From Data to Decisions

Turning Frameworks into Action in Infrastructure Design

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Bright ideas.
Sustainable change.

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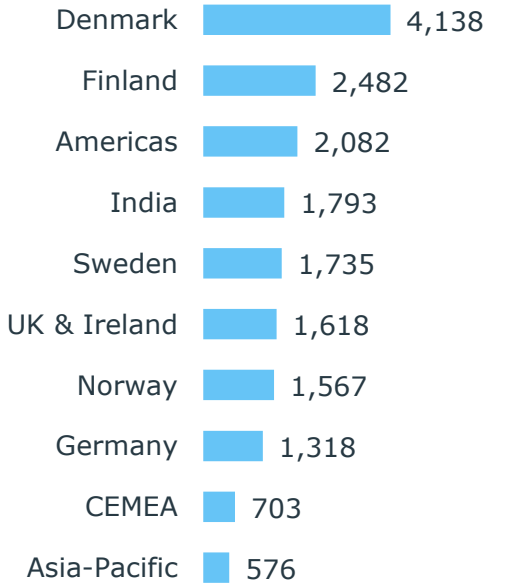
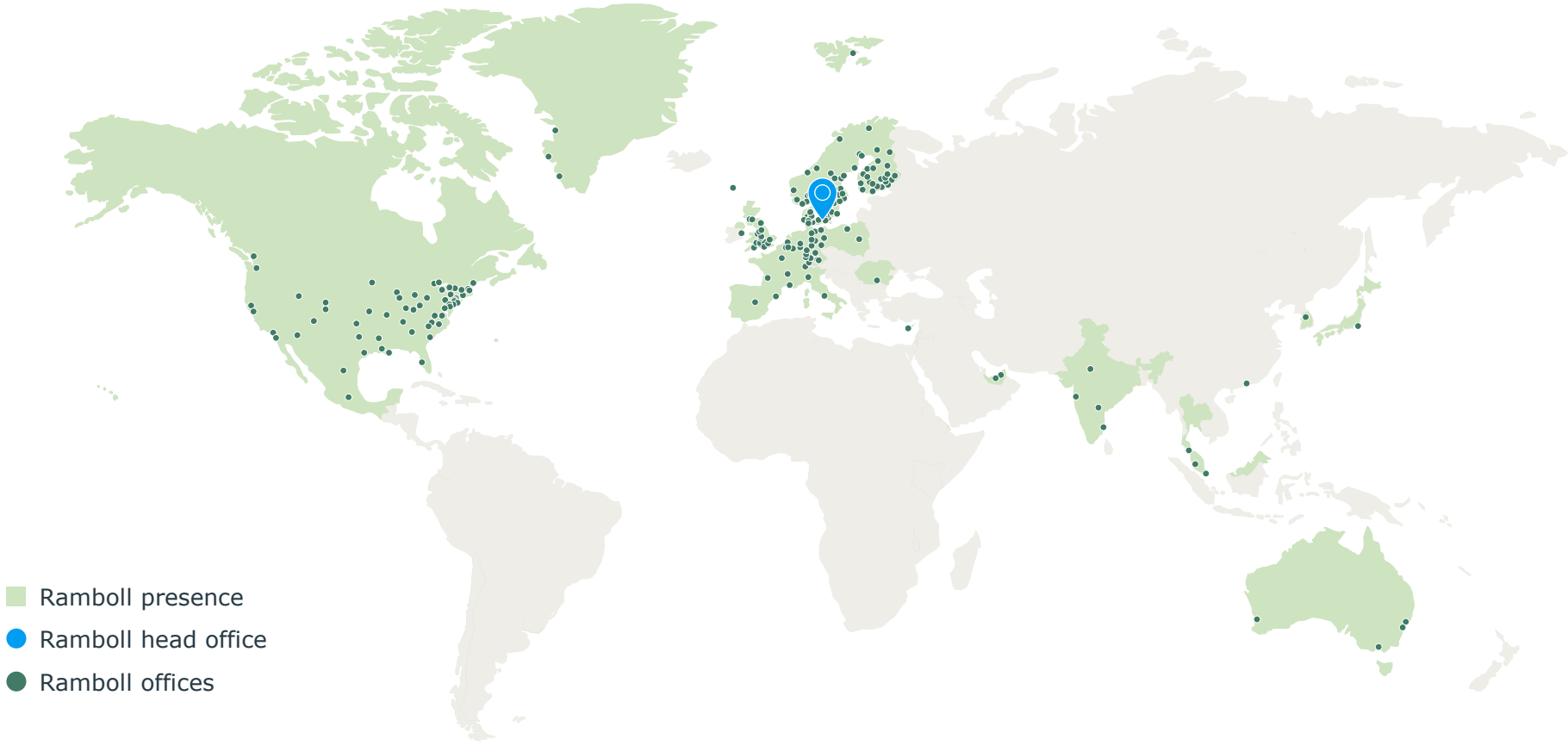
>18,000
experts





Buildings | Transport | Energy | Environment & Health | Water | Management Consulting | Henning Larsen

I’m Andreas Linnet, Global Decarbonisation Lead for Transport at Ramboll with 11 years’ experience – working on major road and rail projects.

I drive carbon accounting and management across our global 4,000-person infrastructure sector and collaborate with FIDIC to advance industry-wide carbon management practices.

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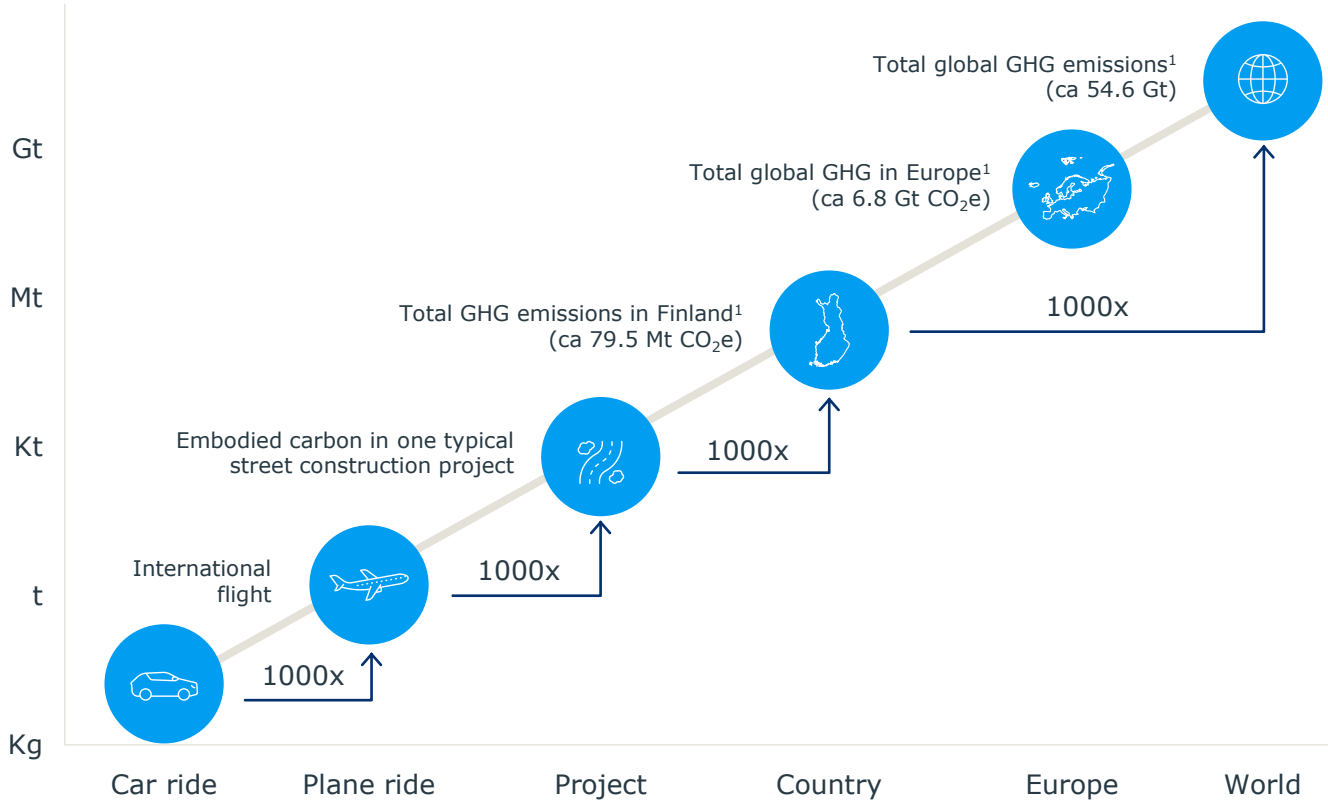
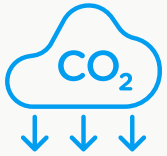
Infrastructure sectors contribution to carbon emissions

Scale of emissions





Construction of roads, bridges, tunnels contribute significantly to carbon emissions.

Material production accounts for a substantial 50% of the overall climate impact and connects to biodiversity loss.

1 Calculated by Our World in Data based on emissions data from Jones et al. (2023)

Why Carbon Management Matters

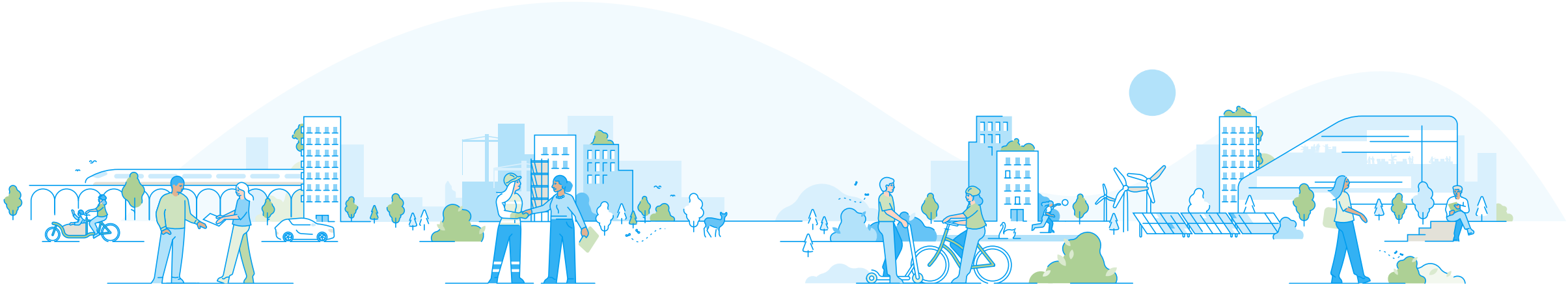
Infrastructure = majority of lifecycle emissions

Climate targets tightening globally

Resource scarcity increasing

Carbon now a **design**, **cost**, and **risk** parameter

Stakeholders expect transparency and comparability



What Carbon Management Looks Like Currently

More than CO_2 reporting

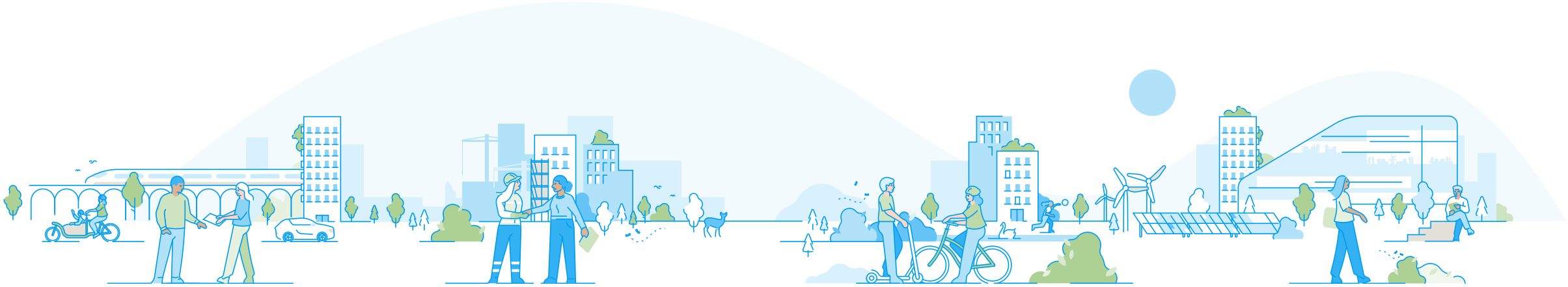
Hotspot identification

Alternative design generation

Optimisation across phases

Procurement alignment

Learning loops from project to project



Example of the potential of carbon management

Sustainability optimisation of concrete bridges, Danish Road Directory (2021)

Purpose

- The Danish Road Directory aims to be in front searching for sustainable solutions in the field of bridges. In order to support this work Rambøll helped them:
- To identify typical elements of an ordinary concrete road bridge which has the greatest potential for reducing greenhouse gas emissions.
- To establish a baseline for future tenders for concrete bridges in relation to carbon footprint.

Solution

- Through analyses of two bridges on Holbækmotorvejen (Vindingevej and Vesterled) a baseline was defined.
- Potentials in relation to geometrical optimisation of the structure and choice of materials have been identified and a hot-spot analyses in relation to materials were conducted.
- The carbon emissions were calculated in InfraLCA.

Effects

- By optimizing towards geometry and material it is possible to **reduce the amount of embodied carbon with 44-48% for at bridge cast in-situ and an element bridge respectively.**
- The hot-spot analysis results showed that approximately **50-70% of GWP comes from concrete and 20-40% from metals** and these materials thus have the greatest potentials when reducing the quantities.
- All reduction can be achieved without any additional costs to add to the traditional budget for a new bridge!

Example of the potential of carbon management

Transport: Examples – Bridge over Vigerslev Allé

Focus on design optimization

Result:

- 40 – 45 tonnes of steel less than originally anticipated
- Almost 50% less used concrete
- Approx 50 tonnes CO_2 saved

Tools and data for carbon management already exist and work in practice.

So if we *can* do it… why aren't we doing it more?

Most projects don't use them – squeezed by time, habits, unclear ownership and perceived extra cost.

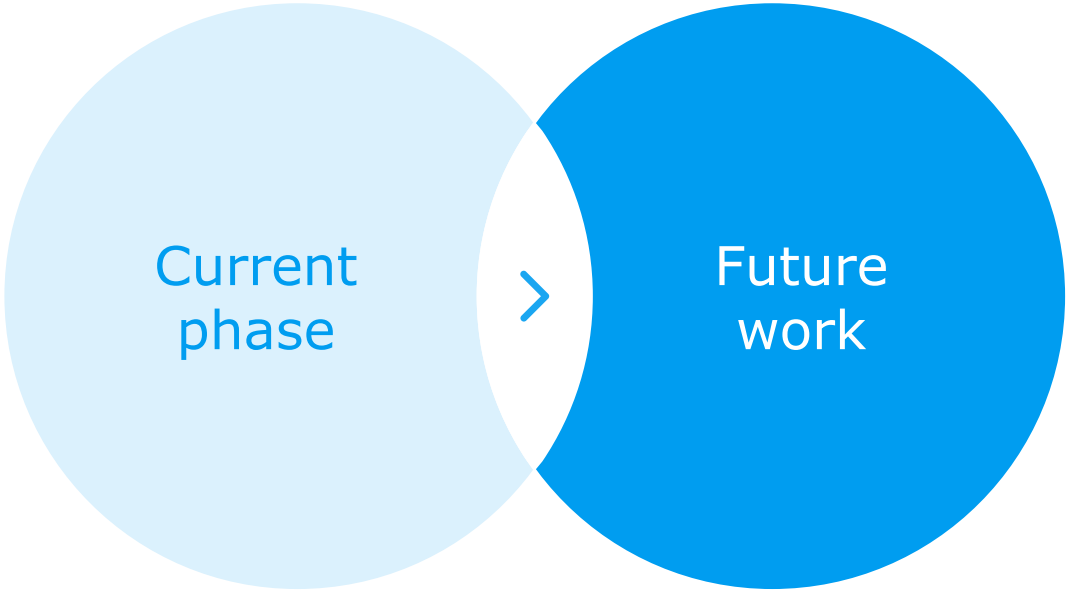
FIDIC’s Carbon Collaboration Initiative – We can influence if we collaborate and speak as one industry

Aim of the FIDIC’s Carbon Collaboration Initiative

FIDIC Carbon Management Framework

Improving the carbon management maturity of project teams

Guidance for improving maturity and implement low carbon solutions in projects



Advocate the change in our industry

Building carbon databases to share carbon data across our industry

The FIDIC Carbon Management Framework (CMF)

Improve carbon management maturity in project teams

Influence and advocate change

Define what good looks like – built on existing good practice

Applies to any project in any geography

Applies to any project delivery stage

Influence different stakeholders in the value chain

Carbon Management Framework used consistently across industry

Links to existing good practices

What it is and what it is not

A white paper with a short shelf life.

It’s an ongoing program.

A detailed step by step process.

It’s a guidance with clear requirements and maturity criteria.

An attempt to replace accepted and applied standards at organisational level (e.g. PAS 2080).

It’s a framework what these should contain.

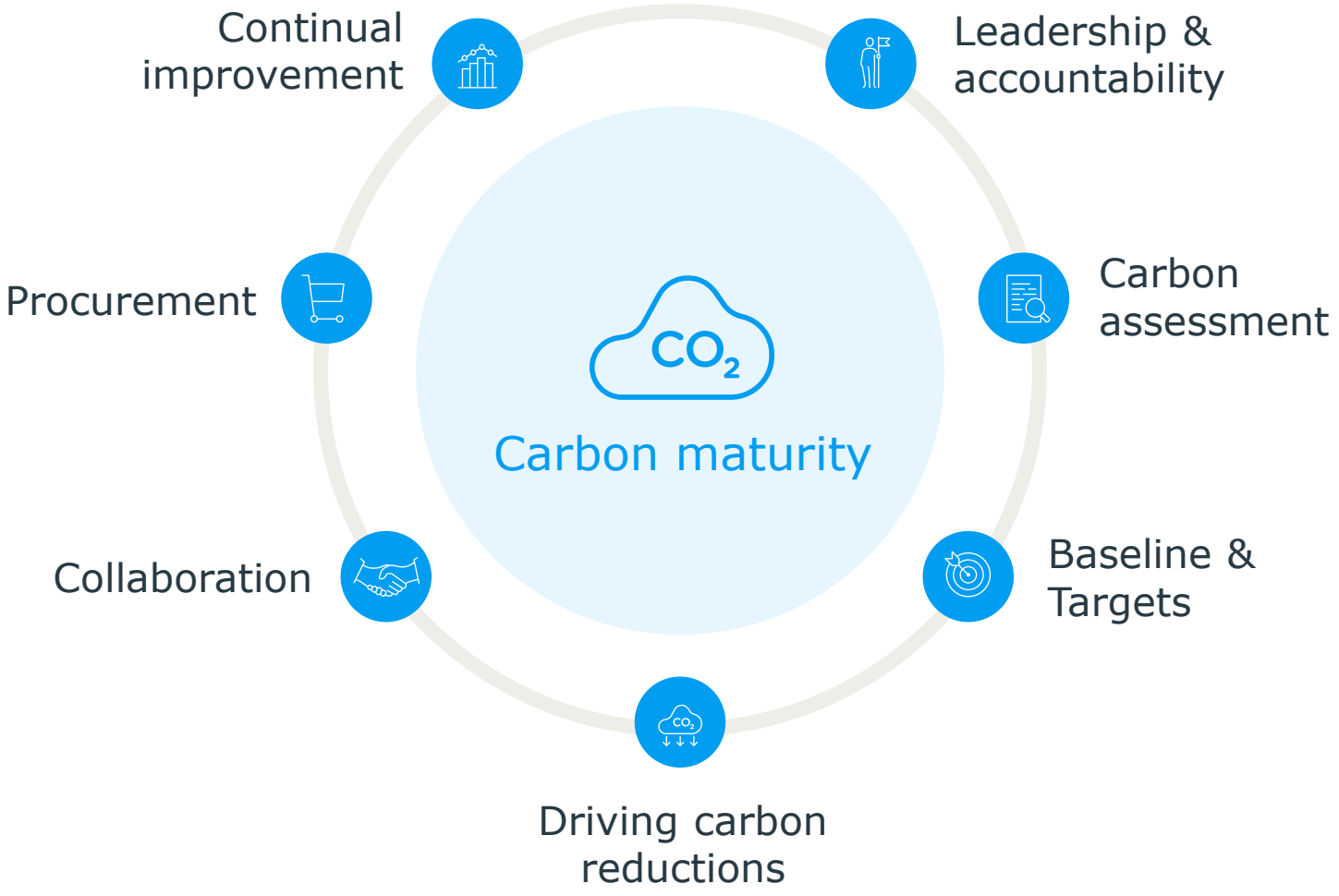
A one-size-fits-all best practice.

It’s a guidance for different levels of maturity of stakeholders and constituencies.

The next CSRD reporting.

It’s a vehicle to share best practice.

Carbon management components

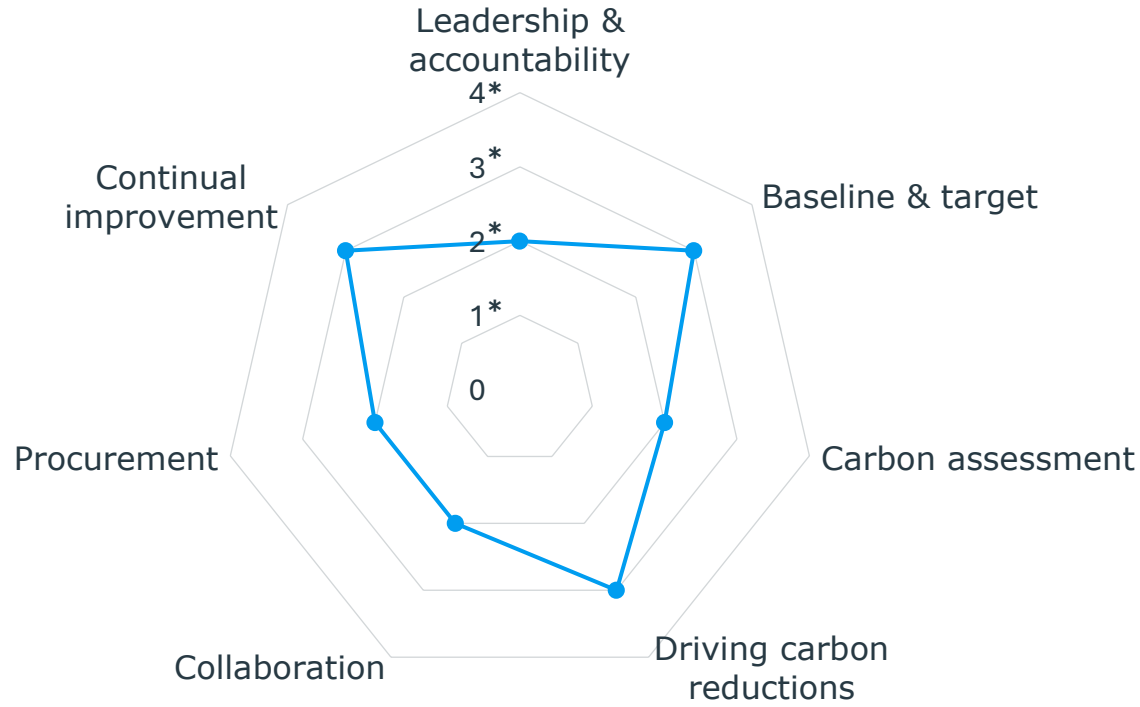


The FIDIC CMF carbon maturity levels

Level 1: Acknowledging 	Carbon management sits with the sustainability professionals who support the designers with understanding where the carbon is. **Carbon reduction mindset starting being built.**	Doing things BETTER
Level 2: Intervening 	Design teams understand carbon management and are actively considering low carbon solutions. Client leadership not consistent and some **low carbon low cost solutions are prioritised and implemented**.	
Level 3 : Achieving 	Project Executive (in client teams) is accountable for carbon management. **Each value chain member actively engaged**. Carbon embedded in **decision-making** process. Design teams **implement low carbon solutions** and project meets set carbon targets	
Level 4: Pioneering 	**Carbon shapes project brief.** Project team (client, planners, consultants) influences conversations to define the right project that has moderate carbon impact across the system. Carbon embedded in project governance and project teams consider systems-level decarbonisation	Doing things DIFFERENTLY

The FIDIC CMF project maturity tool

Understanding a project team's carbon management maturity using the FIDIC CMF



*1 – Level 1; 2 – Level 2; 3 – Level 3; 4 – Level 4

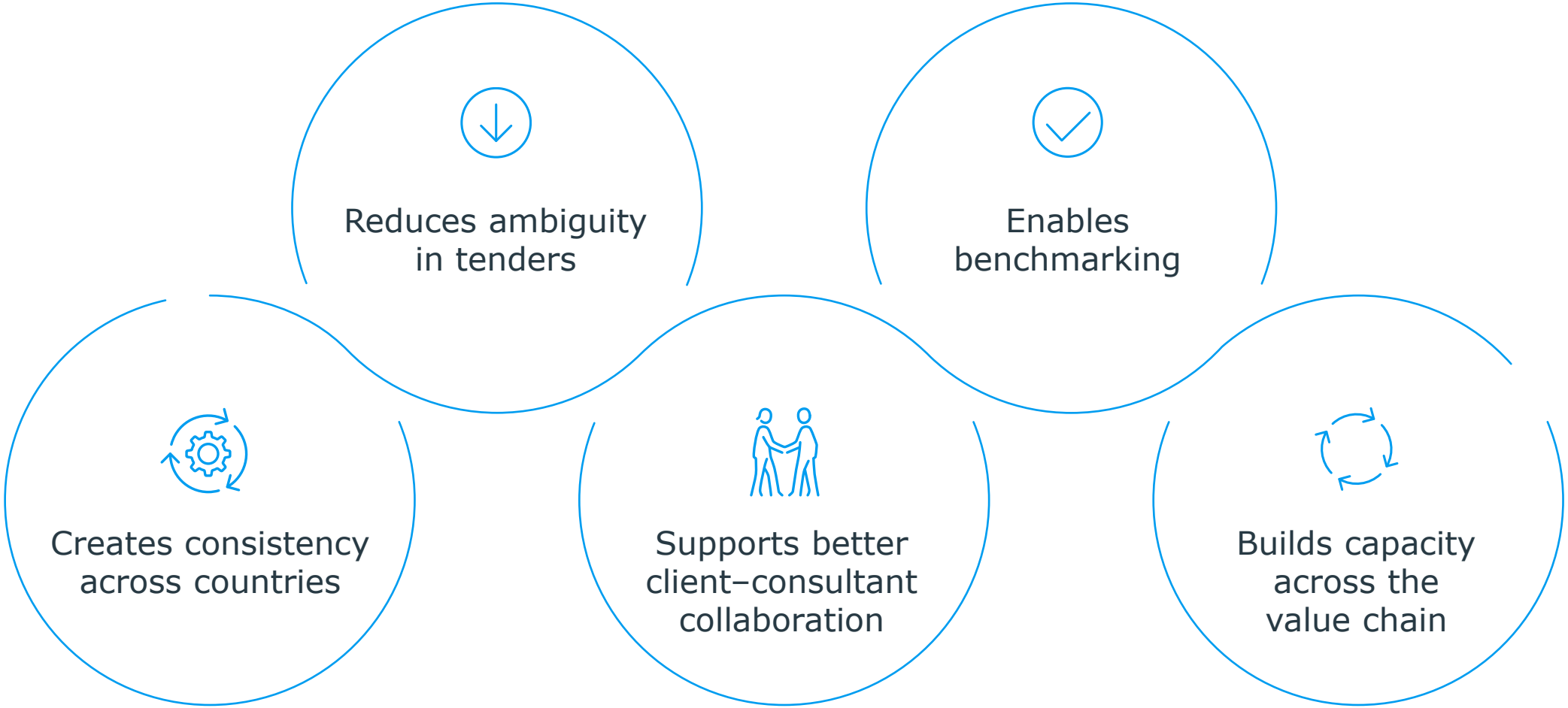
Level 1:
Acknowledging

Level 2:
Intervening

Level 3 :
Achieving

Level 4:
Pioneering

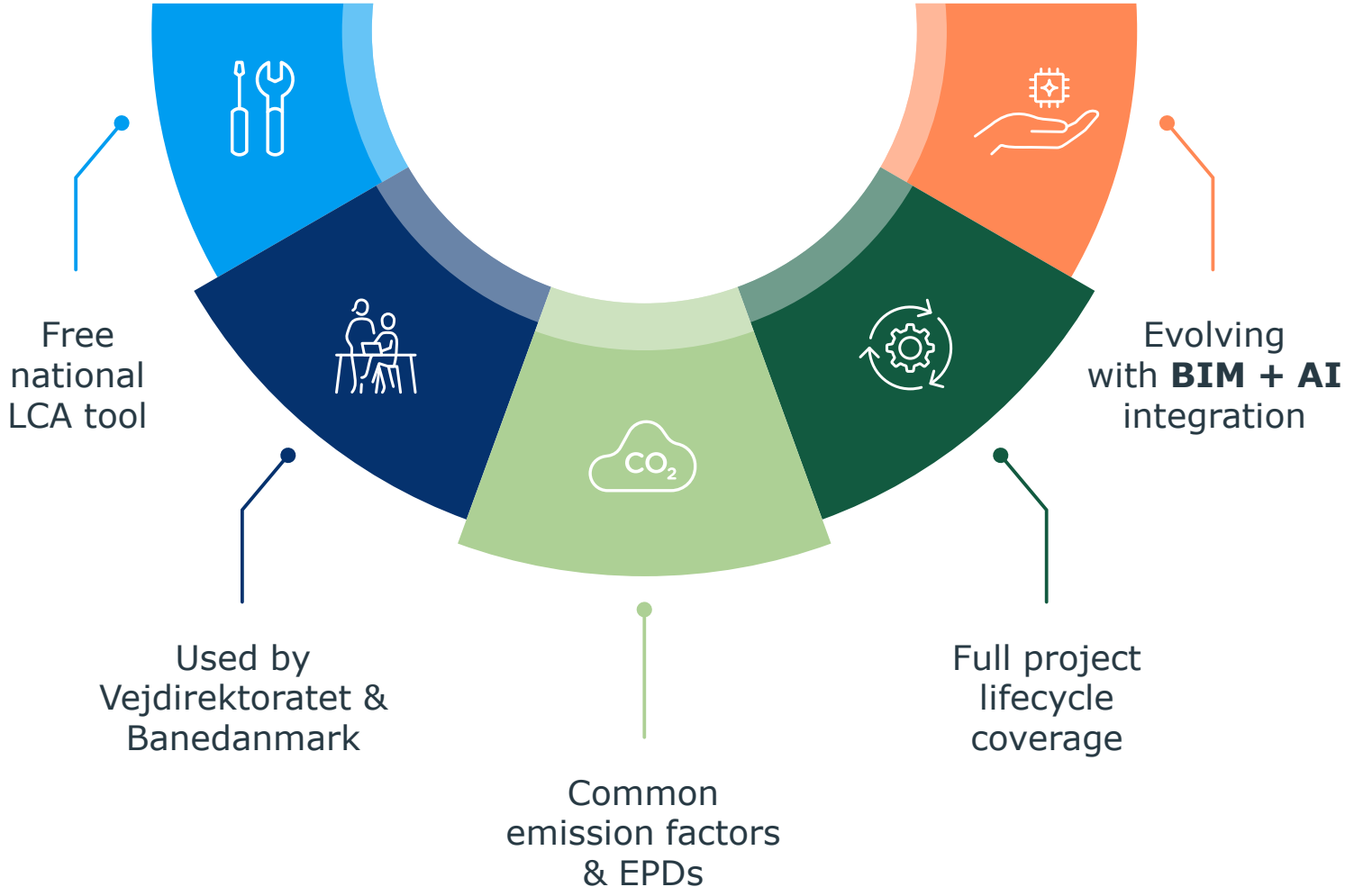
Why global frameworks matter



National best practice: Example - Denmark's InfraLCA

Linking Global + National + Practice

- FIDIC CMF → global process
- InfraLCA → national implementation
- Ramboll Carbon Levels → everyday delivery
  - Shared principles
  - Consistent workflows
  - Scalable impact



Ambition Level 1
Understanding

The goal is to understand where the carbon hotspots are and identify key considerations for improving the design.

Summary of Rambolls embodied carbon management guidelines for internal use for infrastructure projects

Overview of the stages needed for Ambition Level 1

01 Project initiation and scope definition:

Identify the project's scope and key components to understand the boundaries for the carbon estimation.

02 Data collection:

Gather data on major materials and activities that significantly contribute to the project's carbon footprint or use relevant case studies to apply experience and knowledge from previous projects.

03 Rough estimation:

Use basic carbon coefficients or typical values from previous projects and apply them to the collected data to estimate the project's carbon emissions within a 5 – 10-hour timeframe or about 1% of the project budget.

04 Report:

Compile the findings into a brief report highlighting the rough estimation of the project’s carbon footprint and what are the carbon hotspots.

Ambition Level 2 Quantification

The goal is to conduct detailed carbon accounting and provide recommendations on how to improve the design, along with the potential impact of these improvements.

Summary of Rambolls embodied carbon management guidelines for internal use for infrastructure projects

Overview of the stages needed for Ambition Level 2

01 Detailed data collection:

Collect comprehensive data on all materials, processes, and activities involved in the project.

02 Use of carbon accounting tool:

Input the detailed data into a carbon accounting tool to calculate a carbon footprint.

03 Analysis and recommendations:

Analyse the results to identify areas with the highest carbon impact and develop specific, experience-based recommendations for reducing the project’s carbon emissions.

04 Recommendation report:

Produce a detailed report that includes the carbon footprint calculation results and actionable recommendations for emission reduction.

Ambition Level 3
Transformation

The goal is to engage with all stakeholders, actively manage carbon emissions, and optimise the design for a low carbon alternative

Summary of Rambolls embodied carbon management guidelines for internal use for infrastructure projects

Overview of the stages needed for Ambition Level 3

01 Data collection and analysis:

Gather and analyse extensive data on every aspect of the project, considering the entire lifecycle of the project's outputs.

02 Integrated carbon management planning:

Use the carbon accounting tool in conjunction with team expertise to develop an integrated carbon management plan. This plan should cover accounting, design optimisation, and continuous reporting.

03 Implementation of recommendations:

Work collaboratively across disciplines to implement the design optimisations and solutions identified to reduce the carbon footprint.

04 Continuous monitoring and reporting:

Establish mechanisms for ongoing monitoring of the project's carbon footprint and reporting on the effectiveness of the implemented solutions.

05 Stakeholder engagement and reporting:

Engage with all stakeholders, including clients, to report progress and outcomes, encouraging them to prioritise carbon accounting and sustainable design optimisations.

Example of a Digital carbon management tool - ORIS

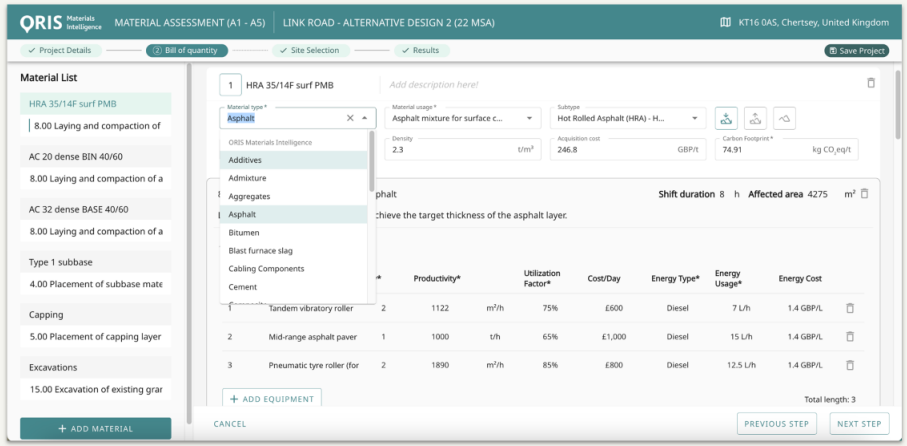
- Carbon + cost + materials combined
- Early-phase optimisation
- Rapid scenarios (concrete, steel, asphalt, aggregates)
- Connects to BIM & LCA workflows
- Builds experience-based carbon database

Bill of quantity

Select your materials specifications among a consistent and centralised cloud-based database of materials

Conducting Material Assessments in ORIS

Measure & Optimize carbon, costs & materials consumption



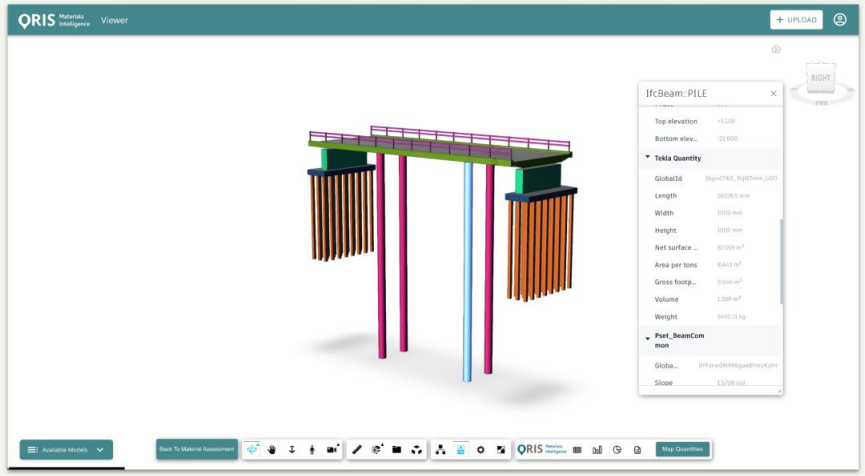
open BIM module

Streamlined web-based BIM viewer allowing automatic BOQ extraction, and universal format compatibility (IFC, RVT, DWG, DGN…) without the need for plug ins.

The open BIM module empowers project teams to go from designs to carbon footprint in minutes.

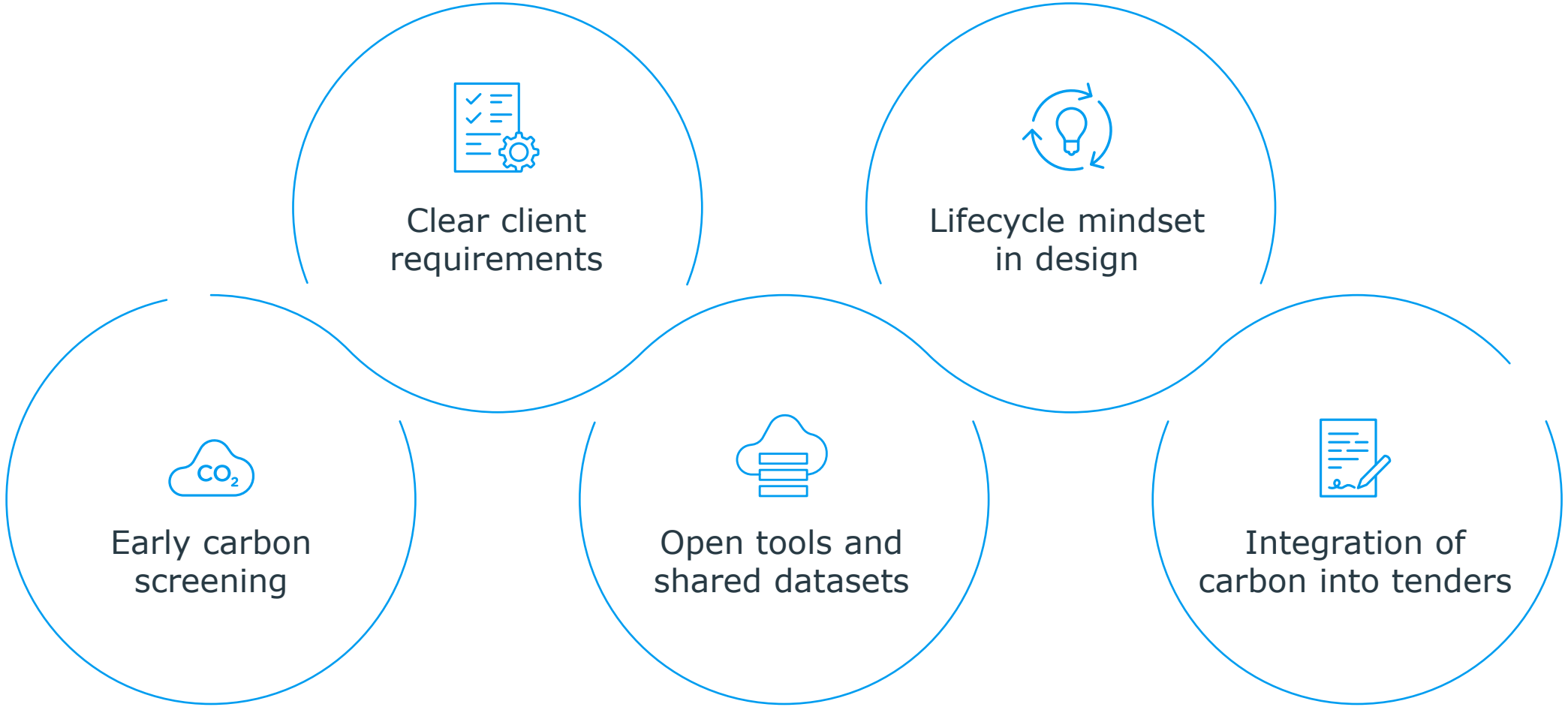
open BIM Module

Integrating BIM designs for Seamless Carbon Calculations



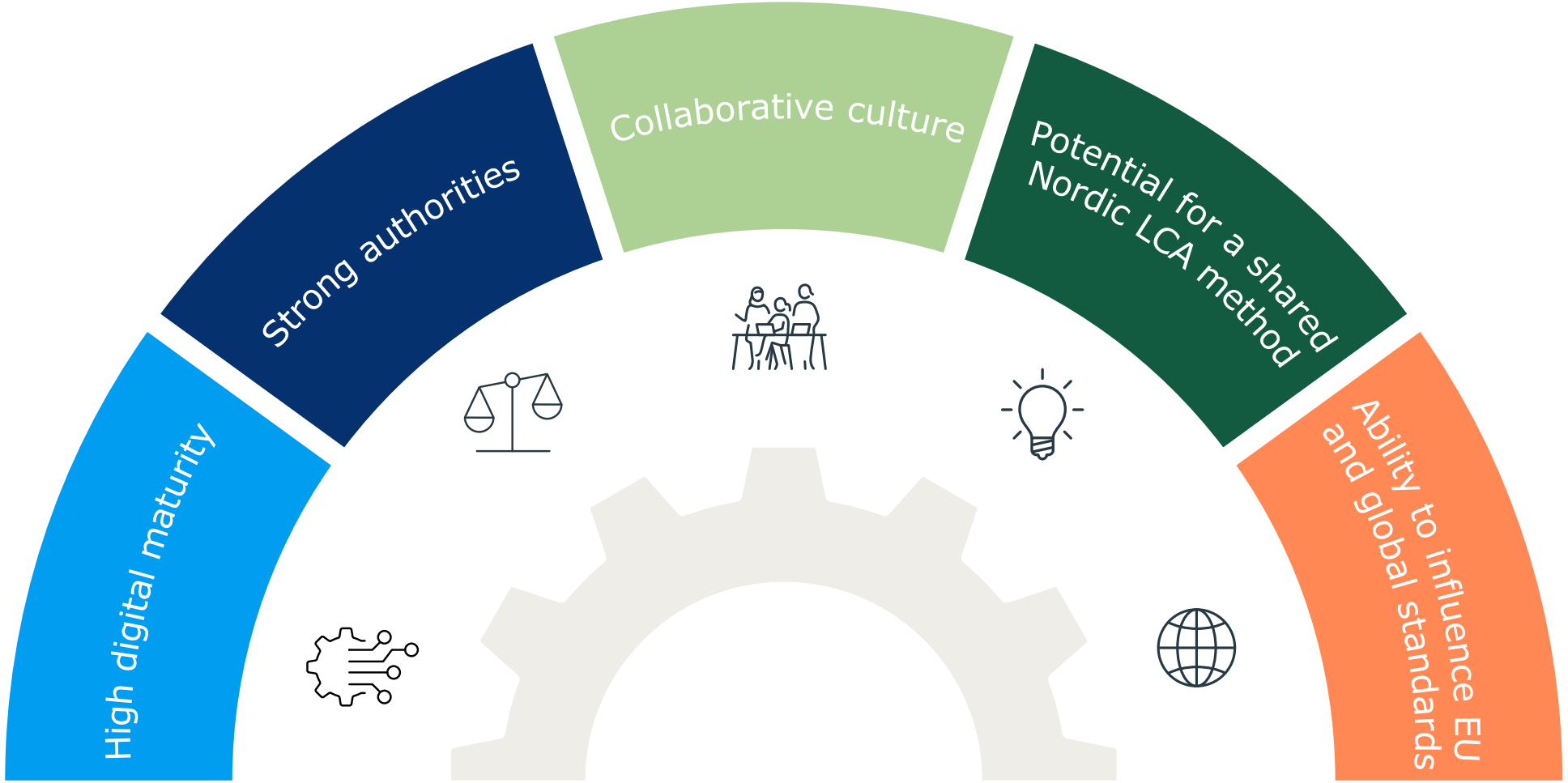
We have the processes and the tools – how do we implement those in all relevant projects?

Global best practices (Today)



Next practices (Emerging)

Nordic leadership potential



Call to action

Carbon management is not reporting.

It is design — and design is our biggest climate lever.

Thank you!

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Sustainable change.

Typical questions

Typical Questions from Audience

- “How to get started?”
- “How can we compare projects across countries?”
- “What reduction potential is realistic?”
- “Where does AI help most?”
- “What is the biggest barrier today?”

Answers

- Start simple: Level 1 screening + InfraLCA/CMF structure
- CMF aligns process, even if data differs
- 20–40% reductions common in early design
- BIM-to-LCA automation + material substitution
- Biggest barrier: fragmented methods + inconsistent requirements

Bright ideas. Sustainable change.

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