

CO2e: understanding and managing greenhouse gas emissions as a procurement KPI

CO2e stands for CO2 equivalents and denotes the unit in which all greenhouse gas emissions are uniformly measured and compared. For buyers, CO2e is increasingly relevant because the majority of an industrial company's emissions arise in the supply chain and customers as well as legislators demand evidence. The term links sustainability reporting with operational procurement decisions. This article explains the definition, methods, key figures and practical aspects of CO2e in strategic and operational procurement.

Key facts

- CO2e (CO2 equivalent) makes different greenhouse gases such as methane or nitrous oxide comparable based on their global warming potential.
- For most manufacturing companies, the largest share of emissions typically lies in Scope 3, i.e. in the upstream and downstream value chain.
- In procurement, CO2e considerations affect supplier selection, tenders, freight cost management and contract renewal.
- Emissions data should be interpreted as indicative values with clear assumptions; data quality labelling is common.
- Growing reporting requirements in the EU increase the pressure for reliable, auditable emissions data along the supply chain.

Definition: CO2e

CO2e stands for CO2 equivalents and is the standard unit of measurement for expressing the effect of different greenhouse gases on climate change in a single common quantity. Each quantity of gas is converted, via its global warming potential (GWP), into the amount of CO2 that would have the same effect. In a procurement context, CO2e typically describes the emissions associated with the materials, components, services and transport of the procured goods and services.

Distinction from CO2

CO2 refers exclusively to carbon dioxide, whereas CO2e includes all climate-effective gases. One kilogram of methane, over a one-hundred-year time horizon, typically acts many times more strongly in the atmosphere than one kilogram of CO2 and is accordingly factored in with a higher conversion factor. For buyers this means: a product can have very different CO2e values depending on the manufacturing process, energy source or materials used, even if the product function is identical.

Overview of Scopes 1 to 3

The common system distinguishes three areas: Scope 1 covers own emission sources such as boilers

or vehicle fleets, Scope 2 covers purchased energy. Scope 3 covers all upstream and downstream emissions, including the manufacture of purchased materials and transport. For manufacturing companies, by far the largest share falls on Scope 3 in practice, which is why procurement plays a key role in emissions reduction.

Methods and approach for capturing CO2e in procurement

Emissions accounting follows established frameworks that also apply to procurement data. Buyers do not need to act as climate consultants, but they should understand the methodology behind the figures they receive from suppliers or from databases. The crucial point is the distinction between primary data from the supply chain and secondary average values.

Primary data versus secondary data

Primary data comes directly from the supplier, for example as a product footprint or site data, and reflects the actual manufacturing. Secondary data are industry- or material-related average values from factor collections; they are available more quickly but are less precise. In practice, the analysis often begins with secondary data to obtain a rough distribution of emissions across procurement categories. For particularly emissions-intensive or high-volume items, it is then worthwhile to request primary data in a targeted manner.

Calculation approaches: spend-based and activity-based

In the spend-based approach, the procurement value is multiplied by an industry-specific emissions factor; it quickly provides an overall picture but is coarse for individual parts. In the activity-based approach, specific quantities, materials and processes are used, for example kilograms of steel plus energy requirements per process step. This route delivers reliable product values but requires data coordination with engineering and suppliers. A staged model is often chosen: rough analysis based on spend, refinement for the most important categories.

Data quality and the role of the data steward

Emissions data become outdated and are based on assumptions, which is why every CO2e data record needs a labelling of source, reference year and uncertainty. A data steward typically takes on the maintenance and consistency assurance of such master data, analogous to material master data or supplier master data. In procurement, it is advisable to integrate CO2e factors into the same processes that also manage prices and lead times, so that consistent data is available for every tender.

CO2e in strategic and operational procurement processes

CO2e is not a standalone project topic but unfolds its impact when it is integrated into existing procurement processes. This ranges from the procurement policy through the commodity strategy to operational order processing and supplier evaluation.

Requirements in tenders and supplier selection

In e-sourcing platforms and tender documents, CO2e disclosures can be defined as a mandatory or bonus criterion, for example an emissions-related product footprint per unit or evidence of the electricity mix used. It is important to use uniform wording so that bids remain comparable; deviations can be clarified via exception management. The procurement policy should also enshrine that sustainability data is weighted in supplier selection alongside price, quality and delivery capability.

Contracts and framework call-offs

Framework call-offs and framework agreements can specify emissions disclosures, progress targets and reporting intervals. A change-order clause can govern what happens if the CO2e value of a product changes significantly due to material or process changes at the supplier. At contract renewal, the documented emissions development serves as an additional negotiation element alongside price and performance issues.

Transport, logistics and procurement logistics

In practice, transport causes a considerable share of category emissions. In freight cost management, emissions aspects can be directly combined with cost criteria, since lower weight, shorter distances and lower-emission modes of transport often improve both objectives. Incoterms such as FOB also influence which transport route, and thus which share of emissions, is accounted for by the buyer or the seller. When sourcing alternatives from other regions, therefore, not only the purchase price but also the transport effort in terms of costs and CO2e should be examined.

Key KPIs around CO2e in procurement

Metrics make emissions targets manageable and link them with classic procurement objectives. Metrics that relate emissions to reference or output quantities have proven effective, as they remain interpretable regardless of volume fluctuations.

Quantity and intensity metrics

Typical metrics are the absolute Scope 3 emissions of procurement, the emissions intensity per euro of spend or per unit produced, and the emissions of the most important categories. In addition, proportion metrics are suitable, such as the share of suppliers with verified emissions data or the share of spend covered by primary data.

Linking with cost and process metrics

CO2e metrics have the strongest effect when they are coupled with existing management metrics. In the cost driver analysis, material selection, manufacturing processes and logistics concepts can be identified as common drivers of costs and emissions. Standardisation and part number cleanup also usually reduce both quantities, since fewer special materials and smaller batch sizes are involved. The order rate per catalogue and a high first-time delivery capability have an indirect effect, as they reduce redundant micro-orders and rush orders, which typically cause emissions-intensive individual transports.

Risks and controls in handling CO2e data

Emissions figures are methodologically sensitive: small changes in assumptions can produce large deviations. Buyers should therefore critically examine the origin, consistency and communication of the data, especially since false or exaggerated environmental claims carry legal and reputational risks.

Greenwashing and regulatory risks

Anyone who uses CO2e disclosures in tenders, product interpretations or communications must be able to substantiate them. False or unverifiable environmental claims can be relevant under competition and cease-and-desist law; specific obligations depend on the individual case and the applicable reporting legislation and should be reviewed professionally. It is advisable to make only statements that are

supported by documented methodology and sources.

Data and supplier risks

Supplier risk also includes data risk: not every provider can deliver reliable emissions values, and submitted values may be inconsistent or outdated. Controls include plausibility checks against industry values, sampling for critical suppliers and clear requirements in the approved vendor list (AVL). A vendor-managed inventory (VMI) relationship shifts part of the stock planning to the supplier but does not change the emissions responsibility; here too, agreements on data delivery and reporting cadence should be recorded.

Internal controls and governance

Effective controls start with processes: defined data formats for CO2e requests, a review before contract award and a documented exception handling via exception management. Within the procurement organisation, a category playbook ensures that emissions criteria are applied uniformly across categories. Coordination with controlling, quality management and the sustainability function avoids contradictions between cost, quality and climate objectives.

Current developments: from voluntary to mandatory data

The handling of CO2e is currently changing fundamentally: voluntary metrics are becoming reportable data, and suppliers are increasingly actively asked for values. For procurement, this creates a new data discipline effort, but also an opportunity to justify procurement decisions more broadly.

Regulatory pressure in Europe

Extended sustainability reporting obligations in the EU require an increasing number of companies to provide reliable information on the value chain as well. In practice this means for buyers: emissions data are becoming a regular procurement document alongside certificates, test evidence and the order confirmation obligation. Companies that set up data requests in a standardised way save considerable coordination effort later on.

Decarbonisation as a negotiation topic

Large customers increasingly ask about their suppliers' reduction pathways, often linked to awards or framework agreement extensions. Strategic alliances or long-term partnerships can be used to jointly plan investments in lower-emission processes. At the same time, the value of suppliers who provide transparent data early is rising: they reduce their customers' reporting failure risk and are preferred in supplier selection.

Digitalisation of emissions data

On the software side, standardised formats for exchanging product footprints are emerging, and databases with emissions factors are better maintained. For procurement, this means: CO2e disclosures will in future migrate into the same master data processes as prices, minimum order quantities and lead times. Procurement planning can then run scenarios in which procurement volumes, supplier selection and transport concepts are optimised jointly for costs and emissions.

Typical metrics

Scope 3 share of total emissions: typically > 70%

Usual guideline for manufacturing-intensive sectors; serves for classification, not as a target value

Share of spend with primary data: start often < 20%

Expansion should sensibly begin with the categories with the highest emissions and volumes

CO2e per euro of spend: highly industry-dependent

Only comparable within the same category and reporting period

Share of suppliers with emissions data: typically 30–80%

Prerequisite for reliable bid comparisons in tenders

Transport CO2e per tonne-kilometre: varies greatly by mode of transport

Usable in freight cost management for the joint consideration of costs and emissions

Practical example

A mid-sized mechanical engineering company with a high proportion of bought-in parts wanted to reliably capture the Scope 3 emissions of its procurement for the first time. The team started with a spend-based rough analysis and identified three emissions-intensive categories: steel pre-products, castings and transport services. In the next tendering round, CO2e disclosures were included for these categories as a weighted additional criterion, alongside the classic cost driver analysis.

- Spend-based rough analysis to identify the categories with the highest emissions
- CO2e criteria in e-sourcing tenders with uniform data formats
- Agreement of reporting intervals and data requirements in framework call-offs
- Review of transport concepts and Incoterms in freight cost management

Conclusion

In procurement, CO2e is more than a reporting metric: it makes the climate impact of procurement decisions measurable and comparable. The biggest lever typically lies in Scope 3, and thus directly in the procured goods and services and in transport. Those who build emissions data methodically sound, anchor it in tenders, contracts and supplier evaluations and maintain data quality systematically not only meet growing reporting requirements but also open up negotiation leeway. What matters is coupling with existing processes rather than parallel special approaches. In this way, CO2e turns from a reporting topic into a regular steering lever of procurement.

Frequently asked questions

What does CO2e mean?

CO2e stands for CO2 equivalents, the standard unit of measurement for greenhouse gas emissions. Different gases such as methane or nitrous oxide are converted into a comparable amount of CO2 using their global warming potential. This allows emissions from materials, production and transport to be expressed in a single common figure.

What role does CO2e play in procurement?

The majority of a manufacturing company's emissions typically arise in the supply chain, i.e. in the Scope 3 area. Procurement influences these figures through supplier selection, material and process specifications, transport concepts and contract design. CO2e is therefore increasingly used as a criterion in tenders and supplier evaluations.

How are CO2e values calculated?

Two approaches are common: the spend-based approach multiplies procurement values by industry-average factors and quickly provides a rough breakdown. The activity-based approach uses specific quantities, materials and process data and delivers more accurate product values, but requires more data effort. In practice, a combination is often chosen.

What are Scope 1, 2 and 3?

Scope 1 covers own emission sources such as heating systems and vehicle fleets, Scope 2 covers purchased energy. Scope 3 covers all upstream and downstream emissions, in particular the manufacture of purchased materials and transport. For manufacturing companies, the largest share in practice is frequently in Scope 3.

Why are suppliers' CO2e figures often inaccurate?

Many suppliers work with average values from databases rather than their own measured data, and methods and reference years differ. In addition, process or material changes can render values out of date. Buyers should therefore document and verify the source, assumptions and data quality of every statement.

What legal obligations exist regarding CO2e disclosures?

In the EU, sustainability reporting regulations are extending the requirements for reliable value chain data to an increasing number of companies. In addition, there are general requirements for the accuracy of environmental claims in communications. The specific obligations depend on company size, industry and the individual case and should be reviewed legally.