Nick Clark · Published April 27, 2026 · PDF

Carbon-Sequestration Admissibility Surface

A credentialed structural element that carries biomass-derived carbonaceous material can sequester that carbon mass within structural building material, and where the source organic-waste feedstock would otherwise have decomposed anaerobically and released methane, the diversion can be attested as methane avoidance. The carbon-sequestration admissibility surface is one of the property surfaces composing the credentialed material's admissibility profile, signed by an environmental-credit authority and bound to the substrate identity through the lineage chain. The surface, together with the methane-avoidance attestation and the migrating carbon attestation, admits the substrate to participate in carbon-credit issuance against specific structural mass.

Mechanism

The carbon-sequestration surface is one of the property surfaces composing the credentialed material's admissibility profile. Where the structural and storage surfaces bound mechanical and electrical loading, the carbon surface declares the material's carbon-sequestration property and admits the substrate to carbon-credit issuance. In the disclosed multi-authority arrangement, the surface is signed by an environmental-credit authority with declared scope rather than by the manufacturer's structural-engineering authority or the utility or building-code authority that signs the storage

surface. The signature binds the attestation to the credentialed structural element's identity and to the lineage chain, such that a subsequent verifier can confirm both the identity of the substrate and the recorded carbon attestations.

The disclosed architecture binds two carbon attestations to the substrate through the lineage chain: a methane-avoidance attestation and a migrating biogenic carbon-credit attestation.

The methane-avoidance attestation is a credentialed event issued by an organic-waste flash feedstock apparatus, recorded in the lineage chain of the produced turbostratic graphene. It declares the diverted organic-waste feedstock mass, a feedstock-class methane-emission factor consistent with the displaced anaerobic-decomposition disposition pathway, the resulting carbon-dioxide-equivalent methane avoidance, and the apparatus's credentialed identity attesting the diversion. The attestation applies where organic-waste feedstock streams that would otherwise undergo anaerobic decomposition, in landfill, lagoon, compost windrow, or anaerobic-digester operation, are diverted to flash Joule heating and converted to turbostratic graphene with the carbon mass sequestered into credentialed substrate-mode storage. The methane-avoidance attestation is independently queryable by environmental-credit authorities and admissibility-evaluable by carbon-market participants.

The migrating carbon attestation is a biogenic carbon-credit attestation bound to the credentialed substrate that migrates with the substrate across material flows and across structural lifetimes. The migration is a credentialed transaction signed by an environmental-credit authority and recorded in the lineage chain. This primitive supports continuous credentialed carbon-sequestration markets in which each cement pour, mortar repointing, surface-coating refresh, and re-credentialing event issues, transfers, or extinguishes carbon-credit attestations against specific structural mass.

Operating Parameters

The methane-avoidance attestation rests on the radiative-forcing differential between methane and carbon dioxide. The disclosed pathway treats organic-waste feedstock streams that would otherwise decompose anaerobically and release methane, whose global warming potential is approximately 28 to 84 carbon dioxide equivalent over 20-to-100-year horizons, as candidates for diversion to flash Joule heating, sequestering the carbon mass into credentialed substrate-mode storage instead. The attestation declares the diverted feedstock mass and a feedstock-class methane-emission factor consistent with the displaced disposition pathway, so the resulting carbon-dioxide-equivalent methane avoidance depends on the feedstock class and the disposition that is displaced.

The carbon mass retained in the substrate need not be lost at end of structural life. The disclosed closed-loop carbon recovery operation processes end-of-structural-life concrete to recover the turbostratic-graphene fraction for re-incorporation into subsequent structural-storage substrate, retaining the substrate's carbon mass within the credentialed structural-storage system across arbitrarily many recyclings, the only mass losses being processing inefficiencies typically below 5 percent per recycling cycle. The substrate operates at a biogenic-carbon-positive carbon balance from biomass photosynthesis through structural sequestration through closed-loop recycling.

The carbon attestations are credentialed events in the lineage chain. The methane-avoidance attestation is issued at production by the organic-waste flash feedstock apparatus; the migrating carbon attestation is transacted by an environmental-credit authority and persists across material flows and structural lifetimes. State-of-health attestations on the storage and structural surfaces do not modify the carbon attestations, which migrate with the substrate as credentialed transactions in the lineage chain.

Alternative Embodiments

In one embodiment, the carbon-sequestration surface is signed by a single environmental-credit authority with declared scope, composing with the other property surfaces through declared composition rules.

In a second embodiment, the substrate is credentialed by multiple authorities operating jointly. The disclosed multi-authority credentialing arrangement is performed by a manufacturer authority, a building-code authority, a utility authority, a carbon-credit authority, and an independent testing authority to produce a composed admissibility profile by which the element is admitted into building-scale operations, building-code review, grid-services participation, carbon-credit issuance, and independent verification. The carbon-credit authority signs the carbon-sequestration surface while the other authorities sign their respective surfaces.

In a third embodiment, the methane-avoidance attestation and the migrating carbon attestation are bound separately. The methane-avoidance attestation is issued by the organic-waste flash feedstock apparatus at production, declaring the diverted feedstock mass and feedstock-class methane-emission factor; the migrating carbon attestation is transacted by the environmental-credit authority. The two are distinct credentialed events in the lineage chain, reflecting the differing point of issuance.

In a fourth embodiment, the migrating carbon attestation moves with the substrate across operational material flows during the structural element's in-service lifetime, including tuck-pointing replacement of mortar joints, surface-coating refresh, cavity-fill replacement, foundation surface coating, topping-slab augmentation, and substrate top-up. Each material flow is a credentialed event signed by an installer authority and recorded in the lineage chain, and the carbon attestation is re-evaluated against the cumulative material flow rather than only at original installation.

In a fifth embodiment, the carbon attestation composes with the closed-loop carbon recovery operation of the cradle-to-cradle architecture. At end of structural life the turbostratic-graphene fraction is recovered, flash re-graphenized, and re-credentialed by a recycler authority, and the biogenic carbon-credit attestation migrates with the recovered carbon mass into the subsequent structural-storage admissibility profile, persisting across structural lifetimes.

In a sixth embodiment, the carbon-sequestration surface composes with the cradle-to-cradle credentialing specification and the lineage chain such that each carbon-credit issuance, transfer, or extinguishment is itself a credentialed event signed by an environmental-credit authority and recorded against specific structural mass, rather than against an aggregate facility output.

Composition With Carbon Markets

The carbon-sequestration surface composes with carbon-credit issuance by binding the attestation to the substrate identity through the lineage chain. The methane-avoidance attestation is independently queryable by environmental-credit authorities and admissibility-evaluable by carbon-market participants, and the migrating carbon attestation supports continuous credentialed carbon-sequestration markets in which each cement pour, mortar repointing, surface-coating refresh, and re-credentialing event issues, transfers, or extinguishes carbon-credit attestations against specific structural mass.

Because the attestations are bound to specific structural mass and recorded as credentialed events in the lineage chain rather than aggregated at the project or facility level, carbon-credit issuance can be effected against individual credentialed structural elements and can migrate with the substrate across material flows and structural lifetimes. The migration is itself a credentialed transaction signed by an environmental-

credit authority, so the carbon attestation persists across the metabolic-lifetime model of building operation in which incoming material flows refresh, augment, or substitute the substrate while the credentialed identity persists.

Prior Art Distinction

Existing building codes recognize multiple material properties of building components, including structural load ratings, fire-resistance ratings, thermal insulation R-values, sound transmission ratings, and vapor permeability, but none recognize carbon sequestration as a material property of structural building components. What distinguishes the disclosed primitive is the treatment of carbon sequestration as an independently credentialed admissibility surface of the structural substrate, signed by an environmental-credit authority and composing with the structural, thermal, storage, and other surfaces through declared composition rules.

The disclosed carbon attestations are bound to the substrate identity through a lineage chain rather than carried as aggregate documentary records. The methane-avoidance attestation is a credentialed event issued by the organic-waste flash feedstock apparatus, declaring the diverted feedstock mass, feedstock-class methane-emission factor, and resulting carbon-dioxide-equivalent methane avoidance. The migrating carbon attestation is a biogenic carbon-credit attestation that migrates with the substrate across material flows and structural lifetimes through credentialed transactions signed by an environmental-credit authority. The combination of substrate-bound carbon attestations, the multi-authority credentialing arrangement, and migration across the cradle-to-cradle lifecycle is the distinguishing structure.

Disclosure Scope

This article elaborates the carbon-sequestration property-surface primitive disclosed in U.S. Provisional Application No. 64/050,895. The disclosure is directed to the carbon-sequestration admissibility surface signed by an environmental-credit authority, the

methane-avoidance attestation issued by the organic-waste flash feedstock apparatus, the migrating biogenic carbon-credit attestation, the multi-authority credentialing arrangement, the binding to substrate identity through the lineage chain, and the composition with carbon-credit issuance across the cradle-to-cradle lifecycle. The inventive concept is the credentialed, substrate-bound carbon-sequestration surface, not any particular carbon-market framework.

Credentialed Surfaces (/credentialed-materials)

All 40 steps → (/inventive-steps)

Building surfaces as credentialed agents that participate in the structure's networking and electrical systems.

Provisional application

PRIMARY TECHNICAL DISCLOSURE

- credentialed-building-materials-cryptographic-admissibility-for-structural-surfaces (/articles/credentialed-building-materials-cryptographic-admissibility-for-structural-surfaces)

SECONDARY TECHNICAL

- **credentialed-materials/carbon-sequestration-property-surface (/articles/credentialed-materials/carbon-sequestration-property-surface)**
- Composition Rules Governing Surface Interactions (/articles/credentialed-materials/composition-rules)
- Decommissioning And Re-Credentialing Attestation (/articles/credentialed-materials/decommissioning-and-recredentialing)
- Electrical-Distribution Admissibility Surface (/articles/credentialed-materials/distribution-property-surface)
- credentialed-materials/end-of-storage-life-attestation (/articles/credentialed-materials/end-of-storage-life-attestation)
- credentialed-materials/energy-storage-property-surface (/articles/credentialed-materials/energy-storage-property-surface)
- Lineage Chain Across Material Lifecycle (/articles/credentialed-materials/lineage-chain-across-lifecycle)

- Master Credential Signature Binding All Property Surfaces (/articles/credentialed-materials/master-credential-binding)
- Multi-Authority Signature Block (/articles/credentialed-materials/multi-authority-signature-block)
- Data-Networking Admissibility Surface (/articles/credentialed-materials/network-property-surface)
- Profile Versioning Continuity (/articles/credentialed-materials/profile-versioning-continuity)
- credentialed-materials/structural-property-surface (/articles/credentialed-materials/structural-property-surface)
- credentialed-materials/thermal-property-surface (/articles/credentialed-materials/thermal-property-surface)
- Versioned Admissibility Profiles With Lineage Chain (/articles/credentialed-materials/versioned-profiles-with-lineage)
- credentialed-materials/water-coupled-property-surface (/articles/credentialed-materials/water-coupled-property-surface)

Credentialed Surfaces overview → (/credentialed-materials)