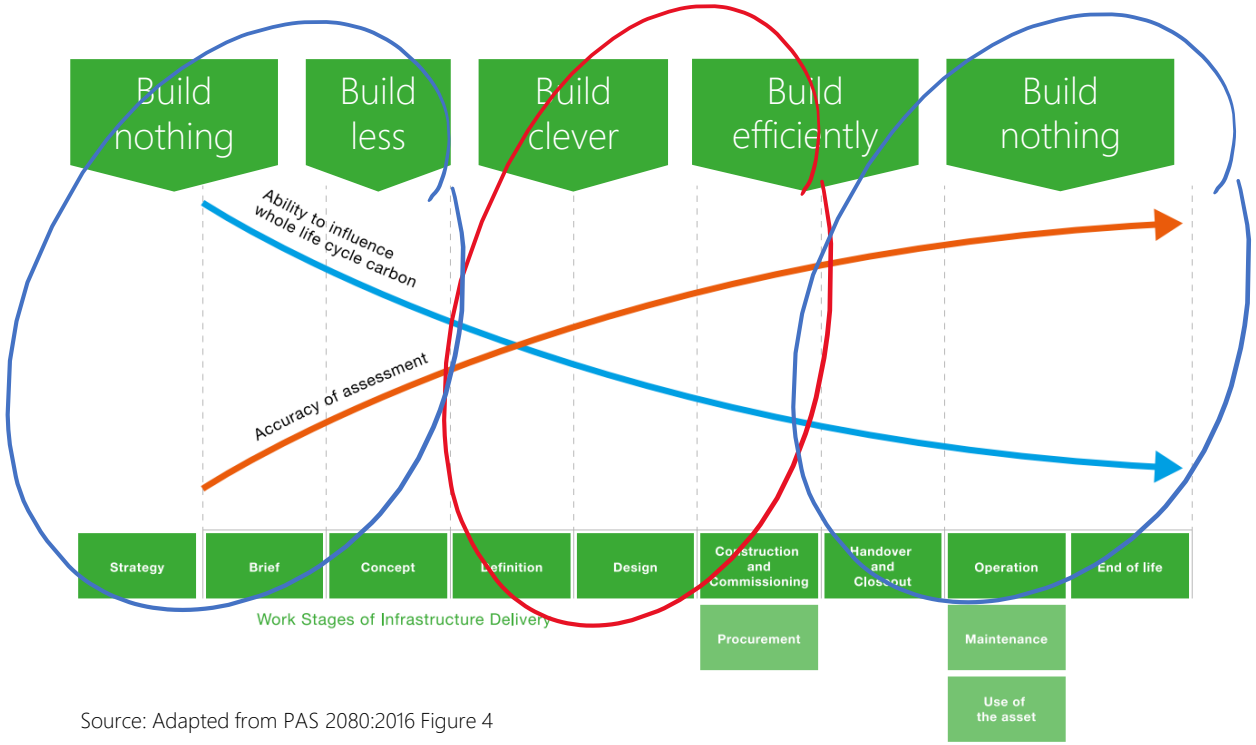
Incentivise spending time on Net Zero

6.

Become comfortable with the uncomfortable

Openness to innovation and challenge

Ability to manage risk



Source: Adapted from PAS 2080:2016 Figure 4

What do we need?

7.

Pilot projects

Pilot structures

Cross-industry pilot programme

8.

R&D needs

Performance testing of low-carbon concrete?

Reduced safety factors?

Smarter fabrication?

9.

Key focus on existing assets

The connection to climate resilience

The biggest savings on carbon footprint

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