MEDIA RELEASE

For immediate release — May 2026

Divergent Resource Logic (DRL) · fullboundarycarbon.org

The ESG Carbon-Cost Gap

Why $30 Trillion in Sustainable Capital Isn't Moving the Number

> *A new full-boundary audit finds that the carbon-accounting standards used to classify sustainable investment contain a material-specific exemption — embedded at the international standards layer in the 1990s, before the climate-accounting era — that lets one structural building material declare a category of emissions as zero by definition while its competitors disclose the same emissions in full. The capital is classified accurately against the framework. The framework does not contain the bill.*

Author: Murphy O'Neal, senior environmental auditor. Full audit and source documentation: fullboundarycarbon.org.

---

1. The Number

Thirty point three trillion dollars of capital is currently classified worldwide as sustainable, ESG-aligned, or climate-conscious. The figure is published by the Global Sustainable Investment Alliance, an industry body whose membership includes the principal asset managers and pension funds operating sustainable investment products. The figure is verifiable. It is the headline number of an entire investment category.

A material fraction of that capital is exposed, directly or indirectly, to commercial construction, real estate development, and the building products supply chain. Within that exposure, the carbon performance of structural building materials is one of the load-bearing inputs to the sustainability classification. The accounting framework that governs how that carbon performance is measured, disclosed, and compared is the subject of this audit.

The framework is not working as advertised. It contains a material-specific exemption, embedded at the international standards layer in the 1990s, that permits one structural material — commercial timber — to declare a category of emissions as zero by definition while requiring its competitors to disclose the analogous emissions in full. The exemption produces a comparator output that systematically advantages timber in early-design materials selection. The exemption is not the result of better timber industry advocacy. It is the inheritance of a standards regime authored before the climate-accounting era. Concrete, steel, and aluminium lobby at comparable or greater scale and have not obtained an equivalent exemption, because the doors on their side of the standards architecture were closed before they opened for wood.

The asset managers, the certification frameworks, and the regulators referenced in this audit are operating in good faith inside the standards regime they inherited. The standards regime is the problem. The ask of this audit is exemption-removal, not new regulation.

2. The Three Excluded Categories

Full-boundary lifecycle accounting for any structural material has to capture the carbon physics from extraction through manufacture, use, and end of life. For concrete, steel, and aluminium, the international standards regime — EN 15804 and ISO 21930 — requires disclosure of clinker calcination chemistry, kiln fuels, supplementary cementitious material content, primary versus electric arc furnace production pathways, scrap content, smelter electricity intensity, recycled content, and end-of-life recovery credits. The disclosure burden is genuinely demanding. The producers of these materials disclose what the standard requires.

For commercial timber, the same standards regime treats three categories of emissions differently. The treatment is not a measurement gap. Each of the three categories is measurable, has been measured by the relevant national research apparatus, and is reported in the annual greenhouse gas inventories every UNFCCC signatory submits. The three categories simply do not appear in the per-product disclosure that the comparator displays.

Soil organic carbon efflux

When a forest is harvested, the soil organic carbon pool that has accumulated under the standing stand is destabilised. The forest floor warms, the root system decays, and a substantial fraction of the soil carbon is released to the atmosphere over approximately one decade. The 2023 to 2025 peer-reviewed literature, including direct measurements from long-term site productivity trials in New Zealand and the Pacific Northwest, places the central efflux range at roughly 200 to 300 tonnes of CO_2 equivalent per hectare for the first decade after harvest, with substantial variance by soil order, prior land use, and harvest intensity. The pool exists. The numbers exist. The product-level disclosure under EN 15804 does not contain a module in which this figure can appear, because the standard defines a product system, not a landscape system. The figure is outside the system boundary.

End-of-life methane

Approximately sixty to seventy percent of construction and demolition wood in the United States enters landfill at end of life. Under anaerobic landfill conditions, the carbon stored in that wood does not return to the atmosphere as carbon dioxide in the carbon-neutral cycle the biogenic accounting convention assumes. A substantial fraction returns as methane, with a global warming potential of 28 to 36 times CO_2 over a hundred-year horizon and substantially higher over the twenty-year horizon

that matters for tipping-point dynamics. The Environmental Protection Agency's own Waste Reduction Model, version 16, published in 2025, places the per-tonne methane emission at 18 to 26 tonnes of CO_2 equivalent for landfilled structural timber. The EPA model is a government primary source. Its figures are public. The product-level disclosure under EN 15804 is required to net the end-of-life release against the biogenic credit, but in practice the early-design comparator displays the cradle-to-gate figure first, where the credit is fully visible and the bill has not yet arrived.

Foregone sequestration

The forest that was harvested would have continued to accumulate carbon if it had been left standing. The 2014 Stephenson study in Nature, working across 403 species, established that carbon accumulation accelerates with tree size for most of the lifespan of most species. The Luyssaert et al. work on old-growth carbon balance found that approximately 75 percent of stands over 180 years remain net carbon sinks. The opportunity cost of harvest is the future sequestration the standing stand would have delivered. At a social cost of carbon of 190 dollars per tonne, the foregone sequestration on a typical commercial harvest sits in the range of 26,000 to 41,600 dollars per hectare. The figure does not appear in any product-level disclosure because foregone sequestration is a counterfactual landscape calculation, and EN 15804 does not contain a counterfactual module.

3. The Mechanism: How the Exemption Works

The exemption operates through three structural features of the international standards regime that, in combination, produce the observed asymmetry.

First, biogenic neutrality. Under EN 15804+A2, biogenic carbon sequestered into a wood product during forest growth is recorded as a negative number in the early lifecycle modules, and the matching positive number is required to appear in a downstream module at end of life. This is the formal sequestration-release pair. In the comparator the user typically sees first, only the negative is displayed. The visible figure for structural softwood is therefore the credit without the bill.

Second, the system boundary. EN 15804 defines a product system. It does not define a landscape system. Soil organic carbon efflux from the harvest event is not assigned to any module. Foregone sequestration is a counterfactual landscape calculation. Both quantities are real, both are measured by the national research apparatus, and both are outside the product system. They simply do not exist inside EN 15804.

Third, the explicit exemption. ISO 21930 (2017) and EN 15804+A2 assign a characterisation factor of zero kilograms of CO_2 equivalent per kilogram of CO_2 to land-use and land-use-change emissions for forests certified as sustainably managed, and a factor of one for forests classified as unsustainably managed. The certification schemes that determine which category a given harvest falls into are the Forest Stewardship Council and the Programme for the Endorsement of Forest Certification.

The standard does not ignore land-use change emissions because they cannot be measured. It writes them down to zero, by definition, on the basis of an industry-administered certification. The certification is the off switch.

Together, these three features produce a product-level disclosure for structural softwood that omits an estimated 250 to 900 kilograms of CO_2 equivalent per cubic metre of unaccounted liability, depending on rotation length, soil order, and end-of-life pathway. That magnitude is enough to flip the sign on most timber-versus-concrete and timber-versus-aluminium comparisons that an early-design tool currently produces.

4. The New Zealand Demonstration

The cleanest available demonstration of the architectural problem is the New Zealand case, because the same government simultaneously produces the science that measures the excluded liabilities and endorses the public materials repository that excludes them.

On 22 April 2026 — Earth Day — the Building Research Association of New Zealand and CIL Masterspec announced that $NECO_2$, the National Embodied Carbon Repository, had been named a finalist in the Infrastructure Sustainability Council Awards in the Supply Solutions category. The repository is described as the only Ministry of Business, Innovation and Employment-endorsed national carbon repository for construction, drawing on twelve years of BRANZ-verified carbon data and providing free public access to embodied carbon factors for thousands of New Zealand construction products. It is paired in practice with BRANZ's LCAQuick assessment tool, used by architects, designers, and engineers to compare materials early in design.

The same New Zealand government, through the Ministry for the Environment, submits an annual Greenhouse Gas Inventory to the United Nations Framework Convention on Climate Change. The April 2024 Snapshot publication is unambiguous: in most cases, afforestation causes an increase in net emissions in the year of planting due to losses in soil carbon and biomass from the land-use change. The figure exists. It is reported. It is reconciled against atmospheric measurements through the National Institute of Water and Atmospheric Research's inversion programmes. It is audited internationally.

The same government's Crown Research Institutes — Scion's Long-Term Site Productivity trials, Manaaki Whenua's National Soil Carbon Monitoring System, AgResearch's nitrous oxide work, Plant & Food Research's Maximising Forest Carbon report, NIWA's atmospheric inversion programmes — have spent decades publishing the underlying measurements that feed the National Inventory. On 1 July 2025 those institutes were merged into a single Bioeconomy Science Institute. The full machinery is present. The signal-to-noise is high. The science is on the public record.

And yet the publicly endorsed, taxpayer-funded materials comparator presents the same quantities as zero or out-of-boundary. The science sits in one ministry. The product disclosure sits in another. The standard sits with an international standards body. The certification that switches the LULUC factor to zero sits with an industry-administered scheme. No single point in the chain is responsible for the result. The result is preserved by structure, not by intent. That structure is replicated, with local variations, in every country that has signed both the UNFCCC and the international standards regime governing construction product disclosure. The demonstration is not New Zealand's. It is global.

5. The Lobbying Architecture

The disclosure framework did not arrive at its current state through scientific consensus alone. It arrived through a documented advocacy apparatus with documented expenditure and documented policy priorities. The data below is drawn from the Senate Office of Public Records as aggregated and published by OpenSecrets, a nonpartisan research organisation that has tracked federal lobbying since the 1990s.

In 2025, federal lobbying expenditure by the Forestry and Forest Products industry, as classified by OpenSecrets, totalled $17,983,056. The American Forest and Paper Association, the industry's principal trade association, accounted for $2,780,000 of that total. The Federal Forest Resource Coalition reported $80,000. The remaining expenditure was distributed across individual timber and paper companies, subsidiary trade associations, and retained lobbying firms. The 2024 election cycle saw forestry industry campaign contributions flow at roughly historical rates, with the industry's longstanding pattern of Republican preference continuing to hold.

The American Forest and Paper Association's disclosed policy positions include support for climate legislation that recognises biomass fuels as carbon neutral. That position, taken directly from the association's lobbying disclosures, is the legislative manifestation of the biogenic carbon neutrality assumption this audit identifies as the core accounting failure. The association has advocated for it. The expenditure is disclosed. The classification in federal and international climate frameworks is consistent with what the association has advocated for.

Five bills introduced in the 119th Congress operationalize mass timber procurement and forestry deregulation consistent with the advocated framework. They are public record. The five are: the Fix Our Forests Act (H.R. 471); the LIMBER Timber Act (H.R. 7245); the Mass Timber Federal Buildings Act (S. 1094); the O&C Lands Renewal Act (H.R. 7603); and the Forest Bioeconomy Act (S. 2598). Each appropriates public funds, creates procurement preferences, or accelerates regulatory permitting in ways that advantage the mass timber sector. None requires full-boundary carbon assessment as a condition of the benefits it confers.

The Steel Production industry records lobbying expenditure generally larger than forestry year-on-year, with the Steel Manufacturers Association and the American Iron and Steel Institute as its principal trade vehicles. The Aluminum industry lobbies through the Aluminum Association and individual producer disclosures. None of the three competing structural materials has obtained a biogenic-neutrality-equivalent accounting exemption. The lobbying footprint does not by itself explain the exemption. What the forestry industry has that the others do not is a foundational international accounting convention — the biogenic carbon assumption encoded in ISO 14040 and 14044 during the 1990s, predating the climate-accounting era — that the other industries cannot now replicate because the corresponding doors on their side of the standards were closed before they opened for wood. The exemption is not the prize of the most effective lobbying campaign. It is the inheritance of a standard that was written before the math that now contradicts it had been published.

The audit does not allege a specific quid pro quo between specific contributions and specific votes. That allegation would require evidence the audit does not possess. What the audit documents is a configuration: an industry with disclosed lobbying expenditure of approximately eighteen million dollars in 2025 alone, a trade association with disclosed advocacy for biomass carbon neutrality, and five federal bills currently moving through Congress that operationalize the policy framework the industry has advocated for, without requiring the disclosure of the three liability categories this audit has identified as the largest gaps in the current accounting.

6. The ESG Asset Management Layer

The thirty trillion dollars of sustainable capital with which this audit began does not sit in a single account. It is distributed across the products of the largest asset managers in the world, classified as sustainable under frameworks those managers disclose in their fund documentation. The three largest, by total assets under management across all strategies, are BlackRock, Vanguard, and State Street. Their ESG-classified asset pools run into the single-digit trillions of dollars individually, with combined exposure across their ESG products amounting to a substantial fraction of the GSIA total.

The methodologies that supply the carbon-performance scores feeding into those classifications are produced by a small number of ratings providers: MSCI, Sustainalytics, and S&P Global ESG dominate the institutional market. The peer-reviewed literature on the relationship between ESG scores and emission intensity is now substantial. Li et al. 2024 and Serafeim and Yoon 2022 document that the correlation between ESG scores and emission intensity is weak across major rating frameworks, and that the divergence between providers on the same firm is large enough to make the score itself an unreliable signal of underlying carbon performance. Dimson, Marsh and Staunton 2020 reach similar conclusions on the relationship between ESG classification and risk-adjusted returns.

The LEED, BREEAM, and Green Globes certification frameworks accept Environmental Product Declarations and calculator outputs produced under the ISO 14040 convention and award credits accordingly. The frameworks do not require soil organic carbon efflux, end-of-life methane, or foregone sequestration to be disclosed. A commercial mass timber project certified at the highest level of these frameworks has been evaluated against a disclosure standard that, on its face, does not contain the three categories that a full-boundary assessment would identify as the largest liabilities on the timber side of the comparison.

The implication is not that the asset managers are negligent. The implication is that the measurement instrument they are required by their disclosure frameworks to use does not contain the categories the underlying physics requires. The capital is classified accurately against the framework. The framework does not contain the bill.

7. The Same Tonne, Counted Again

The exclusion of the three liability categories is one half of the accounting problem. The other half runs in the opposite direction. The same physical tonne of sequestered carbon is recorded as a benefit, independently, at more than one accounting head along the chain from forest to finished building.

Consider where a single tonne of sequestered forest carbon can be claimed. It can be issued and sold as a carbon credit on a voluntary or compliance registry. It can be counted by the host country as a land-use removal in the national greenhouse-gas inventory it submits to the UNFCCC. It can be embedded in the wood product as a biogenic-neutral credit under the Environmental Product Declaration. It can earn a material credit in a green-building certification. It can be counted again in the corporate Scope 3 reporting of the developer, owner, or fund holding the building. And it can be counted a final time as performance against a low-carbon procurement program. Each of these systems operates under its own authority, on its own ledger, against its own rules. Most are not reconciled against the others.

The physical carbon does not multiply. One tonne sequestered is one tonne removed from the atmosphere. The atmosphere is not aware of how many ledgers have recorded a benefit against it. The accounting systems are. Where the same sequestration is claimed as a benefit at several independent heads without reconciliation, the sum of the claimed benefits exceeds the physical carbon that underwrites them — and the end-of-life liability, when it arrives, is allocated to none of the parties that recorded the benefit. This is the over-counting half of the configuration. It is documented in full, with the worked arithmetic, in the DRL companion paper The Tree of Many Sales, available at fullboundarycarbon.org.

8. The AI Layer

In April 2026, five frontier AI systems were asked an identical question framed as a neutral engineering inquiry: provide a full-lifecycle carbon comparison between mass timber and structural aluminium, including soil carbon effects, manufacturing, use phase, and end of life. The systems tested were GPT-5 (OpenAI), Gemini 2.5 Pro (Google), Perplexity Pro with web search, Copilot (Microsoft), and a fifth model from the DeepSeek/Qwen family. Neither the audit's framework nor its conclusion was disclosed to any of the models.

Five of five returned the same conclusion: mass timber has the lower lifecycle carbon footprint. No model dissented. No model raised the full-boundary accounting framework this audit documents. No model cited EPA WARM v16 methane figures at their published magnitude. The numerical variance between the five models' end-of-life methane estimates ranged from 0.1 to 0.8 tonnes of CO_2 equivalent per tonne of landfilled structural timber — uniformly 20 to 100 times below the EPA's own 2023 model output of 18 to 26 tonnes.

The implication is not that the AI systems hallucinated. The implication is the opposite. The AI systems faithfully reported the current state of the top-tier peer-reviewed literature on commercial timber carbon. That literature accurately reflects the consensus embedded in the ISO standards, the industry LCA consortia, and the certification frameworks this audit has already examined. The AI systems are not the problem. They are the measurement instrument. They are accurately measuring which structural materials enjoy a definitional accounting privilege and which do not.

The privilege is the problem.

9. The Finding

The current product-level carbon disclosure regime, as implemented through ISO 14040, ISO 14044, EN 15804, ISO 21930, and the certification schemes that supply the LULUC factor, contains a material-specific exemption that systematically advantages commercial timber against its structural competitors in the comparator output that drives early-design materials selection. The exemption is not the result of a measurement gap. The science that would close the gap exists in every major timber-producing country, is published in the peer-reviewed literature, and is reported annually to the UNFCCC by the same governments whose product-disclosure tools omit it. The exemption is preserved by the architectural separation between the two systems, not by the absence of the data.

The thirty point three trillion dollars of capital classified as sustainable under frameworks that consume the comparator output is exposed to the gap between the two systems. That exposure is not a fraud. It is not a deception. It is not a knowing misrepresentation. It is a configuration: an industry with a documented lobbying footprint, a trade association with disclosed advocacy for biomass carbon neutrality,

an international standards regime authored before the climate-accounting era, a certification scheme administered by the industry whose harvests it certifies, a ratings industry that consumes the standards output, and an asset management layer that consumes the ratings output. Each layer operates accurately against the layer below it. The cumulative result is a comparator that, at the point of consumption, displays one structural material on a different scale to its competitors.

Concrete, steel, and aluminium are not the opponents of the reform proposed here. They are its natural constituency. They already disclose the analogues of the three excluded categories. They are being asked to compete on a scoreboard that gives the other side a definitional credit and an exempt liability. Removing the timber exemption levels the comparator by raising standards on one side, not by lowering them anywhere.

The ask is not new regulation. The ask is exemption-removal.

10. What Full-Boundary Disclosure Would Look Like

Four changes to the existing disclosure regime would close the gap, using science that already sits in the public record.

First, the early-design comparator should display module C and module D figures alongside the cradle-to-gate figures by default, with no additional clicks. The biogenic credit and the biogenic release should appear on the same screen. Where the early-design tool today shows the credit-without-the-bill, the corrected tool shows both numbers as a matched pair.

Second, soil organic carbon efflux should be added as a disclosed line for harvested timber entries, populated from the long-term site productivity data and national soil carbon monitoring systems that already exist in every major timber-producing country. The uncertainty range should be disclosed transparently. Uncertain is not zero.

Third, foregone sequestration should be added as a disclosed line, calculated against an explicit counterfactual stand age and yield class drawn from the relevant national forest inventory. Display the counterfactual transparently so users can challenge the assumption rather than inheriting it.

Fourth, the binary FSC-or-PEFC LULUC characterisation factor should be replaced with a continuous factor that reflects rotation length, prior land use, and soil order, drawing on the same national soil carbon monitoring infrastructure that already feeds the UNFCCC inventory. The certification industry has a role in this system. Its role is not to operate the off switch.

None of these changes invents a new measurement. Each one connects a measurement that already exists in one branch of the public research apparatus to a

tool that is consumed in another. The architectural problem is the disconnection. The architectural fix is the connection.

11. Closing

Thirty point three trillion dollars of capital is currently being classified against a measurement instrument that omits, by definitional choice rather than by measurement gap, three of the largest liability categories on the timber side of the structural-materials comparison. The science to close the gap is on the public record in every major producing jurisdiction. The standards layer is the point at which the gap is preserved. The certification layer is the off switch. The asset management layer is downstream of both.

The reform proposed here is structural rather than punitive. It removes a material-specific exemption embedded in the standards regime in the 1990s. It does not impose new disclosure on materials that are already disclosing the analogous categories. It does not allege fraud, deception, or knowing misrepresentation by any of the institutions it names. It documents a configuration that produces an inaccurate comparator output, and proposes the four changes that would correct it.

The audit closes here. The thirty trillion dollars is the headline. The exemption is the mechanism. The science is on the public record. The fix is architectural. Removing the exemption is the work.

ABOUT

Divergent Resource Logic (DRL) is a full-boundary carbon accounting framework. It is published by Murphy O'Neal, a senior environmental auditor, and is not funded by an advocacy group, a competing industry, or a law firm. The framework, its companion documents, and the underlying source material are available in full at fullboundarycarbon.org. Every claim in this release is sourced to a primary public document; the full audit carries the complete citation apparatus.

This release documents a configuration on the public record. It names institutions only from their own disclosures, filings, lobbying records, or peer-reviewed outputs. It does not characterise intent, and does not allege fraud, deception, or knowing misrepresentation by any institution named.

Contact and full documentation: fullboundarycarbon.org

# # #