

Scope 3 Emissions: Measuring, Managing and Reducing Supply Chain Greenhouse Gas Emissions

Scope 3 emissions cover all greenhouse gas emissions generated indirectly along a company's value chain – both in upstream inputs and in the use and disposal of sold products. For manufacturing companies, they frequently account for by far the largest share of the emissions footprint. Buyers and supply chain managers play a key role here, as the majority of these emissions occur at suppliers and logistics partners. This glossary article explains the definition, measurement methods, relevant KPIs and management approaches for procurement.

Key facts

- Scope 3 emissions are indirect emissions along the entire value chain, caused by a company but not emitted by the company itself.
- The GHG Protocol divides Scope 3 into 15 categories, from purchased goods and services to the end-of-life treatment of sold products.
- In manufacturing, typically more than 70 to 90 per cent of the total greenhouse gas footprint is attributable to Scope 3.
- The calculation is generally based on activity data (volumes, transport kilometres, energy consumption) multiplied by emission factors.
- Procurement has a significant influence on Scope 3 through supplier selection, material decisions, logistics allocation and contract management.
- Regulatory requirements such as the CSRD and supply chain laws increase the pressure for reliable, auditable emissions data.

Definition: Scope 3 emissions

Scope 3 emissions are all indirect greenhouse gas emissions that arise as a consequence of a company's activities, occur neither under its own control nor through its own energy use, and fall under neither Scope 1 nor Scope 2. They form the third of the three emission classes of the GHG Protocol.

Demarcation from Scope 1 and Scope 2

Scope 1 covers direct emissions from own facilities and vehicle fleets, and Scope 2 covers indirect emissions from purchased energy. Scope 3 goes beyond this and concerns all emissions from upstream and downstream stages: from raw material extraction through supplier production and transport to product disposal. In practice, this demarcation is not always clear-cut, for example in leasing arrangements or contract manufacturing. The allocation should therefore be documented in a binding manner.

The 15 categories of the GHG Protocol

The GHG Protocol structures Scope 3 into 15 categories: purchased goods and services, capital goods, energy-related activities (not covered in Scope 2), upstream transport and distribution, operational waste, business travel, employee commuting, leased assets, downstream transport and distribution, processing of sold products, use of sold products, end-of-life treatment, franchises and investments. Materiality and data availability differ considerably by industry, which is why prioritisation makes sense.

Relevance for procurement and supply chain

Because the majority of Scope 3 emissions arise in the supply chain, procurement is the natural control function for reducing them. Procurement decisions have a direct impact on material selection, locations, transport routes and the production methods of suppliers.

Identifying emissions-intensive suppliers

In practice, the majority of upstream emissions is frequently concentrated in a comparatively small group of suppliers and commodity groups, such as steel, aluminium, chemicals, plastics or electronic components. A first-tier-specific view is not always sufficient here, as emissions often occur at sub-tier suppliers. A combined analysis of commodity group strategy and spend structure, similar to an ABC/XYZ classification, is helpful in identifying the relevant levers.

Integration into existing procurement processes

Scope 3 targets are most effective when integrated into established processes: supplier qualification, supplier rating, tenders and contract management. CO₂ criteria can be incorporated as a weighted attribute in supplier evaluation or formulated as minimum requirements in tenders. Clean-sheet costing can also be extended to include CO₂ cost aspects, for example via internal shadow prices on emissions.

Logistics as a lever in its own right

Transport is a Scope 3 category in its own right and offers short-term reduction potential: modal shifts from air to rail or sea freight, higher load factors, consolidated shipments and standardised processes such as the Advance Shipping Notice (ASN) improve both planning reliability and the emissions balance at the same time. Incoterms DAP or EXW shift responsibility for transport, and thus partly responsibility for the data, between supplier and buyer.

Methods and approaches for measurement

The calculation of Scope 3 emissions follows the formula of activity data multiplied by emission factor. Data quality ranges from spend-based estimates to primary supplier data.

Secondary data and spend-based estimation

The starting point is often spend-based estimates: the procurement value of a commodity group is multiplied by average emission factors per euro. Alternatively, physical quantities are combined with industry-average values from life-cycle assessment databases. These methods deliver results quickly but are imprecise and are primarily suited to an initial hotspot screening and a rough structure of the procurement budget.

Primary data and supplier surveys

In a second step, data is collected directly from suppliers, typically via standardised questionnaires covering product footprints, energy consumption and certifications such as ISO 14001. What matters is a structured process with clearly defined requirements, deadlines and verification steps, similar to a procurement approval workflow. A supplier rating with a CO2 component creates incentives for data provision and improvement.

Hybrid calculation and prioritisation

In practice, a staged approach is establishing itself: first a spend- and volume-based estimate across all categories, then a concentration on the largest emission sources with improved data. A bow-tie analysis can help to systematically assess risks along the data chain – for example implausible supplier figures or missing conversion factors. Calculation paths and assumptions should be documented in an auditable manner.

Key KPIs and target pathways

Without measurable KPIs, Scope 3 management remains theoretical. Relevant KPIs combine absolute and relative figures and can be translated into supplier and commodity group targets.

Emissions-specific metrics

Core metrics are absolute Scope 3 emissions in tonnes of CO2 equivalent, broken down by category, as well as indicators such as CO2 intensity per revenue or per unit produced. Product carbon footprints (PCF), reported per component or material, are also increasingly used. These figures form the basis of target costing models that map CO2 targets alongside cost and quality targets.

Management and data quality KPIs

In addition, companies measure how much of the procurement spend is covered by reliable primary data, how many strategic suppliers have set targets, and how delivery performance and carrier performance develop from a CO2 perspective. The coverage of supplier qualification with sustainability criteria and the proportion of binding climate clauses in contract management are also useful process KPIs.

Linkage with financing instruments

Interfaces between procurement and finance arise when CO2 targets are incorporated into supplier financing. Models from factoring in procurement and supply chain finance programmes in practice sometimes tie more favourable terms to suppliers' sustainability criteria. Such incentive systems do not replace data quality but do increase willingness to cooperate.

Risks, controls and legal framework

Scope 3 reporting carries substantial risks: data errors, accusations of greenwashing and regulatory violations. Structured controls and cautious communication are therefore essential.

Data and quality risks

The most common sources of error are incorrect emission factors, double counting between categories, outdated supplier data and inconsistencies with inventory, for example due to obsolete stock or shortfalls in the goods receipt throughput process. Plausibility checks, the four-eyes principle and

regular reconciliation with quantity- and value-based data from inventory and procurement systems limit these risks.

Regulatory requirements

In the EU, sustainability reporting rules such as the CSRD increasingly require large and many medium-sized companies to provide detailed Scope 3 disclosures – with reference to the need to verify the applicable obligations on a case-by-case basis. Supply chain laws and product-specific requirements such as CBAM (a carbon border adjustment for imports) are added to this, with the latter particularly affecting energy-intensive intermediate products. Export controls and Intrastat reporting also affect the data situation for cross-border deliveries.

Contractual safeguards

Contract management should include data-sharing agreements, update cycles for emissions data, conventions on calculation methods and, where applicable, contractual penalties for manipulated data. At the same time, caution is advised regarding guaranteed carbon neutrality or unverified claims, as these can entail legal and reputational risks.

Current developments and outlook

Scope 3 is evolving from voluntary reporting into a regulated mandatory topic with growing data depth. Standards, software tools and supplier disclosure are professionalising in parallel.

Product carbon footprints

Industry initiatives are working on standardised Product Carbon Footprints (PCF) with harmonised calculation rules, for example in mechanical engineering and electronics. The aim is for suppliers to provide a PCF per component that buyers can directly incorporate into clean-sheet costing and target costing. This reduces friction losses and makes comparisons between suppliers reliable.

Digital tools and data integration

A growing number of companies are linking ERP and procurement systems with emissions calculation tools, whereby spend and volume data are automatically mapped to emission factors. Catalogue management and category logics help to assign indirect materials consistently as well. Capacity planning can increasingly optimise transport and production decisions from a CO2 perspective.

The circular economy as a reduction lever

Increasingly, the circular economy is coming into focus: the use of recycled materials, remanufacturing and durable, repairable designs demonstrably reduce Scope 3 emissions because they avoid emissions from raw material extraction. Buyers bear significant responsibility here through tender requirements, secondary material quotas and take-back systems.

Typical metrics

Scope 3 share of total carbon footprint: commonly 70–90 %

typical benchmark for manufacturing companies; varies by industry

Primary data coverage of purchase volume: typically 20–60 % of emissions mass

share of volume backed by reliable supplier data rather than estimated values

CO2 intensity: e.g. t CO2e per EUR 1 million of procurement spend

relative metric for trend comparisons and target pathways

Suppliers with climate targets: > 70 % of strategic procurement spend

common target metric in progress programmes of large buyers

Practical example

A mid-sized mechanical engineering company with around 300 suppliers finds, in its first emissions balance, that more than 85 per cent of its footprint is attributable to Scope 3, primarily steel, castings and freight. Procurement launches a three-stage programme that makes emissions data an integral part of supplier management.

- Hotspot screening of all commodity groups using spend and volume analysis; focus on the roughly 20 suppliers with the largest emissions share.
- Integration of a CO2 criterion weighted at 10 per cent into the supplier rating and mandatory data collection via a standardised form.
- Shifting the air freight share to rail and sea freight with adjusted Incoterms DAP agreements and a mandatory ASN process for transport data capture.
- Agreeing reduction pathways with strategic steel and casting suppliers within contract management, supported by the supply of primary data for the company's own CSRD reporting.

Conclusion

For manufacturing companies, Scope 3 emissions dominate the carbon balance – and at the same time represent the area where procurement has the greatest leeway to act. Success depends less on calculation accuracy in the detail than on a structured approach: identify hotspots, gradually improve data, and anchor emissions criteria in supplier qualification, evaluation and contracts. Those who treat suppliers as partners and jointly develop reduction pathways turn the reporting obligation into a competitive advantage. An early, auditable data foundation pays off in view of tightened regulatory requirements. Procurement should therefore treat Scope 3 as an integral part of commodity group strategy.

Frequently asked questions

What falls under Scope 3 emissions?

Scope 3 covers all indirect greenhouse gas emissions along the value chain that do not fall under Scope 1 (direct) or Scope 2 (purchased energy). Examples include emissions from the production of purchased intermediate products, transportation, business travel, and the use or disposal of sold products. The GHG Protocol defines 15 categories for this purpose.

How are Scope 3 emissions calculated?

The calculation follows the formula of activity data multiplied by emission factors. Activity data may include purchase volumes, material quantities, transport kilometres or energy consumption; factors may be database values or supplier-provided figures. In practice, organisations start with spend-based estimates and gradually replace these with primary supplier data for the largest emission sources.

What proportion of emissions is typically Scope 3?

For manufacturing and industrial companies, the Scope 3 share of the total carbon footprint frequently

exceeds 70 to 90 per cent, as intermediate products, logistics and product use dominate. For service providers, the share can be significantly lower. A company-specific carbon footprint calculation is therefore indispensable.

Are companies obliged to report on Scope 3?

In the EU, sustainability reporting rules such as the CSRD increasingly require affected companies to disclose material Scope 3 categories, depending on company size, stock exchange listing and scope of activities. Whether and to what extent an obligation applies should be legally assessed on a case-by-case basis. Worldwide, additional requirements such as CBAM apply to certain imports.

How can procurement reduce Scope 3 emissions?

Effective levers include selecting low-emission suppliers and materials, embedding CO2 criteria in tenders and supplier evaluations, transport optimisation, and secondary material and circular economy approaches. Contractual reduction pathways with strategic suppliers and internalised carbon prices in target costing also create incentives.

What is the difference between Scope 1, 2 and 3?

Scope 1 captures direct emissions from own sources such as production facilities and vehicle fleets, while Scope 2 covers indirect emissions from purchased electricity, heat or steam. Scope 3 captures all other indirect emissions from upstream and downstream stages and is usually the largest, but also the most difficult to measure, category.