

THE HEMPOXIES CURRENCY (THC)

A material-backed store of value minted from hemp-carbon vitrimer feedstock — serialized, auditable, and designed to return to industry.

THC INSTEAD OF \$



MATERIAL · CARBON · LOOP

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STATUS · TRL 1-2 FORWARD-LOOKING RESEARCH HYPOTHESIS. All compositions, dimensions and performance values are projected design targets, not validated results. THC is not legal tender, is not issued or endorsed by the Bank of Canada or the Royal Canadian Mint, and this paper is not an offer of securities or investment advice. Legal and regulatory statements summarise public sources for planning purposes and are not legal advice.

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CORE MONETARY AXIOM

“A currency should not merely represent value; it should embody sustainability. Every unit of THC is a measured, serialized parcel of hemp-carbon industrial feedstock — designed to be reprocessed, remolded and returned to the loop through verified cycles.”

How to read this paper. Statements of established science and law carry numbered references. Everything specific to THC — compositions, token formats, gate thresholds, prices — is a **proposed design target** for a programme at TRL 1–2. Where v1.0 made a claim that the evidence does not yet support, this edition says so and states what test would settle it (Appendix B lists every change). External facts were checked against live sources on 9 October 2026; confirm statutory text against the current consolidation before relying on it.

1 EXECUTIVE SUMMARY

Fiat currencies derive their value from statute and central-bank policy; gold derives its value from scarcity, history and extraction. The Hempoxies Currency (THC) proposes a third basis: **use-value**. Each THC coin or bar is a precisely weighed, serialized unit of hemp-carbon vitrimer composite — a thermoset that can be reground and reprocessed through catalysed bond exchange — so that what a holder keeps is not a promise but a parcel of certified manufacturing feedstock.

The idea rests on one piece of established chemistry. In 2011 Leibler and co-workers showed that epoxy networks containing ester and hydroxyl groups, with a zinc catalyst, can rearrange their topology through transesterification while staying permanently cross-linked — the material class now called vitrimers.^[1,2] A vitrimer can be reshaped and welded like a glass but does not dissolve or melt like a thermoplastic. Hempoxies applies this to a hempseed-oil epoxy matrix reinforced with five tiers of carbonised hemp, and THC applies Hempoxies to money.

KEY POINTS OF THIS EDITION

1. **THC is a commodity, not legal tender.** It is priced and invoiced in Canadian dollars by grade and certified mass, which keeps it on the right side of the Bank of Canada Act and the Currency Act (§9).
2. **Value comes from industrial demand.** A per-grade reference price is discovered from real offtake transactions, not set by the issuer (§2).
3. **Identification is not authentication.** A laser-etched Data Matrix can be copied, so v2.0 adds a four-layer authentication stack (§5).
4. **Closed loop, honestly counted.** Reprocessing is multi-cycle, not infinite. Every regrind is logged, cycle counts travel with the material, and grades cascade down as properties decline (§6).
5. **Every green claim gets a test first.** ASTM D6866 measures bio-based carbon, not environmental benefit; carbon credits are never sold twice (§7).
6. **Decentralization is a roadmap, not a starting claim.** Administration begins with Landry Industries under multisignature and timelock controls (§8).

The paper is organised as a specification: the monetary model (§2), the material (§3–4), the registry and anti-counterfeiting design (§5), the remolding loop (§6), environmental claims (§7), governance (§8), the Canadian regulatory pathway (§9), and the validation gates and risks that decide whether THC advances beyond TRL 2 (§10–11).

2 THE MONETARY MODEL: FROM \$ TO THC

2.1 What a THC is — and is not

A THC is a **physical, serialized parcel of certified Hempoxies feedstock**, denominated by grade and net mass (for example, “THC-95 · 10 g”). Its registry entry records what it is made of, where and when it was minted, how many reprocessing cycles its material has seen, and what has happened to it since. It is **not** a bank note, not a Canadian coin, not a claim on Landry Industries, and not a share in any enterprise. Keeping those boundaries sharp is both a legal requirement (§9) and the source of THC’s integrity: a holder owns material, full stop.

2.2 Unit, denomination and pricing (proposed)

- **Unit of account:** none of its own. Contracts are written in CAD; THC is the *thing* exchanged, like a gram of silver.
- **Denomination:** grade + certified net mass. Holdings aggregate by grade (e.g., $3 \times \text{THC-95} \cdot 10 \text{ g} = 30 \text{ g of THC-95}$).
- **Reference price:** a CAD/kg figure per grade, computed as a volume-weighted average of verified industrial offtake purchases over a trailing window and published on the registry. The issuer does not set or guarantee it.
- **Redemption in kind (optional):** certified foundries may offer reprocessing of THC into parts at published service rates. No buy-back price is promised, because a promised return on holding THC would invite characterization as an investment contract (§9).

2.3 Fiat, gold and THC compared

Table 2.1 · Three bases of value. THC entries are design intentions at TRL 1–2.

Attribute	Fiat (CAD)	Gold bullion	THC (proposed)
Basis of value	Legal-tender status and monetary policy	Scarcity, monetary history, jewellery and industrial demand	Use-value of certified feedstock to manufacturers
Issuance	Bank of Canada holds the sole right to issue notes ^[13]	Mining and refining	Certified mint nodes, only against audited mass balance
Value density	Very high (paper/digital)	Very high; $\approx 19.3 \text{ g/cm}^3$, $100 \text{ g} \approx 5 \text{ cm}^3$	Low; $\approx 1.4 \text{ g/cm}^3$ (design estimate), $100 \text{ g} \approx 71 \text{ cm}^3$
End of life	Notes withdrawn and destroyed	Remelted indefinitely	Reground and reprocessed for a measured number of cycles, then downgraded
Verification	Security features	Assay, weight, dimensions	Registry + mass, density + surface fingerprint + lab assay (§5)
Main weakness	Purchasing power set by policy	Extraction footprint; low productive use	Unproven price discovery; materials at TRL 1–2

The value-density row matters. Weight-for-weight, a THC bar occupies roughly fourteen times the volume of gold, and its CAD value per kilogram will track industrial composite feedstock rather than precious metals. THC is therefore best understood as **inventory that keeps its value because industry wants it** — a working store of value for manufacturers, cooperatives and communities — rather than pocket cash.

3 PHYSICAL AND CHEMICAL ARCHITECTURE

3.1 The vitrimer matrix

The THC matrix is a Hempoxies resin: epoxidized hempseed oil (EHO) cured with a bio-based acid or anhydride hardener in the presence of a zinc catalyst. The cure forms a network rich in β -hydroxy esters — the exact motif that undergoes zinc-catalysed transesterification in the epoxy-acid vitrimers studied since 2011.^[1,2,4] Because the exchange is *associative* (a new bond forms as an old one breaks), the network stays connected while it rearranges; above its topology-freezing temperature it flows, below it behaves as a rigid thermoset.^[3]

3.2 Five hemp-carbon tiers — no raw fibres

THC uses no raw, moisture-wicking plant fibre. All reinforcement is carbonised hemp, organised in five tiers that are reported in this paper as three aggregated fractions:

Table 3.1 · Hemp-carbon tiers and their intended roles.^[19]

Tier	Reported as	Intended role
HSCF · hemp short carbon fibre (3–6 mm)	HSCF	Macro tier; the load-carrying reinforcement. Single-filament strength is the largest unknown in the programme (Gate G3).
HB · hemp biochar	Biochar	Stiffness, interstitial filling, cost reduction and durable carbon. Loading must be capped; high biochar fractions can lower strength.
HCNS · hemp carbon nanosheets	Nano-Tier	Interconnected, partially graphitic nanosheets (10–30 nm) of the kind first made from hemp bast fibre by Mitlin’s group. ^[7] Mechanical interlocking hypothesis.
HGO · hemp graphene oxide		Covalent bonding into the matrix via surface oxygen groups; insulating.
HrGO · hemp reduced graphene oxide		Restores sp ² conductivity for anti-static and sensing grades; bonds weakly.

The no-raw-fibre rule is itself a hypothesis: carbonised hemp should absorb less water and interfere less with cure than untreated fibre. Gate G5 tests it directly against a raw-fibre control (§10).

3.3 Token grades

Table 3.2 · THC grade compositions (wt%, projected design targets). Each row sums to 100%.

Grade	Resin	HSCF	Biochar	Nano-Tier	Intended use
THC-90 Standard	50	30	12	8	General bars and utility tokens
THC-95 High-Carbon	40	35	17	8	High-rigidity coinage and premium bars (HX-95 specification)
THC-E Conductive	55	—	20	25 (HrGO-rich)	Anti-static units; RFID/NFC-embedded tokens
THC-B Barrier	85	—	10	5	Corrosion-resistant commemorative medallions

3.4 Engineering notes on the grades

- **THC-95 resin fraction.** At 40 wt% resin and 60 wt% carbon, wet-out, void content and consolidation pressure become limiting. G4’s void target ($\leq 2\%$) is the check.
- **THC-E is exploratory.** 25 wt% nano-carbon is far above typical nanofiller loadings, and graphene-oxide surfaces can adsorb the zinc catalyst — the “catalyst tax” identified in the Hempoxies programme.^[19] THC-E should be screened in steps (5 → 10 → 15 → 25 wt%) with catalyst compensation and stress-relaxation testing at each step.
- **THC-B** is matrix-dominated; its barrier claims rest on resin chemistry and must be tested (water uptake, salt-fog) before any corrosion-resistance claim is made.

4 TOKEN FORMATS (PROPOSED SPECIFICATION)

Because composite density is low, formats are sized by mass first and dimensions follow. Thicknesses below assume a density of 1.40 g/cm³, a design estimate to be replaced by the measured value at Gate G4.

Table 4.1 · Proposed THC formats. Mass tolerance target ±0.5% of declared net mass.

Format	Net mass	Footprint	Thickness*	Volume*	Suggested grades
C5 coin	5 g	Ø 32 mm	4.4 mm	3.6 cm ³	THC-95, THC-90
C10 coin	10 g	Ø 40 mm	5.7 mm	7.1 cm ³	THC-95, THC-E
B100 bar	100 g	100 × 50 mm	14.3 mm	71.4 cm ³	THC-90, THC-95
B1000 bar	1 kg	200 × 100 mm	35.7 mm	714 cm ³	THC-90 (industrial lots)
M medallion	25 g	Ø 50 mm (relief)	≈ 9 mm	17.9 cm ³	THC-B

* At $\rho = 1.40 \text{ g/cm}^3$ (estimate). Thickness = mass ÷ ($\rho \times$ footprint area); medallion thickness is an average over the relief. Designs must not resemble current Canadian coins or bank notes in size, colour or imagery.

5 SERIALIZATION, REGISTRY AND AUTHENTICATION

5.1 Identification is not authentication

Every THC carries a laser-marked Data Matrix symbol (ISO/IEC 16022) encoding a unique serial, with mark quality graded under the direct-part-mark guideline ISO/IEC 29158 (target: grade B or better).^[11,12] A Data Matrix *identifies* a token. It does not prove the token is genuine: anyone can photograph a serial and etch it onto a fake. v1.0 described the mark as “tamper-evident”; v2.0 replaces that claim with a layered authentication stack in which each layer is cheap to check and expensive to forge.

Table 5.1 · Layered authentication stack (proposed).

Layer	Check	Who / where	What it defeats · status
L1 Code	Scan Data Matrix; registry returns grade, mass, status	Anyone, phone	Unregistered or voided serials. Duplicate-scan alerts flag cloned serials.
L2 Physical	Mass, dimensions and density (water displacement) vs registry record	Any trader; scale + calipers	Wrong material or under-weight copies. Established practice.
L3 Fingerprint	Macro image of a defined surface window; dispersed carbon tiers form a random pattern hashed at minting	Trader app with macro lens	Cloned serials on genuine-looking material. <i>Research hypothesis — validated at Gate C3.</i>
L4 Laboratory	Filler content (TGA), FTIR, ASTM D6866 bio-based carbon ^[8]	Auditor, sampled	Substituted petrochemical or off-spec material. Established methods.

5.2 Registry records and lifecycle

The registry is an EVM-compatible smart-contract ledger. To limit regulatory exposure (§9), v2.0 proposes that registry entries be **non-transferable provenance records**: they describe the physical token but are not themselves tradeable. Ownership passes with the object, as with any bearer commodity; an optional, off-chain custody log can record transfers between consenting parties. No personal data is written on-chain.

Table 5.2 · Registry fields per serial (proposed).

Field	Content
Identity	Serial; grade; format; declared net mass; L3 fingerprint hash
Origin	Mint-node ID; batch ID; mint date; batch-level ASTM D6866 result and test-report reference
Lineage	Cycle count of the material; parent batch IDs (for re-minted material)
Status	MINTED → ACTIVE → CONSUMED (logged at regrind) or VOID (lost, damaged, defective, recalled)
Carbon attribute	NONE · RETIRED-FOR-HOLDER (with credit serial) · CLAIMED-ELSEWHERE — see §7.3

5.3 Mass-balance invariant

The registry must never allow more THC mass to exist than certified material entering minting. For every minted batch b , the Auditor role reconciles:

$$m_{\text{minted}}(b) \leq \sum m_{\text{consumed}}(\text{inputs}) + m_{\text{virgin}}(b) - m_{\text{loss}}(b)$$

where consumed inputs are tokens whose status changed to CONSUMED, virgin mass is newly produced certified feed-stock, and losses (grinding fines, flash, test coupons) are weighed. Gate C4 targets reconciliation within $\pm 1\%$ per batch.

6 INDUSTRIAL FEEDSTOCK AND REMOLDING PROTOCOL

6.1 The vitrimer advantage — and its limits

Unlike metals, THC does not need smelting, and unlike conventional thermosets it can be reshaped. Leibler’s catalysed epoxy-anhydride networks flowed at about 200 °C because transesterification rearranged their topology,^[3] which is why the THC remolding window sits at 180–200 °C. Bond exchange, however, is not a perpetual-motion machine. In one comparison, a conventional epoxy vitrimer lost about 63% of its strength over six reprocessing cycles, while a vitrimer chemistry tailored for faster exchange recovered its strength fully;^[5] in another, neat vitrimer properties stayed broadly constant before dropping 38–45% between cycles 12 and 21.^[6] Grinding also shortens carbon fibre, which lowers reinforcement efficiency. THC therefore treats cycle life as a **measured property of each grade**, recorded on the registry, not as an assumption of infinite recyclability.

6.2 Remolding protocol

Scanning a token's serial retrieves the factory processing parameters for its grade and cycle count. The baseline sequence is:

- 1 **Verify and consume.** Authenticate (L1–L2 minimum), weigh, and log a CONSUMED event before any physical processing. A token cannot be reground while ACTIVE.
- 2 **Reduce.** Mechanically or cryogenically grind to a uniform regrind particle size under dust control (§6.4). Weigh fines as losses.
- 3 **Consolidate.** Load the regrind into a compression mould at **180–200 °C and 1–5 MPa for 10–30 min** (design window; G2 targets stress relaxation to 1/e in ≤ 10 min at 180 °C). The zinc catalyst activates bond exchange and the particles fuse into a continuous network.
- 4 **Qualify.** Mould test coupons with every lot. Compare against the grade's baseline; G2 targets ≥ 90% property retention after three regrinds.
- 5 **Re-enter.** Lots that pass are minted back into THC at the same grade with an incremented cycle count; lots that fall short cascade down (§6.3). Parts made from THC carry the lineage forward until they too return as regrind.

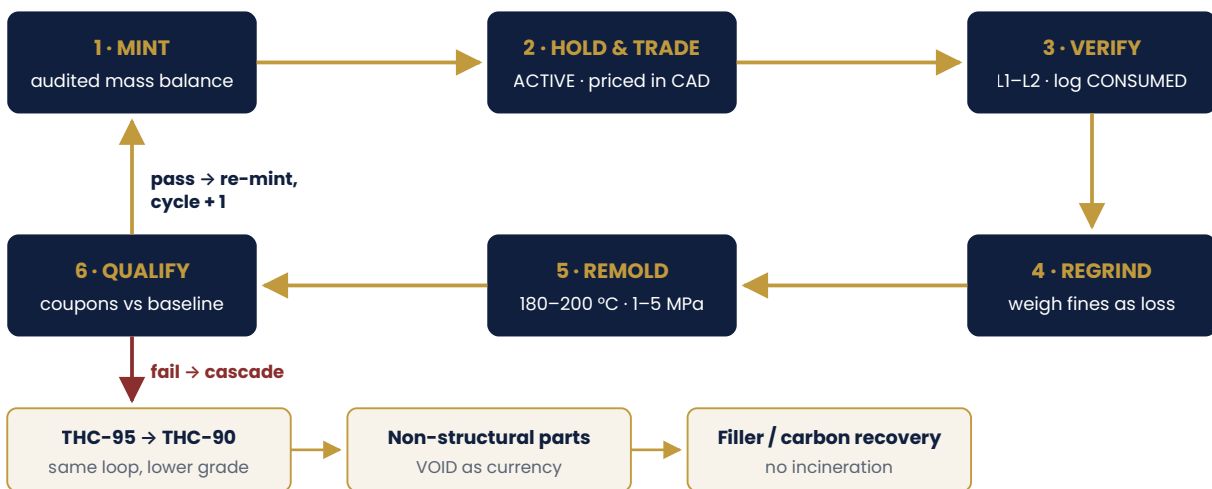


Figure 6.1 · The THC closed loop with grade cascade. Material re-enters the currency only after it requalifies; otherwise it steps down into lower-value uses. End-of-life routing avoids incineration so that embedded biochar carbon is not re-emitted (§7.2).

6.3 Grade cascade and industrial positioning

The cascade keeps every gram productive: THC-95 that fails requalification becomes THC-90, then non-structural parts, then a filler or carbon-recovery stream. v1.0 named aerospace, automotive and marine parts as direct outlets. v2.0 keeps those markets as long-term targets but positions remolded THC first for secondary and non-structural parts; any structural or flight-critical use would require full material qualification under the relevant certification regime, which is far beyond TRL 1–2.

6.4 Safety

Grinding carbon-filled composites generates fine and nano-scale carbon dust. Baseline controls are enclosed grinding with local exhaust ventilation, respiratory protection, housekeeping that avoids dust accumulation, and hot-press guarding. A full hazard assessment of the resin system, hardener and catalyst precedes any pilot run.

7 CARBON AND ENVIRONMENTAL CLAIMS

7.1 What ASTM D6866 does — and does not — show

ASTM D6866 measures the bio-based carbon content of a material by radiocarbon analysis; the accelerator mass spectrometry and scintillation methods carry a maximum total error of $\pm 3\%$ absolute.^[8] The standard itself states that it does not address environmental impact or product performance.^[8] A D6866 result therefore supports a claim such as “contains 95% bio-based carbon”, but not “saves the planet”. v2.0 records D6866 results per batch and ties every broader environmental statement to a separate test or life-cycle assessment.

7.2 Biochar permanence and carbon credits

Biochar is the leading durable carbon-removal pathway, and several crediting methodologies exist — Puro.earth (whose 2025 methodology labels biochar removals CORC200+, i.e., several centuries), the European Biochar Certificate, and Verra VM0044, which covers non-soil as well as soil uses.^[9,10] Biochar locked inside THC is a plausible durable carbon store, but only if the material never reaches an incinerator. Credit eligibility would depend on project-level accounting under a chosen methodology; THC does not assume it.

7.3 No double counting

v1.0 proposed appending carbon credits to tokens. v2.0 adds a single-claim rule: a given tonne of removal is either **retired on behalf of the token holder** (recorded as RETIRED-FOR-HOLDER with the credit serial) or **sold separately** (recorded as CLAIMED-ELSEWHERE) — never both. Tokens with no certified credit carry NONE and make no removal claim.

7.4 Claims ladder

Canada’s Competition Act requires that claims about a *product’s* environmental benefits rest on an adequate and proper test conducted before the claim is made — a requirement left unchanged by 2026 amendments. Claims about a *business’s* environmental benefits must rest on adequate and proper substantiation; Bill C-15 (Royal Assent 26 March 2026) removed the earlier “internationally recognized methodology” requirement and limited private applications for those claims.^[18]

Table 7.1 · Environmental claims permitted at each stage (proposed internal policy).

Stage	May say	May not say
Now (TRL 1–2)	“Designed to...”, “targets...”, “research hypothesis”	Any measured bio-content, durability, carbon or recyclability figure
After G6	“Contains X% bio-based carbon (ASTM D6866)”; hemp-derived mass from audited mass balance	Net climate benefit; “carbon negative”

Stage	May say	May not say
After G2 + C4	"Reprocessed N times with ≥ Y% property retention (test ref.)"	"Infinitely recyclable"
After LCA + credits	Comparative footprint vs a stated baseline; retired removals per token	Any figure without its report reference

8 GOVERNANCE AND ACCESS CONTROL

Issuance and lifecycle changes are governed by role-based permissions in the registry contracts. v2.0 keeps the four roles from v1.0, adds explicit limits to each, and adds two roles that make the system safer and more transparent.

Table 8.1 · Registry roles (proposed).

Role	Held by	May	May not / control
Master Admin	Landry Industries, via multisignature wallet	Deploy contracts; set global parameters; grant and revoke roles	Act alone: changes need M-of-N signatures and a public timelock; cannot mint
Guardian new	Independent signers	Pause minting in an emergency	Cannot mint, burn or change parameters; pauses expire unless ratified
Minter Node	Certified foundries	Mint and serialize against an approved batch; void defective units	Mint beyond the audited batch mass (§5.3)
Auditor	ESG and carbon validators	Approve batches; append D6866, test and credit records	Mint, or edit records after sealing (corrections are new entries)
Industrial Consumer	Verified manufacturers	Log CONSUMED, regrind and remold events	Re-activate a consumed serial
Public Reader new	Anyone	Read any serial's non-personal record	Write

HONEST DECENTRALIZATION

v1.0 described the system as having no centralized points of failure while assigning a Master Admin role to Landry Industries. Both cannot be true. v2.0 states plainly that the registry begins issuer-administered and proposes a path to wider control: multisignature and timelock from day one, independent Guardians, an external smart-contract audit before any production deployment (Gate C2), and later transfer of Master Admin powers to a council that includes certified foundries and auditors.

9 LEGAL AND REGULATORY PATHWAY (CANADA)

NOT LEGAL ADVICE

This section maps public sources to design decisions so that counsel can review a concrete proposal. Gate C1 requires a written opinion from Canadian counsel before any public sale.

Table 9.1 · Instruments that shape THC's design.

Instrument	What it provides	Design consequence for THC
Bank of Canada Act , s. 25(1)	The Bank of Canada has the sole right to issue notes. ^[13]	No paper notes, and nothing marketed as Canadian money.
Currency Act , s. 13	Contracts and payments relating to money must be in Canadian currency, unless made in a foreign currency or a unit of account defined by the currencies of two or more countries. ^[14]	Price and invoice in CAD. THC is the commodity exchanged, never the unit of account.
Pacific Coast Coin Exchange v. OSC , [1978] 2 SCR 112	The Supreme Court held that silver coins sold on margin were an investment contract, taking a broad view of what counts as a security. ^[15]	No investment or return marketing; physical delivery; no issuer-dependent profit promises or guaranteed buy-backs.
CSA Staff Notice 21-327 (2020)	A platform user's contractual right to a crypto asset that is a commodity may itself be a security or derivative unless the asset is immediately delivered. ^[16]	Keep registry entries as non-transferable provenance records; any tradeable token layer needs a securities analysis first.
PCMLTFA / FINTRAC	Businesses dealing in virtual currency must register as money services businesses and meet KYC, record-keeping and reporting duties (since 1 June 2020). ^[17]	Design the registry so it issues no exchangeable virtual currency; otherwise register before launch.
Competition Act , s. 74.01(1)(b.1)–(b.2)	Environmental-benefit claims require an adequate and proper test (products) or adequate and proper substantiation (businesses). ^[18]	Apply the claims ladder (Table 7.1) and Gate C5.

NAMING NOTE

“THC” is also the universal abbreviation for tetrahydrocannabinol. For a hemp-based product this invites confusion with cannabis products and may draw extra scrutiny from payment processors, marketplaces and advertising platforms. Recommended: a trademark clearance search, the full name “Hempoxies Currency” on first use in every channel, and a registry ticker that cannot be mistaken for a cannabinoid label.

10 VALIDATION ROADMAP

THC advances only by passing gates with numbers that can fail. The materials gates G1–G6 are those of the Hempoxies programme;^[19] the currency gates C1–C5 are new in this edition. All thresholds are proposed acceptance criteria, not predictions of success.

Table 10.1 · Stage gates.

Gate	Test	Pass criterion (target)
G1 · Resin	EHO titration; neat resin cure (DSC); Tg (DMA)	Epoxy equivalent weight within ±5% of design; Tg ≥ 40 °C neat
G2 · Vitrimer	Stress relaxation 160–200 °C; Arrhenius fit; regrind cycles	Relaxation to 1/e in ≤ 10 min at 180 °C; ≥ 90% property retention after 3 regrinds
G3 · Carbons	HSCF single-filament strength; HCNS surface area (BET); HGO C/O ratio	Values recorded; HSCF ≥ 0.5 GPa to justify the structural tier
G4 · Composite	THC-90 flexural test (ASTM D7264); void content; density	Flexural modulus ≥ 5 GPa; voids ≤ 2%; Tg ≥ 60 °C; measured density replaces the 1.40 g/cm ³ estimate
G5 · Durability	Water uptake; wet/dry property retention vs raw-fibre control	Lower uptake than the raw-hemp-fibre control
G6 · Content	ASTM D6866 + mass-balance audit	Bio-based carbon ≥ 95%; hemp-derived mass ≥ 90%
C1 · Legal new	Counsel opinion: currency, securities, AML, competition; trademark clearance	Opinion received and design adjusted before any public sale
C2 · Registry new	Testnet deployment; independent smart-contract audit	No unresolved critical or high findings; multisig and timelock live
C3 · Authentication new	Blind counterfeit challenge across L1–L4	≥ 99% of crafted counterfeits flagged; ≤ 1% false rejection of genuine tokens
C4 · Closed loop new	Mint → regrind → remold → re-mint, ≥ 3 cycles	Mass balance reconciled within ±1% per batch; G2 retention met
C5 · Claims new	Substantiation file (D6866, tests, LCA)	Every public environmental claim mapped to a test report before publication

Readiness path. Today: TRL 1–2. TRL 3 (analytical and experimental proof of concept) after G1–G3. TRL 4 (laboratory validation of the integrated system) after G4–G6 and the laboratory-scale loop in C4.

11 RISK REGISTER

Table 11.1 · Principal risks and mitigations. L = likelihood, I = impact (qualitative, at TRL 1–2).

Risk	L	I	Mitigation
Regulatory characterization as currency, security or virtual currency	High	High	Commodity framing, CAD pricing, provenance-only registry, no return promises; Gate C1
Property loss across regrind cycles	High	Med	G2 targets; cycle counter on registry; grade cascade
Thin price discovery and low value density	High	Med	Position as industrial feedstock; reference price from real offtake; start with pilot partners
Nano-tier processability and catalyst tax (THC-E)	High	Med	Stepped loading, catalyst compensation; THC-E kept exploratory
Counterfeiting	Med	High	Four-layer authentication; duplicate-scan alerts; Gate C3

Risk	L	I	Mitigation
Greenwashing exposure	Med	High	Claims ladder; Gate C5; no claim without a test report
Carbon double counting	Med	High	Single-claim rule and carbon-attribute field (§7.3)
Key compromise or contract defect	Low	High	Multisig, timelock, Guardian pause, external audit (C2)
Name confusion with tetrahydrocannabinol	Med	Med	Trademark search; full name on first use; distinct ticker
Occupational dust during grinding	Med	Med	Enclosed grinding, local exhaust ventilation, respiratory protection

12 CONCLUSION

THC asks a simple question: what if money were made of something the economy actually needs? Hempoxies supplies a candidate answer — a hemp-carbon vitrimer that can be weighed, assayed, reground and remolded — and this edition supplies the discipline the answer requires. THC is framed as a commodity priced in dollars rather than a rival to them; its registry records provenance rather than issuing a speculative token; its authenticity rests on physics as well as a printed code; its recyclability is measured cycle by cycle; and every green claim waits for its test.

None of this diminishes the vision. It makes the vision checkable. If the gates in §10 are passed, THC becomes a working demonstration that a store of value can also be a store of carbon and a stock of manufacturing material — a baseline where to save is to hold verified, plant-derived material that industry will want back.

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A GLOSSARY

Associative exchange. Bond exchange in which a new bond forms before the old one breaks, so network connectivity is preserved.

ASTM D6866. Radiocarbon test methods for the bio-based carbon content of solids, liquids and gases.

β -hydroxy ester. Ester with a hydroxyl on the adjacent carbon, formed when epoxides react with acids; the exchange site in epoxy vitrimers.

CONSUMED / VOID. Registry states for a token logged for regrind, or removed from circulation for loss, damage or defect.

Data Matrix. Two-dimensional symbol defined by ISO/IEC 16022; direct-part-mark quality graded under ISO/IEC 29158.

EHO. Epoxidized hempseed oil, the bio-based epoxy of the Hempoxies resin.

EVM. Ethereum Virtual Machine; the smart-contract runtime shared by many public and private ledgers.

HSCE, HB, HCNS, HGO, HrGO. Hemp short carbon fibre, hemp biochar, hemp carbon nanosheets, hemp graphene oxide, hemp reduced graphene oxide.

Mass-balance invariant. The rule that minted mass may never exceed certified input mass minus measured losses.

Multisignature / timelock. Controls requiring M-of-N keys to approve an action, and a public delay before it takes effect.

Nano-Tier. The aggregated HCNS + HGO + HrGO fraction reported in grade tables.

Reference price. Proposed CAD/kg value per grade, from volume-weighted verified offtake transactions.

TRL. Technology Readiness Level; THC is at TRL 1–2 (basic principles and concept formulated).

Vitrimer. A permanently cross-linked polymer whose topology can rearrange by catalysed associative exchange, allowing reshaping above a topology-freezing temperature.

B WHAT CHANGED FROM V1.0

Table B.1 · Editorial and technical corrections.

v1.0 statement	v2.0 change and reason
"Replacing fiat"; THC as the symbol replacing \$	Kept as vision and motto; THC framed operationally as a CAD-priced commodity to respect the Bank of Canada Act and Currency Act (§9).
Units "cycled indefinitely"	Multi-cycle with measured retention and grade cascade; literature shows property loss over repeated cycles in conventional vitrimers (§6.1).
"Five tiers of pyrolyzed hemp carbon" while the table showed three	Five tiers named; table columns explained as aggregated fractions (Table 3.1).
Laser mark is "tamper-evident"	A code identifies but does not authenticate; four-layer authentication added (§5.1).
"Melt down" bullion	Vitrimers do not melt; regrind is consolidated by bond exchange under heat and pressure.
"Without degrading chemical resistance or cross-link density"	Associative exchange preserves connectivity, but cycle-to-cycle retention is a G2 test, not an assumption.
"Complete chemical stability, moisture resistance"	Recast as targets tested at G5.
Direct aerospace, automotive and marine parts	Long-term targets; first use in secondary and non-structural parts pending qualification (§6.3).

v1.0 statement	v2.0 change and reason
ASTM D6866 and ESG metrics retrieved on scan	D6866 recorded per batch with its stated limits; environmental claims gated by the claims ladder (§7).
Carbon credits appended to tokens	Single-claim rule prevents double counting (§7.3).
“Without centralized points of failure”	Issuer-administered start acknowledged; multisig, timelock, Guardians and a decentralization path added (§8).
“Every financial token is simultaneously an audited environmental asset”; “saving money actively saves the planet”	Replaced with claims that become available as gates are passed (Table 7.1, §12).
No unit definition, pricing, formats or legal analysis	Added §2.2, §4, §9; added currency gates C1–C5 and a risk register.

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