Supply Chain Decarbonisation: Systematically Reducing Scope 3 Emissions

Supply chain decarbonisation refers to the systematic reduction of greenhouse gas emissions along the entire value chain, in particular Scope 3 emissions, which account for the largest share of emissions at most industrial companies. For procurement organisations, the topic is increasingly becoming a core procurement task, as the majority of emissions arise at suppliers and in upstream products. The article explains the definition, methods, key figures, risks and current regulatory developments from a buyer's perspective.

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Key facts at a glance

01 Supply chain decarbonisation primarily targets Scope 3 emissions, which typically account for the largest share of an industrial company's CO footprint.

02 Success factors include robust emissions data collection, supplier discussions with concrete reduction targets, and the embedding of CO criteria in award decisions.

03 Instruments range from supplier questionnaires and PCF (Product Carbon Footprint) requirements to CO pricing in evaluation and long-term partnerships with investment commitments.

04 Regulatory pressure is growing: the CSRD, the LkSG (German Supply Chain Due Diligence Act) and the EU Emissions Trading System raise requirements for transparency and evidence in the supply chain.

05 Without reliable primary data from suppliers, calculations often remain estimates based on secondary data with considerable uncertainty.

06 An effective decarbonisation strategy combines procurement policy, category intelligence and concrete award criteria rather than isolated campaigns.

Definition: Supply Chain Decarbonisation

Supply chain decarbonisation encompasses all measures for measuring, reducing and offsetting greenhouse gas emissions at suppliers, service providers and logistics partners. It forms part of the company-wide climate strategy and is in practice predominantly a procurement task, since the levers on the supplier side lie there.

Scope 1, Scope 2 and Scope 3 at a glance

Scope 1 covers the company's own direct emissions, Scope 2 indirect emissions from purchased energy. Scope 3 captures all other upstream and downstream emissions, including purchased materials, transport and the use of sold products. For manufacturing companies, well over two thirds of total emissions frequently lie in Scope 3, particularly in the categories "purchased goods and services" and "transport and distribution".

Distinction from sustainable procurement

Sustainable procurement is the broader term and includes social standards, resource conservation and the circular economy. Supply chain decarbonisation focuses on climate protection and is more measurable: it works with CO equivalents, reduction pathways and target values. In practice, both topics are combined in the same supplier evaluation, but follow different assessment logics.

Why procurement holds the key role

Procurement controls the key levers on Scope 3 through order award, specification and supplier selection. CO requirements can be made binding via the procurement policy, and enforced through qualification criteria in supplier selection and conditions in framework agreements. Without procurement involvement, a decarbonisation strategy remains a declaration of intent.

Methods and approach to supply chain decarbonisation

A robust approach follows a clear sequence: first measure, then set priorities, then reduce. Companies that enter supplier discussions without a sound data basis quickly lose credibility and time.

Emissions inventory and hot spot analysis

The starting point is a Scope 3 inventory in accordance with recognised standards such as the GHG Protocol. Since complete primary data is rarely available, calculations are initially made using secondary data (e.g. industry-standard emission factors) and output volumes. A hot spot analysis identifies the material groups, suppliers and logistics routes with the highest share of emissions. Typically, a small number of categories and suppliers account for the largest share of emissions – concentrating resources on these "top movers" is more efficient than a comprehensive but superficial assessment.

Engaging suppliers: from data collection to reduction pathways

In the second step, priority suppliers are surveyed via structured questionnaires on emissions data, targets and measures. Reliable Product Carbon Footprints (PCF) at product unit level are often only available from larger or industrialised suppliers. For strategic suppliers, bilateral discussions on concrete reduction measures follow: renewable energy at the production site, process optimisation, material substitution or logistics optimisation. These measures can be recorded in joint reduction pathways with interim targets.

Embedding in award and contract processes

CO criteria only have an effect if they change award decisions. Proven instruments include CO guidance values in bid evaluation, binding PCF declarations as part of the specification, commitments to green electricity in framework agreements and precautionary deductions where evidence is missing. Logistics processes can also be integrated: delivery frequencies, load factors and transport modes measurably influence emissions per delivery and are often levers that can be pulled quickly.

Key KPIs for steering supply chain decarbonisation

Without sound key figures, decarbonisation remains driven by gut feeling. The following KPIs have proven effective as steering metrics in practice and should be reviewed regularly with category management and sustainability teams.

Emissions key figures

Key metrics are absolute and production-related Scope 3 emissions (e.g. kg COe per unit or per euro of purchase volume) and their development against a base year. In addition, the share of purchase volumes with primary-data PCFs has proven effective, as it reflects data quality. A consistent methodology over the years is important, as methodological changes can otherwise create improvements that are only apparent on paper.

Supplier and process key figures

At supplier level, the coverage of purchase volume with completed emissions questionnaires, the share of suppliers with their own climate targets and the share with evidence of renewable electricity are relevant metrics. On the process side, the number of ongoing reduction projects and their estimated savings in tonnes of COe per year count. These KPIs are suitable for quarterly reviews and provide arguments for investment decisions at the supplier.

Economic efficiency key figures

Decarbonisation comes at a cost. It makes sense to capture the cost per avoided tonne of COe per measure, comparable to a functional cost analysis in the cost assessment of components. This allows measures to be prioritised and the internal business case to be presented clearly. Marginal cost analysis helps identify the point at which internal reduction becomes more expensive than alternative levers.

Risks and controls in supply chain decarbonisation

The greatest risks lie in unreliable data, accusations of greenwashing and dependence on individual suppliers. Without clear controls, compliance violations as well as reputational and cost risks loom.

Data quality and greenwashing

The most common mistake is over-reliance on secondary data: industry averages say little about the specific supplier. Data collections should be documented and the sources and quality of data classified. Claims of "climate-friendly" or "CO-neutral" are legally sensitive and should only be made with robust, verifiable evidence. If in doubt, a review by the compliance or legal department helps, as regulatory requirements for sustainability claims are constantly tightening.

Supplier risks and dependencies

Tying decarbonisation requirements exclusively to a few suppliers increases dependency risk. Conversely, a radical requirements strategy can overwhelm smaller suppliers and provoke supply failures. A tiered approach is practicable: binding minimum requirements for all, ambitious targets for strategic partners. Contracts should provide for re-tendering rights in the event of missed targets, without jeopardising security of supply in the short term.

Compliance and regulatory controls

Supply chain laws, sustainability reporting and due diligence obligations require documented processes. These include risk-based supplier screening, evidence of origin and production conditions – such as conflict minerals certificates of origin or FSC/PEFC certification for wood and paper – as well as audit-proof archiving of supplier declarations. Since legal interpretations change and are complex in individual cases, the concrete design should always be reviewed by legal counsel or compliance.

Current developments: regulation, market and digitalisation

Supply chain decarbonisation is a fast-moving field. Regulatory requirements, customer demands and technological options are changing in parallel – procurement and sustainability teams must keep pace continuously.

Regulatory pressure in the EU

The EU CSRD requires many companies to produce comprehensive sustainability reports, which must also disclose material Scope 3 emissions. The EU Emissions Trading System (EU ETS) makes CO-intensive production in Europe more expensive and indirectly drives up purchase prices for energy-intensive upstream products. In addition, border adjustment mechanisms (CBAM) lead to additional reporting and cost obligations for certain imported goods. The specific obligations depend on company size, industry and supply relationships and should be reviewed legally in individual cases.

CO prices and material costs

In the procurement of metallic and chemical upstream products, price-dynamic arrangements that reflect CO and energy costs are becoming established. The concept of the alloy surcharge shows exemplarily how such surcharges and deductions are mechanically reflected in price agreements; analogous considerations for CO cost components are conceivable. Buyers should provide for clear rules on energy cost risks and adjustment mechanisms in framework agreements in order to avoid renegotiations and disputes.

Digitalisation and data standards

Data collection via questionnaires reaches its limits with thousands of suppliers. Exchange formats and platforms for PCF data, industry-specific data services and AI-supported analyses are becoming established. In the interest of clean master data, a prior clean-up of supplier and material master data is sensible, otherwise emissions will be incorrectly attributed. Transport data for emissions calculations can also be used in data exchange with logistics partners – for example via the Advance Shipping Notice (ASN).

Typical metrics

Metric	Typical value
Scope 3 emissions (absolute)	Decline versus base year *Core metric of the decarbonisation strategy; comparison only meaningful with a consistent methodology*
Production-related intensity	e.g. kg COe per euro of purchase volume *Makes progress visible independent of growth*
Primary data coverage	typically > 50 % of relevant volume *Share of purchase volume with validated supplier PCF*
Supplier questionnaire coverage	> 80 % of top volume *Share of purchase volume with completed emissions questionnaire*
Cost per avoided tonne of COe	highly dependent on the measure *Comparative metric for prioritising reduction projects*

Practical example

A mid-sized mechanical engineering company with around 400 actively supplying suppliers launched a decarbonisation initiative for its supply chain. Following a hot spot analysis, roughly three quarters of estimated Scope 3 emissions were attributable to steel, aluminium, cast and forged parts as well as road transport. Procurement prioritised twelve suppliers, agreed reduction pathways with interim targets and embedded CO criteria in the bid evaluation for all new awards.

- Collection of PCF data from the twelve top-emitting suppliers using a standardised questionnaire followed by validation
- Introduction of a CO evaluation criterion (typically weighted at 5–10 %) in tenders for steel and cast parts
- Agreement of targets for renewable electricity at the production site with three strategic suppliers
- Optimisation of transport consolidation and a shift to rail on three main routes

Conclusion

In practice, supply chain decarbonisation is primarily a leadership and data task for procurement. Success depends less on extensive calculations than on consistent prioritisation, binding award criteria and credible partnerships with the most important suppliers. Companies that build clean data structures and processes now are better prepared for regulatory requirements while simultaneously reducing energy and material cost risks. Those who instead treat decarbonisation as a one-off project quickly fall behind customer requirements and regulation. Starting with a hot spot analysis and a few measures implemented rigorously is almost always the fastest route to measurable results.

Frequently asked questions

? What does supply chain decarbonisation mean?

Supply chain decarbonisation refers to the systematic measurement and reduction of greenhouse gas emissions at suppliers, logistics partners and upstream products – above all Scope 3 emissions. In practice, responsibility frequently lies with procurement, as it controls the key levers through award decisions, specifications and contracts. The goal is a measurably declining CO footprint along the entire value chain.

? Which emissions fall under Scope 3?

Scope 3 covers all indirect emissions upstream and downstream of the company's own value creation, in particular purchased goods and services, transport, business travel, the use of sold products and disposal. For industrial companies, the category "purchased goods" is typically the largest block. The classification follows the GHG Protocol standard, which comprises 15 categories in total.

? How do you start with supply chain decarbonisation?

The proven approach is to start with a Scope 3 hot spot analysis based on available data in order to identify the most important material groups and suppliers. This is followed by structured data collection from priority suppliers, typically using a standardised questionnaire. Reduction measures are then agreed and CO criteria embedded in award and contract processes.

? What is a PCF (Product Carbon Footprint)?

The Product Carbon Footprint denotes the greenhouse gas emissions of a specific product, usually

per unit (e.g. kg COe per kilogram or per item). Depending on the system boundary, it covers manufacturing (cradle-to-gate) or the entire life cycle (cradle-to-grave). In procurement, the PCF serves as a comparative metric between suppliers and as evidence of reduction progress.

? What role does procurement play in decarbonisation?

Procurement controls the key levers on Scope 3 emissions through supplier selection, specifications, contract terms and purchasing volumes. It can make CO requirements binding via the procurement policy, obtain emissions data from suppliers and agree reduction targets contractually. Without involving procurement, decarbonisation targets usually remain non-binding in practice.

? Which laws affect supply chain decarbonisation?

In the EU, the CSRD (sustainability reporting), supply chain due diligence laws, the EU Emissions Trading System and the Carbon Border Adjustment Mechanism (CBAM) are particularly relevant. The specific obligations depend on company size, industry and supply relationships. As the regulatory framework is constantly changing, application in individual cases should be reviewed legally.

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