

Scope 1 emissions: capturing and controlling direct emissions in your own operations

Scope 1 emissions comprise all direct greenhouse gas emissions arising from a company's own facilities and vehicles. For buyers and supply chain managers, they are the starting point of any carbon inventory because they lie within one's own sphere of influence and are the easiest to measure. Under the Greenhouse Gas Protocol, together with Scope 2 and Scope 3 they form a company's total carbon footprint. Anyone who asks suppliers for climate data or wishes to anchor sustainability requirements contractually must have a firm command of the Scope system.

Key facts

- Scope 1 covers direct emissions from own sources, such as combustion installations, processes and vehicle fleets.
- The delineation follows the Greenhouse Gas Protocol with three Scopes; Scope 1 is a mandatory component of many reporting frameworks.
- Typical sources in industry are heating boilers, melting furnaces, paint lines, own lorries and refrigerant losses.
- The calculation is usually performed using activity data multiplied by emission-specific factors; direct measurement is only possible at certain points.
- Scope 1 emissions are a core component of CSRD reports, supply chain requirements and customer questionnaires.
- Reduction is typically achieved through fuel switching, electromobility, process optimisation and energy efficiency.

Definition: Scope 1 emissions

Scope 1 emissions are greenhouse gas emissions arising from sources that the company itself owns or controls. These include combustion processes in own installations, own vehicle fleets and direct releases from production processes. They are usually reported in tonnes of CO₂ equivalents (CO₂e) per year.

Delineation from Scope 2 and Scope 3

Scope 2 captures indirect emissions from purchased energy such as electricity, district heat or steam. Scope 3 comprises all other indirect emissions along the value chain, for example in procurement, in transport by third parties and in the use of products. For procurement, the delineation is of practical relevance: emissions from the company's own lorry fleet count towards Scope 1, while those of the forwarding agent count towards Scope 3. In practice, the greatest lever for many industrial companies lies in Scope 3; however, the company's own Scope 1 inventory forms the credible basis for all further-going claims.

- Scope 1: own sources, direct control

- Scope 2: purchased energy
- Scope 3: upstream and downstream, often the largest share

Relevance for technical procurement

Buyers increasingly make decisions through commodity strategy, supplier selection and contract terms that have a direct impact on the emissions inventory. Anyone who evaluates suppliers or supplements supplier segmentation with sustainability criteria should know their own Scope 1 data in order to formulate plausible reduction targets. In addition, many OEMs require cross-Scope information from their suppliers, which in turn must be based on reliable data of their own.

Emission sources: what typically counts as Scope 1

In manufacturing and supplier companies, the main Scope 1 sources can be clearly identified. Their capture follows the categories of the Greenhouse Gas Protocol, which enable a systematic allocation.

Stationary combustion and process emissions

Stationary combustion covers heating boilers, heat generation, melting furnaces, drying ovens and combined heat and power units on the company's own premises. Process emissions arise from chemical or physical transformations, for example in lime burning, metal smelting or the use of reducing agents. These sources are often energy-relevant and can be traced almost completely via meter readings and fuel invoices.

Mobility and fugitive sources

Mobile combustion covers own or leased vehicles, forklifts and internal transport vehicles; attention should be paid to technical consumables such as propane or diesel for test rigs. Fugitive emissions arise, among other things, from refrigerant losses from air-conditioning and refrigeration systems as well as from leaks in compressed air and gas systems. In practice they are often underestimated, but depending on the industry they can account for a considerable share.

- Category 1: stationary combustion
- Category 2: mobile combustion
- Category 3: fugitive emissions (refrigerants, leaks)

Biogenic fuels and biomethane

Emissions from biogenic fuels such as wood or biogas are recorded separately in the inventory, as under common frameworks they are not assessed as fossil but must be reported. For biomethane, proofs and certificates of origin are decisive for eligibility. The detailed rules differ depending on the reporting framework, which is why a case-by-case review is advisable.

Methods and approach for capture

Capture follows a clearly structured process: identify sources, collect activity data, assign emission factors and consolidate the data. The data quality of the master data determines the informative value of the inventory.

Activity data and emission factors

The standard method is: quantity consumed times emission factor equals emissions. Activity data typically come from fuel invoices, meter readings and maintenance records; for refrigerants, charge

quantities and leakage rates are used. Emission factors are taken from national or international factor sets; their selection must be documented, as it significantly influences the result.

Organisational delineation

Before figures are collected, it must be clear which sites, entities and shareholdings are included. The common approaches are Financial Control, Operational Control or Equity Share. In production networks with several sites and rented installations, this delineation determines which furnaces, fleets and refrigeration systems belong in the company's own Scope 1 inventory at all.

Organisation and responsibility in procurement

Although the carbon inventory typically sits with sustainability or controlling, procurement provides important input data: consumption figures from site bills, mileage data of the fleet and information from the supplier network on transport-related emissions. In supplier approval and supplier onboarding, additional information on low-emission delivery concepts can be requested. Those who use e-procurement and supply chain analytics can consolidate consumption and procurement data more quickly and continuously check data quality.

Key KPIs and reporting frameworks

Scope 1 emissions are not considered in isolation but embedded in metrics and frameworks. Buyers should know the customary indicators in order to answer follow-up questions from customers and customer questionnaires confidently.

Absolute and intensity-based metrics

In addition to absolute tonnes of CO₂e, emissions intensity is common, for example CO₂e per unit produced, per million of revenue or per production hour. These metrics make sites and years comparable and support target agreements under Science Based Targets. In practice, a combination of an absolute target figure and an intensity metric has proven its worth.

Reporting frameworks and requirements

Relevant frameworks include, among others, the Greenhouse Gas Protocol, EU sustainability reporting (CSRD/ESRS), ISO 14064 as well as customer enquiries via common questionnaire systems. For companies subject to reporting obligations, Scope 1 and Scope 2 disclosures are a mandatory part of reports; the detailed requirements depend on size and sector affiliation. As legal and tax matters may be affected, binding statements should always be supported by a case-by-case review.

Reduction levers and their effect

Typical levers are the switch from heating oil or LPG to natural gas, biomethane or electrical process heat, electrification of the fleet, heat recovery and the reduction of refrigerant losses. In melting and heat treatment processes, the process and commodity strategy has a long-term influence on energy consumption. Each lever should be assessed via an investment appraisal including a carbon price.

Risks, controls and typical mistakes

The most common problems arise not from a lack of will but from inconsistent data, incorrect delineations and missing documentation. Controls and clear responsibilities effectively prevent this.

Data quality and consistency

Inconsistent units, missing metering points and changing emission factors render year-on-year comparisons worthless. A unit and currency master data concept, as known in procurement for quantity and price data, can be transferred to consumption data: same units, same reference values, clear period allocation. Regular reconciliation with energy invoices and inventory data significantly increases reliability.

Avoiding double counting

Where installations are operated by third parties, leased vehicles are wrongly allocated or joint energy generation is recorded twice, the Scopes become distorted. Lease agreements should be examined to determine whether a finance or operating lease exists and which party exercises control. Where work is transferred to other sites or suppliers, it should also be clarified where the emissions migrate to.

Risks from regulation and customer requirements

Companies must increasingly expect binding reporting obligations, carbon prices and customer requirements. Missing or incorrect Scope 1 data can lead to disadvantages in tenders and supplier evaluations. Clear processes, documented calculation paths and internal controls reduce this risk.

Current developments and levers in procurement

Emissions management and procurement are moving closer together: sites, supply chain and product design are increasingly considered jointly. Buyers who actively use Scope 1 data gain negotiation advantages and act faster in response to customer enquiries.

Digitalisation and transparency

Energy and environmental management systems, automated meter reading and business intelligence evaluations make Scope 1 data continuously available rather than annually. Anyone who links supply chain analytics with internal consumption data detects anomalies such as rising fuel quantities with constant production. This supports both energy cost reduction and emissions mitigation.

Collaboration with suppliers and customers

Even though the supply chain formally falls under Scope 3, both sides benefit from mutual knowledge: OEMs increasingly require Scope-specific disclosures from suppliers, while suppliers benefit from co-development and supplier co-innovation in low-emission processes and materials. In dual-source management, the carbon footprint can be used as an additional criterion alongside price and capacity. Transport and export handling also offer approaches, for example through optimised consignment logistics and consolidation.

Contract and pricing design

Emissions and energy metrics are increasingly incorporated into price adjustment clauses, as energy prices and carbon costs are directly linked. Those who disclose carbon costs transparently in framework agreements and annual call-offs can conduct price discussions on a factual basis. In tenders and requests for proposals too, emissions-related requirements will continue to gain in importance.

Typical metrics

Scope 1 emissions (absolute): in t CO₂e/year

Baseline figure of the inventory; target figure against base year

Emissions intensity: e.g. t CO₂e per €m revenue

makes sites and years comparable

Data coverage: > 95% of recorded sources

Share of sources with complete activity data

Reduction progress: e.g. 4–7% p. a.

customary benchmark for linear target corridors

Practical example

A medium-sized mechanical engineering company with three sites and around 300 employees discovered when responding to a customer enquiry that no reliable Scope 1 data existed. Within one quarter, a baseline inventory was prepared and integrated into the ongoing reporting process.

- Capture of all meter and fuel data including fleet, forklifts and refrigeration systems based on uniform master data
- Agreement of clear responsibilities between procurement, facility management and controlling
- Derivation of measures: heat recovery at the compressed air station, conversion of two heating boilers, electrification of the pre-assembly fleet
- Inclusion of emissions questions in the supplier evaluation system and in the annual supplier approval

Conclusion

Scope 1 emissions form the foundation of any corporate inventory: they lie within one's own control, are readily measurable and are a mandatory component in almost all reporting frameworks. For technical buyers this creates concrete tasks, from data provision to supplier evaluation and pricing. Those who handle delineations cleanly, ensure data quality and systematically evaluate reduction levers can meet customer requirements and reduce risks. The view should always extend beyond one's own fence, because without context on Scope 2 and Scope 3 the picture remains incomplete. Companies that master Scope 1 create the foundation for credible sustainability targets across the entire supplier network.

Frequently asked questions

What counts as Scope 1 emissions?

These include all direct greenhouse gas emissions from own sources: stationary combustion such as heating boilers and furnaces, process emissions from manufacturing, own vehicles and fugitive sources such as refrigerant losses. Leased assets may also be relevant depending on the control approach. The decisive factor is that the company itself owns or controls the emission source.

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

Scope 1 covers direct emissions from own facilities and vehicles, Scope 2 the indirect emissions from purchased energy such as electricity or district heat. Scope 3 comprises all other indirect emissions along the value chain, for example in procurement, in transport by third parties and in the use of products. In practice, for many industrial companies the largest share falls to Scope 3.

How do you calculate Scope 1 emissions?

The standard method is: activity data times emission factor. Activity data are quantities of fuel consumed, mileage or refrigerant charge quantities; the factors come from recognised factor sets. The result is reported and documented in tonnes of CO₂ equivalents per year.

Are leased vehicles Scope 1?

This depends on the control allocation: operating leases are usually captured as Scope 1 when the company exercises control over the vehicle, whereas finance lease accounting may be treated differently. Here, too, a case-by-case review and consistent application across the entire fleet is decisive. Where the delineation is unclear, an alignment with the reporting framework and, if applicable, the auditors helps.

Why are Scope 1 emissions relevant to buyers?

Buyers influence energy consumption and thus direct emissions through site decisions, supplier selection and contracts. Moreover, they must respond to customer enquiries about climate data and take sustainability criteria into account in supplier evaluations. Without a sound Scope 1 baseline of their own, credible targets and comparisons within the supplier network are hardly possible.

How can Scope 1 emissions be reduced?

Typical levers are fuel switching, electrification of the vehicle and forklift fleet, energy efficiency measures such as heat recovery and the reduction of refrigerant losses. In energy-intensive processes, the optimisation of furnace and treatment times also counts. Each measure should be assessed via an investment appraisal that includes a carbon price.