Where Waste Comes From

The Chain, the Net, and the Missing Alchemy

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CONTEXT HEADER — read before reacting to this text.

Programme. MAZE: the application of the Vacuum.Net theory to the human being — here to the human economy of matter and energy.

This piece. A diagnosis and an inversion. It reads the dominant production method — matter extracted at maximal distance, converted through long chains — in the vocabulary of the net (winding, mesh, boundary crossing, tension, window), derives why its waste is structural rather than accidental, and states the alternative the same theory supplies: production as state-setting in place. It builds on three published pieces: the Carnot analysis ("From Carnot to the Vacuum Net"), the technology programme ("Technology of the Net"), and the Vacuum Replicator concept paper. Status of the economic reading: a projection of the published model onto the production system — argued, not yet measured.

Settled. The Living Winding (8th ed.): a maintained pattern costs current; closures have windows with a lower edge J_min; boundary crossings carry conductances and losses. The Carnot piece: per-conversion losses computed and a single closure criterion stated. The Replicator concept paper: matter as address in a constitutive medium; transformation as soften–write–harden; rearranging at chemical rates, not creating at mc^2.

Open. The quantitative chain audit on real product chains; the measured window position of extraction-end populations; every engineering stage of the short loop beyond the demonstration points named below.

Conventions. Statuses base/derived/chosen/testable; self-contained text; every number in the text.

Corpus. constable.blog; Academia/ResearchGate.

1. The chain, stated

The dominant method for making things is a chain. Ore is taken from the ground on one continent, by the lowest-paid hands available. It is shipped, smelted, shipped, refined, shipped, formed, assembled, packed, shipped, distributed, sold, used, discarded — and the discard is often shipped again, back toward the poor end. Between the first hand and the last stand dozens of conversion and transport steps. Each step is owned by someone else, priced at its endpoints, and optimised in isolation.

The standing vocabulary calls the losses along this chain *inefficiency* and treats them as a residue to be engineered away. The net reads it differently: the losses are not a residue. They are what the structure is made of.

2. The chain in the net's vocabulary

In the net, a production system is a mesh through which tension flows. Three of the model's published quantities carry the whole analysis.

A step is a boundary crossing, and every crossing costs. Whenever flow passes from one closure to another — one furnace, one ship, one firm, one country — it crosses a boundary with finite conductance, and a share of the tension does not arrive. The Carnot paper computed the canonical single case: of 100 kJ crossing one realistic thermal boundary, 40 kJ is lost to entropy generation and a further 8.5 kJ to coupling mismatch. Call the retained fraction per crossing $q < 1$.

Chains multiply. A chain of k crossings retains q^k. At a representative $q = 0.85$ — an optimistic average over thermal, chemical, logistic and administrative crossings — ten crossings retain $0.85^{10} \approx 0.20$: one fifth arrives. Twenty crossings retain four percent. The loss is exponential in chain length, and the modern chain is long by design. This is the first structural statement: **the waste of the system is not in the steps but in the number of steps.** No step-wise optimisation touches the exponent.

Shipped matter pays maintenance current for nothing. Moving mass is paying the holding cost of matter that ends the journey as the same class of matter it began as. In the model's terms: throughflow J spent entirely on transporting an address instead of writing one. The chain's energy bill is dominated by exactly this term.

3. Why the market selects the long chain

If chains lose exponentially, why do they grow longer? Because of what the market prices — and what it does not.

Endpoint pricing. The market prices what changes hands at the two ends of a crossing. The crossing itself — the entropy generated, the coupling loss, the drift laid into landscapes, bodies and communities along the way — appears in no ledger unless a law forces it there. An optimiser that sees endpoint prices and is blind to crossing costs will lengthen the chain whenever the price difference between two ends exceeds the *priced* part of the crossing cost. The unpriced part accumulates without limit, because nothing in the objective function sees it.

Where the unpriced losses land. They land where resistance is lowest: at the extraction end. Here the Living Winding supplies the exact vocabulary. A person is a closure with a window; below a personal throughflow J_{min}, the pattern itself decays — health, capacity, community. The chain's arbitrage condition is that the far end works for less than maintenance: knots held at or below the lower edge of their own window, so that the chain's drift bill — the wear the crossings generate — is paid out of their pattern instead of out of the price. **Exploitation, in this model, is not a moral adjective. It is a measurable configuration: a mesh kept standing by holding remote knots under their window edge.** The same configuration this programme has read in war and in debt cycles, here read in production.

So the long chain is not a mistake that better management will fix. Under endpoint pricing it is the fixed point: chains grow toward the poorest knots and to the greatest length the wage gap will carry, and the exponential loss is financed by pattern damage at the far end. That is where waste comes from.

4. The inversion: setting the state in place

The same theory that diagnoses the chain supplies its inversion, and it is one sentence — the design rule of the published technology programme: **do not move matter to the form; set the local state so that the form is the fixed point.**

The physical ground is the model's central departure from the standing frame: material properties are state functions of the medium. Matter is an address in a constitutive medium, not a substance that must be fetched. Transformation is then a local cycle — *soften, write, harden*: lower the local stiffness, write the target pattern, restore the stiffness so the pattern holds itself. The energy book of this cycle was stated in the Replicator concept paper and bears repeating, because it is the economic heart: **rearranging matter is paid at chemical rates — electronvolts per bond — not at creation rates (mc^2) and not at intercontinental-transport rates.** The short loop is not frugality; it is a different tariff class.

This is not speculative in kind — only in degree. The demonstration points already exist at small scale, each published: molecular self-assembly writes a designed pattern and the pattern then holds itself (DNA origami); acoustic fields hold and move matter into target configurations without contact (acoustic levitation and assembly); a tunable interaction knob softens and re-hardens a quantum medium on command (Feshbach control). And the industrial world has, without the theory, begun crawling toward the short loop wherever chains became too expensive: additive manufacturing, local recycling, print-on-site. The theory says these are not conveniences. They are the first instances of the correct tariff class.

5. What becomes simpler

Read through the net, the reform programme is not a thousand measures. It is one variable: **chain length.** Every crossing removed is a factor q recovered — gain on the exponent, which no efficiency programme on the steps can match. The practical ordering follows directly:

1. **Price the crossings.** Not as ethics but as bookkeeping: a crossing that generates entropy and drift has a cost whether or not a ledger records it. The Carnot paper's closure criterion (ΔS per delivered unit) is a computable per-crossing number, today.
2. **Shorten before optimising.** A chain of ten crossings at 90 % each (retains 35 %) is worse than a chain of four at 82 % each (retains 45 %). Removing crossings beats polishing them.
3. **Move addresses, not mass.** Information about the target pattern crosses boundaries at negligible cost; matter crosses at full cost. Every technology that ships the *name* and writes locally — the whole soften-write-harden family — converts transport tariff into chemical tariff.
4. **No knot below its window.** The extraction-end condition is not only unjust; it is the financing mechanism of the exponential loss. A chain that must pay maintenance-level prices at every knot loses its arbitrage and shortens by itself. The moral demand and the thermodynamic one are the same demand, stated twice.

6. Afterword: the old name

The oldest name for setting the state of matter in place is alchemy, and its oldest home gave the discipline its name: *kēme*, the black land, Egypt. The alchemist's workshop was the short loop in person — transformation where the matter stands, the material read as carrying a name that the work addresses, the state changed rather than the substance carted. The tradition was later ridiculed for the one claim it could not cash (transmutation of elements at furnace energies) and the rest of its programme — matter as state, work as state-setting, the name as handle — was discarded with it. This paper's economics is that discarded programme, returned with the equations attached. The

chain era treated matter as dead cargo and paid the transport tariff on everything. The net treats matter as address, and the address travels free.

That is the missing alchemy: not gold from lead, but the short loop from the long chain.

Annotated references

Konstapel, J. (2026). ***From Carnot to the Vacuum Net — The End of the Steam-Engine Era.*** **constable.blog / Academia.** The per-crossing arithmetic this paper multiplies into chains: the 100 kJ worked example (40 kJ entropy loss, 8.5 kJ coupling loss) and the single closure criterion (ΔS per delivered unit) used here as the crossing price.

Konstapel, J. (2026). ***Technology of the Net.*** **constable.blog.** The design rule ("set the state so the goal is the fixed point") and the six-technology programme of which the short-loop economy is the economic reading; includes fabrication-as-conditioning and medicine-as-state-determination.

Konstapel, J. (2026). ***The Vacuum Replicator: Matter as Address in a Constitutive Medium.*** **ResearchGate.** The soften–write–harden cycle, the address/name structure (N0–N3), and the energy book — rearranging at chemical rates, not creating at mc^2 — that fixes the tariff argument of Section 4.

Konstapel, J. & Claude (2026). ***The Living Winding.*** **Academia/ResearchGate.** The window and its lower edge J_min: the formal ground for reading underpayment as knots held below maintenance, and for the claim that the chain's drift bill is paid in pattern damage.

Rothemund, P. (2006). Folding DNA to create nanoscale shapes and patterns. ***Nature*** **440, 297–302.** Demonstration point: a written pattern that assembles and then holds itself — the write-and-harden half of the cycle, existing.

Marzo, A. et al. (2015). Holographic acoustic elements for manipulation of levitated objects. ***Nature Communications*** **6, 8661.** Demonstration point: fields holding and steering matter into target configurations without contact — state-setting as manipulation.

Chin, C., Grimm, R., Julienne, P. & Tiesinga, E. (2010). Feshbach resonances in ultracold gases. ***Rev. Mod. Phys.*** **82, 1225.** Demonstration point: a medium whose interaction strength is turned by an external knob — soften and re-harden on command, in the laboratory.

Hornborg, A. (2001). ***The Power of the Machine: Global Inequalities of Economy, Technology, and Environment.*** **AltaMira.** The standing analysis of unequal exchange: technology as a mechanism that displaces costs toward the periphery. Cited as the social-science twin of Section 3 — the same displacement, here given its net-mechanical form (unpriced crossings, knots under the window).