

Product Environmental Footprint (PEF): systematically capturing and managing the product environmental footprint

The Product Environmental Footprint (PEF) is a methodology developed by the European Commission for the standardised measurement of the environmental footprint of products across their entire life cycle. It defines binding rules for system boundaries, impact categories and data quality, thereby ensuring that environmental claims from different suppliers become comparable. For buyers and suppliers in the DACH industrial sector, the PEF is becoming increasingly relevant because customers are demanding evidence of product environmental footprints along the supply chain and regulatory requirements such as the Green Claims Directive and the Ecodesign Regulation build upon it. Anyone who understands the fundamentals of the PEF can realistically assess supplier data and critically review environmental communication.

Key facts

- The PEF is based on a life cycle assessment (LCA) according to ISO 14040/14044, supplemented by harmonised rules from the EU Commission.
- Typically, 16 impact categories are reported, including climate change, resource use, water consumption and particulate matter formation.
- Product Environmental Footprint Category Rules (PEFCR) define product-group-specific requirements for system boundaries and calculations.
- Data quality is assessed according to PEF tiers 1 to 5; primary data collected close to the process are regarded as higher quality.
- In practice, the costs of a PEF-compliant study for a complex industrial product are frequently in the five-figure range, depending on data availability and system boundaries.
- For procurement, a growing effort arises to obtain raw data from the supply chain, for example energy consumption and transport distances.

Definition: Product Environmental Footprint (PEF)

The Product Environmental Footprint is an EU methodological requirement for quantifying the environmental impacts of a product over its entire life cycle, from raw material extraction through production and use to disposal or recycling.

Delineation from classic life cycle assessment

The PEF uses the LCA foundation of ISO 14040/14044 but goes beyond it by laying down calculation rules, impact models, data quality requirements and review procedures in a binding manner. While two LCA studies according to ISO can produce different results despite the same standard, the PEF is intended to establish comparability. This is central for procurement: only comparable values allow a proper supplier assessment and a sound sourcing decision. At the same time, the PEF remains a

method for impact presentation, not a certification system in the strict sense.

Organisation Environmental Footprint (OEF)

In addition to the product footprint, the EU Commission defines the Organisation Environmental Footprint (OEF) as the counterpart at company or organisational level. The OEF assesses sites and entire organisations, the PEF individual products. In practice, the two complement each other: a supplier can provide partial values for PEF requests from its customers on the basis of its OEF results. Buyers should distinguish precisely in requests whether a product or a company-level verification is required, as the data landscape and the costs vary considerably.

Legal and normative context

The PEF was developed as part of the EU Environmental Footprint pilot programme and has since been flowing into regulatory initiatives, among others the concept of digital product passports and requirements for environmental claims. Legal binding effect arises only through specific regulations or product standards, not through the methodology itself. Whether and how PEF requirements apply to a product group must always be examined on a case-by-case basis and with legal or compliance departments. For supply contracts, it can be sensible to address data provision obligations and liability issues relating to environmental data in the terms and conditions of purchase.

Methods and procedure for preparing a PEF

A PEF study follows a fixed sequence: goal definition, inventory analysis, impact assessment, interpretation and critical review. The product-group-specific PEFCR stipulate which process steps are to be mapped with primary or secondary data.

System boundaries and life cycle phases

The PEF fundamentally requires consideration of the entire life cycle: raw materials, upstream products, manufacturing, packaging, transport, use and end-of-life. Depending on the product group, the PEFCR allow individual phases to be narrowed down more closely if they are negligible. For industrial goods that are resold in the B2B sector without a defined use process, the use phase is frequently a crystallisation point: who uses the product, with what energy consumption, over what service life? Here, procurement needs agreements with customers and sales, otherwise assumptions are used that strongly distort the result.

Primary and secondary data and data quality

Primary data are measured values from one's own operations or from suppliers, for example electricity consumption, material inputs or emissions. Secondary data come from databases and averages. The PEF assesses data quality on a scale of 1 to 5, where tier 1 denotes data collected close to the process and currently. In practice, the main effort lies less in the calculation than in data procurement: one's own data control over master data and consumption values must be structured so that reliable values are retrievable per item and work step. This is where the connection to the procurement data model becomes apparent, which must keep material master records, plant data and supplier references consistent.

Critical review and documentation

PEF studies used for comparative purposes or in communication are typically subject to independent review by external verifiers. The scope of the review depends on the use: internal studies are easier to

handle, publication-ready studies require complete documentation including data origin and assumptions. For buyers, this means: when a supplier presents PEF results, it is worth reviewing the documentation of the associated verification. A study without proof of review and without disclosed assumptions should be used with caution for comparative statements or sourcing decisions.

Key KPIs and impact categories in the PEF

The PEF reports 16 impact categories by default, each based on defined calculation models. For procurement, those categories are particularly actionable that can be influenced by sourcing decisions.

The key impact categories

The best-known category is climate change, expressed in kilograms of CO₂ equivalent per functional unit. In addition, resource use, water consumption, acidification, eutrophication, particulate matter formation, ozone depletion and toxicity indicators should be mentioned. For metal and mechanical engineering products, climate change and resource use often dominate in practice, driven by steel, aluminium and energy consumption. For chemical products, toxicity and water categories carry greater weight. The functional unit, for example a specific performance over a defined service life, is the reference anchor for all values and must be identical in supplier comparisons.

Deriving procurement KPIs

Procurement KPIs can be derived from PEF results, for example the CO₂ footprint per procurement volume, the share of suppliers with validated environmental data or the share of materials with a documented recycling rate. Such KPIs are suitable for supplier rating and can be embedded in incentive models for innovation when suppliers are to be rewarded for documented improvements in the product footprint. Proper classification is important: benchmarks such as a share of over 80 per cent of suppliers with data provision obligations within two years are realistic targets, not an industry standard.

Risks and controls in handling PEF data

PEF data are only as good as the underlying information. For procurement, risks arise from data gaps, exaggerated environmental claims and contractual ambiguities about responsibilities.

Data gaps and secondary data risks

When suppliers cannot provide reliable primary data, studies fall back on database averages. These do not reflect the actual performance of a specific supplier but lead to seemingly precise results. The consequence is a distortion in supplier assessment: an efficient supplier with poor data availability may perform worse than an inefficient one with a good data set. Control measure: document data quality as a separate criterion in pre-qualification and make progress in data provision measurable, for example via the share of suppliers with tier-1 or tier-2 data.

Greenwashing and legal risks

Environmental claims without a reliable basis can be classified as unfair commercial practices. The EU is working on tightening measures, for example through rules against unsubstantiated environmental claims. For procurement, this means: product advertising and customer claims about the footprint should be based on verified PEF or LCA results. Anyone supplying environmental data to customers as a supplier should regulate liability rules, the confidentiality level of the data and usage rights contractually, ideally in the terms and conditions of purchase or in specific supplementary agreements.

The legal assessment must always be examined on a case-by-case basis.

Cost and effort risks

PEF studies are personnel- and cost-intensive. Without clear prioritisation, there is a risk of parallel requests from different customers with sometimes diverging requirements that overload the team. Established controls include bundling similar requests, building reusable data models per material group and prioritising by business volume. Within the framework of zero-based budgeting, the PEF effort can be critically weighed against the expected business benefit each year rather than carried forward as a fixed item.

Current developments and outlook

The PEF is evolving from a scientific methodology into a practically relevant compliance and procurement topic. Drivers are the EU sustainability agenda, digital product passports and growing customer demand for reliable environmental data.

Digital product passports and automation

The EU Digital Product Passport initiative provides for certain product groups to make environmental information available in machine-readable form. PEF-compliant data form a logical basis here. For buyers, this means in the long term that environmental data will increasingly become part of the material master and of procurement processes. Early investments in a clean data structure in the procurement data model pay off because they significantly facilitate the later obligation to provide data.

Significance for supplier relationships and strategy

Environmental data are becoming a quality criterion alongside price and delivery reliability. In practice, PEF capabilities increasingly decide admission to the supplier pool, particularly among OEMs in the automotive and mechanical engineering industries. Buyers pursuing supplier consolidation can use environmental aspects as an additional criterion to reduce the number of suppliers while at the same time lowering the data procurement effort. Early Early Supplier Involvement in new developments makes it possible to anchor footprint optimisations in the design phase, where they are most effective.

Typical metrics

Suppliers with validated environmental data: > 80 %

typical target benchmark for strategic suppliers within two years

Share of primary data (tiers 1–2) in the inventory analysis: > 50 %

in practice the starting point is often significantly lower; increases with the maturity of data management

CO2 equivalent per functional unit: individual

no industry benchmark; comparison only meaningful within an identical functional unit and PEFCR

Practical example

A mid-sized mechanical engineering company receives a request from a major customer to provide the Product Environmental Footprint for an assembly. Without its own data structure, this would be hardly manageable. The company begins by prioritising according to volumes and material shares.

- Building a material group database with energy consumption and emission factors per workpiece,

linked to the procurement data model.

- Request to the ten most important suppliers to provide primary data, integrated into the pre-qualification of new suppliers.
- Negotiating an incentive rule: suppliers with validated data and demonstrably reduced footprints receive preferential treatment in price negotiations.
- Critical review of an externally prepared PEF study, including assumptions on the use phase, coordinated jointly with the customer.

Conclusion

The Product Environmental Footprint is more than a calculation method: it creates a common language for environmental data along the supply chain and makes environmental impacts relevant to procurement. For buyers, the core of the work lies in data procurement and data quality, not in the calculation itself. Those who involve suppliers early, build clean data structures and clarify contractual responsibilities significantly reduce risks and effort. Regulatory developments indicate that PEF-related requirements will become a permanent part of procurement processes. Early preparation is therefore strategically sensible.

Frequently asked questions

What is the Product Environmental Footprint (PEF)?

The PEF is a methodology developed by the European Commission for measuring the environmental footprint of products across their entire life cycle. It is based on the life cycle assessment according to ISO 14040/14044, supplemented by binding rules on system boundaries, impact categories and data quality. Its aim is to make environmental claims for different products and suppliers comparable.

Which impact categories does the PEF include?

By default, the PEF reports 16 impact categories, including climate change, resource use, water consumption, acidification, eutrophication, particulate matter formation and toxicity indicators. Different categories dominate depending on the product group. For industrial products, climate change and resource use are usually the most actionable categories in practice.

What is the difference between PEF and LCA?

LCA is the general life cycle assessment methodology according to the ISO standards; the PEF is an EU-specific concretisation of it. The PEF lays down calculation rules, data quality requirements, system boundaries and review procedures in a binding manner, whereas the ISO standard leaves scope for design. As a result, PEF results are more comparable, but also more resource-intensive to produce.

Is the PEF mandatory for companies?

The PEF methodology itself is not generally legally binding. However, legal obligations may arise from specific EU regulations or product rules, for example in the context of digital product passports or rules on environmental claims. Whether and when an obligation applies to a particular product group must be examined on a case-by-case basis with legal or compliance departments.

What are PEFCR?

Product Environmental Footprint Category Rules are product-group-specific rules that set out how the PEF is to be applied to a particular category such as textiles, batteries or metal products. They define

system boundaries, functional units, data requirements and review steps. Only results obtained under the applicable PEFCR are robustly comparable within the product group.

What role does the PEF play in procurement?

The PEF turns environmental impacts into an assessable criterion alongside price, quality and delivery performance. Buyers use PEF data for supplier rating, for sustainability requirements in requests for quotation and as a basis for customer claims. The main effort lies in obtaining qualified data from the supply chain, which requires early integration into pre-qualification and supplier development.