

Supply Chain Carbon Footprint (SCF): Carbon accounting along the supply chain

The Supply Chain Carbon Footprint (SCF) describes the entirety of greenhouse gas emissions generated along a company's entire supply chain – from raw material extraction and supplier production through to transport and disposal. For industrial buyers, this metric is increasingly becoming a decisive factor in supplier selection and tenders. The SCF typically comprises the Scope 3 emissions defined in the Greenhouse Gas Protocol and therefore represents the largest share of emissions at many manufacturing companies. Anyone who measures and manages the SCF systematically can meet regulatory requirements and

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uncover cost and efficiency potential in procurement.

Key facts at a glance

- 01** The SCF records greenhouse gas emissions across all stages of the supply chain, often in accordance with the Greenhouse Gas Protocol (Scopes 1–3).
- 02** At manufacturing companies, the majority of emissions typically lie in Scope 3, i.e. with suppliers and transport.
- 03** Relevant standards include, among others, the GHG Protocol, ISO 14067 and the CSRD reporting requirements.
- 04** The main data sources are supplier data, secondary databases and forwarder calculations per mode of transport.
- 05** Buyers are increasingly integrating CO criteria into enquiry criteria, supplier selection and framework agreements.
- 06** Without reliable primary data, the SCF often remains an estimate based on spend and industry averages.

Definition: Supply Chain Carbon Footprint

The Supply Chain Carbon Footprint is the accounted sum of all greenhouse gas emissions caused by the procurement, production, logistics and disposal of a company's goods and services.

Distinction from the Corporate Carbon Footprint

The Corporate Carbon Footprint considers the company itself as the reporting boundary, whereas the SCF encompasses the entire upstream value chain. In practice, the SCF largely overlaps with the Scope 3 Categories 1 (purchased goods) and 4 (transport). The Product Carbon Footprint, in turn, considers a single product; it can be derived from SCF data when emissions are allocated to items. For buyers, this distinction matters because they can actively influence the SCF through supplier selection and specifications, whereas they can only partially influence the Corporate Footprint.

Units and effectiveness

Measurement is typically in kilograms or tonnes of CO equivalent (COe), since in addition to carbon dioxide, methane and nitrous oxide are also included. Emission factors are used for assessment, which vary, for example, by material group, energy source or mode of transport. In practice, a distinction is made between primary data (supplier-specific) and secondary data (industry averages, databases). The quality of the balance depends significantly on the proportion based on primary data.

Methods and approach for measurement

A robust SCF is only achieved with a structured approach: define the reporting boundary, define data sources and repeat the calculation systematically.

Reporting boundary and data backbone

First, it is determined which suppliers, materials and transports are included. A prioritisation by spend volume and estimated emissions intensity is common: a few item categories often cover the majority of emissions. A consistent procurement data model is the prerequisite here, because without uniform item and supplier master data, emissions cannot be cleanly allocated. Methods of automatic spend classification help to structure the procurement volume sustainably by emissions intensity.

Primary data from suppliers

Supplier data is the most accurate but most labour-intensive data source. A standardised request catalogue has proven its worth, which suppliers complete during qualification and tenders: energy consumption, energy sources, production volumes, certified Environmental Product Declarations. The effort can be reduced by integrating the catalogue into existing enquiry processes, for example together with the Certificate of Conformity or Certificate of Analysis within the documentation requirements. Smaller suppliers can initially be represented using secondary data.

Secondary data and transport emissions

Where primary data is missing, buyers fall back on secondary factors, for example for standard materials or country-specific electricity mixes. For logistics, forwarders increasingly provide calculated emissions values per consignment; in air freight, the transport is documented via the Air Waybill (AWB), whose consignment data can be used for accounting. For road transport too, freight documents such as the CMR consignment note provide a usable data basis. Emission factors differ considerably depending on the mode of transport.

Key KPIs and evaluation logic

The SCF only becomes manageable when it is translated into key figures that can be compared across the supplier and category portfolio.

Absolute versus product-related values

Absolute emissions (tonnes of CO₂e per year) show the overall impact of procurement but are dependent on volume. Intensity metrics such as CO₂e per purchase volume, per tonne of material or per component enable comparisons between suppliers and periods. In practice, companies combine both perspectives: absolute for reporting obligations, relative for supplier ranking.

Management-relevant supplementary KPIs

In addition to the emission volume, other indicators have proven effective: share of emissions on a primary data basis, share of renewable energy at strategic suppliers, coverage rate of spend analysis and the reduction return versus the previous year. The category intelligence of a product group also gains in value when emissions intensity is included as an evaluation dimension alongside price, quality and delivery capability.

Embedding the SCF in the procurement process

The biggest lever lies not in the calculation but in the consistent anchoring of CO criteria in existing procurement processes.

Supplier selection and enquiries

CO disclosures should become a standard element of enquiry criteria, analogous to price, capacity and certifications. In supplier evaluation, an emissions index can be integrated into the scoring, for example with a weighting of 10–20 per cent. Existing structures such as the Approved Vendor List (AVL) can be supplemented with emissions data per supplier, so that buyers can see immediately during sourcing which alternatives perform better in climate terms.

Contracts and reduction commitments

In framework agreements and under take-or-pay obligations, reduction pathways can be agreed as targets, for example an annual reduction in emissions per tonne of product. The key question is how

metrics are verified: without defined data quality, a target agreement remains non-binding. At contract renewals, it is advisable to use the emissions development over the previous term as a negotiation point. The SCF also acts as a decision parameter in requirements management, for example in material substitutions.

Cooperation and innovation

Many reductions only emerge through dialogue: co-development projects on lighter components, recycled materials or more energy-efficient processes often reduce emissions more significantly than switching supplier. The exchange on an emissions roadmap should be part of regular supplier meetings, supported by metrics from the procurement data model.

| Risks and controls

The SCF is a young reporting field. Without clear control mechanisms, there is a risk of data gaps, methodological inconsistencies and reputational damage from exaggerated climate claims.

Data quality and greenwashing risk

The biggest risk is a seemingly precise balance built on an unsound data basis. Communicating secondary data as facts risks regulatory and reputational problems. Documented calculation assumptions, a clear labelling of data quality and a 5-Why-style questioning when supplier values suddenly deviate sharply have proven effective. Legal requirements on reporting and product labelling are developing dynamically; implementation should be professionally reviewed on a case-by-case basis.

Supply chain boundaries and failures

Measures such as shifting to geographically closer suppliers can reduce emissions but raise questions of resilience. Before making this decision, it should be assessed how a supplier failure would impact operations – ideally within a Business Continuity Plan (BCP). It should also be noted that new, lower-emission sources first have to pass the usual qualification stages of the Approved Vendor List (AVL) and that a part delivery/remaining quantity from legacy sources must be factored in during the changeover.

Controls in the process

Sensible controls include an annual update of emission factors, sample checks of supplier data, defined accountability for the balance and reconciliation between procurement, sustainability reporting and controlling. The logical conclusion: the results must be consistent with other company figures in the reporting obligations.

Current developments and outlook

The SCF is evolving from a voluntary metric into a regulated reporting and management object – with direct consequences for industrial procurement management.

Regulatory pressure

Sustainability reporting obligations are increasing in Europe; supply chain due diligence requirements and sustainability reporting are raising the data pressure along the supply chain. For buyers, this means: CO data is becoming a standard requirement profile, comparable with certificates or test plans. Suppliers who cannot provide reliable figures will increasingly be disadvantaged in strategic tenders.

Digitalisation and market prices

In practice, software solutions for emissions calculation, supplier platforms and standardised data exchange formats are replacing manual queries. At the same time, internal carbon prices are emerging, with which emissions are evaluated in make-or-buy analyses and material decisions. In logistics too, the influence of mode of transport choice, utilisation and consolidation on the footprint is being accounted for more precisely – a classic field for collaboration with 3PL providers.

What buyers should do now

A three-stage entry has proven effective: structure the spend and set priorities, then win core suppliers over to primary data, and finally anchor CO criteria firmly in tenders and evaluations. Agile procurement management helps to understand the SCF not as a one-off project but as an ongoing management variable that evolves with market prices, technologies and the supplier portfolio.

Typical metrics

Metric	Typical value
COe per purchase volume	typically 0.2–1.0 kg COe per euro of spend <i>highly industry-dependent; primarily meaningful as a period-over-period comparison</i>
Share of primary data	> 50% (typical target maturity level) <i>share of emissions based on supplier data rather than secondary factors</i>
Reduction return	typically 2–5% per year <i>emission reduction versus previous year at a consolidated reporting boundary</i>
Supplier coverage	> 80% <i>share of spend volume with available emissions data</i>

Practical example

A mid-sized mechanical engineering company with an annual procurement volume of around EUR 80 million launched an SCF initiative after a major customer requested CO data for delivered components. Within six months, a prioritisation by spend and emissions intensity was established, a data request catalogue for suppliers was developed and an emissions index was integrated into the supplier scorecard.

- Piloting with the ten most emissions-intensive suppliers, which together typically account for the main share of emissions.
- Integration of CO criteria into new tenders with a defined weighting in the scoring.
- Shifting two transport routes from air to sea freight, supported by AWB and freight data analysis.
- Agreement of annual reduction targets in framework agreements with metrics and audit rights.

Conclusion

For industrial buyers, the Supply Chain Carbon Footprint is long no longer a niche topic but a management variable with a direct influence on supplier selection, contracts and logistics decisions. What matters is not the mathematical perfection of the balance but the systematic anchoring of CO data in existing processes. Companies that build up primary data step by step and involve suppliers in reductions create both regulatory certainty and competitive advantages. The alternative – pure secondary data analysis without management levers – misses the real opportunity. Those who regard the SCF as part of category management combine sustainability with classic procurement objectives.

Frequently asked questions

? What does Supply Chain Carbon Footprint mean?

The Supply Chain Carbon Footprint covers all greenhouse gas emissions generated along a company's supply chain – from raw material extraction and supplier production through to transport and disposal. It largely corresponds to the Scope 3 emissions defined in the Greenhouse Gas Protocol. The typical unit of measurement is CO equivalent (COe).

? How do you calculate the supply chain carbon footprint?

The calculation is usually performed by multiplying activity data: purchase volumes, material quantities or transport kilometres are multiplied by emission factors. Initially, secondary data from databases is often used; later, primary data from suppliers replaces the estimates. A clean data model with item and supplier master data is the technical prerequisite.

? Which scopes belong to the Supply Chain Carbon Footprint?

The core of the SCF is Scope 3, in particular Category 1 (purchased goods and services) and Category 4 (transport and distribution). The company's own Scope 1 and 2 emissions formally belong to the Corporate Carbon Footprint, not to the SCF. Since Scope 3 typically accounts for the

largest share at manufacturing companies, the SCF is often the most important lever for the overall carbon balance.

? Why is the SCF important for buyers?

Buyers decide on supplier selection, materials and transport routes, and therefore on a large proportion of a company's emissions. In addition, customers and regulators increasingly demand CO data along the supply chain. Those who integrate CO criteria into tenders and supplier evaluations reduce risks and can at the same time unlock cost benefits through energy efficiency at suppliers.

? Which standards apply to the SCF?

Relevant references are the Greenhouse Gas Protocol with its Scope 3 standards as well as ISO 14067 for product footprints. For corporate reporting in Europe, the sustainability reporting requirements (CSRD) and the aforementioned standards together are the defining framework. The specific implementation depends on legal form, size and countries of operation and should be verified on a case-by-case basis.

? How can the SCF be reduced in practice?

The biggest levers are material substitution (e.g. recycled materials), suppliers with lower-emission production, shifting from air to rail or sea freight, higher utilisation rates and joint development projects with suppliers. It is important to anchor targets contractually and to update the data basis regularly.

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