

Governing CO2 Information: An Organisational and Data-Governance Model for Sustainable Procurement

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ABSTRACT

Companies now collect more information about the greenhouse gas emissions of what they buy than ever before, yet much of it never shapes a purchasing decision. This review examined why carbon information so often remains unused in procurement and proposed an organisational and data-governance model to close the gap. A doctoral analysis of information processes in sustainable procurement was synthesised with open-access research published between 2021 and 2026, covering data governance, data ecosystems, sustainable procurement and supply-chain carbon accounting. Carbon information emerged as a layered system in which data, digital systems, decision models and organisational structures depend on one another, so that a weakness in any layer disables the rest. Two layers that practice neglects most received closest attention. At the data-governance layer, reliability rested on clear ownership of each figure, harmonised calculation and verification standards, and reporting arranged to protect data quality. The organisational layer demanded more: a deliberate balance between central and local control, standing coordination among procurement, sustainability and technical functions, carbon indicators built into sourcing targets, and staff able to interpret

emissions figures. Evidence from public purchasing and from firm-level studies indicated that disciplined procurement governance measurably lowered emissions. The review concluded that the obstacle to acting on carbon information is organisational before it is technical, and that assigning responsibility and governance should precede further investment in measurement tools.

Keywords: carbon information governance, data governance, sustainable procurement, organisational design, data ownership, scope 3 emissions, supplier carbon data

INTRODUCTION

Most corporate climate impact is bought rather than made on site. For the majority of firms, the greenhouse gas emissions embedded in purchased goods and services form the largest part of the carbon footprint, which places procurement at the centre of any serious decarbonisation effort.^[1] Over the past decade companies have grown markedly better at measuring these emissions, and many now hold supplier carbon figures that did not exist a few years ago. The puzzle is that holding the data has not translated into using it. A systematic review of procurement-driven decarbonisation in construction found that emissions information frequently sits

unused in sourcing decisions, held back less by missing numbers than by the way organisations handle the numbers they already have.^[2]

The reason is organisational. Carbon data are generated in several places at once, in sustainability teams, in environmental controlling, at suppliers and on external platforms, while the decisions that should act on them are taken in procurement. When responsibility for collecting, checking and supplying these figures is not clearly assigned, the data rarely reach the buyer in usable form, a problem the corporate value chain accounting standard anticipates when it asks firms to define data-management responsibilities rather than leave them implicit.^[3] Firm-level evidence supports the link between structure and outcome. A study of governance and emission performance across large emerging-market firms found that the sustainability competence embedded in a board measurably improved emission results, the board-level effect reaching statistical significance, and that the quality of sustainability reporting strengthened this relationship.^[4] Governance is not a backdrop to carbon measurement but part of what makes the measurement count.

Procurement has the reach to act once the information flows. Public purchasing shows how strong that reach can be. Across 285 Chinese cities a one percent rise in green public procurement was associated with a 1.360 percent fall in local carbon emission intensity, and the effect crossed city boundaries, where a one percent local reduction coincided with a 14.510 percent decline in neighbouring cities.^[5] Reviews of government procurement describe it more broadly as a policy instrument able to steer whole industries toward lower-carbon production.^[6] Private procurement works through contracts rather than statute, yet the mechanism is the same. The buyer chooses, and the choice moves emissions.

This paper asks how procurement organisations should be structured so that carbon information is governed and used,

not merely collected. Building on the organisational and data-governance analysis in a doctoral study of carbon information in procurement, and on open-access research published between 2021 and 2026, it sets out a layered model that connects the data, the systems, the decisions and the organisation, then concentrates on the two layers that current practice neglects most, data governance and organisational design. The automotive value chain and wider manufacturing serve as the reference setting, because deep multi-tier supplier networks there meet some of the strongest reporting and customer demands for emissions transparency. The goal is a usable model that turns carbon data a firm already holds into dependable input for sourcing decisions.

CONCEPTUAL APPROACH

This is a conceptual review rather than an empirical study. Its argument was assembled by synthesising a doctoral analysis of information processes in sustainable procurement with current peer-reviewed work, and every cited source was obtained as an openly available publication. Two bodies of literature were combined. The first concerns data governance and data ecosystems, which supply the vocabulary of roles, ownership and shared infrastructure.^[7] The second concerns sustainable procurement and supply-chain carbon accounting, which supply the operational detail of how emissions data behave in practice. The model presented below is the point where the two meet. The choice to rely only on open-access sources was deliberate, since a model meant to be adopted by practitioners and by smaller suppliers should rest on evidence those readers can themselves obtain and check.

A LAYERED MODEL FOR GOVERNING CARBON INFORMATION

Carbon information does not become a decision in one step. It is collected, integrated, interpreted and finally embedded

in the way an organisation buys, and a weakness at any of these stages undermines the others. This sequence can be read as four connected layers, set out in Table 1. The data layer covers the origin and quality of emissions figures, the system layer the digital infrastructure that moves them, the decision layer the models that bring carbon into supplier choice, and the organisational layer the governance, roles and capabilities

that hold the rest together. Reading it as layers helps because the failure modes are not interchangeable. High-quality supplier data are wasted if no system carries them to the buyer, and a careful scoring model is idle if responsibility for feeding it is unassigned. Placing the organisation as the outer layer, rather than as an afterthought, follows the logic that governance is what converts information into action.

Table 1. A layered model for governing carbon information in procurement

Layer	What it covers	Governance focus
Data	Origin and quality of emissions figures, including primary and secondary data and product carbon footprints	Ownership of each figure, quality criteria, verification
System	Digital infrastructure that stores and moves carbon data across enterprise, supplier and sustainability systems and shared data spaces	Interoperability, access rules, preserved provenance
Decision	Models that bring carbon into supplier choice, such as total cost including carbon, multi-criteria scoring and carbon pricing	Decision rules, weighting, consistency
Organisational	Roles, structure, incentives and capabilities that hold the other layers together	Responsibilities, cross-functional coordination, carbon targets

The four layers are interdependent; a deficiency in any one weakens the use of carbon data in the others.

The decision layer is where the other three meet the buyer. The doctoral analysis behind this paper describes the established tools for it, among them total cost of ownership extended to include a carbon charge, multi-criteria scoring that places emissions alongside price and quality, and the use of an internal carbon price inside existing evaluation systems. These tools share a requirement that the earlier layers must satisfy. A carbon figure can be weighed against cost only if it is comparable, current and owned, which is why the decision layer rarely fails on its own. When buyers say that emissions data are too unreliable to use, the fault usually lies one or two layers below.

Recent information-systems research gives the two upper layers firmer ground. A systematic review of data ecosystems describes them as loose networks of actors that produce, consume and share data, and warns that the label is often stretched to repackage older ideas, a caution worth keeping when carbon platforms are marketed as novel.^[7] Work on data

governance in data spaces translates the idea into concrete building blocks, defining the requirements, principles, roles and responsibilities, and the data-quality and lifecycle controls that a shared data environment needs to function.^[8] Carbon data sharing is a special case of exactly this problem, which is why a governance model for carbon information can draw on the data-space literature rather than invent its own.

THE DATA-GOVERNANCE LAYER

The data-governance layer is where most carbon information fails quietly. A systematic analysis of data-governance frameworks shows that such frameworks are not generic templates but sets of components and assets that have to be matched to the field they serve, and that their value depends on how deliberately that matching is done.^[9] For carbon information the components are recognisable. Someone must own each figure, with a defined responsibility for collecting it, assuring its quality and keeping it current. Without that

ownership, data are present but not trusted, and a buyer cannot tell a maintained value from a stale one.^[8] The corporate accounting standard makes the same demand from the methodological side, asking firms to set rules for how emissions are calculated, what data quality is required and how figures are checked before use.^[3]

Roles give the layer its shape. Data-governance research distinguishes those who set policy from those who carry day-to-day responsibility for a dataset, the stewards who collect, validate and document it, and a workable scheme for carbon data names a steward for each material emission source rather than leaving the task to whoever last touched the figure.^[9] Quality has to be defined just as explicitly. The data-space work lists representativeness, completeness, security and lifecycle control among the properties a governed dataset must hold, and the same checklist applies to a supplier emission factor, which should state the technology, region and year it represents before a buyer relies on it.^[8]

Standards and policies turn these rules into routine. When methods are not harmonised, two suppliers can report different footprints for similar products simply because they drew their boundaries differently, so binding internal guidelines on calculation and verification are what make carbon figures comparable enough to rank.^[2] Reporting governance closes the loop. An analysis of sustainability data governance argued that accountability improves when firms reconfigure their reporting around managed sustainability data rather than treating disclosure as a year-end exercise, a change that turns reporting from an output into a control on data quality.^[10] None of these components is exotic. What is usually missing is the decision to assign and enforce them.

THE ORGANISATIONAL LAYER: STRUCTURE, INCENTIVES AND CAPABILITY

Above the data sits the question of structure. Procurement organisations rarely choose

between fully central and fully local control; they settle somewhere along a continuum, and carbon information sharpens the trade-off. A study of how data ecosystems are governed found that they tend to begin decentralised and drift toward more central coordination as they grow and as the need for consistency rises, while some hold their decentralised form through self-regulation and technology.^[11] The same tension appears inside a firm. Central control yields a single, comparable carbon dataset and one set of rules, while local control keeps procurement close to its supplier markets. A centre-led arrangement, which sets shared standards but leaves execution to category teams, captures much of both.

Structure works only with coordination across functions. Carbon data originate in sustainability and controlling, the systems belong to information technology, and the decisions rest with procurement, so without a standing mechanism to connect them the data stay trapped in the department that produced them. Cross-functional steering of carbon issues, where procurement, sustainability and information technology agree standards and reconcile cost against emissions, is what keeps the figures moving between these groups. The firm-level finding that board sustainability competence improves emission outcomes points the same way, since it shows that placing carbon expertise inside decision structures changes results rather than merely signalling intent.^[4] In practice this coordination is often vested in a standing committee and in dedicated sustainable-procurement roles that sit between the buying and sustainability teams, so that emissions questions have an owner in the room when contracts are decided.

What finally makes carbon data count is incentives and capability. As long as buyers are judged only on price and delivery, emissions stay optional, and embedding carbon indicators in procurement targets is what moves them from a reporting line into a decision criterion. Disclosure programmes report that outside pressure has accelerated

supplier engagement after years of slow movement, even as many companies remain behind their own commitments, which suggests that internal targets rather than goodwill sustain the effort.^[12] Capability matters as much as intent. Research on green supply-chain management connects organisational resources such as social responsibility practices and intellectual capital to stronger sustainability performance, a reminder that staff who can read and challenge a carbon figure are themselves part of the governance system.^[13] The supplier side needs structure too. An examination of sustainable supplier evaluation found that the criteria most firms apply do not yet meet environmental, social and governance reporting requirements, and rebuilt them so that suppliers are scored on verifiable sustainability data rather than declarations.^[14]

GOVERNANCE BEYOND THE FIRM BOUNDARY

Because most emissions sit upstream, governance cannot stop at the firm boundary. A buyer depends on suppliers for the figures it needs, and those figures lose their provenance each time they pass between incompatible systems. Automated, platform-based exchange of carbon data offers a way through, carrying values across organisational boundaries while preserving the record of where they came from and lowering the manual effort of collection.^[15] The gain is concrete. Where partners shared primary, supplier-specific data instead of industry averages, the resulting supply-chain emission estimates were sharper and rewarded genuine reduction.^[1] Governing that exchange, deciding who may see what, on what terms and to what standard, is the same data-space problem described earlier, now stretched across companies.^[8] Smaller suppliers are the binding constraint here, since many lack the systems to produce primary data at all, so a credible model pairs its data demands with support, shared tools and training that raise supplier capability rather than simply raising requirements. An

organisational model for carbon information is therefore incomplete unless it reaches at least one tier out, into the rules that two trading partners agree before they share a single number.

DISCUSSION

Across these layers one finding recurs. Whether carbon data change a purchasing decision depends less on the data and more on the organisation around them. Even the best measurement is wasted without owners to maintain it, standards to make it comparable, structures to move it, and incentives to act on it. The weakest of these four sets the outcome. This reframes a common assumption. Firms that answer slow decarbonisation by buying yet another carbon-accounting tool usually mistake a governance problem for a technical one. The layered model suggests a different order of work, fixing ownership and responsibility first, then standards, then the systems and decision models that the earlier layers make worthwhile. The sequence is not only logical but economical, since money spent on a sophisticated platform returns little while the figures it carries remain unowned and incomparable, whereas the cheaper governance steps of naming stewards and setting calculation rules draw usable value from data the firm already holds.

The implications differ by actor. For a procurement function, the practical step is to assign data ownership, embed a small number of carbon indicators in sourcing decisions, and create a cross-functional forum before investing further in software. For suppliers, the signal is that verifiable data and the capability to produce them now carry commercial value, since buyers increasingly score sustainability evidence rather than promises.^[14] Those who write standards and run platforms should put shared methods and governed exchange first, so that a figure produced once travels along a chain with its meaning intact.^{[2][15]} Public purchasing offers a benchmark, since its measurable effect on regional emissions shows what disciplined, rule-bound

procurement can achieve at scale.^[5] No buyer can wait for perfect data, so the realistic discipline is to weight supplier comparisons by the quality of the figures behind them and to require fuller documentation as a purchase grows in value and in emissions weight.

These conclusions carry limits. The model is conceptual, drawn from a doctoral analysis and from reviews and case studies rather than from large-scale measurement, so it organises existing knowledge more than it tests new claims. The reliance on openly available sources leaves aside parts of the standards and practitioner literature that sit behind paywalls, which may narrow the evidence base. An arrangement that fits a large manufacturer can demand more than a small supplier is able to bear, and the cross-country evidence cited here will not map onto every sector without adjustment. Quantifying how each governance component affects the actual use of carbon data in sourcing remains an open task for empirical work.

CONCLUSION

Carbon information is now abundant in many supply chains and still underused, and the gap is organisational before it is technical. This review set out a layered model in which data, systems, decisions and organisation depend on one another, and argued that the organisational layer, clear ownership, harmonised standards, cross-functional coordination, aligned incentives and the capability to use them, is what converts emissions data into sourcing decisions. The data-space and data-governance literature supplies the building blocks, the procurement and supply-chain evidence supplies the operational detail, and the doctoral analysis behind this paper joins the two. Firms that govern carbon information deliberately, rather than buying more tools to collect it, are the ones whose procurement will move emissions. Treating governance as the first task, not the last, is the practical message of this model.

Declaration by Authors

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