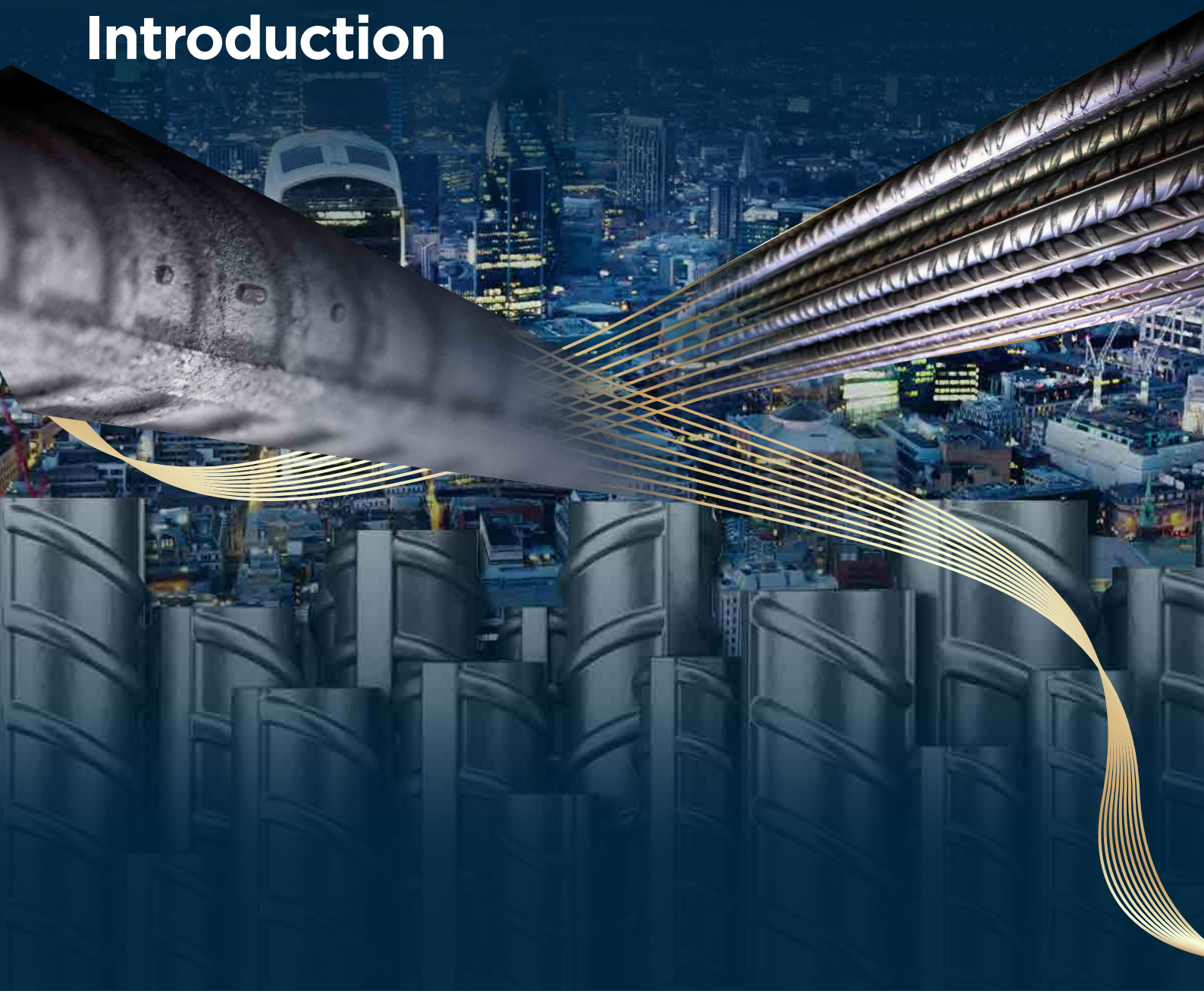
The CARES Guide to Product Certification

Part 12
2025

Digitising the reinforcing steels (rebar) value chain

Contents (click to navigate)

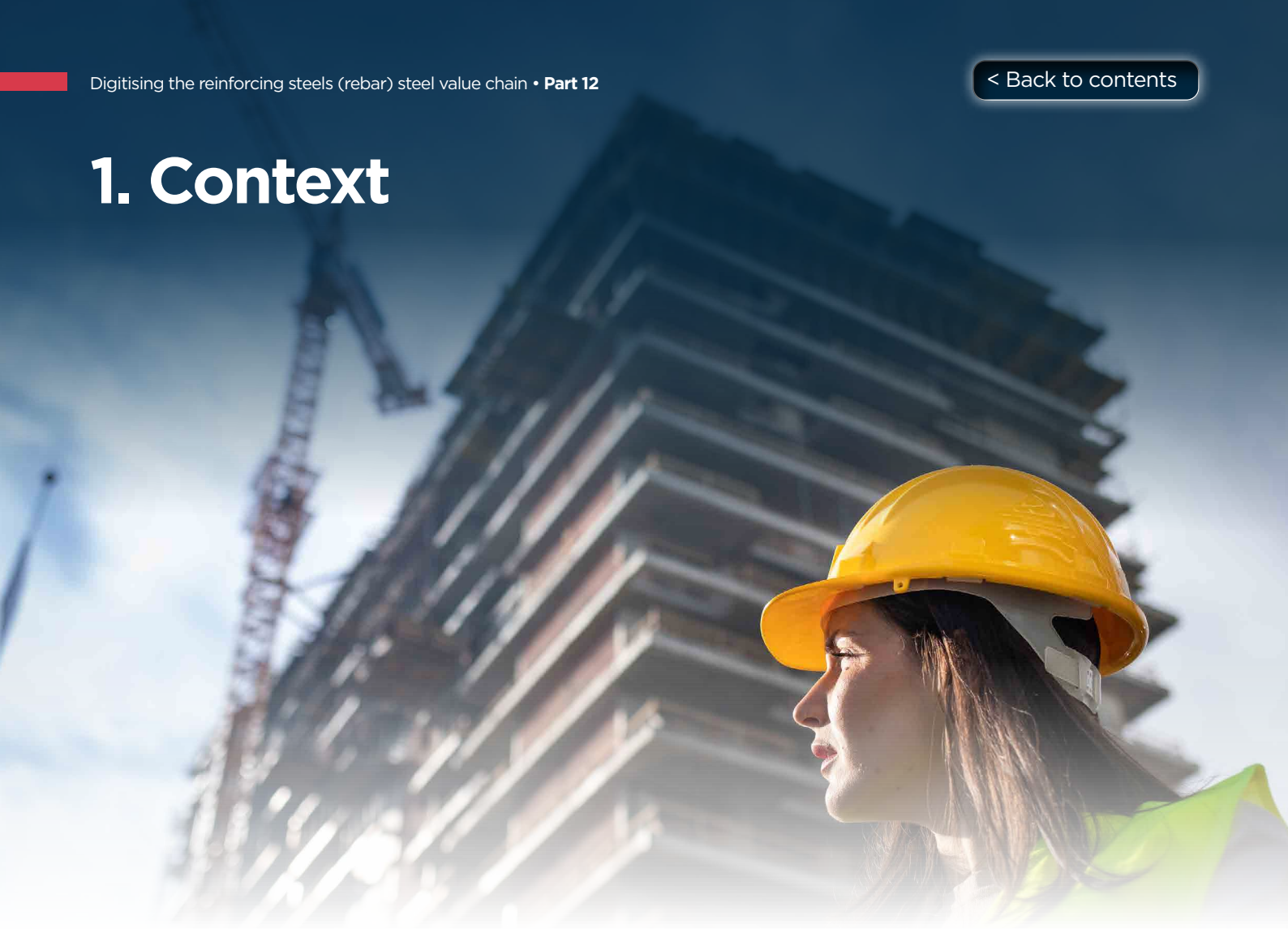
Introduction



Part 12 of the CARES Guide highlights the strategic transformation underway in the reinforcing steel value chain through advanced digitalisation. In direct response to the UK Government's Construction Products Reform Green Paper CP1278 (Feb 2025) [1], this Guide outlines how trusted digital product information is becoming a critical enabler for traceable, quality assured, low-carbon reinforcing steel.

It introduces the CARES Cloud [2] and its digital ecosystem, which securely hosts third-party verified, consistent, and machine-readable data on reinforcing steel products. This ensures that environmental and quality credentials remain transparently linked to physical materials throughout the supply chain - from source to site to structure - supporting 100% product traceability. Backed by several projects, this Guide demonstrates how digital assurance of reinforcing steel not only aligns with policy goals but also delivers real commercial and compliance advantages.

1. Context



Confidence in construction materials has been deeply shaken in recent years—nowhere more tragically than in the Grenfell Tower fire, where systemic regulatory and supply chain failures contributed to the loss of 72 lives [3]. The Phase 2 Inquiry exposed how third-party certification can fail when trust is misplaced, oversight is weak, and documentation lacks transparency or verification. As outlined in the UK Government's Green Paper CP1278 (Feb 2025), there is now a clear and urgent policy direction: data integrity, traceability, and accountability must be embedded into the procurement of all safety-critical materials.

Reinforcing steel is among the most safety-critical materials in any structure—yet the industry continues to rely on legacy systems, siloed formats, and inconsistent verification to prove its provenance and environmental impact. C-suite decision-makers face increasing scrutiny from regulators, clients, and investors to deliver on net-zero commitments while ensuring that materials are legally compliant, ethically sourced, and verifiably safe.

Environmental Product Declarations (EPDs) are vital tools in this effort, but accessing accurate, auditable data on embodied carbon—especially Global Warming Potential (GWP)—remains a significant challenge across much of the construction supply chain. This has real implications for procurement risk, Environmental, Social and Governance (ESG) reporting, and the ability to meet low-carbon design objectives.

To meet this challenge, standards such as the CARES Sustainable Constructional Steel (SCS) certification scheme [4] are now evolving into digital-first systems (Find further details in CARES Guide Part 4 - Sustainability Certification for Constructional Steels) [5]. These ensure that rebar is certified not only for conformity and responsible sourcing but also for transparent, consistent carbon reporting. While traditional paper-based certificates have served their purpose, they are no longer fit for a modern supply chain that demands real-time assurance, interoperability, and 100% product traceability.

As highlighted in CP1278, the construction industry must now shift to common, machine-readable data formats that enable cross-sector collaboration and accountability. For high-emission sectors like steel and cement—responsible for an estimated 15–17% of global CO2eq emissions—this is both a regulatory inevitability and a business imperative. According to worldsteel, over half of the 1.89 billion tonnes of steel produced globally in 2023 was used in buildings and infrastructure, with a significant proportion being reinforcing steel [6]. The lack of granular, traceable emissions data for this segment represents a blind spot in efforts to decarbonise the built environment.

Digital transformation of rebar certification is not just a compliance upgrade—it is a strategic enabler of net-zero delivery, ESG alignment, and public trust. CARES and its ecosystem partners are responding with verified digital tools that meet the expectations set out in both national policy and the hard lessons of past failures.

2. The CARES Cloud

CARES Cloud App

Figure 1. CARES Cloud Apps

CARES Upstream

CARES Auditor

CARES Downstream Fabricator

CARES Downstream Contractor

The CARES Cloud platform, first introduced in 2016, was developed to address and solve these real and urgent issues, bringing simplicity to a complex supply chain while restoring trust where it's missing.

As an independent, profit for purpose certification body (with no shareholders and all profit reinvested towards its mission), CARES has developed its Cloud based digital ecosystem to securely hold third-party, consistent, digital data. By working collaboratively with stakeholders, the CARES Cloud tracks every batch of reinforcing steel from its point of origin at the manufacturers to the construction site. It enables transfer of compliance information and carbon footprint data plus sustainability credentials to achieve client specifications and credits in building and infrastructure rating systems such as BREEAM [7].

This Cloud-based solution provides 100% accurate, reliable, easily accessible product information and evidence of assurance and the journey through the supply chain, with the ability to update Building Information Modelling (BIM) models with data collected from the supply chain and seamless connectivity to other systems via secure Application Programme Interfaces (API's).

The digital platform uses customisable dashboards and a suite of Apps (Figure 1) to allow online and hand-held scanners and smartphones to trace what has been manufactured, procured, fabricated and delivered in real-time. It replaces existing manual, paper-based processes which are labour intensive, and vulnerable to damage or malicious alteration and potentially leave significant gaps in assurance trails. The CARES Cloud also enables a value-based procurement approach providing a reliable digital twin of the installed (fixed) reinforcement (Enabler of world's first digital twin for the build environment).

2.1. Traceability and digital assurance

When the molten steel is cast and rolled the unique CARES bar marks are rolled in to each piece of rebar, which enable individual mills and the country of production to be identified. It is then batched, labelled as shown and delivered to the fabricator. During cutting, bending and welding the cast number is accompanied by a 'bar schedule reference' with the 'bar mark' retained during this process and through to the construction site.

All reinforcement manufacturers, fabricators and all CARES certificates of approval are recorded and summarised on a dedicated assurance dashboard. In turn, this information is cross-referenced against product delivery data to confirm authorised receipt at the project site. All information is recorded on the CARES Cloud platform. The data provides several key performance indicators for all reinforcement delivered to the project. Suppliers' certifications are routinely validated, and made permanently available on the assurance and carbon management dashboards. This information can be accessed by contractors using the CARES App.

All CARES approved reinforcing steels are 100% traceable at a batch and product level to the original manufacturer using an Identity Preserved chain of custody system. ISO 22095 [8] defined Identity Preserved and independent testing by CARES ensures the exact grade specified is produced with a unique cast number.

2.2 Carbon footprint benefits

At the design stage, structural engineers need to understand the environmental impact of their designs and then rely upon contractors to collect relevant data from the supply chain during the construction phase. Generic carbon footprint datasets are often used. For steel products often the Bath-ICE (Inventory of Carbon and Energy) or worldsteel datasets are used. worldsteel reports a GWP of 1.91 tonnes CO2eq per tonne of crude steel produced (Figure 2. Sustainability indicators of the steel industry from worldsteel [9]). This data represents all types of steels such as reinforcing steels, structural steels, special steels and flat steels and as such tends to overestimate the Global Warming Potential of reinforcement steels used in the UK. CARES produces a sector average EPD [10] based specifically on reinforcement manufacturers using the Electric Arc Furnace (EAF) steel recycling route, which covers most of the reinforcement steels used in the UK. The latest sector average using 2021 data is 0.787 tonnes CO2eq per tonne and is recommended to be used at the design stage.

The EPD programme operators accept data provided from a manufacturer to create the EPD and the permitted period of validity of the EPD is five years according to EN 15804:2012+A2:2019/AC2021.

However, the CARES EPD programme [11] takes a more rigorous approach and requires the raw data to be audited during the annual CARES Sustainability audit by a CARES auditor before submitting the data to the EPD verifier to create the EPD report (Figure 3). The validity of the CARES EPD is three years. This means EPDs from the CARES programme have high-quality, more accurate data and the programme allows manufacturers to communicate carbon reductions/improvements in performance at least every three years.

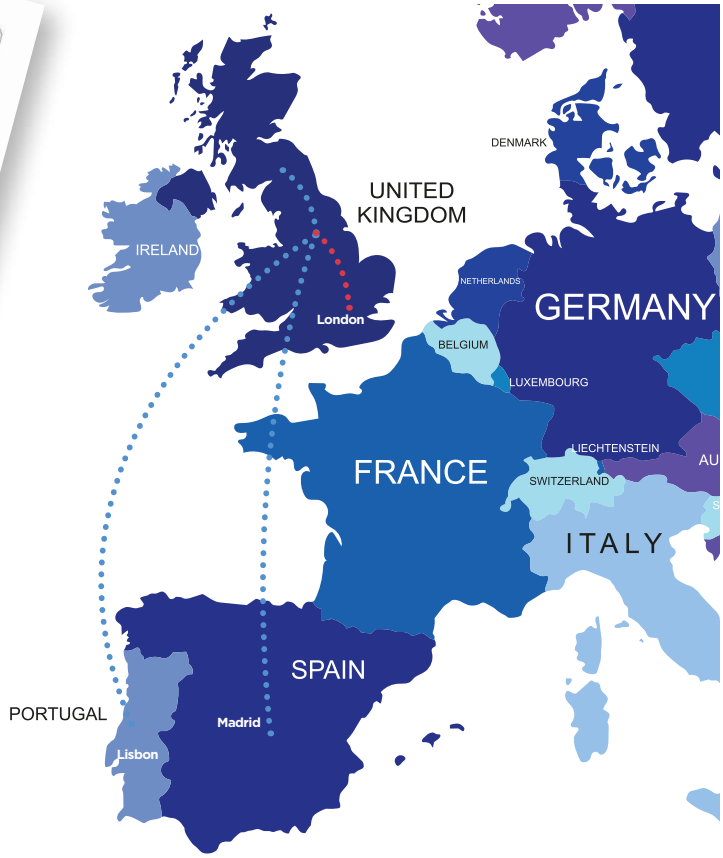
Figure 2. worldsteel average CO2eq per tonne of crude steel

The CARES SCS scheme also requires an EN 15804:2012+A2:2019/AC2021 compliant carbon footprint from the reinforcement fabricators, which is also publicly available and provides the additional GWP from the processing activities.

Figure 3. An illustration of an EPD report from the CARES EPD programme verified by third-party

CARES can provide an estimate of the GWP from the transport between manufacturer to fabricator, which is not in the EPD model as it can be highly variable and because the actual rebar producers used by any given construction project are unknown at the time of the EPD creation. Figure 4 provides an illustration of a project supply chain for reinforcing bar.

Figure 4. An illustration of the reinforcing steel journey – From Manufacturer (Steel mill) to fabricator to construction project site - Blue Lines – Manufacturer (Steel mill) to Fabricator, Red Line – Fabricator to Construction Project Site



3. HS2 Euston station project

CARES has partnered with Mace Dragados JV and Digital Construction Solutions to use the digital chain of custody system for rebar on the HS2 Euston station project. The trial was undertaken throughout a value chain working on two of the early works piling packages and was supported by HS2's innovation fund.

The trial aimed to provide a real-world test of the CARES Cloud on a major infrastructure project. This provides the methodology, tools, and system to enable real-time provenance data for rebar to be accessed. This included digitally authenticated CARES certificates of approval to the required product conformity and quality standards, and its carbon footprint data from verified EPDs for the whole supply chain.

A secure dashboard provides an overview of the CARES product conformity approvals status of each bundle of rebar, ensuring it is of the grade specified, and a digital Product Material Passport of the rebar used, together with quality and responsible sourcing certificates, and the EPD for the actual material used. Figure 5 and Figure 6 show sample assurance dashboard for Fabricator and Manufacturer (Steel mill) and access to digital certificates.

Figure 5. CARES Cloud – Assurance dashboard - Fabricator CARES certificates of approval

Fabricator(s)

Drag a column header here to group its column

Search

Project Name	Company Name	Approval	Version	Type Of Certificate	Approval Date	Expiry Date	QR Code
[redacted]	[redacted]	1855	2	Quality Management System Certification	02/09/2024	01/09/2027	1855
[redacted]	[redacted]	1856	1	Product Conformity Certification - BS 8666 and related activities	01/01/2025	31/12/2025	
[redacted]	[redacted]	1983	1	Environmental Management System Certification	16/05/2022	15/05/2025	1983
[redacted]	[redacted]	1984	1	Occupational Health and Safety Management System Certification 45001	16/05/2022	15/05/2025	1984

1 of 1 pages (4 items)

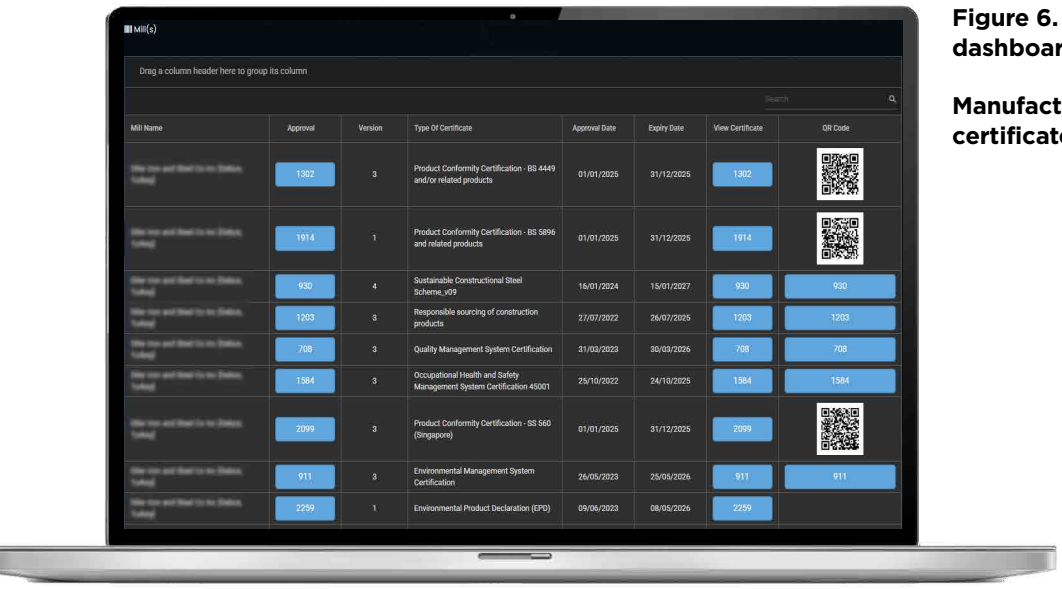


Figure 6. CARES Cloud – Assurance dashboard

Manufacturer (Steel mill) CARES certificates of approval

3.1 Outcomes of the use of the CARES Cloud at HS2 Euston station project

3.1.1. HS2 Learning Legacy

The CARES digital supply chain solution features in HS2's 'Innovation' resource, part of the official Learning Legacy record of best practice [12] [13].

3.1.2. Well received by end users

Feedback from the supply chain demonstrates the tool was well received by users:

"Doing everything via the app has made the whole process a lot easier." – Fabricator user

"All is still working well! I have now scanned and synchronised all cage deliveries. The app is easy to use. With regards to the Carbon and Tonnage, I believe this has been of value to the Client." – Sub-contractor user

3.1.3. Delivered on all the goals set:

1. 100% of steel reinforcement was delivered with a complete set of assurance records; all CARES certificates of approval; and complete carbon footprint data for all reinforcement manufacturers and fabricators.
2. The data collection process using the CARES Cloud Apps enabled a dedicated project dashboard to record, analyse and summarise the data along the supply chain, in real-time. Summary Material Compliance Report (MCR) reports were also provided, as per the test example in Figure 7.
3. Supply chain transparency delivered via the dashboard, provided a single source of truth which increased confidence in the product's integrity, production safety record and carbon accountability.
4. Carbon savings data could be accurately quantified, based on the actual manufacturer of the reinforcement, the quantities used, production methods and origin of manufacture.
5. The scopes of approval of the reinforcement manufacturers and fabricators were readily validated.

3.1.4. Improved productivity

Site productivity was greatly improved through reducing operational time and costs by implementing digital recording of material receipts and demonstrating that paper pro-forma record sheets can be replaced by the system. The trial covered 712 tonnes of reinforcement and delivered an enabled benefit saving of 11 days. Assuming a quantity of 60,000 tonnes this could provide a saving of about 900 days in processing time. Discounted Cash Flow analysis of this time saving shows a positive Net Present Value against the project implementation.

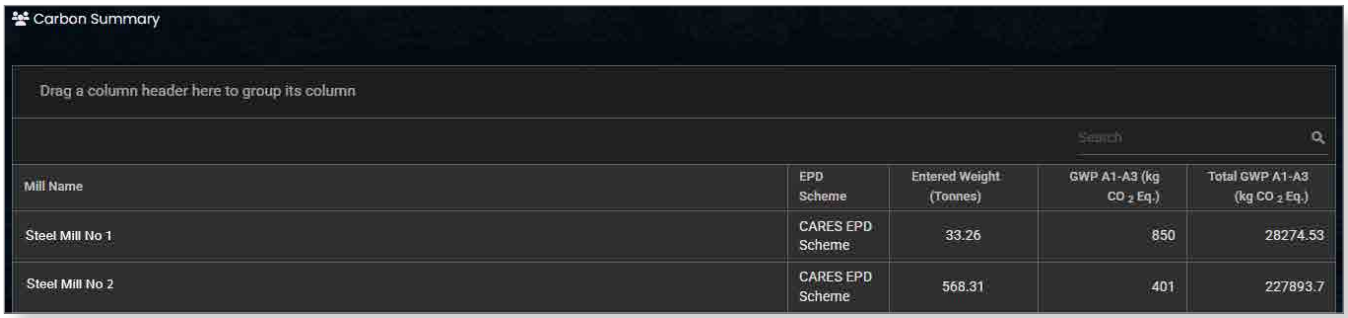
3.1.5. Accurate as-built carbon accounting

The CARES Cloud enabled the use of actual carbon footprint data during the construction phase and overcomes many of the challenges identified by Kaethner and Yang [14], such as a time lag in receiving data, inconsistent formats and an inability to assign available information to a particular batch of incoming materials.

It collated the carbon footprint data for all reinforcement manufacturers in the UK and elsewhere and the tonnage from each manufacturer was reported and analysed via the CARES Cloud Carbon dashboard (Figure 8). It should be noted that using the traditional approach the tonnage supplied by each rebar manufacturer is not readily available or routinely provided.

Figure 7. Test example of Material Compliance Report

Figure 8. An illustration of CARES Cloud carbon dashboard



Mill Name	EPD Scheme	Entered Weight (Tonnes)	GWP A1-A3 (kg CO_2 Eq.)	Total GWP A1-A3 (kg CO_2 Eq.)
Steel Mill No 1	CARES EPD Scheme	33.26	850	28274.53
Steel Mill No 2	CARES EPD Scheme	568.31	401	227893.7

3.1.6. Carbon footprint saving

By providing easily accessible GWP data, which previously was either unavailable or required considerable effort to source, the CARES Cloud unlocked the ability of the procurement team to make informed decisions and give preference to lower emission steel sources, as well as enabling them to accurately calculate the actual emissions associated with the reinforcing bar. This delivering an enabled benefit (non-cash) saving of £19,000 based on the carbon price used at the time of £50 per tonne. This would create the potential for a (non-cash) saving of about £3.6 million in CO2eq for 60,000 tonnes of rebar based on a carbon price of £50 per tonne of CO2eq and a GWP of 0.760 tonnes CO2eq per tonne of rebar (CARES sector average at the time of the project).

3.1.7. Decarbonisation contribution

The carbon savings and digital data exchange support HS2's carbon reduction plan [15] and commitments, and this system can contribute towards any company's corporate commitments to reduce carbon emissions. For example, in line with defined industry pathways such as Construction Leadership Council's Co2nstruct Zero [16] which promote the increased procurement of low emission steel.

3.1.8. Improved assurance processes

CARES Cloud provided robust detailed assurance evidence as well as reliable, accurate, easily accessible product information and evidence of assurance for inclusion in project BIM models, enabling seamless connectivity to other systems via APIs. All CARES-approved reinforcement manufacturers, fabricators, and processors were available on the dashboard, including any revisions to their scopes of approval during the project.

CARES Cloud provided data from the source mill to the site, proving chain of custody and EPD information which enabled the accurate reporting of quantities supplied from UK and non-UK manufacturers.

3.1.9. Compliance with Procurement Policy Note PPN 04/23

The CARES Cloud provided HS2 the toolset to comply with UK Government's commitment in supporting UK businesses and industry, decarbonisation and levelling up through their policy note PPN 04/23 Procuring Steel in Government Contracts [17] by:

- Item 9 (b): In-scope organisations are required to collate data and provide an annual steel data return

- Item 11:In-scope organisations are required to submit, to the Department for Business and Trade (DBT), the steel origin data as set out in the Inspection Certificate (EN 10204 Type 3.1).

In-scope organisations are required to indicate whether the origin stated is also recorded in the certificate as where the steel was melted and poured.
Mace Dragados JV was able to comply fully with this procurement policy notice with confidence, and integrity by using the CARES Cloud.

3.2. Learnings and recommendations

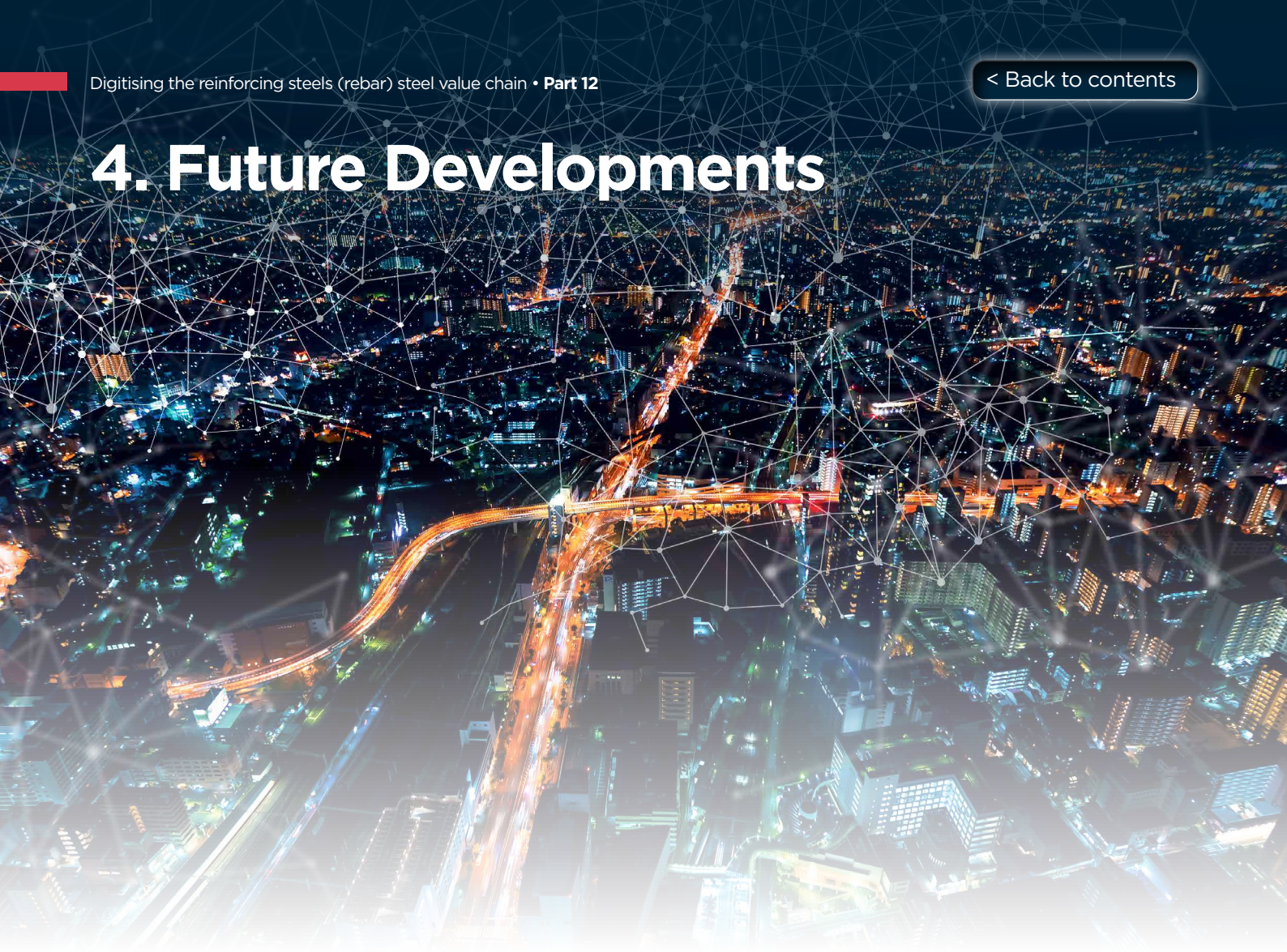
The use of the CARES Cloud provided a highly efficient method to collect quality-assured data for the steel rebar value chain and to use it to meet HS2 goals. The application of the CARES Cloud, the learning and its benefits have also been described in a series of YouTube videos [18] [19] [20] and fibUK (IstructE) developments in structural concrete conference [21].

The transparency offered by the system meant that it was possible to state authoritatively and with a high degree of confidence, how the project complied with HS2 requirements and UK Government Policy to re-design procurement specifications and award criteria.

While using the CARES Cloud eliminates manual efforts to collect and verify data and information across the supply chain, future projects using CARES Cloud should consider implementing appropriate commercial models for project teams, subcontractors, and suppliers to use the tool, so that its use is maximised. The system proved to add value and efficiencies, not cost to the programme.

Engaging design engineers, fabricators, contractors, and clients in the use of CARES Cloud at an early stage in the project could improve sharing of information supporting planned and actual upfront 'embodied carbon' to be established and plans to reduce them to be implemented.

4. Future Developments



CARES is committed to delivering the highest level of assurance and driving efficiencies through digital technology in the design, construction, maintenance and operation of assets built with CARES certified constructional steel products. Its digital infrastructure is being continuously developed to help enable:

- **Seamless connection of different systems to enable communication via a secure API with other systems for example, BIM and Rebar Cloud [22]**
- **Access to the independently verified EPD will support product declarations, resource efficiency and circular economy issues**
- **Improvements to materials efficiency and design efficiency by providing confidence in the conformance and consistency of the reinforcing steel**
- **Tracking of all rebar received on-site and reducing the rebar 'loss' and misuse on-site**
- **Carbon footprint performance levels to be set for the rebar manufacturers as part of procurement specifications. For example, specification clauses in CARES specification guide [23]**
- **Improved cooperation between client and contractor business functions and supply chains**
- **A secure system of product provenance – and traceability – from the design stage, through to an 'as-built digital twin' including all data required to meet current and future safety and sustainability regulations. This helps address key findings of the Grenfell Fire tragedy set out in the Hackitt report (Building a Safer Future) [24], together with the Building Safety Act 'Golden Thread of information' secondary regulation, and the public inquiry report [25]. It also aligns with the UK Construction Playbook, which sets out key policies and guidance for how public works projects and programmes are assessed, procured and delivered [26]**
- **The incorporation of further information and data from CARES SCS scheme criteria into the Cloud, to supports supply chain due diligence, modern slavery and other legal disclosure requirements and responsible sourcing practices**
- **Further enrichment and customisation of all stakeholder dashboards**

5. Global application of the CARES Cloud

The CARES Cloud is not only driving digital transformation within the UK but is also being widely adopted across several major international projects and regulatory frameworks, further demonstrating its global relevance and versatility in the reinforcing steel value chain.

Current applications include:

- **HS2 Curzon Street Station, Birmingham, UK [27]**

  The CARES Cloud is actively supporting the delivery of HS2's Curzon Street Station, providing full traceability, real-time carbon reporting, and assurance across the reinforcing steel supply chain, aligned with UK Government procurement and sustainability policies.

- **United Arab Emirates (UAE) Steel Regulation – Cabinet Decision No. 121/2023 on the UAE Scheme for Steel Bars for Concrete Reinforcement [28]**

  From September 2024, the CARES Cloud has played a key role in supporting the implementation of the UAE's national steel regulation, covering more than 2 million tonnes of reinforcement products to date. CARES Cloud provides the necessary digital infrastructure to ensure regulatory compliance and supply chain transparency in real time and at scale.

- **Hong Kong**

  CARES Cloud is in use across the Hong Kong construction sector, supporting the traceability and digital assurance of over 3 million tonnes of reinforcement products, contributing to improved product compliance and traceability.

- **Singapore**

  With more than 5 million tonnes of reinforcement products managed to date, CARES Cloud is integral to the digital management and assurance of reinforcing steels in Singapore's built environment, providing trusted, transparent product data to meet stringent regulatory and sustainability requirements.

6. How to specify CARES assured digital supply chain

Specification Guide

All reinforcement manufacturers and suppliers shall use the 'CARES Cloud' digital traceability platform.

References

1. UK Government's Construction Products Reform Green paper CP1278 https://www.gov.uk/government/consultations/construction-products-reform-green-paper (accessed 15th July 2025)
2. CARES Cloud https://cares.cloud/ (accessed 15th July 2025)
3. Grenfell Tower Inquiry https://www.grenfelltowerinquiry.org.uk/ (accessed 15th July 2025)
4. CARES Sustainable Constructional Steel (SCS) certification scheme https://www.carescertification.com/certification-schemes/sustainable-constructional-steel (accessed 15th July 2025)
5. CARES Guide Part 4 - Sustainability Certification for Constructional Steels https://www.carescertification/content/HtmlContent/8f1c1746-f707-4485-882f-b6ffd23de879/defc7fc9-31e1-46c4-838d-748ddd20a94a/Part%204%20%E2%80%93%20Sustainability%20Certification%20for%20Constructional%20Steels.pdf (accessed 15th July 2025)
6. worldsteel – World Steel in Figures 2024 https://worldsteel.org/wp-content/uploads/World-Steel-in-Figures-2024.pdf (accessed 15th July 2025)
7. BREEAM https://breeam.com/ (accessed 15th July 2025)
8. ISO 22095:2020 Chain of custody - General terminology and models https://www.iso.org/standard/72532.html (accessed 15th July 2025)
9. worldsteel - World Steel in Figures 2024 - Sustainability Indicators https://worldsteel.org/data/world-steel-in-figures/world-steel-in-figures-2024/#sustainability-indicators-of-the-steel-industry (accessed 15th July 2025)
10. CARES Sector Average EPD verified by third-party https://www.carescertification.com/content/HtmlContent/d7cc4369-ff70-4b95-8c62-24b076626737/fa959717-302d-4cc1-a0b5-40043d4d7e5f/BREGENEPD000125-CARES-Sector-Average-EPD-Scrap_EAF.pdf (accessed 15th July 2025)
11. CARES Environmental Product Declarations (EPD) Programme https://www.carescertification.com/certification-schemes/environmental-product-declarations (accessed 15th July 2025)
12. HS2 Learning Legacy - Digitising the chain of custody for Rebar: CARES Cloud https://learninglegacy.hs2.org.uk/document/digitising-the-chain-of-custody-for-rebar-cares-cloud/ (accessed 15th July 2025)
13. CARES News - CARES digital innovation features in HS2 Learning Legacy https://www.carescertification.com/news/article?id=837896ca-d001-4558-a85a-3f13ec250414 (accessed 15th July 2025)
14. Kaethner and Yang, Environmental impacts of structural materials – Finding a rational approach to default values for software. Institution of Structural Engineers, London 2011
15. HS2's Net Zero Carbon Plan https://www.hs2.org.uk/about-us/our-documents/net-zero-carbon-plan/ (accessed 15th July 2025)
16. Construction Leadership Council - CO2nstructZero https://www.constructionleadershipcouncil.co.uk/workstream/co2nstructzero/ (accessed 15th July 2025)
17. UK Government - PPN 04/23: Procuring Steel in Government Contracts https://www.gov.uk/government/publications/ppn-0423-procuring-steel-in-government-contracts (accessed 15th July 2025)
18. YouTube video – CARES Cloud Transformation https://www.youtube.com/watch?v=KejQ0pEMvHc (accessed 15th July 2025)
19. YouTube video - CARES Cloud App 2021- Steel Authentication, Quality & Assurance https://www.youtube.com/watch?v=MV8RaASItqY (accessed 15th July 2025)
20. YouTube video - CARES Cloud https://www.youtube.com/shorts/7NEGyL54FYg (accessed 15th July 2025)
21. fibUK (IstructE) Developments in structural concrete conference 2024 https://www.istructe.org/resources/training/fibuk-developments-in-structural-concrete-2024/ (accessed 15th July 2025)
22. Digital Construction Solutions – Rebar Cloud https://ukdigitalconstruct.com/Solutions/Rebar-Cloud (accessed 15th July 2025)
23. CARES Specification Guide https://www.carescertification.com/resources/specification-guide (accessed 15th July 2025)
24. The Hackitt Report (Building a Safer Future), UK Government 2020 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/707792/Building_a_Safer_Future_-_foreword_and_summary.pdf (accessed 15th July 2025)
25. Building Regulations Advisory Committee (BRAC) – Golden Thread Report - Building Regulations Advisory Committee: golden thread report – https://www.gov.uk/government/publications/building-regulations-advisory-committee-golden-thread-report/building-regulations-advisory-committee-golden-thread-report (accessed 15th July 2025)
26. Construction Playbook – Version 1.1 September 2022 https://www.gov.uk/government/publications/the-construction-playbook (accessed 15th July 2025)
27. HS2 Curzon Street Station, Birmingham, UK https://www.hs2.org.uk/building-hs2/stations/curzon-street/ (accessed 15th July 2025)
28. UAE Steel Regulation – Cabinet Decision No. 121/2023 https://www.uaelegislation.gov.ae/en/legislations/2346/download (accessed 15th July 2025)