RECYCLING FOR ENVIRONMENTAL MANAGEMENT & INNOVATION (REMI) CIC
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THE REMI PROTOCOL

A Verified Circular Identity framework that turns circular action into portable, verifiable, standard-native proof for people, places, and businesses.

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EXECUTIVE SUMMARY

The Circular economy has a trust problem. Most environmental claims are unverified, hundreds of competing labels confuse the market, and small businesses face growing demands to prove impact they cannot easily measure. Existing solutions focus almost solely on physical products and large enterprises, depend on heavy and costly infrastructure, and repeatedly stall, not on technology but on the absence of a neutral, trusted party to govern the standard.

REMI proposes a different foundation called the **Verified Circular Identity (VCI) framework**. So, instead of a passport for products, it is a portable, actor-owned credential for the people, communities, and businesses who take circular action. A single verified action is captured once and expressed in three ways - as a personal record, a place-based certificate, and an audit-grade compliance data point built on open standards and issued by a mission-locked community interest company as the neutral trust anchor.

This paper is written in a deliberately self-critical register. It sets out the market context, the framework and its methodology, how it differs from prior art, and at length, the open questions and limitations that remain unresolved. REMI is pre-operational; the claims here are a hypothesis the company intends to test, beginning with a local pilot in the United Kingdom.

1. DEFINITIONS & SCOPE

Apparently, the field is crowded with loosely used terms so, this paper fixes the following meanings:

- **Verification**: the process of checking that a claimed circular action actually occurred to a stated evidence standard. REMI performs verification of primary action data.
- **Assurance**: a formal, regulated opinion (limited or reasonable) issued by a licensed practitioner over a body of reported information, For example, under ISSA 5000. REMI does NOT provide statutory assurance.
- **Circular action**: a discrete, real-life act that keeps material in use or out of waste, including recycling, reuse, return, repair, composting, donation.
- **Verified Circular Action Record**: the atomic unit of the framework which is a single verified circular action, expressed as a tamper-evident, actor-owned digital credential.
- **Credential**: a W3C Verifiable Credential; cryptographically checkable statement issued by an issuer (REMI) about a subject (the actor), held by that subject.
- **Trust tier**: the evidence level attached to a record which is attested, evidenced, witnessed, or measured, mapped to established data-quality tiers.

> ***Scope Boundary:*** *REMI verifies primary circular action data and expresses it in standard formats. It is not a licensed audit or assurance firm, does not issue assurance opinions, and does not replace statutory reporting. It is an upstream verification and MRV (measurement, reporting, verification) layer that feeds those processes.*

2. A TRUST CRISIS IN THE CIRCULAR ECONOMY

The gap between demand for credible sustainability and the reality of unverified claims is now well documented. A European Commission assessment found roughly 53% of environmental claims to be vague or misleading and around 40% wholly unsubstantiated, against a backdrop of some 230 competing eco-labels.

Regulation is closing this gap fast. Under the UK's Digital Markets, Competition and Consumers Act 2024, the Competition and Markets Authority can fine misleading environmental claims up to 10% of global turnover. Packaging producer responsibility (pEPR) is live, the Deposit Return Scheme launches in October 2027, and the UK Sustainability Reporting Standards were published in 2026.

The pressure cascades to the smallest actors. Scope 3 emissions represent 70-90% of a typical footprint and depend on data from suppliers. Large companies now demand this data from SME suppliers who lack the tools to provide it. The EU's VSME standard has become the legal ceiling on what may be asked, and the Greenhouse Gas Protocol's 2026 revision privileges verified primary data over spend-based estimates.

> *Meanwhile, genuine circular action, especially by individuals, communities and businesses goes unrecognised, unrewarded, and unrecorded. The problem is not a shortage of good action. It is the absence of trusted proof.*

3. PRIOR ART, AND HOW REMI DIFFERS

REMI does not claim to have invented verifiable credentials, product passports, or sustainability reporting. It combines existing standards in a specific, and we believe novel, configuration. The honest comparison:

- **EU Digital Product Passport (ESPR):** Passports physical products through the supply chain. REMI is complementary because it verifies the actors and places - communities, SMEs, and large businesses local activity, that a product-centric passport does not reach.
- **UN Transparency Protocol (UNECE):** An open framework for verifiable sustainability claims using W3C credentials. REMI intends to align with, not compete with, UNTP by applying it to the specific domain of local circular action.
- **Voluntary carbon markets & MRV platforms:** Focus on carbon quantification and offset integrity, typically for projects and enterprises. REMI verifies circular actions (which feed carbon and waste metrics) at the community and SME level, where existing MRV is too costly to reach.

- **Enterprise ESG & assurance software**: Serves large reporting entities and licensed assurers. REMI sits upstream of these as a neutral primary-data verification feed, not a competitor to the assurance opinion itself.

The distinctive combination: actor-owned credentials + place-based aggregation + a transparent trust ladder + mission locked neutral governance, applied to the long tail of circular action. We are not aware of an existing offering combining all four.

4. THE INSIGHT: VERIFY THE ACTOR, NOT JUST THE PRODUCT

The missing primitive is an identity that is provable, portable, and owned by its subject. REMI's proposition is a Verified Circular Identity for people, places and businesses, built on open standards, and governed in the public interest by design.

5. THE FRAMEWORK

The framework rests on a single idea: verify once, express three ways. A personal record, a community certificate, and a compliance report are the same verified truth at three levels of aggregation. So, a circular action is verified once, minted as one portable credential, and flows into all three products.

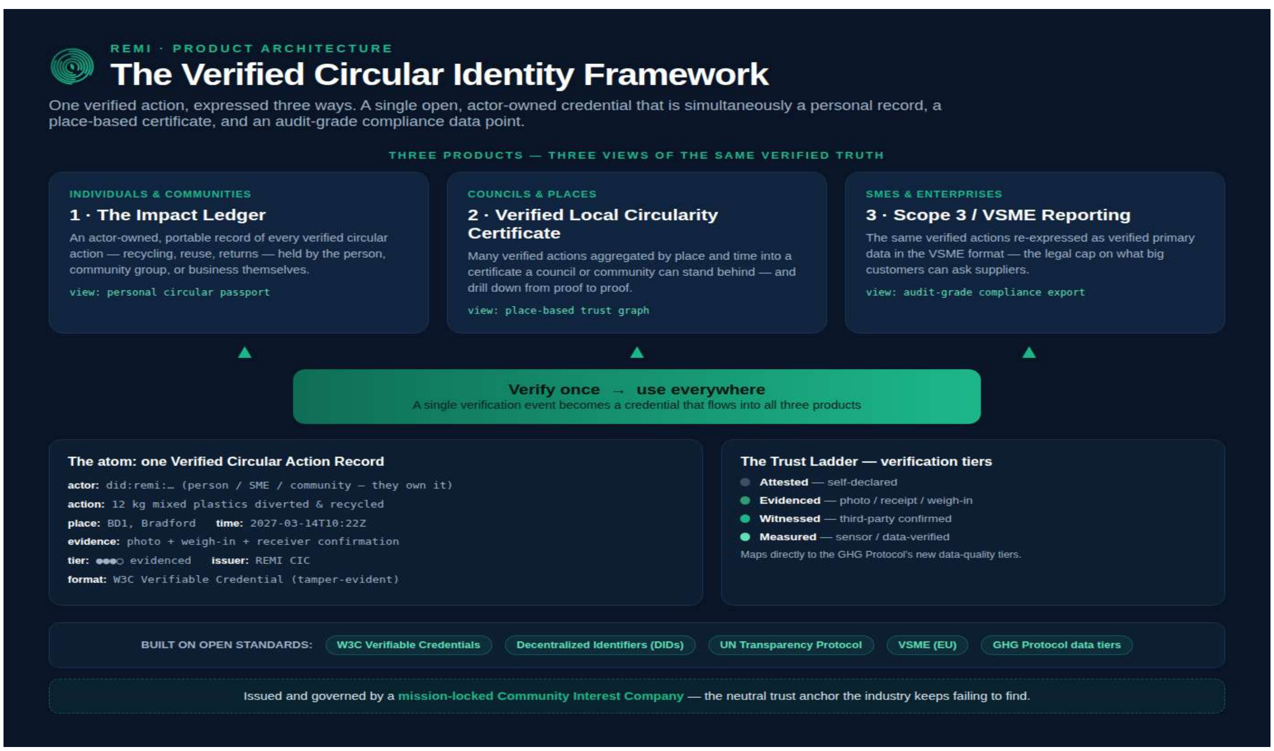

Figure 1 showing The Verified Circular Identity framework: one verified action, expressed as three products, on open standards, governed by a CIC.

6. METHODOLOGY - HOW AN ACTION BECOMES A VERIFIED CREDENTIAL

Verification proceeds in five concrete steps. The design intent is that steps 1-5 can be performed manually at launch and progressively automated without changing the data model.

1. **Capture:** The actor submits an action - actor, action type, material, quantity, location, date - with evidence attached (photo, receipt, weigh-in ticket, or receiver confirmation).
2. **Assess evidence:** REMI (or a delegated witness) checks the evidence against the tier criteria below and assigns a trust tier.
3. **Record**: The action is written to the ledger and, on verification, minted as a Verified Circular Action Record (a W3C credential) owned by the actor.
4. **Aggregate**: Records are summed by actor (Impact Ledger), by place and period (Local Circularity Certificate), or by reporting category (Scope 3 / VSME export).
5. **Express & issue**: The relevant output is issued; each remains linked to its underlying records, so any figure can be traced to its evidence.

Evidence standard at each trust tier

- **Attested** - the actor self-declares the action, with no external evidence. Lowest assurance; suitable only for indicative totals.
- **Evidenced** - supported by a photograph, receipt, or weigh-in record that a reviewer can inspect. The default minimum for issued certificates.
- **Witnessed** - confirmed by an independent third party (For example, a receiving facility, a REMI volunteer, or a partner officer).
- **Measured** - derived from a calibrated instrument or a verifiable data feed (For example, a weighbridge or a scheme's own records).

This ladder maps deliberately onto the Greenhouse Gas Protocol's data-quality tiers, so that a REMI record's tier signals its fitness for upstream reporting use.

7. THE THREE PRODUCTS

1. Individuals & communities
The Impact Ledger

An actor-owned, portable circular passport. A person, community group or business holds their own verified history and can prove their circular record to a council, client or lender, with privacy-preserving selective disclosure.

2. Council & Places
Verified Local Circularity Certificate

Many verified actions aggregated by place and period into a certificate a council or community can stand behind and, because it is a linked credential, an auditor can drill from the certificate down to the underlying proofs.

3. Businesses
Scope 3 | VSME Reporting Support

The same verified actions, re-expressed as verified primary data in the VSME format, the legal ceiling on what large customers may ask of suppliers, and the highest-quality tier under the new GHG Protocol rules. This commercial layer cross subsidises the community layer.

8. GOVERNANCE AS INFRASTRUCTURE - WHY A CIC

The industry's recurring failure is trust in the verifier. A commercial platform has an incentive to flatter whoever pays it; that is why so many verification ventures stall. A community interest company is structurally different because it is mission-locked and non-extractive by law, its assets are held for community benefit, and it exists to keep the record honestly, not to profit from it. In a system whose entire value is trust, the governance model is not a detail, it is the product.

9. STANDARDS ALIGNMENT

- W3C Verifiable Credentials & Decentralized Identifiers (DIDs) - the credential and identity layer.
- UN Transparency Protocol - for interoperable, verifiable sustainability claims.
- VSME (EFRAG) - the SME sustainability-reporting format the market now requires.
- Greenhouse Gas Protocol data-quality tiers - to which the Trust Ladder maps.

10. OPEN QUESTIONS WE'RE TESTING

A note on what is, and isn't, in question. REMI's mission, that genuine circular action deserves trusted, independent proof, is a conviction, not a hypothesis. What the questions below test is narrower and technical, if the method can be made rigorous, affordable, and genuinely useful at the community level. Setting these out openly is how a serious standard earns trust; each is a live question REMI's pilots are designed to answer.

10.1 Who verifies the verifier?

Any verification system creates a new trust dependency on the verifier itself. REMI's answer is structural; a mission-locked CIC with asset lock and public interest governance but structure alone is not proof of trustworthiness. Independent oversight of REMI's own methodology will be necessary as it scales and is not yet in place.

10.2 Can community-level verification be both rigorous and affordable?

Audit-grade assurance is expensive and expert-led, which is why it does not reach communities and SMEs. Lightweight verification is affordable but weaker. The trust ladder is an attempt to hold both - low-cost entry with a transparent, escalating evidence standard but if it delivers sufficient rigour at acceptable cost is an empirical question the pilot must answer.

10.3 Is primary data from small actors sufficient?

A photograph and a weigh-in ticket are not a metered industrial process. There is a real risk of over-stating the reliability of self or photo evidenced data. REMI mitigates this by making the tier explicit on every record, so downstream users can judge fitness for purpose but the question of how much rigour is enough for a given use has no settled answer.

10.4 Will lightweight open standards interoperate, or fragment?

W3C credentials promise portability, but standards historically proliferate before they converge, and community-layer interoperability is unproven. REMI's mitigation is to align with established standards (UNTP, VSME, GHG tiers) instead of inventing its own schema but adoption by others is outside REMI's control.

10.5 What incentive drives participation?

Verification adds friction. Without a compelling reason to log and evidence actions, the system stays empty. Hypothesised incentives such as recognition, access to certificates that satisfy customer or funder requirements, and eventual value from an owned record are plausible but untested at the community level.

10.6 The empirical-validation gap

The academic literature on circular-economy verification is candid that the field is rich in conceptual frameworks and thin on real-world validation. This paper is, at present, a hypothesis. Its central claims will be substantiated or revised only by a pilot that produces real verified actions, real certificates, and measurable outcomes. Until then, they should be read as proposals, not findings.

Evidence-led by Design*. REMI treats the pilot as a genuine test, not a formality. We will measure what works, publish what we learn, and refine the model as the evidence comes in by strengthening the method where it proves sound and reworking it where it does not. Confidence in the mission and rigour about the method are not in tension; they are the same discipline*

11. WHY THIS SCALES GLOBALLY

Beneath the many national regimes, sustainability disclosure has converged on a single baseline, the ISSB's IFRS S1 and S2 now adopted or aligned across more than 28 jurisdictions representing over 60% of global GDP, including the UK, EU, US (via California), Japan, Singapore and Hong Kong. The world has standardised the report; it has not standardised the verification of the action beneath it.

The next regulatory wave everywhere is precisely that mandatory independent assurance of sustainability data, phasing in under California's SB 253, already required in markets such as Mexico and Brazil for which trusted capacity is in short supply. Because REMI is standard-native, a single verified circular action is portable across every ISSB-aligned market. A companion strategy paper, Global Positioning & Path, sets this out in full.

12 · ROADMAP

2026 - Foundation. Company established and active; framework and methodology developed; first partnerships and advisory board.

2027 - Pilot & DRS. First local verification pilots; readiness aligned to the UK Deposit Return Scheme launch.

2028+ - Scale. Verified Circular Identity available to individuals, SMEs and enterprises - built on open standards and portable across international reporting frameworks.

AN INVITATION

REMI is building this framework in the open and actively invites challenge to the reasoning above - from assurance and ESG practitioners, waste and circular-economy specialists, and anyone who has attempted community-level verification. It is also seeking pilot partners, volunteer advisors, and funders.

Get involved: circular@remicic.org.uk | remicic.org.uk

ABOUT REMI & STATUS

Recycling for Environmental Management and Innovation (REMI) CIC is a community interest company registered in England & Wales (No. 16117430), registered office 59 Godwin Street, Bradford, West Yorkshire, BD1 2SH. Its mission is to build trusted, verifiable infrastructure for the circular economy in the public interest.

STATUS & DISCLAIMER

This is a working paper describing a framework under development. REMI is pre-operational; the products described are proposed designs, not live services, and nothing herein is a claim of current deployment, traction, regulatory status, or third-party endorsement. References to external standards and regimes are for context and do not imply their authors' endorsement of REMI. This document is not investment, legal, or compliance advice.

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