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The Sustainability Audit

Rhetoric, regulation and the measurable reality of the green economy - what it actually delivers, who profits, and the path from claims to proof. With a deep dive into circular manufacturing and urban mining infrastructure.

THE THESIS

Sustainability has become a EUR-trillion industry of pledges, reports and certificates. The spending is real and measurable. The environmental result is not yet. This paper separates the two - the proven effects, the regulation that actually compels action, and where the money should go next.

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01 ORIENTATION

The gap between the claim and the proof

Walk any corporate website, annual report or trade-show stand and the language is uniform: **net zero, climate neutral, circular, sustainable supply chain**. The vocabulary is now near-universal. Around 80-90% of large listed companies publish some form of ESG data. What is far rarer is the hard number behind the word - the tonne of CO2 actually removed, the percentage of material genuinely returned to use, the audited reduction rather than the aspiration for 2050.

This paper is an audit, not a manifesto. It asks four questions an investor or a board should ask of any sustainability programme: **How big is the business and who profits? Does it measurably work? What actually forces the industry to act? And what is the most cost-effective path forward?** It treats sustainability as it would any capital-allocation decision - on evidence. Where a figure is sourced and verifiable, it is cited. Where it is an estimate or an assumption, it is flagged as one.

~USD 35-39tn
Assets labelled ESG / sustainable globally, 2025; definitions vary by provider (Precedence; Fortune Business Insights)

38.1 Gt
Record fossil CO2 emitted in 2025, +1.1% year-on-year (Global Carbon Project)

6.9%
Share of the world economy that is circular - down from 7.2% (Circularity Gap Report 2025)

Those three numbers frame the whole problem. Tens of trillions are now badged as sustainable; emissions still set a record every year; and the circular economy - the headline solution - is going backwards as a share of material use. The distance between the first number and the other two is the subject of this report.

HOW TO READ THIS PAPER

Facts carry an inline source. Figures marked **[Flagged]** are estimates, ranges or illustrative assumptions, not audited fact. Market-sizing figures from commercial research houses vary widely by methodology and should be read as order-of-magnitude, not precision. The aim is a defensible picture, not false certainty.

02 MARKET SIZE

How big is the business - and who actually profits

"Sustainability" is not one market; it is at least three, of wildly different sizes, and conflating them is the first source of confusion. The eye-catching headline - tens of trillions of dollars - is **assets under management** that carry an ESG or sustainable label, not money spent on decarbonisation. Estimates cluster around USD 35-39 trillion in 2025, with Europe holding roughly 44% of the total (Fortune Business Insights; Precedence Research, 2026). What counts as "ESG" or "sustainable" varies widely between data providers, so these totals are directional, not comparable like-for-like.

The money **spent on the machinery** of sustainability is two to three orders of magnitude smaller. The market for ESG and sustainability-management software and services is put at only around USD 4-13 billion in 2025 (Custom Market Insights; Market Reports World). Sustainability **consulting and advisory** is a few tens of billions and growing at high single digits, with over 90% of corporate buyers expecting to hold or raise spend (Verdantix, 2025). And the money actually deployed into the transition - clean power, grids, electrified transport - was about USD 2.1 trillion in 2024 (BloombergNEF).

Layer of the “sustainability economy”	Approx. 2024-25 size	What it really measures
ESG-labelled assets under management	USD 35-39 trillion	Capital screened/badged ESG - not spend
Energy-transition investment (deployed)	USD 2.1 trillion / yr	Real capex: renewables, grids, EVs
Circular-economy activity	~USD 0.5 trillion	Recycling, reuse, remanufacturing revenue
Sustainability consulting / advisory	~USD 40-70 billion	Strategy, data, assurance fees
ESG software & reporting tools	USD 4-13 billion	Disclosure, analytics, dashboards

Who profits most? Follow the fees, not the photons. The clearest winners are the intermediaries: the audit, assurance and consulting firms selling compliance; the software vendors building disclosure dashboards; the rating, index and data providers; and the arrangers of green and sustainability-linked bonds (issuance rose from about USD 10 billion in 2019 to over USD 160 billion by 2023, per Fortune Business Insights); the major audit and consulting networks now report sustainability assurance and advisory among their fastest-growing service lines (Verdantix, 2025). Professional-services and software margins on this work typically run far above the single-digit returns typical of much of the heavy industry doing the abating - which is why the advisory layer captures value out of proportion to the tonnes it removes [Flagged: illustrative comparison]. The transition's **industrial** winners - solar, battery and EV manufacturers - are concentrated overwhelmingly in Asia, a point Section 07 returns to.

> *The trillions sit in the label. The billions sit in the reporting. The measurable result, so far, stays small against the total.*

03 THE EVIDENCE

Does it measurably work?

This is the question the marketing often avoids. The honest answer has two halves, and both are supported by data rather than opinion.

Half one: in aggregate, the needle has not yet moved down. The 2025 Global Carbon Budget projects 38.1 billion tonnes of fossil CO2 - a record, up 1.1% on the year, driven by all three fuels (coal +0.8%, oil +1%, gas +1.3%). Total CO2 including land use is essentially unchanged from 2024 at around 42 Gt. The remaining budget for 1.5°C is widely described as “virtually exhausted” - on the Global Carbon Project's estimate, roughly four years at current rates. Engineered carbon removal (direct air capture and similar) offset about 0.003 million tonnes in 2024, around a million times smaller than fossil emissions (Global Carbon Project, Nov 2025).

Half two: the curve is bending, even if it has not turned. The same dataset shows total CO2 growth slowing to about 0.3% per year over the last decade, down from 1.9% per year in the decade before. Clean technology is demonstrably cost-competitive and is now displacing fossil generation in the largest economies - the China evidence in Section 07 is the sharpest example. The effect of renewables is real - they verifiably displace coal and gas generation - but at the level of the whole energy system it is still diluted by relentless growth in total demand: global energy demand has kept rising by around 2% a year (electricity faster still), so cleaner supply is added on top of a growing base rather than in place of it. The transition is genuine; it is simply being outrun, for now.

0.3% / yr
Total CO2 growth last decade, vs 1.9%/yr the decade before (Global Carbon Project)

<16%
Offset credits in studied categories that are real reductions, ~1bn t (Probst et al. 2024)

6.9%
Global circularity rate, 2025 - down 2.2 points since 2015 (Circularity Gap Report)

The circular economy makes the measurement problem vivid. Despite a decade of circular pledges, the share of materials entering the economy from recycled sources **fell** from 7.2% to 6.9% between 2024 and 2025, because total material consumption crossed 100 billion tonnes a year for the first time and is outpacing recycling. Only an estimated 6-9% of plastic is recycled globally. Even if every recyclable material were recovered - without cutting consumption - circularity would reach only around a quarter (Circle Economy / Deloitte, Circularity Gap Report 2025).

THE MEASUREMENT TRAP

Most public sustainability claims are **intensity** or **relative** figures (emissions per unit of revenue, per vehicle, per tonne) because they almost always improve as efficiency rises. **Absolute** figures - total tonnes emitted, total material consumed - frequently do not. A credible programme reports both. When only an intensity number is offered, assume the absolute number is unflattering.

04 THE REGULATORY MACHINE

What actually forces the industry to act

Voluntary virtue moves slowly; regulation moves capital. The decisive force in sustainability is the law - and 2026 marks a genuine turning point in Europe, in two opposite directions at once.

The reporting rulebook has just been rolled back. The EU's Omnibus I directive - Directive (EU) 2026/470 - was adopted on 24 February 2026 and entered into force on 18 March 2026. It sharply narrows the two flagship laws. As adopted in the 2026 revisions, the Corporate Sustainability Reporting Directive (CSRD) applies only to companies above 1,000 employees and EUR 450 million turnover, removing the large majority of previously in-scope firms; the Corporate Sustainability Due Diligence Directive (CSDDD) is cut to firms above 5,000 employees and EUR 1.5 billion turnover - an estimated 70% reduction in scope - with the mandatory climate-transition-plan requirement **removed** and implementation pushed to mid-2029. Exact thresholds and timing may still move in national transposition (CSRD/CSDDD only - CBAM, below, is directly applicable EU law) (Clifford Chance; DLA Piper; Council of the EU, 2026).

The pricing and border rulebook, meanwhile, has just been switched on. The Carbon Border Adjustment Mechanism (CBAM) left its reporting-only phase and entered its **definitive, financially binding** regime on 1 January 2026. Importers of steel, aluminium, cement, fertilisers, hydrogen and electricity must now hold authorised-declarant status and, from 2027, buy and surrender certificates priced to the EU carbon market - with the financial obligation phasing in gradually across the transition period to 2034 as free ETS allowances are withdrawn; scope expands to downstream goods from 2028 (European Commission; KPMG, 2026). This is the single most consequential sustainability instrument for industrial competitiveness, and Section 07 treats it as such.

Instrument	Status / key date	What it compels
CBAM (carbon border)	Definitive phase from 1 Jan 2026	Carbon cost on imported steel, aluminium, cement, etc.
EU CSRD (reporting)	Narrowed by Omnibus I, applies FY2027	Audited sustainability disclosure for large firms
EU CSDDD (due diligence)	Cut ~70% in scope; from mid-2029	Supply-chain human-rights & environmental checks
ECGT (green claims)	Applies EU-wide 27 Sep 2026	Bans generic “eco” & offset-based “neutral” claims
ESPR / Digital Product Passport	Battery passport from 18 Feb 2027	Component-level product data & traceability
EU Critical Raw Materials Act	In force; 2030 targets	Domestic extraction, processing & recycling quotas
China national ETS	Expanding to steel/cement/aluminium 2025	Carbon price across heavy industry, all sectors 2027

The pattern is clear. Europe is **de-emphasising disclosure** (too costly, too complex, a drag on competitiveness per the Draghi and Letta reviews) while **intensifying the instruments with teeth** - a carbon border, product-level traceability and raw-material quotas. The United States, by contrast, has largely retreated from federal climate disclosure, leaving a patchwork led by California. The centre of gravity for mandatory action is now the EU border and Asian industrial policy, not the American boardroom.

That divergence is itself the headline political risk, and it cuts against the assumption that regulation only ever tightens. The US has rolled back federal climate disclosure amid a sustained anti-ESG backlash; Europe's Omnibus simplification is part of a broader, competitiveness-first deregulatory turn; and several voluntary alliances - the Net Zero Banking Alliance among them - have fractured. The ratchet can loosen, and has. Any strategy built purely on ever-stricter rules is exposed; the durable case for action rests on cost, supply security and customer demand, not on regulation alone.

WHY THIS MATTERS FOR NON-EU SUPPLIERS

Scope follows the value chain, not the head office. A Swiss, US or Asian manufacturer selling steel or aluminium into Europe is exposed to CBAM regardless of where it is based; a battery sold into the EU will need a Digital Product Passport from February 2027. Regulation reaches you through your largest customers' procurement rules even when it does not name your company.

05 GREENWASHING

The vocal majority and the credibility crisis

Companies are loud on programmes and quiet on results, and this is now measurable rather than a matter of opinion. The European Commission's own assessment found that **over half of all environmental claims** examined were vague, misleading or unsubstantiated. That single regulator finding is the empirical core of the greenwashing problem.

The favoured tool for converting a claim into a headline - the carbon offset - is where the evidence is most damning. A meta-analysis covering nearly one billion tonnes of credits (about a fifth of all ever issued) found that, **in the project categories studied, fewer than 16%** represented real, additional emissions reductions (Probst et al., 2024). One widely cited study of the 20 largest corporate offset buyers - oil majors, airlines, carmakers, logistics firms - found **87%** of their retired credits carried a high risk of not being real or additional (Trencher et al., Nature Communications, 2024); it is one study rather than settled consensus, but it points the same way as the wider literature.

Some forest-credit schemes (notably REDD+) over-issued at ratios as high as 13 to 1. Some reviewers now argue offsetting has “largely failed” over 25 years and that most credits should be phased out in favour of direct cuts and high-integrity removal (academic review, Oct 2025).

THE CLAIM (marketing)	THE REALITY (evidence)
“We are carbon neutral.” “Climate-positive products.” “Fully circular supply chain.” “Net zero by 2050.” Usually unaudited, intensity-based, and reliant on purchased offsets to close the gap.	Under 16% of studied offsets are real reductions. Circularity is 6.9% and falling. A growing number of firms - incl. Microsoft, Unilever, P&G;, Walmart - have dropped or paused SBTi net-zero commitments since 2024. Most 2050 pledges have no audited near-term delivery.

The accountability infrastructure is, however, tightening in response. The Science Based Targets initiative (SBTi) ended 2025 with nearly 9,800 companies holding independently **validated** targets, up about 40% year-on-year, and is moving its standard to Version 2.0 to reward measurable near-term delivery over distant ambition. At the same time it logged the high-profile dropouts above, citing Scope 3 uncertainty and feasibility. From 27 September 2026 the EU's Empowering Consumers directive (ECGT) will ban generic “eco-friendly” wording and offset-based “climate neutral” product labels outright, with national fines that in the UK can reach 10% of worldwide turnover.

THE GREENHUSHING RISK

As enforcement bites, a second failure mode appears: firms going silent rather than substantiating. The strategic answer is neither loud claims nor silence but **provable specificity** - fewer, audited, absolute numbers tied to a validated target. In a market where most claims are now discounted by buyers and regulators, verified data is a differentiator, not a cost.

06 SECTOR DEEP DIVE

Where the emissions and the leverage actually sit

Sustainability is not uniform across industry. The size of the problem, the availability of a technical fix, and the regulatory exposure differ sharply by sector. The table below is the one-page strategic map.

Sector	Footprint & where it sits	Has a clean tech fix?	Main regulatory lever
Automotive	~15-20% of global GHG (boundary-dependent); mostly use-phase	Yes - electrification	CO2 standards, CBAM on steel/aluminium
Chemicals	Energy- & feedstock-intensive; high Scope 1-2	Partial - electrify, bio/recycled feedstock	CBAM, EU ETS, REACH, energy prices
Food & Agriculture	~a third of global GHG (~16 Gt CO2e)	No clear fix - biological emissions	FLAG targets, deforestation rules
Cosmetics / consumer	Lower direct; packaging & ingredients	Partial - reformulation, refill	Microplastics, packaging EPR, claims rules
Electronics / ICT	Materials-intensive; rising data-centre load	Efficiency + clean power	ESPR / DPP, e-waste rules, CRMA

Automotive is the clearest case of a sector whose footprint is dominated by what happens **after** the product leaves the factory. The vast majority of an automaker's emissions are use-phase - customers driving - which is why electrification is the lever and why Scope 3, not Scope 1-2, is the real battleground. Battery-electric vehicles carry roughly double the **manufacturing** carbon of a combustion car because of the battery, but on the EU grid their

lifecycle emissions are far lower; on renewable power the ICCT (2025) puts a BEV at about 52 g CO2/km, some 78% below a petrol car. Yet the 2025 Corporate Climate Responsibility Monitor found that, Stellantis aside, no assessed major automaker had meaningfully improved the ambition or integrity of its targets - a textbook claim-versus-delivery gap.

Food and agriculture is the sector to watch, because it is the hardest. The agrifood system accounts for roughly a third of all human-made greenhouse gases - about 16 Gt CO2e in 2022 (FAO) - and, unlike energy, it has **no drop-in technological substitute**. Livestock alone drives the majority of farm-gate emissions; enteric fermentation (cattle methane) is about 36% of the farm gate, and global meat production rose 60% from 2000 to 2023, with poultry doubling. China is the single largest agricultural emitter, exceeding all of Europe on a CO2-equivalent basis (including methane and nitrous oxide). Decarbonising food means changing diets, land use and fertiliser chemistry - levers that are social and political, not just engineering. The highest-leverage abatement levers - methane management in livestock, precision and low-emission fertiliser use to curb nitrous oxide, and cutting food loss and waste - are real but incremental, with no single technological substitute. This is where credible programmes and honest communication are scarcest, and therefore where editorial authority is most valuable.

Chemicals - IMP's core territory - sits at the centre of the industrial transition as both emitter and enabler: it supplies the catalysts, recycled feedstocks and lightweight materials the other sectors need to decarbonise. Its own footprint is dominated by energy and feedstock cost, which is why the credible abatement levers are specific and capital-heavy: electrifying steam crackers, switching ammonia to green hydrogen, chemical (feedstock) recycling, and mass-balance accounting for recycled content. The decisive external lever is CBAM - as the border mechanism extends toward organic chemicals (expected 2027-2028), the economics shift against coal-powered Asian production and toward lower-carbon European and Gulf routes, a structural tailwind for producers that can document a clean feedstock and energy mix. **Cosmetics and consumer goods** carry lower direct emissions but high reputational and claims exposure: packaging extended-producer-responsibility rules, microplastics restrictions and the incoming ban on unsubstantiated “natural” and “climate-neutral” labels make this a communications-risk sector first and an emissions sector second.

07 EUROPE, THE US AND ASIA

The competitiveness question - with data, not assumption

The central strategic doubt - what does it help Europe or the US to decarbonise at high cost if Asia produces far more cheaply to lower standards? - deserves a data-led answer rather than a reflex. The data complicate the assumption in three ways.

First, China is not the laggard the framing assumes - it is decarbonising its grid faster than anyone, because it dominates the manufacture of the clean technology. In 2025 China's energy and industry CO2 emissions were reported to be **roughly flat to slightly down** - around 0.3% lower on some estimates - even as energy consumption kept growing by several percent, the first time clean generation rather than weak growth appears to have driven the change (official statistics; Carbon Brief / CREA, 2025). Renewables supplied close to 40% of its power generation; solar capacity passed 1 terawatt; it hit its 2030 wind-and-solar target six years early; and it builds roughly 70% of the world's EVs. China accounted for well over half of the USD 2.1 trillion spent globally on the energy transition in 2024 (BloombergNEF). Cement process emissions have fallen 27% since their 2021 peak.

Second, the picture is genuinely mixed, not triumphal. Coal still supplies over 60% of Chinese electricity; China remains the world's largest coal producer, consumer and overall emitter; and it is set to miss its own carbon-intensity target (about 12% achieved against an 18% goal). Its 2035 pledge - to cut emissions 7-10% below a still-undefined peak - is modest. The honest reading is that China is industrialising the transition for commercial advantage, with environmental gains as a by-product, and that its standards are rising, not static.

Third, this is precisely why Europe built CBAM. A carbon border adjustment is the explicit answer to the cost-and-standards gap: it puts a carbon price on carbon-intensive imports equivalent to what EU producers pay, so a cleaner-but-dearer European tonne of steel is not simply undercut by a dirtier imported one. When fully phased in, CBAM is designed to cover more than half the emissions in the sectors under the EU carbon market. It converts Europe's higher standard from a pure cost disadvantage into a tariff-like shield - and, by design, an incentive for exporters to clean up.

THE COMMON ASSUMPTION	WHAT THE DATA SHOW
Europe and the US decarbonise at high cost; Asia undercuts them with cheap, dirty production; the net global effect is zero or negative, and Western effort is self-harm.	China's 2025 emissions were roughly flat to slightly down while output rose; it leads clean-tech manufacturing and deployment. The gap is being closed by Asian industrial policy and by CBAM, which prices the carbon difference at the EU border.

THE RESOURCE-NATIONALISM COUNTER-RISK [PARTLY FLAGGED]

The mirror image of clean-tech dominance is supply leverage. China controls an estimated 85-95% of rare-earth processing (depending on the stage) and imposed two waves of export controls in April and October 2025. The EU's response - the Critical Raw Materials Act (recycle 25%, process 40%, extract 10% of needs by 2030; no single supplier above 65%) plus the RESourceEU stockpiling plan - is real but, on most analysts' assessment, **unlikely to be met on schedule [Flagged]**. Sustainability and security have merged into one agenda.

08 CIRCULAR MANUFACTURING & URBAN MINING

Closed-loop supply chains as the next infrastructure

If Sections 03-07 are the diagnosis, this is the most investable part of the cure - and the deep dive this brief calls for. The thesis is straightforward: as primary raw materials become geopolitically contested and carbon-priced, the cheapest and most secure source of critical materials is the stock already circulating in finished products. Mining the city, not the ground.

The scale is documented. The UN's Global E-waste Monitor 2024 records 62 million tonnes of electronic waste generated in 2022 - up 82% since 2010, rising to a projected 82 million tonnes by 2030. The metals embedded in that waste were worth about **USD 91 billion** (including USD 19bn of copper, USD 15bn of gold, USD 16bn of iron), yet only about USD 28 billion of secondary material was actually recovered, and only 22.3% of e-waste was formally collected and recycled - a rate projected to **fall** to 20% by 2030 as generation outpaces capacity. Formal recycling that does happen already avoided around 900 million tonnes of primary ore extraction and 93 million tonnes of CO2-equivalent. Raising formal collection from today's ~22% toward the 60% the UN judges achievable by 2030 could roughly double recovered metal value - on the order of an extra USD 30-40 billion a year [Flagged: illustrative, scaled from UN figures].

USD 91bn
Value of metals in 2022 e-waste; only ~USD 28bn recovered (UN Global E-waste Monitor 2024)

22.3% → 20%
E-waste formally recycled now, projected to fall by 2030 (UNITAR / ITU)

~1%
Share of rare-earth demand met by recycling today (UN Global E-waste Monitor)

Three engineering pillars turn this from waste management into a supply strategy:

— **Component-level tracking.** The EU's Ecodesign for Sustainable Products Regulation (ESPR, in force since 2024) introduces the **Digital Product Passport** - a QR/NFC-linked record of a product's materials, carbon footprint, recycled content and end-of-life handling, built on GS1, JSON-LD and a three-tier access model. On the current timeline the mandatory **Battery Passport** arrives 18 February 2027 for EV and industrial batteries above 2 kWh; textiles, electronics, furniture, steel and aluminium follow to 2030. This is the data layer without which closed loops cannot be audited or automated.

— **Advanced recycling automation.** AI-guided sorting, robotic disassembly and chemical/advanced recycling (e.g. Honeywell's 2025 broader-plastics process) raise the yield and purity of recovered feedstock - the difference between downcycling and genuine material substitution.

— **Critical-raw-material recovery.** Recovering rare-earth magnets, lithium, cobalt and copper from end-of-life products directly counters resource nationalism. The EU's 25%-from-recycling target by 2030 and its 2026 restriction on exporting rare-earth waste and battery black mass are the policy scaffolding around exactly this.

The strategic point for any industrial board is that circular manufacturing is no longer an environmental nice-to-have; it is becoming **supply-chain insurance and Scope 3 reduction in one instrument**. Tracking material at component level both satisfies tightening eco-regulation and hedges against the next export-control shock. The gap between the documented opportunity (USD 91bn unrecovered, falling collection rates) and the policy ambition is the investment thesis.

> *The cheapest critical-materials mine in Europe is the pile of products it has already sold. The barrier is not geology - it is collection, tracking and automation.*

09 THE COST

What all of this actually costs

Sustainability has two distinct cost lines that are routinely confused: the cost of **proving** it (reporting and compliance) and the cost of **doing** it (the transition itself). Both are large; they are not the same money.

On **reporting**, EFRAG's impact assessment estimated that first-time CSRD compliance would cost large EU companies about EUR 1.7 billion in initial set-up and EUR 1.9 billion a year recurring, plus up to EUR 4 billion a year in external assurance. At company level, a majority expect to spend over EUR 100,000 a year, with large firms facing roughly EUR 287,000 in one-off set-up (EFRAG; Novata; Position Green, 2025). This administrative burden - 84 reporting requirements and over 1,100 data points - is exactly what the 2026 Omnibus rollback was designed to cut. The lesson is that disclosure cost, untethered from real-world abatement, becomes politically and commercially unsustainable.

On **doing**, the gap is the headline. Energy-transition investment ran at about USD 2.1 trillion in 2024. A net-zero-by-2050 pathway requires roughly **USD 5.6 trillion a year** this decade - an annual shortfall of about USD 3.5 trillion, or close to 170% above current spend (BloombergNEF). The world is, in round terms, investing less than 40% of what its own stated targets require. That single ratio explains why emissions still rise even as the technology gets cheaper.

Cost line	Order of magnitude	Note
CSRD set-up (large EU firm)	~EUR 287,000 one-off	Plus EUR 100k+/yr recurring for most
EU-wide CSRD admin (large cos.)	~EUR 1.7bn + EUR 1.9bn/yr	EFRAG impact assessment; assurance up to EUR 4bn/yr
Transition investment today	~USD 2.1 trillion / yr	BloombergNEF, 2024 actual
Transition investment needed	~USD 5.6 trillion / yr	Net-zero-2050 pathway; ~USD 3.5tn gap

THE TIME DIMENSION - WHEN DOES THIS CONVERGE? [SCENARIO-DEPENDENT]

On current investment (under 40% of the net-zero requirement) the gap does not close this decade. Most mainstream outlooks (broadly the IEA's stated-policies view) see global emissions plateauing in the late 2020s rather than falling steeply, with any decisive turn dependent on transition investment roughly doubling. Convergence between pledge and delivery is therefore a **2030s question, not a 2020s one** - and contingent on capital, not on further reporting. **[Flagged: scenario-dependent]**

THE ALLOCATION QUESTION

Every euro spent documenting a marginal data point is a euro not spent on abatement. The single most useful reform a board or a regulator can make is to shift the ratio of **spend-on-proof** to **spend-on-progress** - fewer, materially relevant disclosures; more deployed capital. That is the rationale behind both Europe's Omnibus simplification and the SBTi's pivot to near-term delivery.

10 THE PATH FORWARD

What needs doing - the steps, the cost, and what AI can do

The audit's conclusion is not that sustainability is a fraud - the regulation has teeth, the technology works, the curve is bending. It is that the **effort is mis-weighted**: too much on claiming and reporting, too little on measurable abatement, and the cheapest high-leverage moves are under-funded. Five steps follow directly from the evidence in this paper.

— **Report absolutes, not just intensities.** Publish total tonnes and total material use alongside per-unit figures, against an externally validated (e.g. SBTi) near-term target. Provable specificity beats both loud claims and greenhushing.

— **Cut before you offset.** With under 16% of studied credits delivering real reductions, prioritise in-value-chain abatement (“insetting”) and reserve high-integrity removal only for genuine residual emissions. From September 2026 the EU bans offset-based “neutral” claims regardless.

— **Treat circularity as supply security.** Build component-level tracking (Digital Product Passport) and recovery now; it satisfies eco-regulation and hedges resource-nationalism risk in one move.

— **Design for the border, not just the brochure.** For traded industrial goods, CBAM and product passports - not voluntary pledges - now set the economics. Decarbonise the embedded carbon that the border will price.

— **Move the spend ratio from proof to progress.** Close the ~USD 3.5 trillion/yr investment gap by redirecting compliance overhead and offset budgets into deployed abatement.

What can AI do? Two honest halves, again. AI is itself a growing energy draw: the IEA's base case projects global data-centre electricity use roughly doubling this decade - from about 415 TWh in 2024 toward 945 TWh by 2030, with its scenarios spanning a wider band - growing around 15% a year. But context matters: even toward the upper end that is still under 3% of global electricity, less than the demand growth from electric vehicles or air conditioning, and data centres remain under 1% of global CO2. The rebound risk is real: Google cut its data-centre emissions intensity 12% in 2024 while absolute consumption rose 27% and total emissions climbed 51% since 2019.

Set against that modest direct footprint is large enabling leverage. AI's measurable value to sustainability is in the unglamorous middle of the value chain: optimising grids and industrial processes for energy efficiency; powering the component-level tracking and supplier-data plumbing that Scope 3 and the Digital Product Passport require; driving the sorting and disassembly automation that lifts urban-mining recovery rates; and discovering lower-carbon materials and catalysts. The IEA judges that AI's emissions could be more than offset if it is deliberately deployed to cut emissions elsewhere. The operative word is **deliberately** - the leverage is real only if it is aimed at abatement rather than left to accrue as load.

> *AI will not make a company sustainable. Pointed at the right problems - efficiency, traceability, recovery - it can make the difference between a claim and a number.*

The verdict of this audit is therefore practical, not cynical. The sustainability economy is real, large and increasingly compulsory. Its weakness is not ambition but evidence and allocation. The firms - and the editors - that win the next decade will be those that replace the vocabulary of sustainability with its arithmetic.

— SOURCES & NOTES

Method, attributions and flagged figures

This paper synthesises public data current to June 2026. Inline attributions identify the source of each material figure. Market-sizing figures from commercial research houses (ESG AUM, circular-economy and ESG-software market sizes) vary by methodology and are presented as order-of-magnitude. Several figures are deliberately framed as ranges or estimates: offset-integrity findings (Probst; Trencher) reflect the project categories studied and, in the Trencher case, a single study consistent with the wider literature; China's 2025 emissions figures are early estimates subject to revision; and EU regulatory thresholds and timelines reflect the 2026 revisions and may shift in national transposition. Figures marked **[Flagged]** - including the profit-margin comparison, the assessment that EU Critical Raw Materials Act 2030 targets are unlikely to be met on schedule, and the convergence-timing note - are analyst judgement, not settled fact.

Principal sources. Global Carbon Project / Global Carbon Budget 2025 (emissions, carbon budget). Circle Economy & Deloitte, Circularity Gap Report 2025 (circularity rate, material use). UN / UNITAR & ITU, Global E-waste Monitor 2024 (e-waste value, recovery, urban mining). European Commission, Council of the EU, Clifford Chance, DLA Piper, KPMG, PwC (Omnibus I / Directive (EU) 2026/470; CBAM definitive phase; ECGT; ESPR / Digital Product Passport). European Parliament / EPRS and Merics (rare-earth export controls; Critical Raw Materials Act). FAO Statistical Yearbook 2025 and EDGAR-FOOD (agrifood emissions). S&P; Global Mobility, ICCT (2025), Bain, NewClimate Institute Corporate Climate Responsibility Monitor 2025 (automotive). Probst et al. (2024) and Trencher et al., Nature Communications (2024) (carbon-offset integrity). Science Based Targets initiative (validated targets, dropouts, V2.0). BloombergNEF (transition investment and gap). EFRAG, Novata, Position Green (CSRD compliance cost). IEA, Energy and AI (2025) and Carbon Brief (data-centre demand and emissions). Fortune Business Insights, Precedence Research, Custom Market Insights, Verdantix (market sizing).

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