





Centre of Excellence
for Decarbonising Roads

CATEGORISATION OF CARBON EMISSION FACTORS

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STATUS/AMENDMENT	APPROVED	APPROVED
1.0	<p>Name: Annabelle Farrington</p> <p>Role: Carbon Lead, North Campus</p> <p>Signature: </p> <p>Date: 09/12/2025</p>	<p>Name: Febin Fatima</p> <p>Role: Carbon Lead, South Campus</p> <p>Signature: </p> <p>Date: 11/12/2025</p>

Executive Summary

Centre of Excellence for Decarbonising Roads (CEDR) is part of Live Labs 2, a three-year, UK-wide £30 million programme, funded by the Department for Transport, aimed at decarbonising the local highway network. It includes seven projects, grouped by four interconnected themes, led by local authorities working alongside commercial and academic partners.

North Lanarkshire Council, with support from Amey, leads the north campus for the Centre of Excellence for Decarbonising Roads, while Transport for West Midlands, with support from Colas, leads the south campus, creating a national framework for collaboration and knowledge sharing.

Purpose and Scope

Purpose

The Categorisation of Carbon Emission Factors process, as set out in this document, seeks to clarify the process followed when giving emission factors (CO₂e covering lifecycle stages A1-A3) the classification of either Gold, Silver or Bronze, as presented on the Live Labs 2 CEDR Knowledge Bank.

The purpose of this categorisation is to ensure consistency, transparency and auditability when teams select and apply emission factors for project-level carbon reporting, procurement scoring and internal decision-making, and to reduce risk from inconsistent assumptions or undocumented data across trials.

Carbon emissions within the Live Labs 2 CEDR trials have been assessed based on the whole lifecycle stages A1-A5 (cradle to construction) in accordance with EN 15804+A2. EN 15804 is the European standard that defines the rules and reporting format for Environmental Product Declarations (EPDs) for construction products, providing a consistent, auditable framework for quantifying carbon impacts across a products lifecycle. These stages cover raw material extraction, transport to and manufacture at the factory, delivery to site and on-site installation, see. This clear separation of stages enables precise attribution of emissions to each segment of the supply chain, helping to identify areas for potential reduction measures and ensures comparability across all trials.

For this analysis to be completed the Carbon team is reliant of supplied emission factors (A1-A3). This document defines what is considered acceptable emission factors and which are not.

Scope

This process covers cradle-to-gate emission factors (lifecycle stages A1-A3) for materials, products and construction inputs used in project reporting, procurement submissions and internal carbon assumptions across Live Labs 2. Factors that extend beyond A1-A3, operational/use phase factors (B and C stages), and statutory Whole Life Carbon assessments remain outside the routine application of this process unless explicitly extended by the project carbon lead.

The scope includes the classification rules (Gold, Silver, Bronze), the minimum evidence requirements needed to support each classification, allowable source types and procedures for reclassification.

Intended users are project managers, carbon leads and technical reviewers within the Live Labs 2 partner organisations. The process supports consistent, transparent and auditable selection of emission factors across trials while enabling pragmatic decision-making.

Definitions

Defined Term	Definitions
Live Labs 2	Live Labs 2 is a three-year, £30 million UK programme funded by the Department of Transport and delivered through ADEPT to pilot innovations to decarbonise local roads and related assets.
CEDR	Centre of Excellence for Decarbonising Roads is a Live Labs 2 programme that identifies, trials and evaluate innovative low-carbon road materials and approaches, creating a centralised hub for live trials, data, and shared best practice for UK local authorities.
Carbon Management	Assessment, removal and reduction of GHG emissions during the delivery of new, or the management of existing, infrastructure assets and programmes.
Carbon Dioxide Equivalent (CO ₂ e)	Unit for comparing the radiative forcing of a greenhouse gas to carbon dioxide.
Greenhouse Gases (GHGs)	Gaseous constituents of the atmosphere, both natural and anthropogenic (human-induced), that absorb and emit radiation at specific wavelengths within the spectrum of infrared radiation emitted by the Earth's surface, the atmosphere, and clouds. The term 'carbon' is often used as shorthand for GHGs [The UNFCC Kyoto Protocol six main greenhouse gases include carbon dioxide (CO ₂), methane (CH ₄), nitrous oxide (N ₂ O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF ₆)].
Whole Life Cycle Carbon Emissions	Sum of GHG emissions from all stages of the life cycle of a product or asset and within the specified system boundaries of the product or asset.

Classification Criteria

Classification	Examples	Reasoning	Recommendations to improve classification
Gold – Highest Confidence	Environmental Product Declaration (EPD) (Third-Party Verified)	EPDs follow ISO 14025 and EN 15804+A2 with third party verification, transparent life-cycle boundaries and units, making them suitable for product level, auditable emission factors.	Require complete EPD scope (functional unit, system boundary) alignment with the project's LCA Scope.
	Academically verified Emission Factors	Peer reviewed, transparent methods and reproducible studies offer high methodological rigour and traceability suitable for robust accounting.	Require a short methodological summary with any academic factor (publication details, boundaries, key assumptions).
Silver – Acceptable with Controls	Third-party verified emission factors (No EPD)	Independent verification adds credibility but absence of a formal EPD format can leave gaps in declared system boundaries and allocation.	Require the verifier's scope and evidence. Require all assumptions made to be declared.
	EPDs with no third-party verification	Follows ISO 14025 and EN 15804+A2, transparent life-cycle boundaries and units. However, has not gained third-party verification.	Requires methodology, scope, lifecycle-boundaries and assumptions to be declared.
	Emission factors calculated using a third-party verified carbon tool (with assurance)	Tools with independent assurance and transparent methods are acceptable for project-level estimates, but tool outputs depend on input quality and chosen assumptions.	Requires export of the tool's assumptions, methodology's selected parameters, and version and cross-check against a Gold source where feasible.

	Industry Standard Partner Emission Factors	Industry partners may supply useful, context-specific factors but quality varies with transparency and verification. Silver industry standard emission factors require alignment with international standards e.g. PAS 2080 and independent verification.	Require methodological and assumption disclosure and an independent technical validation or internal reviewer approval.
	Supplier provided emission factors with High transparency	Requires high levels of transparency including methodology, scope of assessment, assumptions and detailed carbon assessment (cradle to gate) with calculations.	If all these aspects are not met, then the emission factor must be treated as bronze.
Bronze – Provisional/ Low Confidence	Supplier provided emission factor with no third-party verification nor methodology/assumptions	Unverified supplier numbers lack transparency and auditability due to unknown assumptions and boundaries.	Treat as provisional: require methodology within a set remediation.

Evidence Checklist

- **Identification:** product/material name; supplier; batch/lot
- **Source:** Dataset/EPD/ tool name and version; publication date
- **Functional unit and units used:** kg, tonnes, m², m³ etc
- **System Boundary:** Explicit statement that factor covers A1-A3 (or note extension)
- **Methodology Summary:** Allocation rules, cut-off rules, key assumptions and regionalisation.
- **Verification:** Third-party verifier statement / EPD verifier ID / peer-review citation / tool assurance statement
- **Confidence statement:** Known limitations