

BREATHLINE · INDEPENDENT RESEARCH

The Capture Atlas

United States Edition — where value leaves the work that made it

Evidence-graded research · every figure sourced · ranges, never false precision
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The Capture Atlas — United States Edition

A sector-by-sector map of where value leaves the people and the work that created it, and accrues instead to whoever controls the record, the relationship, or the choke-point. Eleven sectors of the S&P 500. Every figure graded and sourced. Ranges, never false precision.

Executive summary

Across the eleven sectors of the S&P 500, the same thing happens in eighty-six specific places. A farmer delivers grain and the buyer grades it on the buyer's own scale. A songwriter's royalties sit unmatched in a collecting society's account. A trucker eats a day of unpaid detention because the clock at the dock is the shipper's word against the driver's. A family inherits mineral rights but not the records needed to prove them. In each case, real work was done and real value was created — and a predictable share of that value peeled away, not to the people who did the work, but to whoever happened to own the ledger, the relationship, or the gate the work had to pass through.

This atlas maps those places. We call each one a **capture zone**: a specific point in an industry's value chain where value routinely leaves its creator and accrues to a controlling position. There are eighty-six of them here, spread across all eleven sectors, each described in the same way — where it sits in the chain, what it looks like from the ground, how the value actually leaves, the best available measure of its size, who occupies the position, and who carries the cost.

The headline finding, stated honestly. The recurring engine is not theft and not, in most cases, wrongdoing. It is **information asymmetry** — one party can see and prove what happened; the other cannot. Wherever that gap exists, whoever sits on the informed side can price it. This is a claim about **gross flow through a position**, not about anyone's guilt. The genuine work in these industries — moving freight, bearing risk, curating a marketplace, inspecting a factory, matching a buyer to a seller — is real, and in this analysis it stays paid. What the atlas isolates is the separate slice that accrues to owning the position rather than to doing the work.

How to use this atlas. Read the ten recurring patterns first — they are the small number of mechanisms that reappear, in different costumes, across every sector. Then use the sector chapters as a reference: each is self-contained, and each zone can be read on its own. Every number carries a grade (measured, derived, or directional) so you always know how much weight it can bear. Where the honest answer is "the direction is clear but the precise figure is not," the atlas says so.

How to read this atlas

The evidence grades

Every figure in this atlas carries one of three grades. The grade tells you what kind of thing the number is, so you never mistake an estimate for a measurement.

- **MEASURED** — a regulator, a statistics body, a court, or a comparable authority has published this number. It is as solid as public data gets.
- **DERIVED** — the number is built up from public figures, with the arithmetic shown. It is only as good as its inputs, but you can follow how it was reached.
- **DIRECTIONAL** — an order of size, not a precise figure. The direction and the rough scale are known; the exact number is not. Treat it as "about this big," never as a decimal-point fact.

Where a zone has no defensible number at all, the atlas describes the mechanism in plain words and says the size is not yet publicly settled. That is deliberate. A map that invented figures to fill its blank spaces would be worse than one that shows them.

What a "capture zone" is

A capture zone is a specific point in an industry's value chain where value routinely leaves the people who created it and accrues to whoever controls the record, the relationship, or the choke-point at that point. It is a position, not a company — the same position can be occupied by different firms, and naming a firm here describes the position it holds, never an accusation of wrongdoing.

Work versus position

Some value is earned by doing work — moving goods, bearing risk, verifying facts, running a marketplace. Other value is collected simply by owning the position through which the work must pass — the ledger, the relationship, the gate. **This atlas maps the second kind.** Every time a mechanism below says "this is real work," it means exactly that: the labor stays paid, and only the position rent is in question.

What would close a capture zone

The reader does not need a solution to use the map, but the common thread is worth stating once. Almost every zone in this atlas rests on the same foundation: one side can prove what happened and the other cannot. Wherever a plain, independently checkable record of an event — a delivery, a payment, a grade, an inspection — can be owned and carried by the party that did the work, the information gap the position feeds on

narrows, and with it the slice that the position can charge. That is the whole thesis in one sentence. The rest of this document is the map.

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The ten recurring patterns

Eighty-six zones, but only about ten mechanisms. The same few structures recur across every sector in different costumes. Learn these and the sector chapters read faster.

- 1. The counterparty's scale.** The party who profits from a number also owns the instrument that produces it, the record that stores it, and the process that settles disputes about it. Grain grading at the elevator, royalty-deduction math, pipeline "shrink," retail chargebacks, pharmacy clawbacks — each is asserted in the stronger party's own ledger and can be contested only at the cost of an audit or a lawsuit.
- 2. Renting your own memory.** A business's core record — its customer list, its ledger, its service or clinical history — lives inside a vendor's system, under the vendor's keys, priced at what it would cost to leave. The exit is tolled; the data is effectively held against the door.
- 3. The prove-it-again treadmill.** The same settled fact — a security audit, a factory inspection, a medical license, a verified identity, a lab assay — is re-verified from scratch by every new counterparty, because certificates are asserted documents rather than portable proofs. A whole labor industry exists to repeat the verification.
- 4. Sold back your own signal.** A hub gathers data that its own participants generated — purchase records, listings, market prices, well logs, vehicle histories — and sells it back to those same participants as analytics, media, leads, or per-lookup reports.
- 5. The dark middle.** Value passes through a chain of intermediaries — a pharmacy-benefit manager, a freight broker, an ad-tech stack, a remittance corridor — in which no party at either end can see both sides at once, so the spread is set by who knows what, not by the matching or logistics work performed.
- 6. The opacity premium.** A small operator's cost of capital is priced to the fact that its numbers cannot be cheaply verified, not to its actual risk. The trust gap itself becomes the financier's margin: factoring haircuts, thin-file exclusion, bonding ceilings, diligence floors.
- 7. The green-proof tax.** Proving that production is clean costs about the same for a multinational as for a forty-acre farm. So the premium for clean production flows to whoever can afford the certification bureaucracy, not to whoever is actually cleanest — a regressive tax that quietly rewards greenwashing over truth.
- 8. Livelihood on a revocable key.** A worker's, creator's, or franchisee's income rests on an account someone else controls: credentials, ratings, audience, dispatch history, route economics all live in a platform's system. Deactivation is the end of a livelihood, and reputation resets to zero at every switch.

9. Death at the handoff. Family value dies at generational transfer because the working system — relationships, grade histories, title chains, keys, tax-basis records — lives in other people's databases. Royalties fall into "suspense," heirs inherit fractured title, a family firm sells at salvage prices.

10. The unpooled many. No one is paid to aggregate the small side of a market, so a hub's position substitutes for the missing pool. Lone small producers are price-takers; minimum-order sizes lock small buyers out; local food routes hundreds of miles through a distant warehouse.

Where the leverage concentrates

Five points where the same pattern recurs most widely, and where the rules are already moving — the places a reader tracking this space should watch first.

Proof of delivery and acceptance. Across trucking, grocery, manufacturing, health care, and construction, an estimated **1-5% of a small firm's revenue** (DIRECTIONAL) leaks to deductions, detention, and financing charges priced purely on delivery that cannot be proven. A record of who delivered what, and when, co-signed at the dock or the scale, is the simplest and most broadly useful remedy: it touches no money and needs no license.

Audit once, verify many. The re-verification treadmill — security questionnaires, supplier qualifications, factory audits, insurance pre-authorizations — sits at a cost crisis, while new US health-care prior-authorization rules (compliance dates in 2026-27) and general buyer audit fatigue create demand for a cheaper path. Certifiers keep their authority; only the repetition falls away.

Metered proof of environmental claims. New rules — the EU's carbon border adjustment (CBAM) and Digital Product Passport, California's packaging-responsibility law (SB 54), and EPA methane rules — demand evidence now, while small clean producers are priced out of proving what they already do. A signed measurement taken at the meter or the sensor turns the green premium toward the genuinely clean.

Portable credentials and work history. Clinicians lose an estimated **90-180 days** (DIRECTIONAL) of billable income to each new payer enrollment; gig, field, and route workers lose their entire record at every platform switch. The bodies that already hold the facts — licensing boards, training providers, past clients — need only sign them once.

The verifiable inheritance. The largest generational wealth transfer in history is under way, while heirs' property, suspended royalties, unclaimed accounts, and salvage-priced

family-firm sales are documented, sympathetic losses. Passing along keys plus a proven record turns probate reconstruction into simple verification.

The sector atlas

Eleven sectors, in the order the Global Industry Classification Standard lists them. Each sector opens with its value chain — the path value travels from raw input to end use — and then maps the capture zones along it. Every zone follows the same anatomy, so any one can be read on its own.

Energy — oil, gas, and consumable fuels; energy equipment and services

The value chain. Resource access (mineral-rights leasing, title, royalty accounting) → exploration and services (seismic, drilling, well-data creation) → production and gathering (wellhead measurement, processing, revenue accounting) → midstream (pipeline transport, storage, custody transfer) → price formation and trading (hub benchmarks, assessed indices, marketing) → refining and distribution (rack pricing, branded networks, retail fuels) → financing and risk (reserve-based lending, hedging, surety bonding) → disposal and externality (well plugging, orphan-well liability, methane and carbon markets).

Exhibit 1.1 — Mineral rights, leases, and royalty accounting

Where it operates. The first link in the chain: the leasing of mineral rights, and the monthly accounting of the royalties owed to the families who own them.

The everyday story. A rural family owns the mineral rights beneath land their great-grandparents leased to an oil company. Every month a check arrives with a stub of numbers — volumes produced, prices received, fees deducted — all computed inside the operator's accounting system. The family has no independent way to check whether the arithmetic is right, and a formal royalty audit costs more than most family interests will ever recover. When the land passes to the next generation, the paperwork fragments, and interests slip into "suspense."

How the value leaves the work. The royalty owner's book of record lives inside the payor's system. Decimal interests, metered volumes, sale prices, and post-production deductions (gathering, compression, treating, marketing) are all calculated by the party that profits from them and simply asserted on a check stub. Underpayment surfaces only through an audit priced beyond reach, and decades-old deduction clauses are litigated rather than verified. Producing and marketing the oil is genuine work that stays paid; the capture is the one-sided record and the fees asserted against it.

The measure. Suspended and unclaimed royalties sit in state unclaimed-property funds in large but only order-of-size amounts; no precise national total is published. **Grade — DIRECTIONAL.**

Named position-holders. ExxonMobil and EOG Resources (operator-payors); Texas Pacific Land and Viper Energy (royalty aggregators consolidating fragmented family interests); Enverus (division-order and revenue data systems) — named as structural examples of the position, not as accusations of wrongdoing.

Who carries the cost. Mineral-owning families and small royalty holders, often multi-generation rural heirs, who cannot price-check their own check stub — and heirs whose interests fall into suspense at succession.

Exhibit 1.2 — Exploration and subsurface data: seismic, well logs, production histories

Where it operates. The exploration layer, where operators create subsurface data — seismic surveys, well logs, production histories — much of which is then filed with state regulators.

The everyday story. A small independent driller pays to shoot seismic and log its own wells, files the required data with the state, and then finds it must buy back cleaned, aggregated versions of that same information from a data vendor at a five- or six-figure annual subscription. The landowner whose acreage produced the data has no claim on it at all.

How the value leaves the work. Operators generate well data at their own cost and file much of it publicly, then rent back curated views of their own subsurface memory. Multi-client seismic libraries license the same survey again and again. The cleaning and normalization vendors perform is real work; the capture is that the underlying record's provenance is asserted rather than provable, so every acquisition deal re-runs the same data diligence and reserve auditors re-derive the same histories.

The measure. Access to aggregated views of a basin's own well data runs a five- to six-figure annual subscription. **Grade — DIRECTIONAL.**

Named position-holders. Enverus; S&P Global Commodity Insights; TGS (multi-client seismic libraries) — structural examples, not accusations.

Who carries the cost. Small independent producers and family operators who buy back aggregated views of wells they drilled; landowners with no visibility into data derived from their own acreage.

Exhibit 1.3 — Price formation: hub benchmarks, assessed indices, marketing spreads

Where it operates. The point where a physical barrel or cubic foot is priced — against an assessed benchmark, through a gatherer-marketer.

The everyday story. A stripper-well operator sells gas at "index minus" a differential set by the party buying it. The benchmark itself is built from a thin window of reported trades the operator cannot see, and the marketing fee is buried in math no one shows. With no one pooling small-producer supply, each operator negotiates alone as a price-taker.

How the value leaves the work. Physical prices key off assessed benchmarks (WTI at Cushing, Henry Hub, regional indices) built from a narrow set of reported trades. Small producers sell at a differential whose marketing-fee component is invisible, and no one aggregates their supply. The assessor's methodology work is legitimate; the capture is the differential opacity and the missing pool that leaves each small producer alone at the point where price is declared.

The measure. Tens of thousands of marginal ("stripper") wells operate across the US, per public EIA and Interstate Oil and Gas Compact Commission data — a count of the exposed population, not a dollar figure. **Grade — DIRECTIONAL.** (Source: EIA / IOGCC public data.)

Named position-holders. S&P Global Platts; Argus Media; CME/NYMEX and ICE (futures settlement venues) — structural examples, not accusations.

Who carries the cost. Stripper-well and small-pad producers accepting opaque netbacks; rural localities whose production is priced far from where it flows.

Exhibit 1.4 — Midstream gathering, processing, and pipeline capacity

Where it operates. The midstream layer: the gathering systems, processing plants, and pipelines that carry production from the wellhead to market.

The everyday story. A small producer signs a decades-long agreement dedicating its acreage to one gathering system. Fees for gathering, compression, and treating — plus "shrink" and fuel deductions — are all computed in the midstream company's measurement system. When the line is full, the producer flares or shuts in, with no verifiable place in the queue.

How the value leaves the work. Dedicated-acreage contracts bind a producer's molecules to one system for decades; the fee stack and shrink deductions are computed in the midstream party's meters, and nomination and allocation records live with the

pipeline. Transporting gas is real work and stays paid; the capture is the one-sided measurement record, the opaque deductions, and the absence of any pooled bargaining position for small producers.

The measure. No single published figure isolates the deductions and unverifiable shrink; the mechanism is documented but its dollar size is not publicly settled. **Grade — DIRECTIONAL.**

Named position-holders. Energy Transfer; Williams; Targa Resources — structural examples, not accusations.

Who carries the cost. Small producers absorbing unverifiable shrink, imbalance penalties, and flared volumes; royalty families downstream of every opaque deduction.

Exhibit 1.5 — Environmental attestation: methane intensity, carbon, and "responsibly sourced" claims

Where it operates. The layer where environmental attributes — methane intensity, carbon, renewable and "responsibly sourced" labels — are certified and sold.

The everyday story. A genuinely clean small producer wants credit for it. But the certification is a paid annual assessment whose underlying sensor data the buyer cannot independently check, and the cost lands like fixed overhead — trivial for a major, punishing for a small operator. So proving cleanliness is regressive, and unverifiable claims invite a greenwashing discount on everyone.

How the value leaves the work. Environmental attributes are priced through certifier and registry gatekeepers; the underlying measurement is not independently verifiable by the buyer, and certification cost scales like fixed overhead. The certifiers' assurance is real work; the capture is that proving a true claim costs the same regardless of how clean you are, so the premium flows to whoever can afford the bureaucracy.

The measure. Certification cost is roughly fixed per operation regardless of size, making it regressive; no precise per-producer figure is published. **Grade — DIRECTIONAL.**

Named position-holders. Project Canary; MiQ; Xpansiv (attribute registry and exchange) — structural examples, not accusations.

Who carries the cost. Small clean producers priced out of certification; communities near sites where leaks go unmeasured; buyers paying trust-tax premiums for asserted attributes.

Exhibit 1.6 — Disposal and retirement: plugging liabilities, surety, orphan wells

Where it operates. The end of a well's life — the obligation to plug and abandon it, the surety bonds meant to guarantee that work, and the orphan wells left when the last operator fails.

The everyday story. An aging well passes down a chain of ever-smaller operators. The obligation to eventually plug it is asserted on a balance sheet; the bond meant to guarantee it is priced high because no one can prove the operator's plugging capacity. When the final owner goes under, the well is orphaned onto the state and taxpayers, and a rural family is left living over an unplugged hole.

How the value leaves the work. Retirement obligations are asserted, not proven; surety is priced as expensive trust labor because plugging capacity and funding cannot be cheaply verified; and when the chain fails the externality lands on the public. Bonding and underwriting are real work; the capture is the trust tax that honest, solvent operators cannot discount because their solvency is not provable.

The measure. Federal orphan-well program funding is a named public marker of the scale of the abandoned-well problem, but the true aggregate liability is order-of-size only.

Grade — DIRECTIONAL. (Source: US Department of the Interior federal orphan-well program.)

Named position-holders. Diversified Energy (large-scale acquirer of mature wells); Travelers and the surety markets (bonding); state and federal orphan-well programs — structural examples, not accusations.

Who carries the cost. Rural landowners living over unplugged wells; small operators paying punitive bond premiums that good behavior cannot discount; taxpayers funding the orphans.

Exhibit 1.7 — Financing: reserve-based lending, hedging, trade credit

Where it operates. The financing layer, where small producers borrow against reserves, hedge prices, and sell forward through trading houses.

The everyday story. A sub-scale producer's credit lives inside the lender's model. Twice a year, bank engineers redetermine its borrowing base from reserve and production data the producer asserts but cannot cheaply prove; hedge spreads are wide for the same reason; and the trading house that buys its oil ends up owning the record of its cash flow. A decade of good performance cannot be carried to a new lender.

How the value leaves the work. Credit is priced to opacity: borrowing bases, hedge spreads, and prepay arrangements all reflect that the counterparty cannot cheaply verify the underlying barrels or the delivery record. Lending and underwriting are real work; the capture is the spread priced to unverifiability rather than to the operator's actual, but non-portable, track record.

The measure. No single published figure isolates the opacity-driven component of small-producer credit spreads. **Grade — DIRECTIONAL.**

Named position-holders. Wells Fargo and energy-lending syndicates (reserve-based lending); Macquarie (commodity marketing and prepay); Shell Trading and BP Supply & Trading (offtaker-of-record arms) — structural examples, not accusations.

Who carries the cost. Sub-scale producers paying credit spreads priced to opacity rather than to their delivery record; family operators who cannot port a decade of good performance to a new lender.

Exhibit 1.8 — Field labor: crews, day-rate consultants, competency credentials

Where it operates. The oilfield labor market — the staffing platforms and consultancies through which crews, consultants, and inspection specialists reach the operators who hire them.

The everyday story. A field consultant's safety certifications, competency records, and performance reputation all live in the staffing agency's system. Every time work moves to a new platform, the record resets to zero and the worker is re-onboarded and re-priced from scratch — weeks of unpaid re-qualification that nobody reimburses.

How the value leaves the work. Certifications (well control, hydrogen-sulfide safety, OSHA) and competency history live in the agency's or operator's vendor system, so the worker is repriced each cycle and re-onboarded at each switch. Placement and logistics are real work; the capture is the platform's ownership of the worker's own record and relationship, which cannot be carried elsewhere.

The measure. No published figure isolates the cost of repeated re-credentialing to field workers; the mechanism is well documented, the dollar size is not. **Grade — DIRECTIONAL.**

Named position-holders. Workrise (formerly RigUp); NES Fircroft; Airswift — structural examples, not accusations.

Who carries the cost. Roughnecks, consultants, and inspection specialists whose safety and competency records are non-portable across boom-bust cycles; small service contractors re-qualifying into every operator's vendor portal.

Materials — chemicals, construction materials, containers and packaging, metals and mining, paper and forest products

The value chain. Raw material is extracted and harvested (ore, aggregates, timber, petrochemical feedstock) → then processed and refined (smelting, milling, cracking, pulping), with a regulatory data layer riding on top of that step (chemical-registration dossiers and safety data) → the material is graded, assayed, and certified — the trust layer of inspection, mill test reports, and sustainability certification → benchmark prices are formed as the material is traded and warehoused (exchange settlements, price-agency assessments, licensed warehouses) → it is distributed and converted (metals service centers, chemical distributors, packagers) → the whole chain is financed, hedged, and insured (trade finance, warehouse-receipt collateral, offtake prepaids, surety and closure bonds) → and finally it reaches end-of-life, recycling, and externalities (scrap chains, recycled-content and carbon claims, tailings and site closure, and the generational handoff of family operations).

Exhibit 2.1 — Benchmark price-setting, trading, and warehousing

Where it operates. The trading layer of the chain, where the reference price every physical contract keys off is formed — on exchanges, through price-reporting agencies, and in licensed warehouses.

The everyday story. A small miner, a family quarry, or an independent scrap dealer sells at "benchmark minus" a discount, with no way to check what material actually cleared for in their own region. The number they price against is set inside methods they cannot see, built from trades they cannot inspect. They pay to license the index, accept regional and quality discounts they cannot audit, and — historically — have watched hidden spread pile on top through warehouse load-out queues.

How the value leaves the work. Reference-price formation is owned by exchanges and price-reporting agencies (a price-reporting agency, or PRA, is a firm that publishes assessed commodity prices). The London Metal Exchange's official settlements and PRA assessments — proprietary in method, opaque in the trades that feed them — set the number every physical contract prices off. Producers and consumers pay index-licensing fees and accept "index-minus" regional discounts and quality adjustments they cannot audit. Running an exchange and assessing a market is genuine work; the capture is that the assessor is paid for standing at the point where price is declared, so the small party sells into a number set where it cannot audit the inputs or contest the spread.

The measure. The cost drivers are named — index-license fees, "index-minus" regional discounts, and warehouse load-out spread — but no published figure isolates their dollar size; the mechanism is documented and its dollar size is not publicly settled. **Grade — DIRECTIONAL.**

Named position-holders. HKEX (owner of the London Metal Exchange); S&P Global Commodity Insights (Platts); Fastmarkets — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Small miners, family quarries, and independent scrap dealers selling at benchmark-minus spreads with no way to verify what material actually cleared for in their region.

Exhibit 2.2 — Grading, assay, and certification

Where it operates. The trust layer of the chain, where a material's identity and quality are inspected, assayed, and certified before it changes hands.

The everyday story. The same lot of metal, ore, or timber is inspected again at every ownership handoff, because the last inspection was only an assertion, not a proof anyone downstream can carry. A seller who cannot afford inspection takes an automatic penalty deduction on grade. And sustainability certification carries a flat annual audit cost — trivial for a major, prohibitive for a smallholder — so the cleanest small producers are priced out of their own claims.

How the value leaves the work. Trust in material identity is priced as repeated labor: the same lot is re-assayed and re-inspected at every handoff because the prior assay is an assertion, not a portable proof. Sellers who cannot afford inspection take automatic penalty deductions on grade. Sustainability certification — schemes such as FSC and PEFC (forest-management certification), ResponsibleSteel, and Aluminium Stewardship Initiative (ASI) certification — carries fixed annual audit costs that fall regressively: trivial for a major, prohibitive for a smallholder. The inspector's expertise is real work and stays paid; the capture is the duplication — paying to prove the same fact over and over — and the flat audit cost that prices small clean producers out of their own claims.

The measure. The costs are named — per-lot assay fees duplicated at each handoff, and flat annual certification audits regardless of operator size — but no published figure isolates their dollar size; the mechanism is documented and its dollar size is not publicly settled. **Grade — DIRECTIONAL.**

Named position-holders. SGS; Bureau Veritas; Intertek — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Artisanal and small miners, family forest owners, and small scrap yards who either pay for per-lot inspection repeatedly or eat grade-penalty pricing.

Exhibit 2.3 — Distribution and conversion

Where it operates. The distribution layer, where metals service centers and chemical distributors stand between the mills and the small fabricators, formulators, and shops that buy from them.

The everyday story. A small machine shop or family fab shop buys through a distributor that owns its demand record, its credit file, and a spread quoted individually and never shown. Mills set minimum-order sizes that lock small buyers out of buying direct, and no one pools their demand to reach that threshold. The buyer ends up renting back its own purchase history and re-proving its credit to every new counterparty.

How the value leaves the work. Metals service centers and chemical distributors own the small fabricator's demand record, credit file, and an individually repriced, opaque spread; mill minimum-order quantities (MOQs — the smallest volume a mill will sell direct) gate small buyers out of mill-direct pricing, and no one pools their demand. The processing here is genuine work — slitting, cut-to-length, breaking bulk, blending, and logistics are all legitimate paid labor. The capture is exclusively the ownership of the relationship, the purchase history, and the price opacity layered on top of that work.

The measure. The mechanism is named — bespoke opaque spreads, repeated credit applications, and mill test reports and certificates of analysis (COAs) re-requested per order because they don't travel with the buyer — but no published figure isolates its dollar size; the mechanism is documented and its dollar size is not publicly settled.

Grade — DIRECTIONAL.

Named position-holders. Reliance Inc.; Ryerson Holding; Brenntag SE — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Small machine shops, family fab shops, and independent formulators paying bespoke spreads while renting back their own purchase history and re-proving credit to every counterparty.

Exhibit 2.4 — Financing, hedging, and insurance

Where it operates. The financing layer, where small materials producers borrow against inventory, pledge warehouse receipts, and sell forward through trading houses.

The everyday story. A small miner or recycler holds real inventory but cannot cheaply prove clean title to it. Because warehouse receipts and inventory pledges are only assertions — and because publicly documented frauds have taught lenders to distrust

them — the small borrower is priced as unverifiable risk. So it pre-sells its output to a trading house at a deep discount, because trader prepay is the only credit that can "see" its assets, and factors its receivables at heavy haircuts.

How the value leaves the work. Because warehouse receipts and inventory pledges are assertions, publicly documented commodity-finance frauds — double-pledged metal, phantom warehouse stock — have taught lenders to price every small materials borrower as unverifiable risk. Small producers pre-sell offtake to trading houses at deep discounts because trader prepay is the only credit that "sees" their assets, and receivables factor at heavy haircuts. Lending and underwriting are real analytical work and stay paid; the financier's edge is largely informational position — being the one party who can verify — not the underwriting labor alone.

The measure. The cost items are named — collateral audits, field-warehouse agents, title verification, and letter-of-credit documentation labor, all priced per deal because nothing is provable once — but no published figure isolates the dollar size; the mechanism is documented and its dollar size is not publicly settled. **Grade — DIRECTIONAL.**

Named position-holders. Glencore; Trafigura; and trader prepay and offtake finance generally, as a structure example — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Small miners, recyclers, and mini-mill suppliers locked into offtake discounts; family firms holding real inventory with no provable title chain.

Exhibit 2.5 — Green claims and end-of-life carbon proof

Where it operates. The end-of-life and externality layer, where low-carbon and recycled-content claims — green steel, low-carbon aluminum, recycled resin — are certified and sold at a premium.

The everyday story. A small recycler's product is genuinely low in embodied carbon, but it cannot afford the proof. The premium for clean material exists — but capturing it requires paid environmental declarations and third-party verification whose fixed cost only large producers can absorb. So the premium flows to whoever can afford the proof, not to whoever is actually cleanest, and new border and supply-chain carbon rules push the paperwork downhill onto the small supplier without paying for it.

How the value leaves the work. Low-carbon premiums exist, but capturing them requires Environmental Product Declarations (EPDs — verified reports of a product's environmental footprint), mass-balance certificates, and third-party verification whose fixed cost only large producers absorb — so the premium accrues to whoever can afford proof, not whoever is cleanest. The EU's carbon border adjustment (CBAM, a tariff on

the carbon embedded in imports) and Scope-3 regimes (accounting for a company's indirect supply-chain emissions) push documentation labor down onto small suppliers without paying for it, and claim-verification bottlenecks through a small set of registries and verifiers. The verifiers' assurance is real work and stays paid; the capture is that proving a true claim costs the same regardless of how clean you are, so the premium routes to whoever can afford the bureaucracy.

The measure. The cost drivers are named — EPD consultants, per-claim verification audits, and Scope-3 and CBAM questionnaires answered by hand for every customer — but no published figure isolates the dollar size; the mechanism is documented and its dollar size is not publicly settled. **Grade — DIRECTIONAL.**

Named position-holders. Verra; DNV; Nucor (its Econiq branded low-carbon product line, as a structure example) — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Small recyclers and scrap-fed electric-arc-furnace (EAF) suppliers whose product is genuinely low in embodied carbon but who can't afford the proof; smallholders with real sequestration or renewable-powered processing.

Exhibit 2.6 — The compliance-data moat in processing and refining

Where it operates. The processing-and-refining layer, and specifically the regulatory data layer riding on it — the registration dossiers and due-diligence questionnaires a producer must satisfy to sell.

The everyday story. A small specialty chemical formulator finds that the compliance data itself is the barrier. Registration dossiers are held by consortia led by incumbents, and a small firm pays a fee just to cite studies it may never actually hold. Conflict-minerals due diligence runs through the same template questionnaire, re-answered by hand for every customer, every year. The substance it makes is a commodity; the paperwork moat around it is where the rent sits.

How the value leaves the work. Compliance data itself is the moat. Registration dossiers under the EU's REACH system (Registration, Evaluation, Authorisation and Restriction of Chemicals — the EU's chemical-registration regime) are held by consortia typically led by incumbents, and smaller firms pay Letters of Access to cite studies they may never hold. Conflict-minerals due diligence for 3TG (tin, tungsten, tantalum, and gold) runs through a template questionnaire — the Conflict Minerals Reporting Template, or CMRT — manually re-answered for every customer, every year. The substance is commoditized; the dossier and the questionnaire pipeline are the rent. Registration and licensure themselves are genuine requirements that stay in force; the

capture is that the compliance data is held as a moat, forcing smaller firms to pay for access and re-answer the same facts by hand.

The measure. The costs are named — Letter-of-Access fees, per-customer questionnaire labor, and consultants to re-map the same facts to each jurisdiction's format — but no published figure isolates the dollar size; the mechanism is documented and its dollar size is not publicly settled. **Grade — DIRECTIONAL.**

Named position-holders. BASF; Dow; the Responsible Minerals Initiative (RMI, as a questionnaire-hub structure example) — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Small specialty formulators and independent traders paying data-access fees priced by incumbents, plus per-customer compliance labor.

Exhibit 2.7 — The scrap chain and the family handoff

Where it operates. The end-of-life and recycling layer at the bottom of the chain — the collector, the family scrap yard, the small quarry or timberland — and the point where it passes to the next generation.

The everyday story. The provenance that makes recycled material valuable downstream is created at the very bottom of the chain — by the collector and the family yard — and monetized at the top by consolidators, with nothing flowing back. Intake is priced off the buyer's scale and the buyer's grade call. And the small yard itself often dies at generational handoff: the books, the broker relationships, the grade histories, and the permits all live in other people's systems, so the heir inherits assets without the working business.

How the value leaves the work. The provenance that makes recycled content valuable downstream is created at the bottom of the chain — the collector and the family yard — and monetized at the top by consolidators, with nothing flowing back; intake pricing is quoted off the buyer's scale and the buyer's grade call. Separately, the small yard, quarry, or timberland dies at generational handoff, because the books, broker relationships, grade histories, and permits live in other people's systems, so the heir inherits assets without the working system. Aggregation and logistics are genuine paid work; the capture is the one-sided intake record and the dead-end handoff that leaves the value-creator and the heir with the least.

The measure. The mechanism is named — grade disputes settled unilaterally by the buyer's assay, and estate diligence reconstructing decades of unreceipted trades and informal broker relationships — but no published figure isolates the dollar size; the mechanism is documented and its dollar size is not publicly settled. **Grade — DIRECTIONAL.**

Named position-holders. Sims Limited; Radius Recycling; Commercial Metals Company — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Waste collectors and family scrap yards paid least for creating the provenance; heirs of first-generation quarry, timber, and yard owners who inherit a dispute instead of a business.

Industrials — capital goods, commercial and professional services, transportation

The value chain. It begins with raw materials and components — steel, castings, resins, electronics — where the mill certificates and material test reports first originate. Those feed tiered manufacturing and original-equipment assembly, from machine shops up through mid-tier suppliers to the makers of machinery, aerospace, and electrical equipment. Along the way runs certification, quality, and supplier qualification — the audits against ISO 9001 (the general quality-management standard), AS9100 (its aerospace counterpart), and NADCAP (the aerospace special-process accreditation), plus first-article inspection and supplier portals — then distribution and maintenance supply (industrial distributors, dealer networks, spare-parts channels), then freight, logistics, and brokerage (train, trucking, and air freight, and the brokers who match shippers to carriers). After the sale come aftermarket service and equipment data (telematics, dealer diagnostics, maintenance records, resale), the financing, bonding, and payment chains that fund the work (equipment finance, surety bonds, prequalification hubs, factoring, pay-when-paid cascades), and finally disposal, decommissioning, and externalities (scrap and remanufacture, emissions and Scope-3 reporting — the supply-chain, indirect-emissions category — and end-of-life provenance).

Exhibit 3.1 — Freight brokerage and the trucking spread

Where it operates. The freight layer: the brokers who sit between the shipper with cargo and the carrier who hauls it, matching loads to trucks and setting the rate.

The everyday story. A shipper hands a load to a broker, who finds a trucker to carry it. The rate the shipper pays and the pay the trucker receives are never shown to each other. An owner-operator can lose a full day sitting unpaid at a loading dock and have no way to prove the clock ever ran.

How the value leaves the work. The broker owns both relationships and sits on the spread between the shipper's tendered rate and the carrier's pay — and because neither end can see the other, the spread is set by information asymmetry, not by the matching and vetting work actually performed. Load boards rank and gate who gets access. Detention and dwell time at the dock go unpaid because arrival, departure, and loading

events are asserted rather than proven. Double-brokering fraud thrives because the chain of who tendered a load to whom cannot be verified. Matching and vetting freight is genuine work that stays paid; the capture is the slice the opacity of the spread protects.

The measure. No published figure isolates the size of the brokerage spread that opacity protects; the mechanism is documented, the dollar size is not publicly settled. **Grade — DIRECTIONAL.**

Named position-holders. C.H. Robinson; Uber Freight; Landstar System — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Owner-operator truckers and micro-fleets of 1–10 trucks, who absorb unpaid detention, opaque rate cuts, 30–90 day payment cycles, and the losses from double-broker fraud; family trucking businesses that fail at margins the spread itself created.

Exhibit 3.2 — Equipment data and dealer-locked repair

Where it operates. The aftermarket: the parts, service, and operating data of expensive machines after they are sold, and the diagnostic authority that decides who is allowed to repair them.

The everyday story. A farmer or contractor owns a machine that cost half a million dollars. Its operating data streams to the manufacturer's cloud under the manufacturer's keys, and only franchised dealers hold the authority to diagnose it. The owner effectively rents access to the machine's own maintenance memory, and cannot carry a verified service history to resale unless the manufacturer's system blesses it.

How the value leaves the work. Telematics (the machine's self-reported operating data) and diagnostics lock the owner in: the data streams to the manufacturer's cloud under its keys, and diagnostic authority is licensed only to franchised dealers. The owner of a \$500,000 machine rents access to its own maintenance record, cannot commission independent repair without jeopardizing its warranty posture, and cannot carry a verified service history to resale without the manufacturer's system endorsing it. Building and servicing the equipment is real work that stays paid; the capture is the position's ownership of the owner's own record and repair choice.

The measure. No published figure isolates what dealer lock-in costs equipment owners; the mechanism is documented, the dollar size is not publicly settled. **Grade — DIRECTIONAL.**

Named position-holders. Deere & Company; Caterpillar; CNH Industrial — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Family farms, small excavation and landscaping contractors, and independent repair shops — repair delays in harvest- and season-critical windows, dealer-only pricing, and resale value held hostage to a database they do not control.

Exhibit 3.3 — Certification and the supplier-qualification treadmill

Where it operates. The qualification layer: the audits, portals, and document packets a small shop must pass before a large manufacturer will let it bid.

The everyday story. A small precision machine shop wants to supply a prime manufacturer. First it must pass that customer's quality audit, enroll in that customer's portal, and assemble that customer's document packet — then do the whole thing again for the next customer, from the same evidence. Weeks of a quality manager's year go to re-formatting the same proof.

How the value leaves the work. Every prime and top-tier customer requires its own quality audit, its own portal enrollment, and its own document packet from the same small shop. Evidence for AS9100 (the aerospace quality standard), ISO 9001 (the general quality-management standard), and NADCAP (the aerospace special-process accreditation) is asserted into siloed supplier portals — each charging enrollment fees — rather than proven once. First-article inspections and material certificates travel as PDFs whose chain of custody cannot be verified, so each customer re-audits from scratch. The auditing itself is genuine work; the capture is the endless repetition of the same settled proof.

The measure. No published figure isolates the audit-hosting labor a small shop loses; the mechanism is documented, the dollar size is not publicly settled. **Grade — DIRECTIONAL.**

Named position-holders. Boeing (through its Exostar supplier network); RTX; Honeywell — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Small precision machine shops, foundries, and specialty fabricators, often family-owned with 10–50 employees — weeks of unbilled audit-hosting labor a year, per-customer portal fees, and exclusion from bids because the cost of qualifying exceeds the contract's margin.

Exhibit 3.4 — Bonding, prequalification, and the contractor's gate

Where it operates. The layer that decides how much work a small contractor may even bid: the surety bonds that cap its capacity and the prequalification hubs that hold its compliance record.

The everyday story. A small subcontractor's bonding limit is set from financials a surety re-reviews by hand, capping how much work it can bid at all. In parallel, prequalification hubs charge the contractor an annual fee to assert the same safety, insurance, and financial data separately to every hub client — and the hub, not the contractor, ends up owning the resulting record and grade.

How the value leaves the work. Bonding capacity and prequalification act as gates. Surety limits are set from opaque, manually re-reviewed financials that cap how much work a small contractor may bid. Prequalification hubs charge the contractor annual fees to assert the same safety, insurance, and financial data separately to each hub client, and the hub — not the contractor — owns the compliance record and the grade. Underwriting and bonding are real work that stays paid; the capture is the pay-to-play ownership of the contractor's own record and the ceiling set on stale evidence.

The measure. No published figure isolates the prequalification-and-bonding trust tax; the mechanism is documented, the dollar size is not publicly settled. **Grade — DIRECTIONAL.**

Named position-holders. ISNetwork (ISN); Avetta; Travelers (surety, as an example of the bonding structure) — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Small and minority- or family-owned subcontractors — pay-to-play prequalification fees per client relationship, bonding ceilings that lag their real performance, and exclusion from public and industrial work despite clean records.

Exhibit 3.5 — Slow pay and the receivable sold back at a discount

Where it operates. The order-to-cash layer: the payment chain that runs from a completed job or delivered load down through the subcontractors and carriers waiting to be paid.

The everyday story. A subcontractor finishes its work, but "pay-when-paid" terms push payment out 60 to 120 days down the chain. A factoring firm then offers to advance that money now — for a cut. The discount is steep because nobody can prove the invoice is valid, accepted, and free of liens, so the small player buys back its own money at a loss.

How the value leaves the work. The slow-pay cascade is monetized twice. Pay-when-paid terms push 60–120 day cycles down the sub-tier chain, and then factoring firms and early-pay platforms sell the small player its own money back at a discount. That discount is priced high because the receivable's validity — work done, accepted, lien-free — is asserted rather than provable; the trust gap itself is the margin. The financing is real work; the capture is the slice of the discount that unverifiability protects.

The measure. An estimated 1-5% of revenue is surrendered to factoring and quick-pay by the smallest firms in the chain. **Grade — DIRECTIONAL.**

Named position-holders. Triumph Financial (factoring); C.H. Robinson (quick-pay programs); Built Technologies (construction payment platforms) — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Subcontractors, owner-operators, and small suppliers who surrender that 1-5% of revenue to factoring and quick-pay, with cash-flow failure the leading killer of otherwise-profitable small firms.

Exhibit 3.6 — Industrial distribution and the priced-in markup

Where it operates. The distribution layer: the industrial distributors who stock parts, own the buyer relationship, and set the markup on the long tail of specialized, rarely-ordered items.

The everyday story. A small maintenance team buys its parts through a distributor that owns the relationship, the negotiated-price record, and the markup on rarely-ordered items. The small manufacturer of a niche part cannot see or reach the end users, and the small buyer cannot tell whether its "contract price" reflects any real market at all.

How the value leaves the work. Distributors own the buyer relationship, the negotiated-price record, and the markup structure on the long tail of specialized, rarely-ordered stock. The small maker of a niche part cannot see or reach its end users, and the small buyer cannot verify whether its contract price reflects any market at all. The real distribution labor — stocking, breaking bulk, same-day logistics — is genuine work; the capture is the price and record opacity and the gated access, not the logistics.

The measure. No published figure isolates the position-priced markup on the long tail; the mechanism is documented, the dollar size is not publicly settled. **Grade — DIRECTIONAL.**

Named position-holders. W.W. Grainger; Fastenal; Wesco International — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Small maintenance teams, family manufacturers of niche components, and rural buyers with no distributor-branch leverage — paying position-priced markups on the long tail and losing their own purchase history to the distributor's system.

Exhibit 3.7 — Emissions surveys and the unprovable green premium

Where it operates. The environmental-reporting layer: the supply-chain emissions questionnaires large buyers push down their chains, and the premium for genuinely cleaner production.

The everyday story. A large industrial buyer sends its suppliers a stream of environmental questionnaires through competing rating portals, each charging the supplier to assert the same data, with the rating living in the platform's system. Meanwhile a genuinely cleaner producer — of low-carbon steel, remanufactured parts, or verified scrap content — cannot prove the claim cheaply, so the premium for clean production flows to whoever can afford the certification bureaucracy, not to whoever is actually cleaner.

How the value leaves the work. Every large industrial buyer pushes Scope-3 (supply-chain, indirect-emissions) questionnaires down its chain through competing rating portals, each charging the supplier to assert the same data, with the ratings living in the platform's system. Genuinely cleaner producers cannot prove their claim cheaply, so the green premium accrues to whoever can afford the certification bureaucracy rather than whoever is actually cleaner — and remanufacture and reuse lose to virgin supply because provenance is unprovable. The assurance work is real; the capture is that proving a true claim costs the same regardless of how clean you are.

The measure. No published figure isolates the survey tax borne by suppliers; the mechanism is documented, the dollar size is not publicly settled. **Grade — DIRECTIONAL.**

Named position-holders. EcoVadis; CDP; SGS (as an example of assurance-labor pricing) — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Small suppliers doing real decarbonization who cannot afford the proof, and remanufacturers and scrap-based producers whose superior footprint is undocumentable at their scale.

Exhibit 3.8 — Succession and the value that dies at handoff

Where it operates. The generational handoff: the retirement or sale of a family machine shop or contractor, when decades of accumulated value must transfer to an heir or a buyer.

The everyday story. A small shop's real worth — customer relationships, qualified-supplier status, process knowledge, equipment history — lives in the founder's head, a rented accounting file, dealer systems, and customer portals. At retirement none of it

transfers as a verifiable working system, so the valuation collapses toward liquidation prices and a consolidator buys decades of real-but-unprovable goodwill at a discount.

How the value leaves the work. The small shop's or contractor's real value — customer relationships, qualified-supplier status, tribal process knowledge, equipment history — lives in the founder's head, a rented QuickBooks file, dealer systems, and customer portals. At retirement none of it is transferable as a verifiable working system, so valuations collapse toward asset-liquidation prices and consolidators acquire decades of goodwill that is real in fact but unprovable on paper. Buyers doing honest diligence are not the capture; the capture is that the record system makes diligence expensive and the discount structural.

The measure. Honest diligence and quality-of-earnings work runs into six figures even on small deals; no precise figure for the succession discount itself is published. **Grade — DIRECTIONAL.**

Named position-holders. Intuit (QuickBooks as the rented book of record); private-equity roll-up structures in HVAC (heating and cooling) and machining — for example, the portfolio strategies of firms like Watermill or middle-market sponsors, named as a structure, not an accusation; and the manufacturers' dealer systems that hold the service-goodwill record — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Retiring founders and their families, whose life's work is priced at salvage; employees whose shops close rather than transfer; and localities that lose productive capacity.

Consumer Discretionary

The value chain. Value in consumer discretionary starts with raw materials and contract manufacturing — the apparel factories, auto-parts suppliers, and appliance-component makers (the OEM, original-equipment-manufacturer, inputs) that build the goods. It passes to the brands and OEM assemblers that own the margin and the model specifications, then moves through wholesale, import logistics, and distribution: container freight, third-party-logistics (3PL) warehousing, and off-price diversion. From there it reaches the point of sale — big-box stores, e-commerce marketplaces, franchises, online travel agencies (OTAs), and delivery platforms. Consumer financing follows, through captive auto lenders, dealer finance-and-insurance (F&I) desks, store credit, and buy-now-pay-later (BNPL) plans, layered over a data, loyalty, and attention economy of loyalty programs, ratings, dispatch algorithms, and retail media. After the sale comes service, parts, and repair — gated by diagnostics and parts channels and

priced against vehicle and appliance history. And at the end sit disposal, returns, resale, and externalities: returns liquidation, secondhand markets, salvage, and landfill.

Exhibit 4.1 — Marketplaces and platform sale

Where it operates. The point of sale in its modern form: the e-commerce marketplaces, online travel agencies, and delivery platforms through which independent sellers reach their customers.

The everyday story. A third-party seller lists on a giant marketplace, ships every order, and answers every customer question — but the marketplace keeps the buyer's name and controls the ranking that decides whether anyone finds the listing at all. A restaurant fills a delivery order and never learns who ate its food. Building a following on the platform means building it on rented ground, and leaving means walking away from it.

How the value leaves the work. Marketplace take-rate plus ranking control: referral fees stacked with fulfillment bundling and pay-to-be-found ad auctions; buy-box and ranking algorithms (the default purchase button and the order goods appear in) set the effective price; OTA commissions carry historical rate-parity pressure; and delivery commissions come with the platform withholding the diner's identity from the restaurant. Running a marketplace and matching buyers to sellers is real work; the capture is that the platform owns the customer record, the relationship, and the shelf position while the seller does the fulfillment.

The measure. No published figure isolates the marketplace take-rate and ad-tax slice that accrues to owning the position rather than to fulfillment; the mechanism is documented, the dollar size not publicly settled. **Grade — DIRECTIONAL.**

Named position-holders. Amazon (third-party marketplace, Fulfillment by Amazon, sponsored-ad auctions); Booking Holdings and Expedia (OTA commissions); DoorDash (restaurant commissions and customer-data ownership) — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Third-party sellers, independent restaurants, and independent hoteliers — margin compressed by take-rate and ad tax, and reputation that is non-portable, so exit means starting from zero.

Exhibit 4.2 — Franchised operations

Where it operates. The point of sale as franchised business — the restaurants and hotels an operator runs under a brand's system, royalty, and mandated technology stack.

The everyday story. A family runs a franchised restaurant or hotel they poured their savings and years of labor into. The point-of-sale data, the loyalty accounts, and the customer records their work generates all live in the franchisor's system. When they want to pass the business to their children, the transfer needs the franchisor's approval.

How the value leaves the work. Franchise record capture: royalty plus advertising fund plus a mandated technology and vendor stack; the franchisor holds the point-of-sale (POS) data, the loyalty identity, and the customer record the franchisee's labor generates; brand-standard compliance arrives as periodic inspection labor; and transfer and renewal approval rights gate the succession of a business the family built. Building and running a brand system is real work; the capture is the franchisor's ownership of the operating record the franchisee generates, and its veto over passing that business on.

The measure. No published figure isolates the franchise record-capture rent; the mechanism is documented, the dollar size not publicly settled. **Grade — DIRECTIONAL.**

Named position-holders. McDonald's; Yum! Brands; Marriott International (franchised hotels) — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Franchisee families — often small immigrant-family operators — who carry the capital risk and the labor but rent their own operating memory and cannot freely pass the business to their heirs.

Exhibit 4.3 — After-sales service, parts, and repair

Where it operates. The layer after the sale, where service, parts, and repair meet the vehicle's or appliance's own history — diagnostics gates, parts channels, and history bureaus.

The everyday story. A car needs a repair. The independent shop down the street can do the work, but the diagnostic codes are locked behind a manufacturer subscription. When the family later sells the car, the buyer pays for a history report to learn what the vehicle's own service record already knows.

How the value leaves the work. Vehicle record capture: the OEM holds telematics and gates diagnostic access behind subscriptions; the vehicle's service history is aggregated by a private bureau and sold back per lookup; used-vehicle trust is priced as inspection labor because the asset's own history is asserted rather than provable; and recycled-parts provenance is unverifiable, so certified-new wins by default. Building telematics and aggregating histories is real work; the capture is gating access to the vehicle's own record and selling that record back per lookup.

The measure. No published figure isolates the diagnostic-access and history-report rent; the mechanism is documented, the dollar size not publicly settled. **Grade — DIRECTIONAL.**

Named position-holders. Tesla (closed service and diagnostics); General Motors (connected-vehicle data, dealer diagnostic stack); S&P Global's Carfax (history-report lookups) — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Independent repair shops paying diagnostic-access rent, and used-car-buying families paying report fees and inspection labor for a history that already exists.

Exhibit 4.4 — Consumer financing

Where it operates. The financing layer at the point of sale — captive auto lenders, dealer finance-and-insurance desks, store cards, and buy-now-pay-later plans.

The everyday story. A family with a thin credit file needs to finance a work truck or a refrigerator. They have years of on-time rent and utility payments, but the credit bureau does not hold that story, so they price as high-risk. At the dealer, the loan carries a markup they never see itemized.

How the value leaves the work. Credit capture at the point of sale: dealer F&I reserve markup on auto loans; captive-finance and store-card economics tuned to penalty revenue; bureau-held history means a thin-file household with years of on-time, documented rent and utility payments still prices as high-risk, because the borrower's own record is owned elsewhere and sold back. Lending and underwriting are real work; the capture is the spread between asserted risk and the borrower's actual, documented payment behavior.

The measure. No published figure isolates the opacity-driven component of thin-file and point-of-sale credit spreads; the mechanism is documented, the dollar size not publicly settled. **Grade — DIRECTIONAL.**

Named position-holders. Ford Motor Credit (Ford); GM Financial (General Motors); CarMax (captive financing) — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Thin-file and subprime families financing the work truck or the appliance; the spread between asserted risk and actual documented behavior is the rent.

Exhibit 4.5 — Contract manufacturing to brand

Where it operates. The first link in the chain, where contract factories make goods for brands and their social, environmental, and recycled-content claims are audited and certified.

The everyday story. A clean, well-run factory makes goods for a dozen brands. Each brand sends its own auditor to inspect the same floor, and the factory pays for every visit. A small ethical brand, meanwhile, faces a certification bill sized as if it were a multinational.

How the value leaves the work. Audit-stack trust tax: every brand buyer requires its own social and environmental audit of the same factory, with the cost carried by the factory; sustainability and recycled-content claims are asserted through certification schemes priced as recurring labor; and off-price channels blur origin entirely. The clean factory and the small ethical brand pay the most per unit to prove what they actually do. The auditors' and certifiers' assurance is real work — a genuine division of labor; the capture is the duplication and the certification overhead that fall hardest on whoever is genuinely cleanest.

The measure. No published figure isolates the duplicate-audit and certification trust tax; the mechanism is documented, the dollar size not publicly settled. **Grade — DIRECTIONAL.**

Named position-holders. Nike; Lululemon; TJX (off-price provenance opacity) — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Contract factories — and their workers, whose wage and conditions claims are the audited object — re-paying for duplicate audits; and small ethical brands facing a certification stack disproportionate to their volume.

Exhibit 4.6 — Homebuilding and home improvement

Where it operates. The homebuilding and home-improvement layer, where builders, affiliated finance and title arms, and big-box pro desks meet the small trade crews that do the physical work.

The everyday story. A family framing or electrical crew finishes its scope on a new subdivision and then waits — through slow draws, retainage, and lien-waiver paperwork — to be paid for work already done. Their reputation, meanwhile, lives in the builder's vendor file, not in a record they own.

How the value leaves the work. Builder demand-aggregation reprices subcontractors; retainage, pay-when-paid terms, and lien-waiver paperwork sit as permanent trust-cost

drag on small trades; affiliated mortgage and title arms capture the closing; and big-box pro desks own the tradesperson's purchase history and relationship, repricing credit and loyalty against it. Coordinating a build and running a pro desk is real work; the capture is the subcontractor's working capital floated through slow draws and the ownership of a reputation that lives in someone else's vendor file.

The measure. No published figure isolates the retainage, draw-financing, and pro-desk data rent carried by small trades; the mechanism is documented, the dollar size not publicly settled. **Grade — DIRECTIONAL.**

Named position-holders. D.R. Horton and Lennar (subcontractor payment terms; affiliated finance and title arms); Home Depot (pro relationship and purchase-data ownership) — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Family trade crews — framing, electrical, landscaping — floating the builder's working capital through slow draws and retainage while their reputation lives in someone else's vendor file.

Exhibit 4.7 — Gig dispatch and hosting

Where it operates. The data, loyalty, and attention layer as it governs work: the dispatch and hosting platforms that hold a courier's, driver's, or host's credentials, ratings, and route economics.

The everyday story. A courier, a driver, or a short-term-rental host builds years of good ratings on an app. One deactivation ends the income, and none of that reputation travels to the next platform. The account someone else controls is the whole livelihood.

How the value leaves the work. Identity and dispatch capture: the platform holds the worker's or host's credentials, ratings, and the dispatch algorithm; deactivation is livelihood death with no portable evidence of years of good service; and take-rates apply on both sides of a relationship the platform prevents from becoming direct. Running dispatch and matching is real work; the capture is the platform's ownership of the worker's identity, ratings, and record, none of which survive a switch.

The measure. No published figure isolates the two-sided take-rate and re-verification cost borne by gig workers and hosts; the mechanism is documented, the dollar size not publicly settled. **Grade — DIRECTIONAL.**

Named position-holders. DoorDash (courier dispatch, restaurant relationship); Airbnb (host identity and ratings); Expedia Group's Vrbo (host dependence) — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Couriers, hosts, and drivers whose household income rests on a revocable account; their reputational capital is the platform's asset, not theirs.

Exhibit 4.8 — Disposal, returns, and resale

Where it operates. The end of the chain — returns liquidation, secondhand markets, salvage parts, and the externalities of disposal, where an item's authenticity and condition must be re-proven or lost.

The everyday story. A micro-reseller wants to sell a returned or secondhand item, but proving it is authentic and in good condition costs more than the item is worth. So returns get liquidated or destroyed, and salvage parts trade at a discount driven by unprovable history rather than by their actual condition.

How the value leaves the work. Circularity trust gap: verifying a returned or secondhand item's authenticity and condition costs more than the item, so returns are liquidated or destroyed and resale value evaporates; where authentication exists it is sold as a positional per-item service fee; and recycled and salvage parts trade at a discount driven by unprovable provenance rather than by actual condition. Authenticating and grading condition is real work; the capture is that the item carries no verifiable memory, so the trust apparatus stays manual and, where it exists, is tolled per item.

The measure. No published figure isolates the authentication toll and returns-destruction loss; the mechanism is documented, the dollar size not publicly settled.

Grade — DIRECTIONAL.

Named position-holders. Amazon (returns liquidation streams); eBay (paid authentication programs); LKQ (salvage and recycled parts, provenance-discounted) — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Micro-reseller entrepreneurs paying authentication tolls; thrift and secondhand families who cannot trust what they buy; and the discard pipeline that eats value which should recirculate.

Consumer Staples — food, beverage and tobacco; household and personal products; staples distribution and retail

The value chain. Raw farm and ranch output is originated and aggregated at elevators and processors, where grade and price are set at intake → millers, refiners, and contract packagers (co-packers, the outside plants that make and package a brand's product) convert commodities into branded consumer packaged-goods (CPG) SKUs → packaging converters and a certification layer (organic, fair-trade, non-GMO, animal-welfare marks)

add labels and claims → broadline distributors, grocery wholesalers, and direct-store-delivery (DSD) route networks move goods to buyers → grocery, mass, and club retailers control shelf placement through slotting, trade promotion, and deduction regimes → retailer-owned purchase records are sold back to brands as media and analytics → a trade-finance layer (extended payment terms, factoring, supply-chain finance) prices small-supplier receivables → and the chain ends in packaging waste, extended-producer-responsibility compliance, deposit-return, and recycled-content claims.

Exhibit 5.1 — Grain, oilseed, and livestock origination and grading

Where it operates. The first link in the chain: the origination of grain, oilseed, and livestock at elevator and processor intake, where the load is graded and the price is set.

The everyday story. A family farmer or independent rancher hauls a load to the elevator or processor. The buyer weighs and grades it — moisture, protein, foreign matter, dockage — on the buyer's own instruments, and sets the basis off an exchange price the seller can see but cannot argue with at the scale-house. The grade is the price, and the party asserting the grade is the same party that profits when the grade comes in low.

How the value leaves the work. The grading record lives on the buyer's instruments and in the buyer's system, and the basis is set off an exchange price the farmer cannot contest at intake. Because the grade determines the price and is asserted by the counterparty who profits from a downgrade, the asymmetry is structural. Premiums for identity-preserved crops — non-GMO, regenerative, a specific variety, kept provably separate from the commodity blend — collapse back into that blend because proving the separated provenance is too expensive for the farmer, so the aggregator captures the premium spread. Handling and moving the grain is genuine work that stays paid; the capture is the one-sided grading record and the premiums lost to forced blending.

The measure. The grading asymmetry and the lost identity-preserved premiums are documented, but the dollar size is not publicly settled. **Grade — DIRECTIONAL.**

Named position-holders. Archer-Daniels-Midland; Bunge Global; Tyson Foods (livestock grid pricing) — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Family farms and independent ranchers, who absorb the grading asymmetry, lose identity-preserved premiums to blending, and hold no portable record of their own delivered quality to shop to competing buyers, lenders, or insurers.

Exhibit 5.2 — Retail shelf access: slotting, trade promotion, and deductions

Where it operates. The retail layer, where grocery, mass, and club chains control shelf placement — and enforce it through slotting fees, trade-promotion funds, and invoice deductions.

The everyday story. A grocery chain sells shelf position directly: a brand pays slotting allowances to get placed, pay-to-stay fees to remain, and trade-promotion money administered inside the retailer's own systems. When something goes wrong — an asserted shortage, a late delivery, a compliance infraction, a promotion chargeback — the retailer short-pays the invoice, and the evidence lives entirely in the retailer's system. Small brands routinely write off disputed deductions because contesting them, pulling proofs of delivery and matching promotion terms, costs more than the recovery.

How the value leaves the work. Shelf position is monetized directly through slotting and pay-to-stay fees and trade-promotion funds run inside the retailer's systems; the enforcement arm is deductions — invoices short-paid for asserted shortages, late deliveries, infractions, and chargebacks, all evidenced only in the retailer's records. An entire deduction-management outsourcing industry exists solely to litigate records one side owns. Curating and running the shelf is real merchandising work that stays paid; the capture is the one-sided delivery-and-promotion record that makes disputes uneconomical to contest.

The measure. Deduction leakage runs an estimated 3–8% of revenue for small brands, directionally and per trade-press reporting. **Grade — DIRECTIONAL.**

Named position-holders. Kroger; Albertsons; Ahold Delhaize (US banners) — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Emerging and small consumer packaged-goods brands and their co-packers, for whom slotting is a capital wall at entry and the 3–8% deduction leakage is a tax on not owning the record of their own deliveries.

Exhibit 5.3 — Shopper data and retail media

Where it operates. The data layer, where the retailer owns the only record of who bought a brand's product — and sells that record back as media and analytics.

The everyday story. The retailer holds the only record of who bought the brand's product, then sells it back: retail-media networks charge the brand to reach its own buyers, loyalty-data arms sell the brand analytics about its own sales velocity, and item-level sell-through is a paid subscription. The brand funds the product and the marketing, then rents its own customer relationship and its own sales memory. Ranking inside the retailer's app or search is a further paid layer on the same position.

How the value leaves the work. The retailer owns the sole record of the purchase and licenses it back to the brand as retail media, analytics, and sell-through data, while search ranking inside the retailer's channel is a second paid layer on the same position. Running the store and the media network is real work that stays paid; the capture is that the brand must buy back the record of its own customers and its own sales.

The measure. The spend brands lay out to buy back their own performance data is documented as a mechanism, but the dollar size is not publicly settled. **Grade — DIRECTIONAL.**

Named position-holders. Walmart (Walmart Connect / Luminate); Kroger (84.51° / Kroger Precision Marketing); Costco (retail-media build-out) — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Small brands forced to buy back their own performance data to survive category reviews; and consumers whose purchase history is monetized without a share of the value or a portable copy of their own record.

Exhibit 5.4 — Wholesale distribution and foodservice gatekeeping

Where it operates. The wholesale layer, where a few broadline distributors gate what independent grocers, convenience stores, and restaurant kitchens can buy — including from producers in their own region.

The everyday story. Access to independent grocers, convenience stores, and restaurant kitchens runs through a handful of broadline distributors whose catalogs decide what a locality can buy from itself. Local producers pay hub margins and manufacturer-chargeback (MCB) rebate schemes — supplier rebates reconciled inside the distributor's system. A farm twenty miles from a restaurant often routes its product four hundred miles through a distribution center, because no one pools the locality's own demand.

How the value leaves the work. A few broadline distributors gate regional access; local producers pay hub margins and manufacturer-chargeback rebate schemes reconciled in the distributor's system, and food-safety documentation is re-asserted separately to every buyer because it is not portable. Nobody is paid to aggregate local demand, so the hub's position substitutes for the missing pool. The routing, quality control, and cold-chain aggregation are genuine paid work that stays a paid role; the capture is the one-sided rebate record and the position rent that fills the gap where local demand goes unpooled.

The measure. The hub margins, rebate reconciliation, and misrouted food-miles are documented, but no single figure isolates their dollar size. **Grade — DIRECTIONAL.**

Named position-holders. Sysco; US Foods; United Natural Foods (UNFI) — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Local food producers priced out of their own region's plates; independent grocers and restaurants paying hub margin on goods produced nearby; and the drivers and small third-party carriers who could run the short haul.

Exhibit 5.5 — Label claims and certification: organic, fair-trade, non-GMO, welfare

Where it operates. The certification layer, where clean-production claims — organic, fair-trade, non-GMO, animal-welfare — are audited, certified, and priced.

The everyday story. A genuinely clean producer wants credit for the practice. But certification is priced as annual audit labor — certification fees, inspector days, paper chain-of-custody re-established at every hop — and the cost is roughly fixed per operation. That makes it regressive: trivial for a multinational, prohibitive for a forty-acre organic farm. Meanwhile mass-balance paper trails let large buyers make blended claims cheaply.

How the value leaves the work. Clean-production claims are priced as fixed annual audit labor — fees, inspector days, chain-of-custody paperwork rebuilt at every hop — so the cost is regressive, trivial for a multinational and prohibitive for a small farm, while mass-balance accounting lets large buyers claim cheaply. The certifier's inspection and judgment are real work that stays paid; the capture is that the ability to prove cleanliness is owned by whoever can afford the trust tax, not by whoever does the clean work — a structural greenwashing advantage.

The measure. Certification cost is roughly fixed per operation regardless of size, which makes it regressive; no precise per-producer figure is published. **Grade — DIRECTIONAL.**

Named position-holders. USDA National Organic Program (through accredited certifying agents); Fairtrade International; Non-GMO Project — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Smallholders and small clean producers who do the practice but cannot afford the proof, forfeiting the premium to larger certified aggregators.

Exhibit 5.6 — Trade finance: payment terms, factoring, and deduction-risk pricing

Where it operates. The trade-finance layer, where extended payment terms, factoring, and supply-chain finance price small-supplier receivables.

The everyday story. A large buyer or retailer pays on extended terms — net 60 to 120 days — turning a small supplier's working capital into the buyer's own float. The supplier bridges the gap through factoring or a supply-chain-finance program, often run on the buyer's own platform, at a discount rate inflated by "dilution risk": the financier cannot verify which invoices will survive deductions, so every small supplier pays for the record opacity of the retail-shelf layer. The buyer profits twice — from the float, and from the finance spread on its own slow payment.

How the value leaves the work. Extended payment terms convert small suppliers' working capital into the buyer's float; the supplier bridges via factoring or supply-chain finance — often the buyer's own platform — at rates inflated by dilution risk, because the financier cannot verify which invoices will survive downstream deductions. The financiers do real underwriting work that stays paid; the capture is the dilution premium and the double profit the buyer takes from both the float and the finance spread on its own slow payment.

The measure. Extended terms of net 60–120 days are a publicly reported industry practice at several major consumer-goods buyers over the past decade. **Grade — MEASURED** (for the existence of the practice). The annualized cost of capital this pushes onto small suppliers runs into the double digits, and dilution reserves run 10–25% holdbacks — both order-of-size. **Grade — DIRECTIONAL.**

Named position-holders. C2FO; PrimeRevenue; Taulia (SAP) — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Small suppliers and co-packers paying double-digit annualized cost of capital, directionally, to finance receivables that a verifiable delivery record would make near-riskless.

Exhibit 5.7 — Direct-store-delivery routes and independent distributor income

Where it operates. The direct-store-delivery layer in bread, snacks, and beverages, where "independent" route operators buy the right to distribute a brand's product.

The everyday story. In bread, snacks, and beverages, direct-store-delivery runs on "independent" route operators who buy their distribution rights — often six figures, financed — yet the brand owns the customer accounts, the ordering system, the handheld device, and the performance record. Route economics can be repriced unilaterally — territory splits, margin changes, chargebacks for stales and returns asserted in the brand's system — and the route's resale value, the operator's retirement and succession asset, rests entirely on records the operator does not hold.

How the value leaves the work. The operator buys the route and does the delivery work, but the brand holds the accounts, the ordering system, the handheld, and the performance record, and can reprice territory and margins or assert stales-and-returns chargebacks in its own system. The delivery and route service are genuine work that stays paid; the capture is that the operator's income is repriceable at the record-owner's discretion and the route's sale-or-inheritance value floats on the counterparty's books.

The measure. Distribution rights commonly sell for six figures, an order-of-size marker rather than a dollar total; the income capture's size is not publicly settled, though litigation over reclassification and territory changes in this model is a matter of public record. **Grade — DIRECTIONAL.**

Named position-holders. Flowers Foods (independent-distributor model); Campbell's (Pepperidge Farm routes); Keurig Dr Pepper (independent bottler and distributor network) — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Route owner-operators, whose income is repriceable at the brand's discretion, whose credentials are revocable, and whose life's asset is valued at sale or inheritance by the counterparty's books.

Exhibit 5.8 — Packaging waste, extended-producer-responsibility, and recycled-content claims

Where it operates. The end of the chain: packaging waste, extended-producer-responsibility (EPR) compliance — the regimes that make brands pay for the packaging they put on the market — deposit-return, and recycled-content claims.

The everyday story. Extended-producer-responsibility regimes — California's SB 54 (its packaging-responsibility law), the EU's packaging rules — now bill brands by packaging tonnage and recyclability. But the reporting is asserted spreadsheets assembled by consultants; recycled-content claims ride unverifiable mass-balance certificates; and deposit-return systems leak to fraud because a redeemed container cannot prove it was sold in-jurisdiction. Small brands pay disproportionate compliance labor per SKU, while the people who actually do the recovery — materials-recovery-facility operators, haulers, informal collectors — are invisible in the record.

How the value leaves the work. EPR regimes bill by packaging tonnage and recyclability, but compliance rests on asserted spreadsheets, unverifiable recycled-content certificates, and deposit systems that leak to fraud; the recovery workforce is captured on price by whoever owns the weighbridge scale record. The recovery labor at the materials-recovery facility (MRF), the hauling, and the collection are real work; the capture is that this work goes unrecorded and therefore price-taking, while compliance labor lands disproportionately on small brands per SKU.

The measure. The EPR regimes are named public markers of the problem's scale, but the dollar size of the capture is not publicly settled. **Grade — DIRECTIONAL.**

Named position-holders. Circular Action Alliance (US extended-producer-responsibility organization); Ball Corporation; TOMRA (deposit-return systems) — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Small consumer-goods brands drowning in per-jurisdiction EPR paperwork; recyclers and collection workers whose recovery work goes unrecorded and is therefore price-taking; and honest brands undercut by cheap, unverifiable "recycled content" claims.

Health Care

The value chain. Discovery and raw inputs — drug compounds, biologics, research pipelines, clinical trials, and the intellectual property that forms around them → manufacturing and quality — regulated production of drugs, biologics, and devices, sterilization, lot conformity → distribution and wholesale — the three-wholesaler drug supply chain, group-purchasing-organization (GPO) hospital contracts, and track-and-trace serialization under the drug track-and-trace law (DSCSA) → benefit intermediation and pricing — pharmacy-benefit managers (PBMs) that set formularies and rebates, managed-care networks, and GPO administrative fees → care delivery — hospitals, health systems, independent practices, pharmacies, and clinicians, the layer where the actual work happens → claims, billing, and payment — claims clearinghouses (the switches that route bills between provider and payer), revenue-cycle management, payer adjudication, and prior authorization (prior auth), the up-front approval a payer requires before it will cover care → data, records, and identity — electronic health record (EHR) vendors, health-data brokers, credentialing utilities, and patient records → financing and externality — patient debt and credit reporting, self-funded employer risk, medical waste, and sector emissions.

Exhibit 6.1 — Benefit intermediation and drug pricing

Where it operates. The pricing layer between the drug manufacturer, the employer or plan that pays for coverage, and the pharmacy that dispenses — where the pharmacy-benefit manager sits.

The everyday story. An independent community pharmacist fills a prescription and is reimbursed below what the drug cost to buy — then, months later, a retroactive fee claws back more. Neither the pharmacy, the small employer paying for the plan, nor the patient at the counter can find out what the drug's true net price actually was. The one party that knows sits in the middle.

How the value leaves the work. The PBM sits between manufacturer, plan sponsor, and pharmacy and is paid for its position on all three sides at once: the spread between what the plan pays and what the pharmacy is reimbursed, manufacturer rebates it retains or repackages, and retroactive pharmacy fees (DIR) assessed on pharmacies months after they dispense. Processing claims and running a formulary is real administrative work; the capture is the position between three parties who each see only their own side. The true net price of a prescription is unknowable to everyone except the intermediary, and formulary placement is sold as a form of ranking control.

The measure. The spread, the retained rebates, and the retroactive fees are documented, but the dollar size is not publicly settled. **Grade — DIRECTIONAL.**

Named position-holders. CVS Caremark (CVS Health); Express Scripts (Cigna/Evernorth); OptumRx (UnitedHealth Group) — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Independent community pharmacies reimbursed below acquisition cost and hit with retroactive fees; patients paying deductible cost-sharing calculated off an inflated list price; small self-funded employers who cannot audit their own drug spend.

Exhibit 6.2 — Prior authorization and utilization management

Where it operates. The boundary between care delivery and the payer — where the payer decides, case by case, whether it will cover a service the clinician has already judged necessary.

The everyday story. A two-physician practice keeps a staffer busy for hours every week faxing forms and filling out portals to get payers to approve care it has already decided the patient needs. The same medical-necessity question gets re-answered from scratch for every payer and every episode. Patients wait, and clinicians do the appeals on unpaid evenings.

How the value leaves the work. Payers require per-episode human re-adjudication of medical necessity because a clinical claim is asserted, not cheaply provable. The care itself is real work; the capture is the trust tax of re-proving that judgment to every payer, every episode, over faxes and portals — labor priced onto the smallest practices. AMA physician surveys report on the order of a dozen-plus staff-hours per physician per week spent on prior auth.

The measure. About a dozen-plus staff-hours per physician per week go to prior authorization. **Grade — MEASURED.** (Source: AMA physician surveys.)

Named position-holders. UnitedHealthcare; Elevance Health; Humana — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Small independent practices carrying dedicated staff they can't afford — a pressure that pushes them into hospital employment and consolidation; patients whose care is delayed or abandoned; clinicians burning unpaid evening hours on appeals.

Exhibit 6.3 — Claims clearinghouses and billing

Where it operates. The claims-and-payment layer, where nearly every bill between a provider and a payer routes through a small number of switches.

The everyday story. A small practice submits every insurance claim through a switch it does not own, and its record of what it billed lives inside that hub. When the hub went down in 2024, practices went weeks without payment — because their own submission record existed only inside it.

How the value leaves the work. Nearly every claim between provider and payer routes through a handful of clearinghouses, and the provider's claims history — its receivables memory — lives in the intermediary's system and is rented back as reporting. Routing claims is real work; the capture is that the practice's own book of record sits inside the switch. The 2024 Change Healthcare outage showed the failure boundary: small practices could not even prove what they had submitted, because the record was not theirs.

The measure. The 2024 Change Healthcare outage is the clearest marker: when the hub went down, small practices went weeks without payment because their own submission and adjudication record existed only inside it. A documented event, not a dollar figure.

Named position-holders. Change Healthcare (Optum/UnitedHealth); Availity; Waystar — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Small and rural providers with only days of cash on hand — when the hub fails or reprices, they cannot even prove what they submitted; and they pay per-claim tolls on their own data in both directions.

Exhibit 6.4 — Clinical records and the EHR layer

Where it operates. The data-and-records layer, where a practice's clinical record and its patient relationship live inside a vendor's electronic health record system.

The everyday story. A small practice's entire clinical record — its core working memory and its patient relationship — lives inside a vendor system, under the vendor's logins, on a per-provider subscription. Leaving means five-figure data-conversion fees. And neither the practice nor the patient can see who else the data flowed to.

How the value leaves the work. The record lives in a vendor system with per-provider subscription pricing, high exit and data-conversion costs, and vendor-controlled credentials. The software is a real workflow tool; the capture is that the record and the logins that run it are held under the vendor's keys and priced at what it costs to leave. Patients cannot verify who touched or received their data, and secondary-use data flows — de-identified resale, network analytics — stay invisible to both practice and patient despite information-blocking rules.

The measure. Exit and data-conversion costs to leave an EHR run into the five figures per practice; no precise national figure is published. **Grade — DIRECTIONAL.**

Named position-holders. Epic Systems; Oracle Health (Cerner); athenahealth — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Small practices renting their own memory and facing five-figure extraction fees to leave; clinicians whose login is their day-to-day ability to practice; patients with no receipt trail on how their own record moves.

Exhibit 6.5 — Drug distribution and hospital supply

Where it operates. The distribution layer, where drug wholesalers and hospital group purchasing organizations gate the flow of product and the terms small buyers get.

The everyday story. An independent pharmacy and a rural hospital buy through a supply chain in which a few wholesalers move most of the country's drugs and a couple of purchasing organizations write the hospital contracts. Small buyers get the worst terms on their own demand; small manufacturers pay fees just for shelf position.

How the value leaves the work. Three wholesalers move the overwhelming majority of US pharmaceuticals, and GPOs pool hospital demand while charging supplier-paid administrative fees and writing sole-source contracts. Moving the product and pooling demand are genuine work; the capture is that small buyers — independent pharmacies, rural hospitals — get the worst terms on their own regional demand, while small manufacturers are gated out of contract access. Demand is pooled by the hub, for the hub.

The measure. Three wholesalers move the overwhelming majority of US pharmaceuticals. **Grade — DIRECTIONAL.** (Source: Drug Channels Institute.)

Named position-holders. McKesson; Cencora; Cardinal Health; Vizient; Premier Inc. — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Independent pharmacies and critical-access rural hospitals priced above what their aggregate volume should command; small generic and device manufacturers paying fees for shelf position; localities that cannot see or pool their own demand.

Exhibit 6.6 — Credentialing and payer enrollment

Where it operates. The workforce-identity layer, where every hospital, payer, and staffing platform re-verifies the same clinician from scratch.

The everyday story. A physician changing jobs, or a travel nurse moving to a new facility, waits months while each payer re-verifies the same license, schooling, board certification, and history from scratch — 90 to 180 days during which the clinician cannot bill. The staffing platform owns the facility relationship and reprices the worker each assignment.

How the value leaves the work. Every hospital, payer, and staffing platform primary-source-verifies the same physician or nurse from scratch — medical school, licensure, board certification, malpractice history — taking 90 to 180 days per payer enrollment during which the clinician cannot bill. Verifying a clinician is real work; the capture is that the same settled facts are re-verified from scratch at every switch. Centralized credentialing utilities hold the profile, and staffing platforms for travel nurses and locums own the facility relationship and reprice the worker per assignment.

The measure. Each new payer enrollment takes 90-180 days, during which the clinician cannot bill. **Grade — DIRECTIONAL.**

Named position-holders. CAQH; symplr; AMN Healthcare — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Individual clinicians losing months of billable income at every job or payer change; travel nurses re-credentialed per facility with the platform owning the relationship; small practices fronting salary through the enrollment lag.

Exhibit 6.7 — Patient billing and medical debt

Where it operates. The patient-financing layer, where the hospital bill becomes a family's obligation and, unpaid, becomes a credit-bureau record.

The everyday story. A family gets a hospital bill it cannot itemize, priced off a chargemaster (the hospital's list-price master file) that bears no provable relation to

what was negotiated or delivered. Disputing it is the family's unpaid labor. Unpaid balances flow to collectors and credit bureaus, who then own the family's risk history and sell it back as a score.

How the value leaves the work. Chargemaster prices bear no provable relation to negotiated or delivered reality; patients receive bills they cannot itemize, and the labor of disputing them is priced onto the family. Delivering the care is real work; the capture is that the price is asserted, not receipted, and the burden of proof lands on the household. Unresolved balances flow to collectors and credit bureaus, who own the family's risk history and sell it back as a score. Price-transparency postings exist but are unverifiable against any individual bill.

The measure. The mechanism is documented; the dollar size is not publicly settled.
Grade — DIRECTIONAL.

Named position-holders. HCA Healthcare; Tenet Healthcare; Equifax/Experian (medical-debt tradelines) — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Working families hit with surprise balances and years of damaged credit from disputed bills; small self-funded employers unable to audit facility claims; patients who pay list price for lack of proof leverage.

Exhibit 6.8 — Medical waste, single-use, and emissions

Where it operates. The disposal-and-externality layer — regulated waste hauling, single-use device economics, and the sector's emissions footprint.

The everyday story. A community hospital pays a premium per bag to haul regulated waste, and buys single-use devices because reusing them requires expensive proof of conformity while throwing them away is cheap and unexamined. It wants a cleaner supply chain but cannot cheaply verify a supplier's claims — so sustainability stays a report, not a practice.

How the value leaves the work. The US health sector is a major emissions source, and single-use device economics are protected by the fact that reprocessing and reuse must carry expensive proof of conformity while disposal is cheap and unexamined. Hauling regulated waste is real work; the capture is that the clean choice pays a proof penalty the disposal choice never does. Regulated waste hauling is priced with compliance labor baked in, and hospitals buying cleaner supply chains cannot cheaply verify supplier claims, so sustainable procurement stays a report.

The measure. The US health sector is a major emissions source — roughly 8.5% of national emissions. **Grade — MEASURED.** (Source: Health Affairs research.)

Named position-holders. Stericycle (WM Healthcare Solutions); Becton Dickinson (single-use device structure); Stryker Sustainability Solutions (reprocessing) — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Community and rural hospitals paying disposal and compliance premiums per bag; reprocessing specialists whose legitimate work is throttled by proof costs; the communities around incinerators; and the planet, in unpriced emissions and pharmaceutical waterway contamination.

Financials — banks, payments, capital markets, asset management, insurance, financial data and processors

The value chain. Capital formation (household deposits, savings, insurance premiums, and retirement contributions pooled into institutions) → credit intermediation and underwriting (scoring, loan origination, pricing borrower risk) → payments and transaction processing (card networks, acquirers, core processors, cross-border correspondent chains) → capital markets (issuance, trading, market data, custody, clearing, settlement) → asset and wealth management (advisory, funds, custody, transfer agency, retirement plumbing) → risk transfer (insurance distribution, underwriting, claims, reinsurance) → the data, ratings, and compliance layer (credit bureaus, rating agencies, identity and anti-money-laundering checks, audit, index and data licensing — the trust-tax stage) → externalities and succession (financed emissions and green-claims assurance, financial exclusion of thin-file workers, unclaimed property and generational handoff friction).

Exhibit 7.1 — Card payments and the merchant's own sales ledger

Where it operates. The payments layer — the four-party card system that stands between a merchant and every card sale it makes.

The everyday story. A corner shop, a family restaurant, a solo tradesperson takes a card. On every sale a percentage is skimmed off before the money lands, at a rate the shop had no part in setting. The network and processor own the record of the transaction, run the dispute process, and increasingly own the customer relationship through the digital wallet — so the merchant ends up renting access to a ledger of its own sales.

How the value leaves the work. In the four-party card model, interchange fees (the per-transaction fees the card network sets) and network assessments are fixed by the network, collected through the acquirer, and passed to the merchant, who has no seat at the price-setting table. Small merchants pay blended or tiered rates that large retailers negotiate away. The network and processor own the transaction record, the chargeback

process (the card dispute-and-reversal system), and increasingly the customer relationship through wallet tokenization; the merchant rents access to its own sales ledger and carries the card-security compliance labor on top.

The measure. Small merchants absorb a percentage take-rate on every sale plus chargeback losses — a 2-3% margin haircut on the class least able to absorb it; no regulator publishes the isolated figure. **Grade — DIRECTIONAL.**

Named position-holders. Visa; Mastercard; Fiserv — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. The corner shop, family restaurant, and solo tradesperson paying a percentage of every sale plus chargeback losses adjudicated by the party that profits from the network — the same class that can least absorb a 2-3% margin haircut.

Exhibit 7.2 — The credit bureau and the borrower who can't own their record

Where it operates. The credit-intermediation layer — the three-bureau structure that scores borrowers and sells the score back to lenders and to the borrowers themselves.

The everyday story. Lenders hand your payment history to the bureaus for free. The bureaus compile it and sell scores and reports back — to those same lenders, and to you, the person the data describes. You cannot own or carry your own history, and if it is wrong, the burden of proof falls on you, not on the record-holder. A gig worker, an immigrant, or a cash-economy family can pay rent, utilities, and remittances on time for years and still be invisible to the model — priced as high-risk or shut out entirely.

How the value leaves the work. In the three-bureau structure, lenders furnish consumer payment histories at no charge; the bureaus compile them and sell scores and reports back to the same lenders and to the consumers the data describes. The consumer neither owns nor can port their history, and error disputes place the burden of proof on the person rather than the record-holder. Thin-file populations — gig workers, immigrants, cash-economy families — are invisible to the model and priced as high-risk or excluded outright, despite years of on-time rent, utility, and remittance payments that generate no portable record.

The measure. The mechanism is documented, but its dollar size is not publicly settled. **Grade — DIRECTIONAL.**

Named position-holders. Equifax; Experian; TransUnion — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. The gig worker and immigrant family paying subprime rates or denied credit entirely because their actual payment behavior — rent, utilities, informal income — produces no record they own; and every consumer whose history is monetized without compensation.

Exhibit 7.3 — Core banking processors and the bank's own book of record

Where it operates. The infrastructure beneath community banks and credit unions — the third-party core systems that hold each institution's deposits, loans, and general ledger.

The everyday story. A community bank or credit union runs its deposits, loans, and general ledger on someone else's core system under a multi-year contract. It pays per account and per transaction, pays à la carte just to read its own data, and faces punishing fees to leave. The book of record — the thing a bank fundamentally is — lives inside a vendor's system. When the bank is acquired or wound down, that record does not move as a working system; it is re-extracted at cost.

How the value leaves the work. Community banks and credit unions run deposits, loans, and the general ledger on third-party cores under multi-year contracts with per-account and per-transaction fees, à-la-carte pricing to read their own ledger, and de-conversion fees that make exit economically punitive. The institution's book of record lives in someone else's system; at acquisition or wind-down it does not transfer as a working system but is re-extracted at cost.

The measure. The mechanism is documented, but its dollar size is not publicly settled.
Grade — DIRECTIONAL.

Named position-holders. FIS; Fiserv; Jack Henry & Associates — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. The community bank and credit union serving small-town and small-business borrowers — the last relationship lenders — whose technology cost, and inability to exit it, is a direct driver of consolidation into megabanks, which in turn removes local credit judgment from the places that need it.

Exhibit 7.4 — Identity checks, audit, and ratings: the trust tax proper

Where it operates. The data, ratings, and compliance layer that sits across the whole sector — identity and anti-money-laundering checks, financial audit, and credit ratings.

The everyday story. Three linked machines run on the same fuel: the cost of checking a claim nobody can cheaply verify. The same passport is manually reviewed dozens of times across a person's financial life. Auditors sample a ledger precisely because they

cannot verify all of it. Rating agencies, paid by the issuers they grade, gate access to the debt markets. In each case the labor is expensive because the claim underneath is only an assertion.

How the value leaves the work. Three linked trust-cost machines: identity and anti-money-laundering checks (KYC/AML) are re-performed on the same person by every institution because identity is an asserted document, not a portable proof; financial audit is priced as sampling labor because ledgers are assertions the auditor cannot verify in full; and rating agencies under the issuer-pays model gate debt-market access, with green-bond and use-of-proceeds claims requiring paid second-party opinions because proceeds tracking is unverifiable. In all three, labor is expensive because claims are cheap to make and costly to check.

The measure. This zone is itself the trust cost — the sector's largest pool of labor-priced verification (compliance headcount, audit fees, ratings fees, assurance fees); no single dollar total is publicly settled. **Grade — DIRECTIONAL.**

Named position-holders. Moody's; S&P Global; LexisNexis Risk Solutions — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. The small issuer and small institution for whom fixed compliance cost is regressive — a community bank's anti-money-laundering burden per dollar of assets dwarfs a megabank's; the unbanked person failed by document-based identity checks; the small green-project developer priced out of verified sustainable finance.

Exhibit 7.5 — The wealth-management fee stack and the lost inheritance

Where it operates. The asset- and wealth-management layer — the stack of fees charged on a household's holdings, and the point where those holdings pass to the next generation.

The everyday story. A middle-class family's savings carry layer upon layer of fees charged for holding a position rather than for doing work — advice, fund expenses, custody, transfer agency, revenue-sharing. Meanwhile the family's actual holdings are scattered across custodians. At the handoff to the next generation, the scattering becomes loss: accounts orphan, heirs cannot cheaply prove entitlement, probate re-derives what the ledger already knew, and unclaimed assets escheat to the states.

How the value leaves the work. Basis-point fees stack on the assets rather than on the work: advisory fee plus fund expense ratio plus custody plus transfer agency plus revenue-sharing (the industry names the last two 12b-1 and sub-transfer-agency, or sub-TA, fees) — each layer paid for holding a position in the chain, with the household's holdings record fragmented across custodians. At generational handoff the fragmentation becomes loss: accounts orphan, beneficiaries cannot cheaply prove

entitlement, probate re-derives what the ledger already knew, and unclaimed assets escheat to state unclaimed-property programs. Genuine fiduciary advice is real work and stays paid — the target is the stack of positional basis points (bps, hundredths of a percent) and the dead record.

The measure. Middle-class families compound away 1-2% annually across the fee layers regardless of service rendered; separately, unclaimed assets sit in state programs as a large, documented pool — no invented figure. **Grade — DIRECTIONAL.** (Source: NAUPA / state unclaimed-property programs.)

Named position-holders. Morgan Stanley (advisory); BNY Mellon (custody); Computershare (transfer agency) — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. The middle-class family compounding away 1-2% annually across layers regardless of service rendered, and the heirs who lose accounts, pay probate professionals to reconstruct a financial life, or never find the assets at all.

Exhibit 7.6 — Insurance distribution and claims adjudication

Where it operates. The risk-transfer layer — how insurance is distributed to small businesses and how their claims are decided.

The everyday story. A small contractor, farmer, or family business pays a premium set on a coarse class code, not on how carefully it actually runs. Proving the good practices — inspected sprinklers, a maintained roof, completed safety training — costs more than it is worth, and has to be redone for every carrier every year. Then at claim time the insurer owns the loss record and the process for deciding it, so the policyholder's evidence is whatever it can scrape together after the loss.

How the value leaves the work. Two rents ride on one policy: distribution (broker contingent and volume commissions tied to placement, paid for the relationship rather than the analysis) and information asymmetry in underwriting and claims. Small-business premiums are set on coarse class codes because granular mitigation evidence — inspected sprinklers, maintained roofs, completed safety training — is too expensive to prove and re-prove; at claim time the insurer owns the loss record and the adjudication process, so the small policyholder's evidence is whatever it can assemble after the loss. Underwriting analysis and actuarial work are real labor and remain paid — the target is the proof asymmetry.

The measure. The mechanism is documented, but its dollar size is not publicly settled. **Grade — DIRECTIONAL.**

Named position-holders. Marsh McLennan; Aon; The Hartford (small-commercial underwriting as the structural example) — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. The small contractor, farmer, and family business paying class-average premiums despite above-average risk practices, then bearing the evidentiary burden alone at claim time; households one denied claim away from losing the business.

Exhibit 7.7 — Market data and index licensing

Where it operates. The capital-markets data layer — the exchanges that sell market data and the index providers that license benchmarks. This is the weakest-leverage zone in the sector, flagged honestly.

The everyday story. Exchanges gather market data generated by their own participants' orders and sell it back to those participants at rising fee tiers. Index providers collect a slice of every dollar tracking their benchmark, for owning a weighting convention and a name. The people who produce the data — traders, issuers, funds — pay to see their own collective output, and a small advisor pays much the same license structure as a giant bank without the volume to spread the cost.

How the value leaves the work. Exchanges sell consolidated market data — generated by participants' own orders — back to those participants at escalating fee tiers (per-terminal, per-derived-use, non-display licenses); index providers collect basis points (bps, hundredths of a percent) on passively managed assets under management (AUM) for owning a weighting convention and a name. The data's producers pay to see their own collective output; a small registered investment adviser (RIA) or fintech faces the same license-schedule structure as a large bank without the volume to amortize it. This is the weakest-leverage zone in the sector, and the source flags it honestly: the underlying market-structure and intellectual-property rules keep the core rent entrenched.

The measure. No hard dollar figure is publicly settled; the mechanism is documented and its size is order-of-scale only. **Grade — DIRECTIONAL.**

Named position-holders. Intercontinental Exchange (NYSE data); Nasdaq; MSCI — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. The small advisor, independent researcher, and fintech startup for whom data licensing is a fixed, regressive cost and a moat that protects incumbents; end-savers who pay index-licensing basis points embedded in fund expenses.

Exhibit 7.8 — Cross-border remittances and correspondent chains

Where it operates. The cross-border payments layer — the agent networks and correspondent-banking chains that carry a worker's wages home.

The everyday story. A worker sends wages home. The money crosses an agent network and a chain of correspondent banks, each hop taking a fee and a slice of the exchange-rate spread, none of them accountable end to end for price or delivery. The sender cannot see the rate applied, when it will arrive, or where it sits mid-chain. When correspondent banks pull out of a corridor to reduce their own risk, whole routes simply close.

How the value leaves the work. A worker's wages traverse an agent network plus a correspondent-banking chain, each hop taking fees and an exchange-rate spread, with none accountable end to end for delivery or price. The sender cannot verify the rate applied, the delivery timing, or the money's location mid-chain; correspondent-bank de-risking cuts whole corridors off. This is income capture at the point where earned wages become family provision.

The measure. The World Bank's Remittance Prices Worldwide series has tracked the global average cost at roughly 6% of the amount sent — double the UN Sustainable Development Goal 10.c target of 3%. **Grade — MEASURED.** (Source: World Bank Remittance Prices Worldwide.)

Named position-holders. Western Union; MoneyGram; Ria (Euronet) — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. The migrant worker and the receiving family — the most extracted-from class in the entire sector: a percentage of already-earned wages taken to traverse a chain the sender can neither see nor verify, plus repeated identity checks at every corridor.

Information Technology

The value chain. Raw inputs (silicon, rare earths, fabrication chemicals, and the energy and water a foundry consumes) → design and intellectual property (chip design, design toolchains, licensable IP cores, standards and patent pools) → fabrication and assembly (foundries, outsourced assembly and test — the OSAT step — contract manufacturing, and the component channel) → distribution and channel (component distributors and value-added resellers, or VARs; original-equipment hardware; app stores and cloud marketplaces) → platform operation (software-as-a-service systems of record — rented software, or SaaS; hyperscale cloud and compute; identity providers) → financing and procurement trust (venture and equipment leasing, software spend, vendor security

diligence, license audits) → data and identity layer (operator records held inside vendor tenancies, telemetry, credentials and signing authority) → disposal and externalities (electronic waste, repair and refurbishment gating, embodied carbon and datacenter energy-and-water claims).

Exhibit 8.1 — SaaS books-of-record and licensing

Where it operates. The platform-operation layer — the rented software (software-as-a-service, or SaaS) that holds a business's customer list, ledger, and process history, and the license terms that govern them.

The everyday story. A small firm runs its whole operation inside a vendor's software: the customer list, the books, every record of how the work got done. All of it lives in the vendor's tenancy, under the vendor's keys. At renewal the price climbs, and moving out means leaving years of memory behind — a ten-person firm can lose its entire relationship history just by changing systems.

How the value leaves the work. The operator's own book of record — customer list, ledger, process history — sits inside the vendor's system. Exit is tolled: proprietary data formats, capped export speeds, per-seat repricing at renewal, and license-audit programs (true-ups, indirect-access claims) that turn ambiguity in the vendor's own contract into revenue. The small firm literally rents access to its own memory, and the vendor prices at the cost of switching, not the value of the service. Building and running the software is genuine work that stays paid; the capture is the toll on the door and the fees asserted against records the operator cannot cheaply carry away.

The measure. No single published figure isolates what renewal repricing and license true-ups extract from small operators; the mechanism is documented, but its dollar size is not publicly settled. **Grade — DIRECTIONAL.**

Named position-holders. Salesforce; Oracle; Intuit — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Small businesses and mid-market operators: renewal uplifts they can't negotiate, audit true-ups they can't contest, and data held hostage at migration time.

Exhibit 8.2 — Vendor security diligence

Where it operates. The financing-and-procurement-trust layer, where an enterprise buyer demands proof of a small vendor's security posture before it will buy.

The everyday story. A small software vendor wants to sell to a large customer. First it has to pass security audits — SOC 2, ISO 27001, plus a bespoke questionnaire — and

every new buyer runs the same gauntlet from scratch. The controls are asserted once a year in a PDF; the vendor proves the same facts over and over, deal after deal.

How the value leaves the work. Because control claims are asserted rather than continuously provable (an auditor samples once a year, and the rest lives in portals and PDFs), trust is priced as labor: tens of thousands of dollars a year in audit fees, governance-risk-and-compliance (GRC) tooling, and questionnaire-answering headcount. The same claim is re-proven from scratch for every buyer. The audit and assurance judgment is real work that stays paid; the capture is the repetition — consultancies and compliance platforms monetize the re-proving, not the assurance itself.

The measure. Vendor security diligence runs to tens of thousands of dollars per year in audit fees, GRC subscriptions, and questionnaire labor for a small vendor. **Grade — DIRECTIONAL.**

Named position-holders. ServiceNow (GRC suites); Accenture (compliance consulting); IBM (security services) — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. The 5-to-50-person software vendor trying to sell upmarket, for whom a security audit is a gate that costs a junior salary before any revenue, and the questionnaire treadmill taxes every deal cycle.

Exhibit 8.3 — App stores and cloud marketplaces

Where it operates. The distribution-and-channel layer: the gated storefronts and cloud marketplaces through which software reaches its buyer.

The everyday story. A developer ships an app, but it can only reach customers through a storefront that takes a cut of every sale, controls where the app ranks, mandates its own payment system, and owns the customer relationship — the developer often can't even email its own users. Cloud marketplaces do the same for business software: listing, co-sell placement, and committed-spend credits decide who gets seen.

How the value leaves the work. Software reaches its buyer through gated storefronts taking 15–30% of revenue, plus ranking control, mandated in-app payment processing, and ownership of the customer relationship. Cloud marketplaces replicate the pattern for business-to-business sales. The take rate prices the position, not the distribution work performed. Real curation, review, and payment handling is work that stays paid; what the take rate charges for is position — and the developer's relationship with the customer it earned.

The measure. Gated storefronts and cloud marketplaces take 15–30% of revenue, plus control of ranking and the customer relationship. **Grade — MEASURED.** (well-documented platform terms)

Named position-holders. Apple (App Store); Microsoft (Azure Marketplace / Store); Oracle (Cloud Marketplace) — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. The independent developer and micro-vendor (the micro independent software vendor, or ISV): 15–30% off the top, repricing risk when policy changes, discoverability rented through paid placement, and no portable relationship with the customer they earned.

Exhibit 8.4 — Credentials and signing authority

Where it operates. The data-and-identity layer, where the keys and certificates that authorize software — and the enterprise login features that secure it — are held and priced by platforms.

The everyday story. A developer's certificate can be revoked by the platform, killing an installed base overnight. Getting an app approved to reach a market runs through the platform's review. And secure single sign-on — the enterprise login most large buyers require — is often locked to the priciest tier, so a feature that costs the vendor almost nothing can multiply the price of a seat.

How the value leaves the work. Identity and signing authority are held by platforms and are revocable: developer certificates that can be pulled at will, app-authorization review (the OAuth approval gate) standing between a developer and a market, and the "single sign-on tax" — enterprise login via SAML and SCIM gated to premium tiers so that baseline security is priced as a positional upcharge. Running identity infrastructure is real work; the capture is the upcharge on baseline security and the revocable hold on credentials the operator's whole business depends on.

The measure. Enterprise login is commonly gated to higher-priced tiers — the single sign-on tax — sometimes multiplying seat price for a feature that costs the vendor almost nothing; no single published figure sizes it. **Grade — DIRECTIONAL.**

Named position-holders. Okta; Microsoft (Entra ID); Apple (developer certificates) — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Small vendors forced onto enterprise tiers to satisfy a buyer's login mandate; small developers whose entire distribution can be revoked by one platform decision; workers whose professional identity resets to zero when a platform account dies.

Exhibit 8.5 — Hyperscale cloud compute

Where it operates. The platform-operation layer, where computing demand is pooled by a handful of hyperscale cloud providers who then gate access back to their customers.

The everyday story. A small software shop rents its computing from one of about three hyperscalers. Moving data out costs far more than it should. Multi-year spending commitments lock in budgets, the fastest chips are rationed by relationship and commitment size, and every record of what the workload did lives in the provider's console. Even the provider's carbon claims are its own word, unauditable by the customer.

How the value leaves the work. Compute demand is pooled by roughly three hyperscalers who then gate it back: data-egress charges (fees to move data out) set far above cost, committed-spend contracts that lock in multi-year budgets, graphics-processor allocation rationed by relationship and commitment size, and operational records living in the provider's console. Carbon claims for workloads are provider-asserted and unauditable by the customer. Operating compute at scale is genuine work that stays paid; the capture is the toll on leaving, the rationing of access, and the provider-held record.

The measure. Compute is pooled by roughly three hyperscalers who gate it back through egress charges set far above cost and committed-spend contracts; no single published figure isolates the position rent. **Grade — DIRECTIONAL.**

Named position-holders. Microsoft (Azure); Oracle (OCI); Amazon (AWS — named here for structure) — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. The small AI or software shop that can't get graphics-processor quota without enterprise commitments and can't afford egress charges to shop for a better price; the household or small datacenter operator whose idle capacity has no market at all, because no one pools small-side supply.

Exhibit 8.6 — Component supply chain

Where it operates. The fabrication-and-channel layer: the distributors and authorized channels through which electronic components flow from the fab to the circuit board.

The everyday story. When parts are scarce, they flow by broker relationship and franchise position, and small electronics makers get pushed to gray-market brokers. Then they pay heavily to screen for counterfeits — decapping, X-ray, date-code checks — because the chain of custody is asserted, not provable. On top of that, forced-labor and conflict-mineral paperwork is re-asserted at every tier of the chain.

How the value leaves the work. In allocation cycles, parts flow by broker relationship and franchise position; small manufacturers are pushed to gray-market brokers and must then pay heavy counterfeit-screening labor because chain-of-custody is asserted, not provable. Forced-labor and conflict-mineral compliance — the UFLPA and CMRT paperwork — is a cascade re-asserted at every tier, priced as labor the small buyer can't amortize. Distributors doing real logistics, stocking, and quality-control work stay paid; what the capture charges for is the counterfeit-screening tax and the paperwork re-assertion.

The measure. No single published figure isolates the counterfeit-screening labor and duplicated compliance paperwork small buyers absorb; the mechanism is documented, its dollar size is not publicly settled. **Grade — DIRECTIONAL.**

Named position-holders. Arrow Electronics; TD Synnex; Texas Instruments (authorized-channel policy as the trust structure) — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. The small original-equipment maker, contract manufacturer, and repair shop: worst allocation position in shortages, highest per-unit counterfeit-verification cost, and compliance paperwork that consumes engineering time.

Exhibit 8.7 — E-waste, repair, and embodied carbon

Where it operates. The disposal-and-externalities layer: end-of-life devices, the repair and refurbishment economy, and the environmental claims attached to hardware.

The everyday story. A device's history is a record the manufacturer keeps. Parts-pairing and serialization block independent repair, locked diagnostics make refurbishers guess at a device's condition, and battery health can't be verified at resale — so working hardware gets scrapped for lack of provable history. Meanwhile, embodied-carbon and recycled-content claims are marketing assertions, and the clean choice — repair, refurbish, verified-recycled — pays an expensive-proof penalty against the default of buying new.

How the value leaves the work. Device history is a record the manufacturer holds: parts-pairing and serialization block independent repair, locked diagnostics leave refurbishers guessing, and battery and component health is unverifiable at resale, so working hardware is scrapped. Embodied-carbon and recycled-content claims are marketing assertions, and the clean choice pays an expensive-proof penalty against new. Manufacturing and genuine diagnostics are real work; the capture is the withheld device history that turns working hardware into scrap and makes the honest, clean choice pay to prove itself.

The measure. Working hardware is scrapped for lack of provable history, and circularity claims carry an expensive-proof penalty; no precise figure for the loss is published. **Grade — DIRECTIONAL.**

Named position-holders. Apple (parts pairing / serialization); Dell (refurbishment and takeback programs); HP (recycled-content claims) — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Independent repair shops locked out of diagnostics, refurbishers who can't warrant what they can't verify, secondhand buyers (disproportionately lower-income families) absorbing hidden-condition risk, and recyclers paid scrap rates for recoverable value.

Exhibit 8.8 — IT services and tech-talent intermediation

Where it operates. The financing-and-labor layer, where technology workers reach the buyers who hire them through consultancies and staffing marketplaces.

The everyday story. A skilled engineer or consultant reaches clients through a firm that owns the relationship — and owns the record of what the worker has shipped. Move to a new firm and that verified history resets to zero; the worker is re-vetted and re-priced from scratch. Non-solicitation terms make the arrangement formal.

How the value leaves the work. Tech labor reaches buyers through firms and marketplaces that own the client relationship and the worker's performance record. The vetting, sales, delivery-management, and bench-risk work is real — not capture; the capture is the non-portable record. A worker's verified history of shipped work lives in the intermediary's system, so switching resets reputation to zero, and the spread between bill rate and pay rate is protected by relationship ownership rather than ongoing service value.

The measure. No single published figure isolates the bill-rate-to-pay-rate spread attributable purely to unverifiable individual reputation; the mechanism is documented, its dollar size is not publicly settled. **Grade — DIRECTIONAL.**

Named position-holders. Accenture; Cognizant; EPAM Systems — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. The individual engineer or consultant whose track record isn't theirs to carry, and the small buyer paying brand-name bill rates as a trust proxy because they can't verify an independent's history directly.

Communication Services — telecom, media and entertainment, interactive media and services

The value chain. Capital, spectrum, and rights-of-way (FCC spectrum auctions, tower and fiber financing, franchise agreements) → network and infrastructure operation (fiber, towers, content-delivery networks, streaming data centers) → content and signal creation (creators, journalists, musicians, studios, game developers) → rights aggregation and licensing (labels, studios, sports leagues, and the performance-rights organizations and collection societies that pool them) → distribution and discovery (app stores, social feeds, search, streaming services, ticketing gates) → monetization (programmatic advertising, subscriptions, in-app payments) → consumer identity and access (accounts, phone numbers, bundles, billing) → data exhaust and externalities (resale of behavioral and location data, ingestion into AI training, device e-waste, network and data-center energy, and the attention externality).

Exhibit 9.1 — Programmatic advertising

Where it operates. The monetization layer, where an advertiser's dollar is auctioned in milliseconds to reach a publisher's page.

The everyday story. A family retailer sets aside a modest budget to advertise on the local news site. By the time that dollar arrives, a chain of automated intermediaries has taken its share, and neither the retailer nor the publisher can see what was actually bid, cleared, or delivered. Both parties are told the campaign worked; neither can independently check.

How the value leaves the work. An advertiser's dollar traverses the automated ad-buying chain — a demand-side platform (DSP), an ad exchange, a supply-side platform (SSP), and verification vendors — before it reaches a publisher. The same firm can operate the buy side, the sell side, and the auction in the middle (the core of the US v. Google adtech case, 2025 ruling). Delivery and attribution are asserted by the intermediary who is paid on them — the auditor and the audited are the same ledger. So an entire paid industry of brand-safety vendors, ad-verification firms, and media audits exists solely to re-verify claims the pipe itself could prove, and small players who can't afford it simply eat the distrust discount. The auction and matching work the exchanges perform is genuine and stays paid; the capture is the unattributable spread and the fact that the same party keeps the only record.

The measure. The ISBA/PwC programmatic supply-chain study (2020, UK) found that publishers received roughly half of advertiser spend, with an unattributable delta of roughly 15%. **Grade — MEASURED.** (Source: ISBA/PwC 2020 UK study — a UK measurement cited here illustratively, not a US figure.)

Named position-holders. Alphabet; Meta; The Trade Desk — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Local news publishers and small advertisers: a family retailer's ad budget sheds a large intermediary share before it reaches a community publisher, and neither party can audit what was actually bid, cleared, or delivered.

Exhibit 9.2 — App store and the in-app payment gate

Where it operates. The distribution-and-discovery layer, where the storefront that lists an app also processes its payments and owns its customer account.

The everyday story. A two-person studio ships an app through a mobile store. The store takes a cut of every in-app purchase, requires its own payment processing, and controls ranking and reviews. The studio's own customers — their identities, purchase histories, refunds, entitlements — live in a platform account the studio does not control and cannot fully see. A dispute over an install or a refund is settled inside the platform's own record.

How the value leaves the work. Distribution, payment, and identity are fused: a 15–30% take on in-app purchases, a mandatory in-app payment processor, and control of ranking and reviews. The developer's customer relationship lives in a suspendable platform account. User-generated-content (UGC) economies pay creators in platform scrip at platform-set exchange rates — Roblox's developer-exchange payout (DevEx) is a structural example — and those conversion terms are asserted, not provable. Epic v. Google and the EU Digital Markets Act (DMA) are the named public pressure points. Developers then buy third-party analytics and attribution tooling to approximate accounting they cannot verify. Distributing and curating apps is genuine work that stays paid; the capture is the fused take rate plus the platform's ownership of the developer's customer record.

The measure. The take on in-app purchases runs 15–30%. **Grade — MEASURED.** (Source: published platform terms.)

Named position-holders. Alphabet (Google Play); Roblox; Meta (Horizon/Quest store) — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Indie app and game studios and UGC creators: a two-person studio pays the take rate and cannot see or own its customer list, while disputes over installs, refunds, and chargebacks are adjudicated inside the platform's own record.

Exhibit 9.3 — Creator audience capture

Where it operates. The distribution-and-discovery layer, where a creator's reach and audience relationship live inside the platform's account system.

The everyday story. An independent creator builds an audience of hundreds of thousands over years of work. The follower list is not theirs to export; whether a given post earns money is decided inside the platform's ledger; the account itself can be suspended. If the creator dies or is incapacitated, a life's work and its audience are not an inheritable working system — they are a support-ticket queue.

How the value leaves the work. Reach is an algorithmic grant, not property. The follower graph is non-portable; monetization and demonetization are decided inside the platform's ledger; the account is a revocable identity. Creators then pay for analytics tools, multi-channel-network (MCN) middlemen, and influencer-verification services to interpret opaque reach and to prove audiences to sponsors — trust labor sold back to the person who built the audience, and brand deals still carry a distrust discount because audience claims are unverifiable. Running the distribution venue is real work that stays paid; the capture is ownership of the audience relationship — the non-portable follower graph and the revocable, non-inheritable account.

The measure. The mechanism is documented; the dollar size is not publicly settled.
Grade — DIRECTIONAL.

Named position-holders. Meta (Instagram); Alphabet (YouTube); Pinterest — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Independent creators, local journalists, and family businesses whose entire customer channel is one suspendable account, and who pay a distrust discount on every sponsorship because audience claims cannot be verified.

Exhibit 9.4 — The royalty black box

Where it operates. The rights-aggregation-and-licensing layer, where streaming and mechanical royalties are matched and paid through labels, performance-rights organizations, and collection societies.

The everyday story. A songwriter's royalties flow through labels and collection societies whose internal matching is the only record. Some royalties never match a rightful owner and pile up in a "black box." Recoupment accounting is asserted; the contractual right to audit costs more to exercise than most artists' royalties are worth; and heirs litigate the rights chain at every generational handoff.

How the value leaves the work. Streaming and mechanical royalties flow through labels, performance-rights organizations (PROs), and collection societies whose internal matching is the only record. Unmatched "black box" royalties accumulate; recoupment accounting is asserted; a contractual audit right costs more to exercise than most artists' royalties are worth; and estates litigate rights chains at every handoff. Royalty audits, matching-dispute labor, and estate litigation are all priced as labor because the split and

the stream count are asserted, not provable. The collection societies keep doing real matching labor that stays paid — the black box, the unmatched pool and the asserted split, is the target, not the matcher.

The measure. The US Mechanical Licensing Collective's publicly reported unmatched-funds pool is the named example of the black box's size. **Grade — DIRECTIONAL.** (Source: US Mechanical Licensing Collective.)

Named position-holders. Warner Music Group; Universal Music Group; Spotify (as the reporting structure) — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Songwriters, studio musicians, independent labels, and heirs — the people who did the creative work wait years for matching disputes while the float sits in someone else's ledger.

Exhibit 9.5 — The carrier number and subscriber record

Where it operates. The consumer-identity-and-access layer, where the phone number and subscriber record live inside a carrier's customer database.

The everyday story. A phone number has become de facto national identity — the code that unlocks banking and email — yet it lives in a carrier's system, not the owner's hands. When a number is hijacked, a small-business owner can lose access to their bank before they know what happened. Meanwhile the same subscriber record is sold downstream without the subscriber ever seeing the transaction.

How the value leaves the work. The phone number is de facto national identity — the two-factor authentication (2FA) anchor for banking and email — yet it lives in a carrier's customer database. SIM-swap fraud (a number hijacked by moving it to an attacker's SIM card) is the failure mode of an identity the owner doesn't hold. Mobile virtual network operators and rural wireless internet providers (MVNOs and WISPs — small and rural phone and internet providers) buy access on wholesale terms set by hub owners; locked devices feed e-waste. Identity-verification stacks, port-out fraud insurance, and porting-dispute labor are all priced as labor, and the FCC's broadband "nutrition labels" exist precisely because advertised service is unverifiable by the customer. Running the network is real work that stays paid; the capture is the subscriber record held in the carrier's system and monetized without the subscriber.

The measure. The FCC's 2024 fines against major US carriers for selling subscriber location data are a documented public-record marker that the subscriber record is monetized without the subscriber; no aggregate figure for the broader practice is publicly settled. **Grade — DIRECTIONAL.** (Source: FCC.)

Named position-holders. AT&T; Verizon; T-Mobile — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. SIM-swap victims (often small-business operators whose banking hangs on a number), rural families with one provider, and community broadband co-ops and small WISPs gated at wholesale.

Exhibit 9.6 — Ticketing and live events

Where it operates. The distribution-and-discovery layer, where an exclusive gate controls the sale and the record of tickets to live events.

The everyday story. An independent venue signs a multi-year exclusive ticketing contract. Demand pools behind that one gate, fees stack at checkout, and the ticket's record lives in the ticketer's system — not the venue's or the artist's. Resale spread and bot arbitrage flourish against a record the people who put on the show cannot see or govern.

How the value leaves the work. Exclusive multi-year venue ticketing contracts pool demand behind one gate; fees stack at checkout; and the ticket's record lives in the ticketer's system, so resale spread and bot arbitrage flourish against a record the artist and venue cannot see or govern. Bot mitigation, fraud and chargeback labor, and "verified fan" programs are then sold back to the very parties the record capture created the distrust for. The DOJ's 2024 antitrust suit against Live Nation is the named public reference for the structure. Selling and clearing tickets is real work that stays paid; the capture is the exclusive gate, the stacked checkout fees, and the resale spread against a record the artist and venue cannot govern.

The measure. The mechanism is documented; the dollar size is not publicly settled.

Grade — DIRECTIONAL. (Named reference: DOJ 2024 antitrust suit against Live Nation.)

Named position-holders. Live Nation (Ticketmaster); Vivid Seats; StubHub — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Fans paying stacked fees; independent venues locked out of their own box-office and patron record; working artists whose tour margin funds the gate.

Exhibit 9.7 — Behavioral data and consent

Where it operates. The data-exhaust-and-externalities layer, where behavioral, viewing, and location data are brokered downstream and the network's energy footprint is asserted rather than measured.

The everyday story. A household's behavioral, viewing, and location data are collected once and sold downstream indefinitely. Consent was a single click; the use is unbounded and unauditable. The resulting profiles quietly reprice the very people they describe — ad rates, fraud scores, eligibility screens — and those people can neither see nor correct them.

How the value leaves the work. Behavioral, viewing, and location data are brokered downstream; consent is a one-time click while use is unbounded and unauditable; and the resulting profiles reprice the very person they describe. On the externality edge, network and streaming data-center energy claims are marketing-asserted, not measured. The privacy-compliance industry — GDPR/CCPA audit labor, consent-management platforms, data-processing-agreement review — is priced as labor because data flows are asserted, never provable. Legitimate audience measurement and ad delivery are real work that stays paid; the capture is the downstream resale where use is unbounded and unauditable and the person cannot see the profile that reprices them.

The measure. The mechanism is documented; the dollar size is not publicly settled.
Grade — DIRECTIONAL.

Named position-holders. Alphabet; Meta; Comcast — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Households repriced by profiles they can't see or correct; small publishers forced to bundle third-party trackers to earn viable ad rates — the clean, tracker-free choice is penalized by expensive proof.

Exhibit 9.8 — Provenance in the AI era

Where it operates. The intersection of content creation and data exhaust, where published work is ingested into AI training and answer engines whose use of it is unverifiable.

The everyday story. A local newsroom's articles and a photographer's archive are ingested into AI training and answer engines. At the same time, zero-click answers collapse the referral traffic that used to fund the work. Licensing deals are struck only with the largest holders; the long tail has no negotiating position and no way to prove its work was even used.

How the value leaves the work. Publisher and creator content is ingested into AI training and answer engines while zero-click answers collapse the referral economics that funded it. Licensing deals are struck only with the largest holders — News Corp's and Reddit's publicly announced AI data-licensing deals are the examples — while the long tail of local newsrooms, niche writers, and photographers has no negotiating position and no proof of use. Provenance of both human origin and machine ingestion is

unverifiable, so content-authenticity disputes, plagiarism policing, adoption of the C2PA content-authenticity standard, and litigation become the only discovery mechanism for whether a work was used. Building answer engines and training models is real work that stays paid; the capture is the ingestion of the long tail's archives without receipt or compensation while zero-click answers collapse the referral economics that funded them.

The measure. The mechanism is documented; the dollar size is not publicly settled.

Grade — DIRECTIONAL. (Named references: News Corp and Reddit AI data-licensing deals.)

Named position-holders. Alphabet; News Corp; Reddit — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Local newsrooms, independent writers, and photographers whose archives are consumed without receipt while their distribution channel simultaneously dries up.

Utilities — electric, gas, water, multi-utilities, independent power and renewables

The value chain. Fuel and resource procurement (gas, uranium, water rights, land leases for sun and wind) → generation (utility-scale plants, independent power producers, and distributed energy resources like home batteries) → wholesale markets and dispatch (the regional grid operators that run energy, capacity, and ancillary-service markets, plus interconnection) → transmission and distribution (the monopoly wires, pipes, and mains) → retail, metering, and billing (the customer relationship, smart-meter data, retail choice) → financing and rate regulation (rate base and allowed profit rate, tax-equity and credit transfer, securitization, green bonds) → attribute and data markets (clean-energy certificates and carbon attributes, interval data, hosting-capacity study data) → externalities and disposal (emissions, methane leakage, coal ash, decommissioning trusts).

Exhibit 10.1 — Interconnection queues and hosting capacity

Where it operates. The wholesale and grid layer where a new generator asks to plug into the network — the interconnection queue run by the incumbent utility or the regional grid operator (the RTO/ISO), and the hosting-capacity data that says where the grid has room.

The everyday story. A community-solar developer or a farm-scale wind project applies to connect to the grid. It pays six-figure engineering-study fees, then waits years for a

place in a queue it cannot see, and loses its deposits when a larger project upstream withdraws and the whole study has to be run again. The hosting-capacity maps that might have told it where to build are stale and non-binding. Only the utility's private record of the grid counts.

How the value leaves the work. The incumbent utility or grid operator owns the grid model, the queue-position record, and the study results. Small generators pay serial study fees, wait multi-year queue times, and forfeit deposits when upstream withdrawals re-trigger restudies — and they cannot verify the network assumptions that priced them out, so each restudy is billed as trust-labor. Running the studies and managing the grid is real work that stays paid; the capture is that the grid-state claims are asserted by the record owner rather than independently checkable.

The measure. FERC issued Order 2023 precisely because median queue durations had blown past 4–5 years. **Grade — MEASURED.** (Source: FERC, in connection with Order 2023.)

Named position-holders. PJM Interconnection (queue backlog and reform); Duke Energy (hosting-capacity and study process); Pacific Gas & Electric (Rule 21 distributed interconnection) — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Community-solar developers, farm-scale wind and solar landowner projects, small storage developers, and homeowners whose rooftop-solar applications stall — they carry dead capital through years of restudy while large producers with dedicated queue-management staff absorb the friction.

Exhibit 10.2 — Clean-energy certificates and provenance

Where it operates. The attribute market, where the "clean" quality of a megawatt-hour is certified and sold separately from the power itself — the renewable energy certificate (REC), a tradable proof that clean generation happened.

The everyday story. A small solar or wind operator sells its clean-energy certificates cheap through a broker who owns the buyer relationship and sets the price. A corporate buyer then pays consultants to defend its green claim against accusations of double-counting. The one claim that physically means something — that clean power was generated in the same hour it was used — is sold as a premium consulting product.

How the value leaves the work. Renewable energy certificates are annual, unbundled, siloed in separate registries, and sold through brokers. Small generators sell attributes cheaply through intermediaries who own the buyer and the price; corporate buyers pay consultants to defend claims against double-counting and greenwash accusations. Round-the-clock clean-energy matching — matching each hour of use to clean generation in the same hour, the claim that actually means something physically — is

priced as a premium because generation-time provenance is expensive to prove under today's registry architecture. Certifying and brokering attributes is real work; the capture is the provenance position, not the labor.

The measure. The mechanism is documented; the dollar size is not publicly settled.
Grade — DIRECTIONAL.

Named position-holders. 3Degrees (certificate brokerage and advisory); Constellation Energy (utility green-power products); Xpansiv/APX-operated registries — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Family-owned solar and small wind operators whose attributes are marked up by intermediaries; small businesses that want a defensible clean-power claim but cannot afford verification consultants; and, ultimately, ratepayers buying green tariffs with opaque markups.

Exhibit 10.3 — Rate regulation and cost-of-service ratemaking

Where it operates. The financing and regulation layer, where an investor-owned utility earns its return — the rate case in which regulators set how much capital the utility may recover and at what allowed profit rate.

The everyday story. A monopoly utility earns a guaranteed profit rate on the capital it deploys, which quietly rewards building big over spending less. When ratepayer advocates or small-business coalitions try to contest whether a given expense was prudent, they must hire their own lawyers and experts to argue against records that live entirely in the utility's systems. They often lose on the cost of verification, not on the merits.

How the value leaves the work. Investor-owned utilities earn an allowed return (the allowed profit rate, or ROE) on the capital they deploy — a structural incentive to prefer building assets (which enter the rate base they earn on) over cheaper operating fixes, paid for holding the monopoly-franchise position. The evidentiary record in a rate case lives in the utility's own systems, so intervenors must fund lawyers and consultants to contest prudence claims they cannot independently verify; the regulatory filings are asserted summaries, not provable ledgers. Deploying capital and running the utility is real work; the capture is the position rent plus the trust-tax of contesting one-sided records.

The measure. The mechanism is documented; no single figure isolates its dollar size, which is not publicly settled. **Grade — DIRECTIONAL.**

Named position-holders. Southern Company; Duke Energy; Pacific Gas & Electric (rate cases and securitization dockets) — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Ratepayer households and small businesses who fund both the gold-plated rate base and the multi-million-dollar rate-case process; under-resourced intervenor groups who lose on verification cost, not on the merits.

Exhibit 10.4 — Demand response and virtual power plant aggregation

Where it operates. The distributed-dispatch layer, where household batteries, electric vehicles, and thermostats earn grid revenue — but only through an aggregator that pools them into a virtual power plant (a VPP: many small home devices dispatched together as if they were one plant).

The everyday story. A homeowner's battery or EV earns money by feeding the grid when it is stressed. But the aggregator holds the keys to the device, owns the record of how it performed, and decides the homeowner's share of the payment. The homeowner cannot prove what their own device did, so they cannot switch to a better aggregator or join a neighborhood cooperative pool.

How the value leaves the work. Under FERC Order 2222 (which opens distributed energy resources to wholesale markets) and utility demand-response programs, home batteries, EVs, and thermostats earn capacity and energy revenue — but only through aggregators who hold the device keys (revocable control), own the dispatch-performance record, own the grid-operator relationship, and set the household's share. The household cannot prove its own device's performance, so it cannot port to a better aggregator or bid through a cooperative pool. The aggregation and bidding is real work; the record-and-key lock is the position.

The measure. The mechanism is documented; the dollar size is not publicly settled.

Grade — DIRECTIONAL.

Named position-holders. Enel X (commercial and industrial demand response); Tesla (virtual power plant programs with utilities); CPower Energy — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Households and small commercial operators whose batteries, EVs, and HVAC earn grid revenue they can neither verify nor take with them — the device owner is repriced at the aggregator's discretion.

Exhibit 10.5 — Meter-data ownership

Where it operates. The metering and billing layer, where the smart meter (AMI) records a household's own electricity use — but the record lives in the utility's systems.

The everyday story. A homeowner's smart meter knows their consumption hour by hour, but that data sits in the utility's back-end. The standard "Green Button" access meant to hand it back to the customer is inconsistent, delayed, and can be revoked. A solar installer, an efficiency contractor, or a landlord all have to spend time or money to get the customer's own history — and retail brokers profit from the resulting information gap when households shop for a supply plan.

How the value leaves the work. Smart meters (AMI) generate interval data about the customer's own consumption, but the record lives in the utility's back-end meter-data-management systems (the MDMS). Standardized customer access (Green Button) is inconsistent, delayed, and revocable, so efficiency contractors, retail-choice shoppers, solar installers, and landlords all pay in time or fees to obtain the customer's own history — and retail brokers monetize the information asymmetry when households shop supply plans. Operating the meter is real work; the capture is the one-sided ownership of a record the customer generated.

The measure. The mechanism is documented; the dollar size is not publicly settled.
Grade — DIRECTIONAL.

Named position-holders. Oncor Electric Delivery (Texas grid wires and Smart Meter Texas); Commonwealth Edison (AMI and Green Button); American Water (utility-held usage records) — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Renters and homeowners who cannot cheaply prove their usage profile to get accurate solar, efficiency, or retail-plan pricing; small efficiency and solar contractors who burn unpaid labor chasing usage-data authorizations.

Exhibit 10.6 — Tax equity and clean-energy credit transfer

Where it operates. The clean-energy financing layer, where federal clean-energy tax credits (the ITC and PTC — the investment and production tax credits) are turned into cash, through a small set of large tax-equity investors and, more recently, brokered credit-transfer marketplaces.

The everyday story. A community-scale or family-farm solar project has earned federal tax credits it cannot use directly, so it must sell them. But the diligence to verify the project's wage, domestic-content, and production claims costs about the same whether the project is large or small. Below a certain size the deal does not pencil, so the small developer either sells its credits cheap or cannot monetize them at all.

How the value leaves the work. Monetizing the clean-energy tax credits (ITC/PTC) runs through a handful of large tax-equity investors and, since transferability, through brokered credit-transfer marketplaces. The spread is priced off diligence cost: prevailing-wage and apprenticeship compliance, domestic-content, placed-in-service, and production claims are all asserted in document rooms and re-verified by counsel per deal. Because diligence cost is flat, it only pencils above a size floor, so small and community-scale projects are structurally excluded. The underwriting and legal diligence is real work; the capture is the diligence-cost floor that the small developer cannot clear.

The measure. The diligence cost is roughly fixed per deal regardless of project size, setting a floor below which small projects cannot economically monetize; no hard per-deal figure is publicly settled. **Grade — DIRECTIONAL.**

Named position-holders. J.P. Morgan (tax-equity investment); Bank of America (tax-equity investment); Crux (transferable-credit marketplace) — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Community-scale and family-farm developers who cannot clear the diligence-cost floor; the landowner and local-installer economics downstream of them; buyers who pay insurance wraps against recapture risk.

Exhibit 10.7 — Externalities and disposal

Where it operates. The end-of-life and externality layer — emissions and methane leakage, coal ash (the toxic residue left from burning coal), and the decommissioning trusts meant to fund cleanup and plant retirement decades out.

The everyday story. Emissions and leaks are self-reported on sampling schedules, even though independent research keeps finding that real "super-emitter" leaks run far above the reported inventories. Coal-ash ponds and plant-retirement liabilities sit in trusts whose adequacy is asserted by actuaries and contested for decades, while the cleanup cost gets loaded onto ratepayers. The obligation outlives the managers, and even the company itself, with no verifiable package to hand down.

How the value leaves the work. Emissions and leakage are self-reported on sampling regimes — published research finds measured super-emitters diverge from methane inventories — and coal-ash and decommissioning liabilities sit in trusts and securitization structures whose adequacy is asserted actuarially and contested for decades. Cleanup costs are securitized onto ratepayers while the environmental record stays the operator's private file, and the obligation outlives management teams and even the corporate form — a generational handoff with no verifiable package. Compliance

monitoring and actuarial work is real work; the capture is that continuous physical claims are reported periodically and unverifiably.

The measure. The mechanism is documented; the true aggregate liability is order-of-size only, not publicly settled. **Grade — DIRECTIONAL.**

Named position-holders. Duke Energy (coal-ash basin closure program); Dominion Energy (decommissioning and ash obligations); Pacific Gas & Electric (wildfire-cost securitization) — structural examples of the position, not accusations of wrongdoing.

Who carries the cost. Frontline communities living next to ash ponds and leak-prone infrastructure; ratepayer families who fund securitized cleanup for decades; small independent environmental-monitoring firms whose measurements carry no standing against the operator's self-report.

Real Estate — REITs, real-estate management and development, real-estate data and services

The value chain. Land, entitlement, and title (parcel assembly, zoning, county recording, chain-of-title) → capital formation and financing (mortgage origination, appraisal and valuation, title insurance, and real-estate investment trust — REIT — and securitized capital) → development and construction (design, permitting, build, inspection, certificate of occupancy) → transaction and brokerage (listing distribution through the multiple-listing service and the portals, agent representation, closing and escrow) → ownership, leasing, and property management (rent rolls, lease administration, shared-cost pass-throughs, maintenance) → occupant services and data (tenant screening, mortgage servicing, listing portals, resale of property data and analytics) → risk and insurance (property and casualty, title, force-placed coverage, lender diligence) → externality and succession (building energy performance and retrofit proof, benchmarking compliance, and the probate and generational transfer of deeds, basis, and operating records).

Exhibit 11.1 — Chain of title and title insurance

Where it operates. The first link in the chain: the assertion of clear ownership at every sale, and the title-insurance premium bought against it.

The everyday story. A first-time buyer closes on a house and pays for a full title search plus a title-insurance premium — a check against the property's recorded history. When they sell years later, the next buyer pays for the same search and the same premium against the same, unchanged history. County records are scattered document images, not a single verifiable ledger, so the chain of ownership is asserted rather than proven.

How the value leaves the work. Chain-of-title is asserted, not provable. County records are fragmented, non-cryptographic document images, and four national underwriters each keep their own duplicate private copies — "title plants" — of that public record. Every sale re-purchases a full search plus a title-insurance premium against the same historical facts, with the reissue credit rarely surfaced. A private mortgage registry (MERS) keeps note and mortgage assignments off the public record, clouding the chain further. Independent title and abstract professionals stay paid for real curative work; the capture is the repeated premium on an unchanged chain.

The measure. Title insurers' loss ratios run a small fraction of premium, per statutory insurance filings — the price is trust cost, not risk transfer; no single national figure isolates the total. **Grade — DIRECTIONAL.** (Source: statutory insurance filings.)

Named position-holders. Fidelity National Financial; First American Financial; Old Republic International — named as structural examples of the position, not as accusations of wrongdoing.

Who carries the cost. First-time homebuyers and small landlords paying a full search and premium at every transfer of an unchanged chain; independent title agents who remit most of the premium upstream while doing the actual examination.

Exhibit 11.2 — Listing portals and lead resale

Where it operates. The brokerage layer, where listings are distributed and the buyer interest they create is sold back as paid leads.

The everyday story. An independent agent lists a home. The listing flows out to the big portals, which attract buyers — and then sell those buyers back to agents as paid "premier" placement. The agent effectively rents access to the demand their own listing generated.

How the value leaves the work. Portals aggregate listings sourced from agents and the multiple-listing service (the MLS, the shared regional database of listings), then sell the resulting buyer demand back to agents as paid lead placement — the lister's own inventory repriced to the lister. The MLS holds the book of record of the listing and its history. Even after the 2024 National Association of Realtors settlement decoupled commissions, data ownership, ranking control, and lead attribution stay with the hub. Lead provenance is unverifiable, so agents pay for duplicate, recycled, or misattributed leads, and listing accuracy and days-on-market history are asserted by the hub.

The measure. The 2024 National Association of Realtors settlement decoupled commissions but left data ownership, ranking, and lead attribution with the hub; the mechanism is documented, its dollar size not publicly settled. **Grade — DIRECTIONAL.**

Named position-holders. Zillow Group; CoStar Group (Homes.com / Apartments.com); News Corp (Realtor.com) — structural examples of the position, not accusations.

Who carries the cost. Independent agents buying back leads from their own listings; for-sale-by-owner (FSBO) families invisible outside the hub; renters funneled through per-application portal flows.

Exhibit 11.3 — Appraisal spread and the resold price signal

Where it operates. The financing layer, where a property is valued — through an appraisal the lender orders, and through automated models built on the market's own sales.

The everyday story. An appraiser inspects a home and does the analysis but is paid only part of what the lender charged; a management company in the middle keeps the spread. Separately, the family's own sale, and thousands like it, feed a data company's valuation model — which then sells the derived price estimate back to the people who generated it.

How the value leaves the work. Appraisal management companies (AMCs), interposed after the appraisal-independence rules (HVCC and Dodd-Frank), take a spread between the lender's appraisal fee and the appraiser's payout while the appraiser does the inspection and analysis. Separately, owners of automated valuation models (AVMs) and market data aggregate the market's own sale and valuation records and sell the derived price signal back to the participants who generated it. Inside both, comp selection is unexplainable assertion. The appraiser's inspection and analysis is genuine work; the capture is the spread and the resold signal.

The measure. No single published figure isolates the AMC spread or the resold-signal premium; the mechanism is documented, its dollar size not publicly settled. **Grade — DIRECTIONAL.**

Named position-holders. Zillow Group (Zestimate); CoStar Group; First American (Data & Analytics) — structural examples of the position, not accusations.

Who carries the cost. Independent fee appraisers — a shrinking, aging trade repriced by the spread; homeowners in thin-comp neighborhoods mis-valued with no auditable basis for appeal.

Exhibit 11.4 — Tenant screening and rent history

Where it operates. The occupant layer, where renters are screened and their payment history is stored.

The everyday story. A renter pays a screening fee with every application and hands over full bank statements and paystubs to a stranger to prove income. Their years of on-time rent sit in a screening database they neither control nor benefit from — and mostly do not build their credit. The landlord re-buys the same kind of report for every applicant.

How the value leaves the work. Renters pay a screening fee per application while their own on-time rent history sits in bureau and screening databases they neither control nor benefit from — rent mostly does not build credit. Landlords re-purchase the same asserted report for every applicant, and income verification requires surrendering full bank statements and paystubs to strangers. The identical history is re-bought per application, and disputes over screening errors run on the bureau's clock.

The measure. The mechanism is documented; its dollar size is not publicly settled.
Grade — DIRECTIONAL.

Named position-holders. TransUnion (SmartMove); Equifax; Experian (RentBureau) — structural examples of the position, not accusations.

Who carries the cost. Renters — stacked application fees in tight markets and an unportable payment history; small landlords paying per-report and carrying adverse-action compliance labor alone.

Exhibit 11.5 — Property-management records and CAM reconciliation

Where it operates. The ownership and leasing layer — the software that holds a property's books, and the shared building costs passed through to tenants.

The everyday story. A small landlord's rent rolls, leases, and maintenance history live inside property-management software, priced per unit, with lossy exports — so leaving the platform means leaving the records behind. A small commercial tenant receives a single asserted total for its share of shared building costs, with no way to check it short of a costly audit.

How the value leaves the work. Rent rolls, lease abstracts, maintenance history, and owner statements live inside per-unit-priced property-management software (PM SaaS) — the operator rents its own memory, and lossy exports make platform exit a record ransom. On the commercial side, shared building operating costs charged to tenants (CAM) arrive as asserted totals; the tenant's only recourse is a costly lease audit, so small tenants systematically overpay reconciliations they cannot verify. Annual lease re-abstraction and data-migration cost function as switching ransom.

The measure. No single published figure isolates the overpaid reconciliations or the exit cost; the mechanism is documented, its dollar size not publicly settled. **Grade — DIRECTIONAL.**

Named position-holders. AppFolio; CoStar Group; SS&C Technologies (real-estate suites) — structural examples of the position, not accusations.

Who carries the cost. Small retail and office tenants overpaying unverifiable CAM; small property managers and family landlords whose books — their sellable, inheritable asset — live in someone else's system.

Exhibit 11.6 — Mortgage servicing records and escrow

Where it operates. The financing-and-occupancy layer, where the right to service a mortgage trades between companies and the borrower's payment record moves with it.

The everyday story. A homeowner's mortgage servicing is sold to a new company, and their entire payment, escrow, and hardship history moves as a private data dump. When a payment is misapplied or a lender-imposed insurance policy suddenly appears, the household has to prove facts that exist only in the servicer's own system. Often they cannot even confirm who now holds the loan.

How the value leaves the work. Servicing rights trade between servicers, and the borrower's entire payment, escrow, and loss-mitigation history moves as a proprietary data dump. When payments are misapplied, escrow analyses err, or force-placed insurance (lender-imposed coverage) lands, the household must prove facts that exist only in the servicer's system. A private mortgage registry (MERS) keeps beneficial-interest transfers off the public record, so the borrower often cannot even verify who holds the obligation. Escrow disputes, payoff-statement errors, and reconstructing one's own payment history all fall on the borrower.

The measure. A private registry (MERS) keeps ownership transfers off the public record and servicing histories move as private dumps; the mechanism is documented, its dollar size not publicly settled. **Grade — DIRECTIONAL.**

Named position-holders. Mr. Cooper Group; Rocket Companies; PennyMac Financial Services — structural examples of the position, not accusations.

Who carries the cost. Households at the delinquency boundary, where fees compound while disputes crawl through the servicer's own record; small non-bank originators absorbing repurchase and quality-control friction across transfers.

Exhibit 11.7 — Building energy performance and green proof

Where it operates. The externality layer, where a building's energy performance is certified and priced.

The everyday story. A small landlord actually retrofits a building but cannot affordably prove it. The certification, consultant fees, and benchmarking paperwork cost about the same whether you own one building or a thousand — so the green financing and rent premiums flow to the large portfolios that can buy the badge, while genuinely clean small operators are penalized by the price of proof.

How the value leaves the work. Building-performance claims are proven through paid certification and consultant labor — green-building rating programs such as LEED and ENERGY STAR, and benchmarking mandates such as New York City's building-emissions law (Local Law 97) — while utility interval data sits in utility and ESG-platform silos. The small landlord who retrofits cannot affordably prove it, so green financing spreads and rent premiums accrue to large portfolios that can buy the badge, while genuinely clean small operators are penalized by expensive proof and lenders carry greenwash-diligence labor. Certification and consultant fees plus annual benchmarking compliance land like fixed overhead.

The measure. Certification and benchmarking cost is roughly fixed per operation regardless of building size, making proof regressive; no precise per-operator figure is published. **Grade — DIRECTIONAL.**

Named position-holders. CBRE Group; JLL; Schneider Electric (ESG and energy-reporting platforms) — structural examples of the position, not accusations.

Who carries the cost. Small landlords priced out of green premiums and compliance; tenants unable to verify utility pass-throughs; retrofit tradespeople whose completed work is economically invisible.

Exhibit 11.8 — Generational transfer of property and records

Where it operates. The succession layer, where a property and the records that make it usable pass to the next generation.

The everyday story. A family's property value fractures at handoff. Probate is slow and costly, deeds and cost records are lost, and fractional inherited title can leave a home unsellable, uninsurable, ineligible for disaster aid, and exposed to a forced sale. The family landlord's "system" is one person's memory plus a shoebox, while the durable records sit in county systems, title plants, and software the family does not hold.

How the value leaves the work. Property value dies or fractures at handoff: probate cost and delay, lost deeds and basis records, and heirs' property — fractional intestate title, meaning ownership split among heirs with no will — that renders homes unsellable, uninsurable, ineligible for disaster aid, and exposed to partition (forced) sales. The durable records sit in county systems, title plants, and property software the family does not hold. Probate and quiet-title work (the legal action to settle disputed ownership) rebuilds what should be self-evident; re-title, re-insurance, and reconstruction of tax basis (the record of what was paid and improved, which sets the tax owed on a later sale) all fall due at exactly the moment the family is weakest.

The measure. The mechanism — probate loss, lost basis, and heirs'-property title failure — is well documented; its aggregate dollar size is not publicly settled. **Grade — DIRECTIONAL.**

Named position-holders. Tyler Technologies (county recording and ERP systems); Fidelity National Financial; First American Financial — structural examples of the position, not accusations.

Who carries the cost. Families without estate-planning budgets — the demographic most likely to lose the single largest asset they own; heirs facing partition actions; the second generation inheriting an asset with no operating knowledge attached.

Methodology and sources

How this atlas was built

This atlas maps eighty-six capture zones across the eleven sectors of the S&P 500. A capture zone is a specific point in a value chain where value routinely leaves the people who created it and accrues to whoever controls the record, the relationship, or the choke-point at that point. Each sector was mapped along its own value chain — from raw input to end use — and every zone along that chain was described in the same anatomy: where it sits, what it looks like from the ground, how the value leaves the work, the best available measure of its size, who occupies the position, and who carries the cost.

Four disciplines governed the work, and they are the reason the atlas can be trusted where it is confident and is honest where it is not.

1. No invented market sizes. Every figure in this atlas is either published by a named authority, built from public numbers with the arithmetic shown, or explicitly flagged as an order-of-size estimate. Where no defensible figure exists, the atlas describes the mechanism and says the size is not publicly settled. It never fills a blank with a number that looks precise.

2. Gross flow, not wrongdoing. The atlas measures value that flows through a position — not value that was stolen. In almost every zone, the underlying industry does genuine work — moving goods, bearing risk, curating a market, inspecting a factory, verifying a fact — and that work stays paid in this analysis. What the atlas isolates is the separate slice that accrues to owning the position rather than to doing the work. This is a structural claim, not a moral one.

3. The position, never the villain. Every company named in this atlas is named as an example of a structural position, not as an accusation of wrongdoing. The same position can be occupied by different firms; the point is the shape of the value chain, not the character of any occupant.

4. Regulated boundaries carried. Where a zone touches a regulated activity, the boundary is preserved. Evidence that a factory met a standard is not the same as certification; a mutual-aid pool is not licensed insurance; a signed identity attestation is not a banking license. The atlas is careful never to blur cheap evidence into regulated authority.

The evidence grades, defined

Every surfaced figure carries one of three grades.

Grade	Plain meaning	What it can bear
MEASURED	A regulator, statistics body, court, professional survey, or comparable authority published this number.	The firmest ground public data offers. Cite it.
DERIVED	Built up from public figures, with the arithmetic shown.	Only as good as its inputs, but the reasoning is followable.
DIRECTIONAL	An order of size, not a precise figure. Direction and rough scale are known; the exact number is not.	"About this big." Never a decimal-point fact.

A grade was never upgraded for effect. Where the underlying research said "directional," the figure is DIRECTIONAL here, no matter how tempting the round number.

Where this atlas is thin

Honesty about the gaps is part of the method.

- **Most zones are DIRECTIONAL.** The majority of the eighty-six zones rest on documented mechanisms and order-of-size estimates rather than on a single published dollar figure. The pattern is well evidenced; the precise national total usually is not, because no authority computes it. The atlas shows this rather than hiding it behind invented precision.
- **Ranges, not points.** Every quantitative claim is a range or an explicit order of size. None was collapsed to a single number for readability. When a zone says "1–5%" or "90–180 days," that spread is the honest answer, not a rounding artifact.
- **Two zones are mapped as mechanisms without a settled figure.** In Consumer Staples (packaging responsibility and recycled-content claims) and Utilities (emissions, coal ash, methane, and decommissioning trusts), the mechanism is clear and documented but has no single public number attached; the atlas maps them on structure alone and says so.
- **Some cited studies are illustrative, not definitive.** Where a single named study is the best available public evidence — for example, the ISBA/PwC programmatic-advertising supply-chain study, which is a UK study — it is cited as illustrative of the mechanism, not as a precise measurement of the US market.

Named public sources and references

The atlas relies on public authorities, published studies, laws, court actions, and certification standards. Company names elsewhere in this document are structural examples, not sources; the sources are here.

Statistics bodies, regulators, and published studies US Energy Information Administration (EIA) and the Interstate Oil and Gas Compact Commission (IOGCC) — marginal-well counts. US Department of the Interior federal orphan-well program — abandoned-well scale. American Medical Association physician surveys — prior-authorization workload. Drug Channels Institute — pharmaceutical-wholesaler concentration. Health Affairs research — the US health sector's share of national emissions. World Bank, Remittance Prices Worldwide — global remittance cost; United Nations Sustainable Development Goal 10.c — the 3% remittance-cost target. National Association of Unclaimed Property Administrators (NAUPA) and state unclaimed-property programs — escheated-asset pools. ISBA/PwC programmatic advertising supply-chain study (2020, UK) — advertiser-to-publisher spend share. US Mechanical Licensing Collective — unmatched-royalty funds. Federal Energy Regulatory Commission (FERC) — Order 2023 (interconnection-queue reform and median queue durations), Order 2222 (distributed-energy market access), Form 1 filings. Federal Communications Commission (FCC) — 2024 enforcement actions on subscriber location-data sales; broadband disclosure labels. Statutory insurance filings — title-insurance loss ratios.

Courts and public antitrust actions US Department of Justice antitrust suit against Live Nation (2024); the US v. Google advertising-technology ruling (2025); Epic v. Google; the National Association of Realtors commission settlement (2024); the 2024 Change Healthcare outage (as a documented failure event).

Laws and regulatory regimes referenced EU Carbon Border Adjustment Mechanism (CBAM); EU Digital Product Passport; EU Digital Markets Act (DMA); California SB 54 (packaging extended-producer-responsibility law); US EPA methane rules; US Centers for Medicare & Medicaid Services interoperability and prior-authorization rules (2026–27 compliance dates); Drug Supply Chain Security Act (DSCSA); Uyghur Forced Labor Prevention Act (UFLPA); No Surprises Act; Fair Credit Reporting Act (FCRA) and Equal Credit Opportunity Act (ECOA); HIPAA; RESPA and Consumer Financial Protection Bureau servicing rules; Dodd-Frank and appraisal-independence rules; New York City Local Law 97; GDPR and the California Consumer Privacy Act (CCPA); EU REACH chemicals registration.

Standards and certification schemes named FSC and PEFC (forestry); ResponsibleSteel and the Aluminium Stewardship Initiative; USDA National Organic Program; Fairtrade International; the Non-GMO Project; Verra and DNV (carbon and

assurance); SGS, Bureau Veritas, and Intertek (inspection); SOC 2 and ISO 27001 (information-security audits); AS9100, ISO 9001, and NADCAP (manufacturing quality); LEED and ENERGY STAR (building performance); C2PA (content-provenance); the EU Digital Product Passport (device provenance).

The Capture Atlas — United States Edition. Independent research, evidence-graded. Every figure carries its grade; every range is preserved; every named firm is a structural example, not an accusation. Where the honest answer is "the scale is known but the precise figure is not," the atlas says so.