STAKEHOLDER BRIEFING · 2026

TRACE

Construction materials deserve a second life

A blockchain-enabled digital marketplace giving reclaimed construction materials a verifiable second life.

Heriot Watt University
Adventurous Systems
·
Robert Gordon University
Stirling Reuse Hub pilot
·
trace.construction

Scotland Beyond Net Zero

THE CHALLENGE

Construction is the world's most wasteful industry — and its waste is invisible.

~37%

of global CO_2 emissions come from the built environment, much of it embodied in materials.

⅓

of all waste in Europe is generated by construction and demolition.

Few

reclaimed materials are reused — buyers can't trust origin, condition or compliance.

Reuse is the missing market.

A demolished steel beam or reclaimed brick still holds decades of service life and the carbon already spent to make it. The barrier isn't supply — it's **trust**.

Without provenance, structural evidence and a clear chain of custody, reclaimed materials can't compete with new on a professional project.

THE UNLOCK

Give every reclaimed material a passport buyers can verify — and reuse becomes a real, compliant marketplace.

- → Provenance & structural evidence, captured once
- → Tamper-proof record anyone can check
- → Compliance built in for 2027 regulation

WHAT TRACE IS

TRACE issues blockchain-anchored material passports for reclaimed construction materials.

Not a private platform but a **digital commons** — shared infrastructure where reuse hubs, architects and contractors list, discover and transact materials with trust and compliance.

EU DPP compliant

Every passport follows EU Digital Product Passport standards, ready for 2027 regulation.

Blockchain anchored

Integrity proofs on VeChainThor — anyone can verify a passport has not been tampered with.

Circular economy

Track deconstruction origin, condition grades, carbon savings and reuse history.

SECTION I

How the platform works

Follow a single material from the demolition site to its second life — and see the product at every step.

THE PROCESS

How a material moves through TRACE

Five steps turn a salvaged material into a trusted, tradeable asset with a permanent record.

1

Register

A reuse hub captures the material's origin, specs and photos, and issues a passport.

2

Grade

A condition report scores integrity and assigns a reuse grade from A to D.

3

Anchor

An integrity proof is written to VeChainThor — tamper-evident forever.

4

List

The material appears in the marketplace with price, carbon saving and grade.

5

Reuse

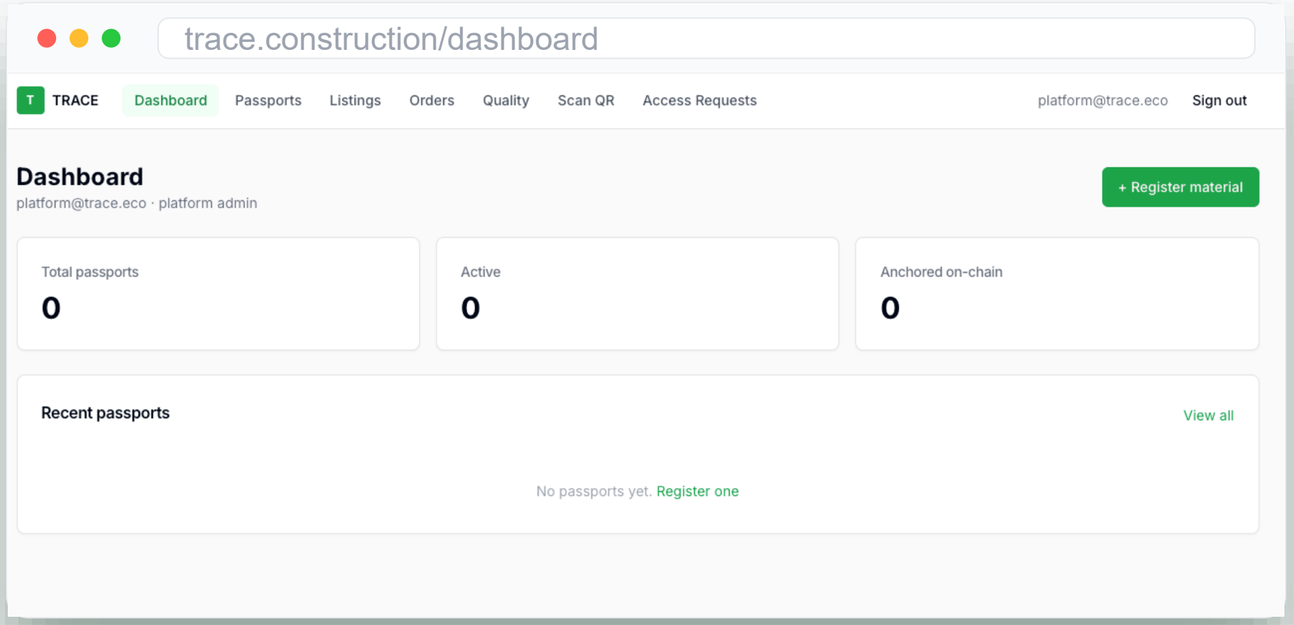
A buyer scans the QR, verifies the passport and gives the material a second life.

STEP 1 · REGISTER

Register and issue a passport

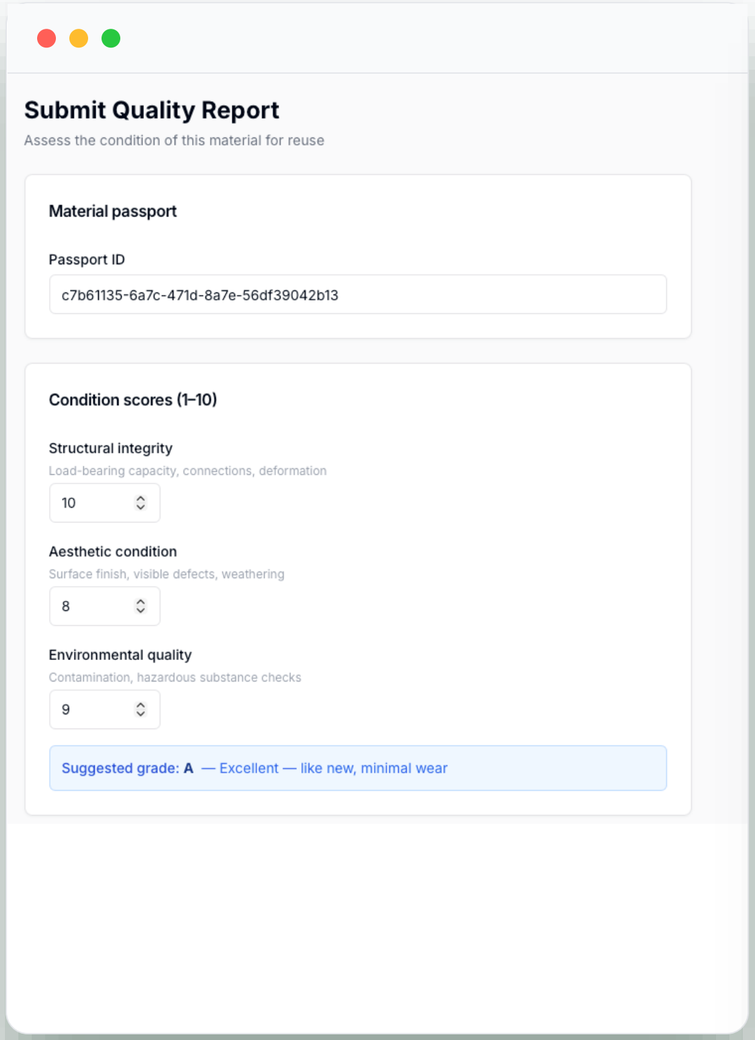
From the hub dashboard, an operator registers a reclaimed material — category, manufacturer, dimensions, deconstruction method and photos.

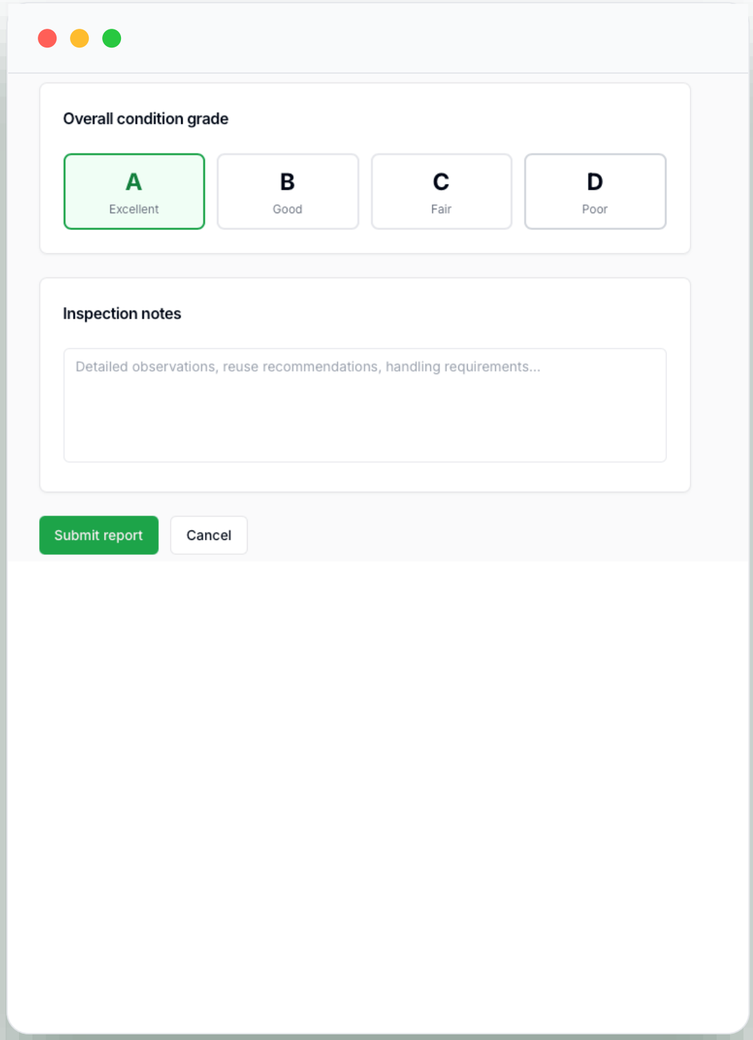
TRACE mints a unique `material passport` and tracks every passport from one place.



STEP 2 · GRADE

Grade the condition for reuse





Inspectors score structural integrity, aesthetic condition and environmental quality from 1–10.

TRACE suggests an overall **A–D grade** — so buyers read condition at a glance.

STEP 3 · ANCHOR

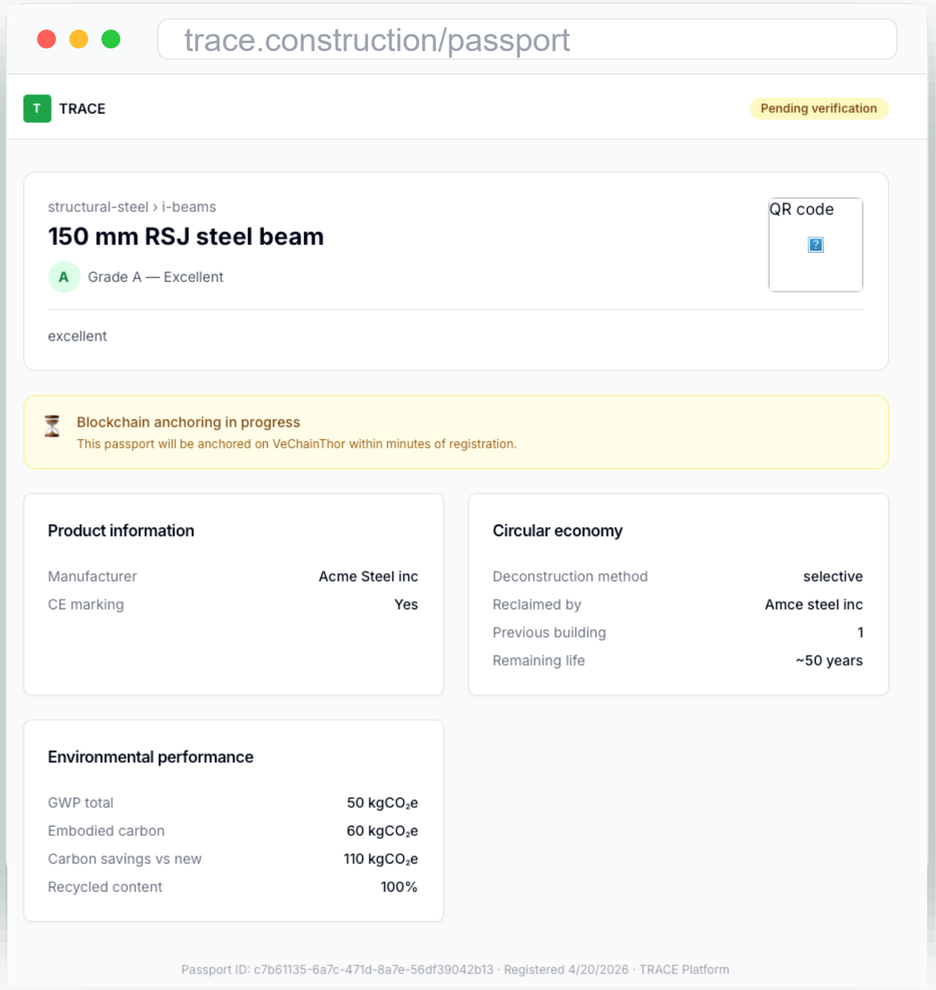
Anchor the proof on-chain

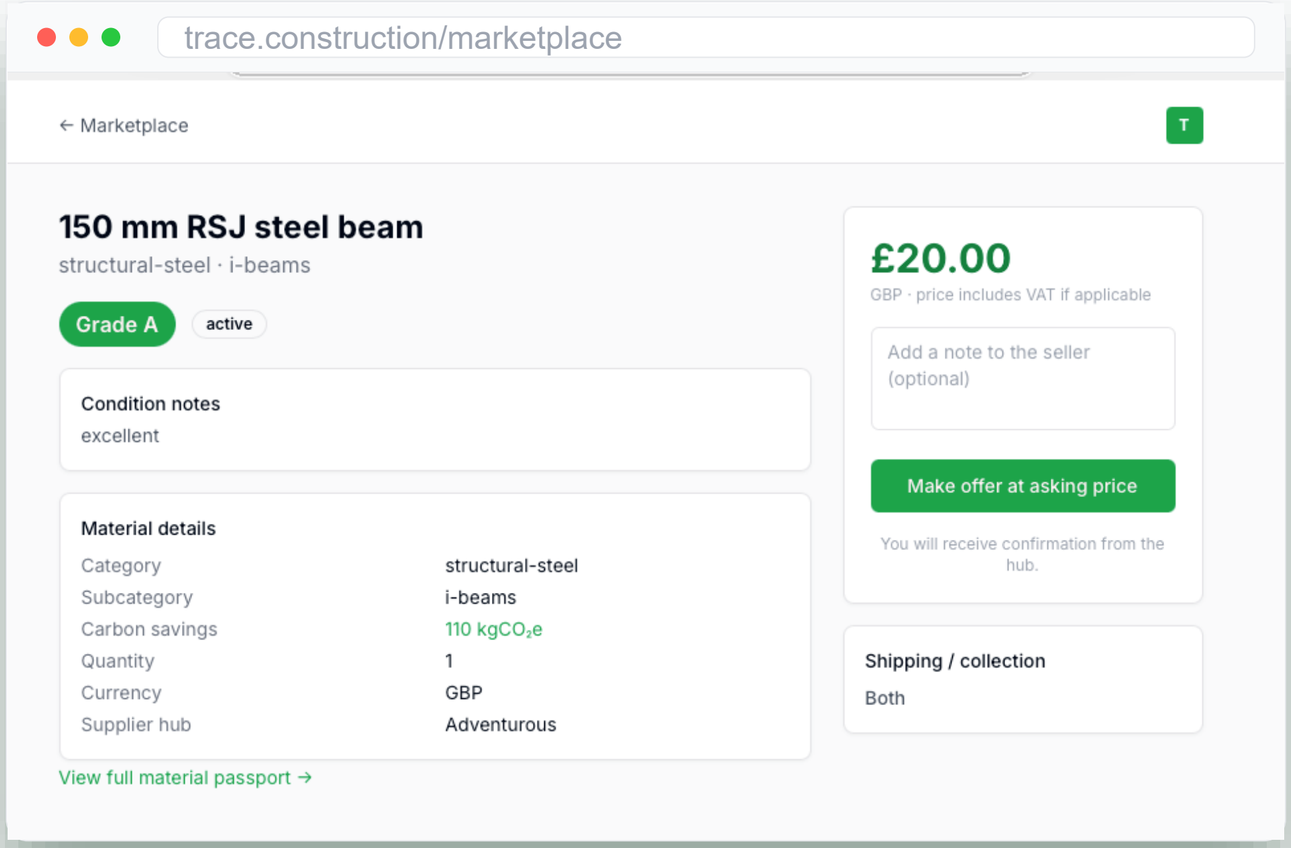
Within minutes of registration, an integrity proof for the passport is anchored on **VeChainThor** . The record becomes immutable and independently verifiable.

Blockchain anchoring in progress

This passport will be anchored on VeChainThor within minutes of registration.

No coin-speak, no wallets for users — just a permanent, checkable record of truth.





STEP 4 · LIST

List and discover in the marketplace

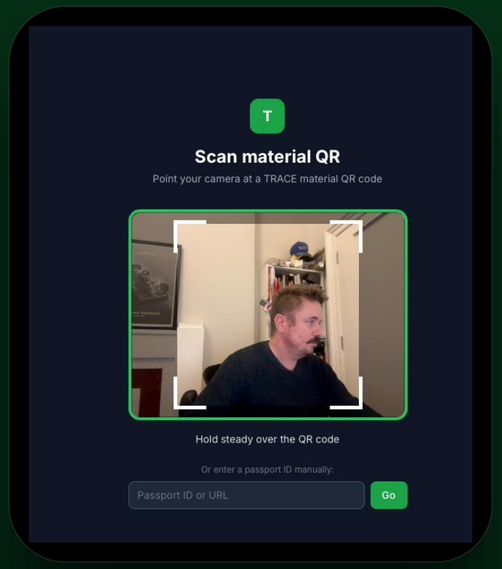
Graded materials are listed with price, quantity and shipping. Each listing surfaces its **condition grade** and **carbon saving** up front.

Buyers make an offer to the hub and link straight through to the full material passport.

STEP 5 · REUSE & VERIFY

Verify anywhere with a scan

Every material carries a QR code. Point a phone at it to open the public passport and confirm — instantly — that the record is authentic and unaltered.



Anyone — buyer, inspector or regulator — can verify provenance without an account.

INSIDE A MATERIAL PASSPORT

One record carries everything a reuse decision needs.

PROVENANCE

Manufacturer	**Acme Steel Inc**
Previous building	**1**
Deconstruction	**Selective**
Remaining life	**~50 years**

ENVIRONMENTAL

GWP total	**50 $kgCO_2e$**
Embodied carbon	**60 $kgCO_2e$**
Saving vs new	**110 $kgCO_2e$**
Recycled content	**100%**

INTEGRITY

Condition grade	**A — Excellent**
CE marking	**Yes**
Anchored on	**VeChainThor**
Passport ID	`c7b61135…42b13`

SECTION II

The research project

TRACE is a research prototype — built on academic method, tested on a real site, and aligned to regulation from day one.

Research-led.

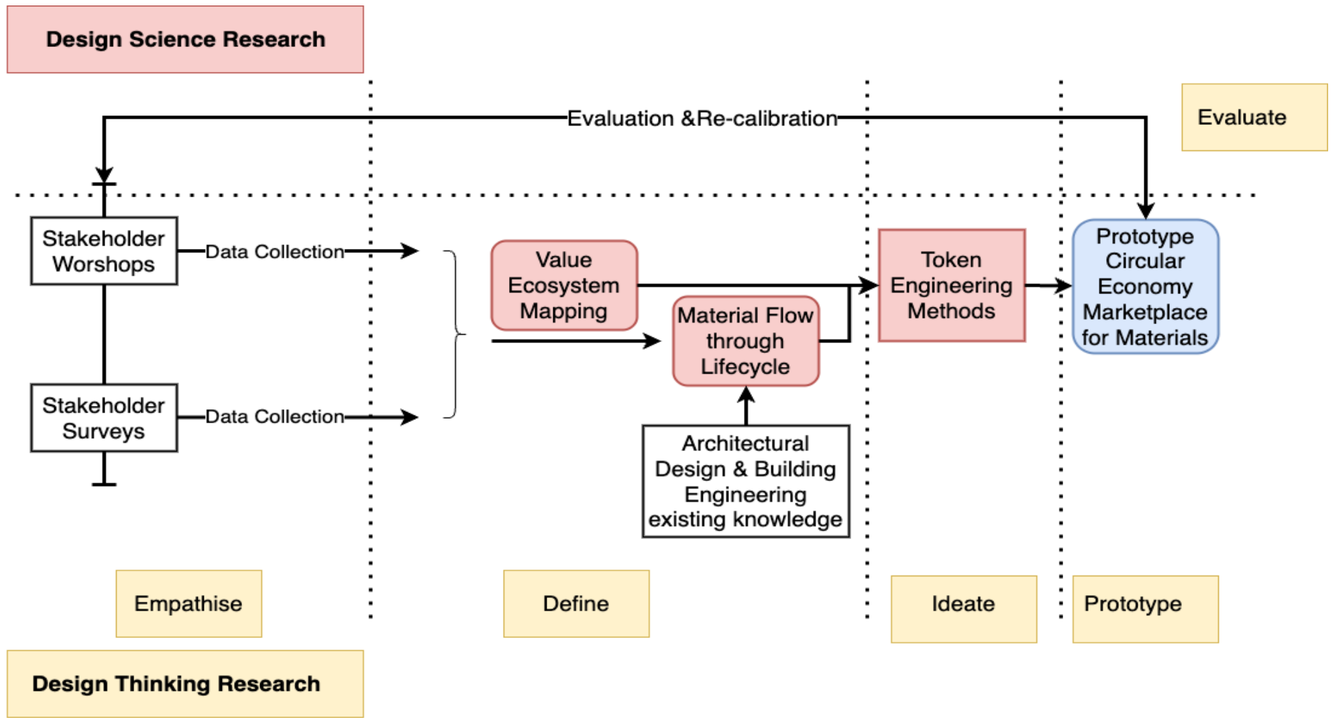
TRACE combines two strands of method to move from human need to working prototype.

Design Thinking

Empathise → Define → Ideate → Prototype, grounded in stakeholder workshops and surveys.

Design Science Research

Value-ecosystem mapping, material-flow modelling and token-engineering, evaluated and re-calibrated.



Combined Design Thinking × Design Science Research framework

PILOT SITE

Stirling Reuse Hub — Scotland's first blockchain-enabled construction material reuse hub.

TRACE is being proven where it matters: a working reuse hub, with real materials, real operators and real buyers. The pilot turns method into operational evidence.

THE CONSORTIUM

A partnership across host, technology, research and policy.

Stirling Reuse Hub

Pilot host — operational insight and a real-world testing environment for material reuse.

Robert Gordon University

Research lead — embodied carbon, circular economy and sustainable construction.

Heriot-Watt University

Research partner — digital design, blockchain and construction technologies.

Scotland Beyond Net Zero

Climate and sustainability experts accelerating Scotland's transition beyond net zero.

Adventurous Systems

Technology partner — Web3 and AI-enabled digital-twin infrastructure for the built environment.

BUILT FOR THE REGULATORY LANDSCAPE

Compliance isn't a feature we'll add later — it's the foundation.

EU

EU Digital Product Passport

Passport schema ready for mandatory DPP regulation arriving in 2027.

🏴

Circular Economy (Scotland) Act 2024

Infrastructure for measuring and enabling material reuse at scale.

🤝

The Construction Accord

Aligned with Scotland's shared route to a sustainable built environment.

🎯

Net Zero 2045

Cutting embodied carbon by keeping materials in use, not in landfill.

SECTION III

The future as infrastructure

A pilot today; the trust layer for material reuse tomorrow.

A reuse marketplace for all of Scotland — governed as a digital commons.

1.3% of Scotland's construction materials are reused today.

Reclaimed materials are a **shared, common-pool resource** — rivalrous and hard to coordinate. EU passport rules assume a manufacturer that reuse doesn't have.

TRACE closes that governance gap with Elinor Ostrom's principles for managing a commons — encoded directly into the platform.

OSTROM'S DESIGN PRINCIPLES → TRACE

Clear boundaries	what qualifies for reuse
Congruence	rewards match contribution
Collective choice	hubs vote on standards
Monitoring	reputation-scored inspectors
Graduated sanctions	staking, slashed on disputes
Conflict resolution	community arbitration
Recognised rights	hubs issue passports
Nested enterprises	local hubs, one network

FROM PILOT TO INFRASTRUCTURE

One hub proves it. A network makes it infrastructure.

01

Prove

Validate trust, grading and on-chain provenance at the Stirling pilot.

02

Connect hubs

Onboard reuse hubs across Scotland and the UK onto one shared standard.

03

Open the network

Architects, contractors and suppliers buy and sell across a liquid market.

04

Become the registry

A digital commons — the interoperable passport layer for material reuse in Europe.

Every passport added makes the network more useful — provenance compounds, and reuse becomes the default rather than the exception.

THE IMPACT WE'RE BUILDING TOWARD

Trust turns reclaimed materials into carbon saved and waste avoided.

110 $kgCO_2e$

saved by reusing a single steel beam instead of buying new.

100%

of a passport's provenance is verifiable by anyone, without an account.

2045

net-zero target that material reuse is essential to reaching.

Figures illustrative of pilot materials; network-scale impact grows with every hub onboarded.

WHAT'S NEXT

Funding the next phase — and a call for partners.

We're taking TRACE from a single-hub pilot to national, commons-governed infrastructure — pursuing research funding across three fronts.

Horizon Europe

Circular Construction

Build the federated platform and onboard Scotland's reuse hubs onto one shared standard.

AHRC

Design

Design-led research into deconstruction, condition assessment and trustworthy interfaces.

ESRC

Economy

The institutional economics of commons governance and circular construction markets.

CALL FOR PARTNERS

Build the commons with us — reuse hubs, local authorities, architects & contractors, and research collaborators.

Partner with TRACE

JOIN THE SECOND LIFE

Help us give materials a second life .

Partner with the pilot network, adopt the passport standard, or register your first material today.

Register a material **Partner with us**

trace.construction · Adventurous Systems Ltd · Stirling Reuse Hub

Heriot Watt University · Robert Gordon University

Scotland Beyond Net Zero