Konsido ApS
Haslegårdsvej 8, D34
8210 Aarhus V
T.: +45 22 82 85 13
CVR: 41978198

Konsido KLIMA Methodology

Version 1.0, January 2026

Table of contents

1. Introduction

Managing greenhouse gas (GHG) emissions requires a full view of an organization's climate footprint across Scope 1, Scope 2, and Scope 3 — the foundation for credible climate action in line with Europe's net-zero ambitions. Konsido's methodology is designed to deliver exactly that: **a complete and transparent climate account covering all scopes**, with particular depth where it matters most — the complex world of Scope 3 and especially purchased goods and services.

For public authorities, municipalities, and large private entities, Scope 3 often represents the majority of emissions and remains the hardest to measure. Konsido addresses this challenge through a combination of **invoice-based spend data, automated categorization** with **continuous human quality assurance,** and **Input-Output Life Cycle Assessment** (IO-LCA). This approach allows organizations to capture their full footprint — from direct fuel use and electricity consumption to the broad spectrum of supplier-driven impacts — in a consistent and scalable way.

The methodology is designed to meet the growing expectations of transparency, traceability, and comparability embedded in European sustainability policies. It aligns with recognized standards such as the **Greenhouse Gas Protocol** and **the European Sustainability Reporting Standards** (ESRS), ensuring that results can serve both compliance and strategic decision-making purposes.

By adopting Konsido's methodology, organizations gain not only a reliable climate account but also a decision-support tool for managing procurement, engaging suppliers, and planning their transition toward a low-carbon economy.

---

2. Standards and frameworks

Konsido's methodology is grounded in recognized international and European frameworks to ensure credibility, comparability, and audit-readiness. The GHG Protocol is used because it is the dominant global standard for calculating greenhouse gas emissions and is referenced as the methodological basis within the European Sustainability Reporting Standards (ESRS).

The Corporate Sustainability Reporting Directive (CSRD) establishes the legal requirement for sustainability reporting in the EU, while the ESRS define how organizations must report in order to comply with the CSRD. Konsido aligns its methodology with the ESRS to ensure that climate accounts meet CSRD requirements, including expectations related to structure, transparency, and auditability. By aligning with both, Konsido ensures that results are scientifically consistent, regulatorily relevant, and directly usable for European climate reporting.

2.1 The Greenhouse Gas Protocol (GHG Protocol)

The GHG Protocol is the most widely used global standard for GHG accounting. It defines three categories ("scopes") of emissions (see Figure 1):

- **Scope 1**: Direct emissions from owned or controlled sources.
- **Scope 2**: Indirect emissions from purchased energy.
- **Scope 3**: All other indirect emissions across the value chain, including procurement.

The Scope 1–2–3 structure matters because it helps organizations understand which emissions they control directly and which they influence indirectly, allowing them to target the right types of reduction actions.

Konsido's methodology covers all three scopes, but emphasis is placed on **Scope 3 Category 1: Purchased goods and services,** which is typically the largest contributor for clients. This ensures a complete and realistic understanding of climate impact, rather than a narrow focus on the easiest-to-measure sources.

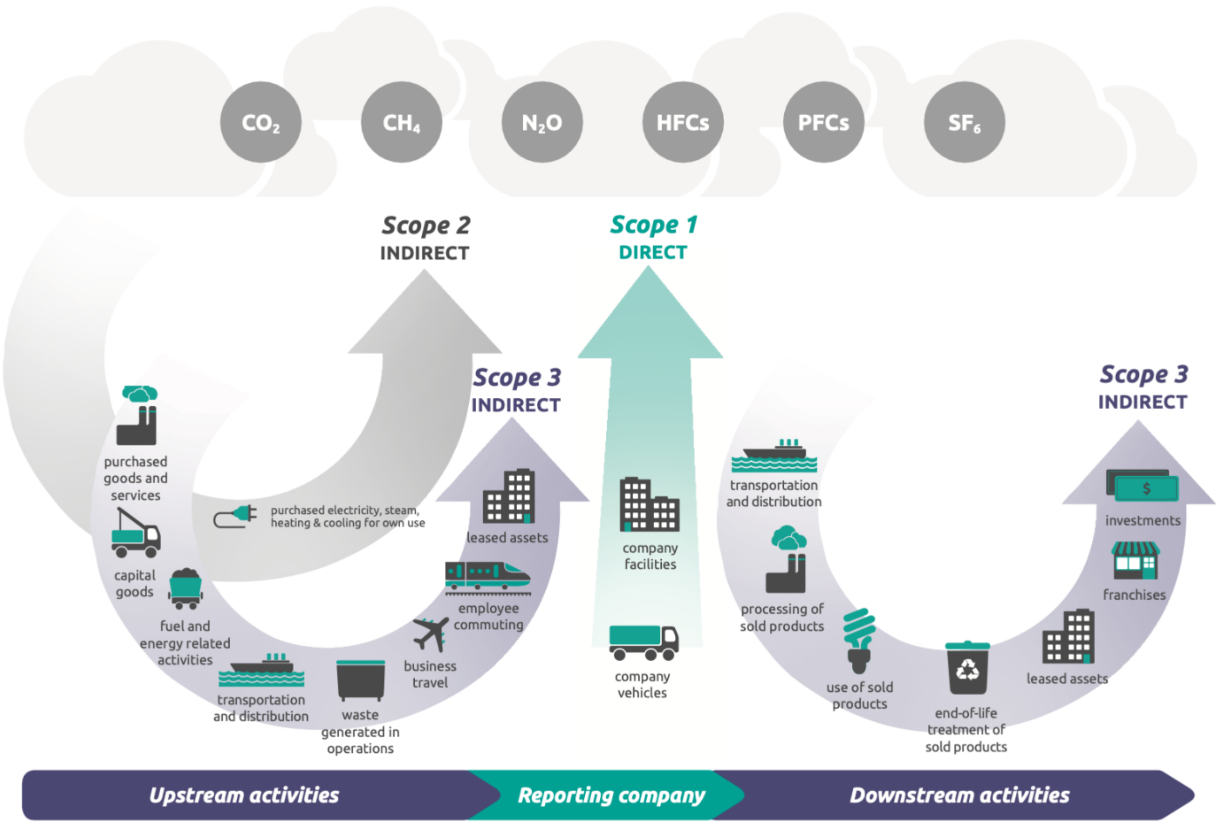

Figure 1 Scopes 1, 2, and 3

2.2 EU sustainability reporting (CSRD and ESRS)

The **Corporate Sustainability Reporting Directive (CSRD)** is the EU legal framework for mandatory sustainability disclosures. It defines what organizations are required to report, places climate reporting on par with financial reporting, and introduces mandatory external assurance.

To operationalize the directive, the EU has developed the **European Sustainability Reporting Standards (ESRS)** — a comprehensive set of environmental, social, and governance reporting requirements. **ESRS E1** specifies how organizations must report on climate change, including emissions categorization, data quality, mitigation plans, and transition strategy.

From 2025 onward, large EU companies must report under CSRD, with additional categories of organizations phased in over the following years. Many public authorities and institutions also choose to align with ESRS to ensure transparency, comparability, and preparedness for future regulatory obligations.

Konsido's methodology is fully aligned with CSRD and ESRS requirements. It enables organizations to:

- Identify and justify **material Scope 3 categories**
- Ensure **consistent and comparable reporting** across departments and suppliers
- Provide auditors with **transparent, traceable, and reproducible** calculations

This alignment ensures that climate accounts produced with Konsido support both regulatory compliance and strategic decision-making

---

3. Data foundation

Reliable carbon accounting begins with reliable data. Konsido's methodology is built on procurement transactions, specifically **invoices and credit notes**. These reflect what an organization purchases, making them the most complete available data source for organizational activities.

3.1 Invoice data

Each invoice provides key information, including:

- Supplier name and registration number
- Transaction value and currency
- Purchase description
- Date
- Organizational department

The data is obtained from client-provided extracts of ERP systems or from e-invoicing platforms. Using financial transactions as the basis ensures that no categories of spend are overlooked.

3.2 Konsido1000 categorization

Once collected, invoice lines are processed through Konsido's proprietary **Konsido1000 categorization system**.

- It contains appr. **1,000 categories**, organized in **three hierarchical levels** (e.g. "Food products → Dairy products → Milk").
- The system is specifically designed for procurement analysis, offering a great product resolution.
- Categorization is automated and tailored to **Nordic and European procurement contexts**, with structures and rules continuously updated to capture differences in supplier descriptions and languages.

The result is a structured spend dataset that forms the foundation for emissions mapping.

3.3 Data quality assurance

Konsido applies several measures to ensure categorization accuracy and overall data quality:

- **Algorithmic confidence scoring** with thresholds for human review,
- **Manual sampling and correction** on a rolling basis,
- **Continuous improvement loop** where corrections are fed back into future categorization updates.

This process typically achieves a **categorization accuracy above 95%**, which is essential for ensuring credible emissions calculations.

---

4. Emissions calculation methodology (Potential Database)

With structured spend data in place, Konsido links organisational activity to greenhouse gas emissions by applying appropriate emission factors at invoice-line level. Depending on the information available, activity is represented either in **monetary terms** or in **physical units**, which determines the applicable calculation method.

4.1 Spend-based vs. Activity based emission factors

All emission accounting approaches aim to connect an organisation's activities to the greenhouse gas emissions occurring along the corresponding supply chains. These activities can be described in different ways, depending on data availability and the required level of precision.

Konsido applies two complementary approaches:

- **Spend-based emission factors**, where activity is represented by monetary expenditure
- **Activity-based emission factors**, where activity is represented by physical quantities

Both approaches are scientifically established and widely used in life cycle assessment. They differ primarily in how activity is measured, the level of precision they provide, and the completeness of system coverage.

LCA approach	Input–output LCA (IO-LCA)	Process-based LCA	Product LCA / EPD
Type of emission factor	Spend-based	Activity-based	Activity-based (verified)
Activity representation	Monetary expenditure	Physical quantities	Physical quantities
Typical unit	kg CO_2eq / DKK	kg CO_2eq / unit	kg CO_2eq / declared unit
Typical application	Complete Scope 3 coverage, baselines, hotspot identification	Targeted analysis of high-impact activities	Product-level assessment, supplier engagement
Main strengths	Complete system coverage; applicable to all purchases	High precision; reflects actual production processes	High credibility; externally verified
Main limitations	Sector averages; low product specificity	Incomplete system boundaries; data-intensive and costly	Limited availability; narrow scope

Table 1 Spend-based and activity-based emission factors comparison.

Spend-based emission factors are derived from **input–output life cycle assessment (IO-LCA)**, a top-down method that allocates economy-wide emissions to industries based on monetary flows. Emissions are expressed per unit of currency (e.g. kg CO_2eq/DKK). This approach ensures complete coverage of purchased goods and services, but results reflect sector-level averages rather than product-specific characteristics.

Activity-based emission factors express emissions per physical unit of activity (e.g. kg CO_2eq/kg, kg CO_2eq/kWh). They are typically derived from **process-based life cycle assessment**, a bottom-up approach that models emissions based on specific production processes. This method provides higher precision but is limited by data availability and system boundaries. Where available, **Environmental Product Declarations (EPDs)** provide ready-to-use, externally verified activity-based emission factors.

In practice, activity-based emission factors are applied when sufficient physical data and reliable product- or process-specific emission factors are available. When such data is missing, spend-based emission factors are used to ensure complete emissions coverage.

For service-oriented organisations, most emissions typically arise in **Scope 3 purchased goods and services**. Due to the absence of physical quantities or product-specific emission factors for the majority of invoices, most emission calculations are therefore based on spend-based emission factors. A logic tree is used to determine the applicable method for each invoice line.

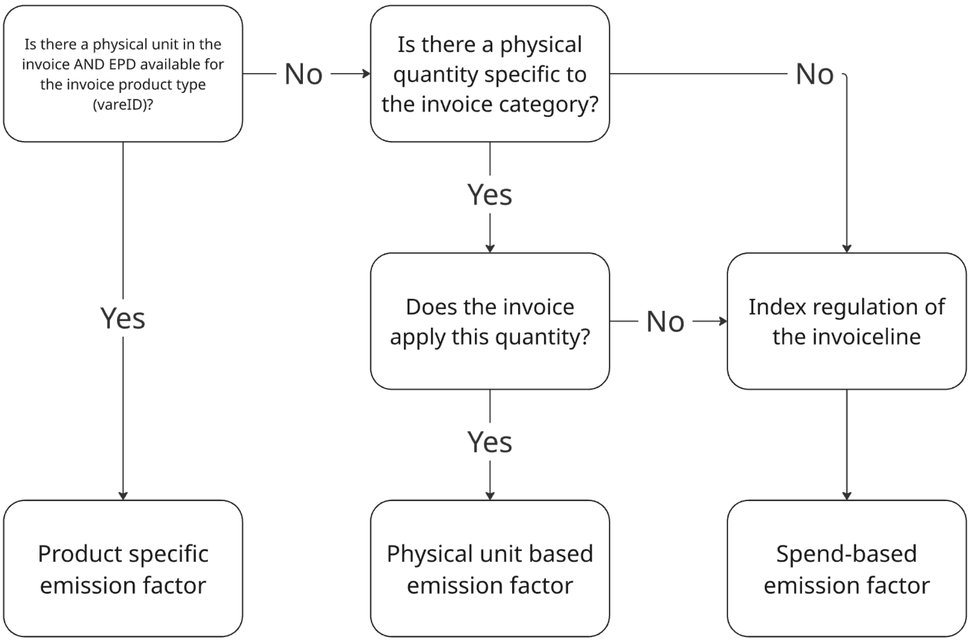

Figure 2 A logic tree to determine method for emissions calculation.

4.2 Tracing changes in emissions

A key objective of organizational carbon accounting is to support emission reductions over time. Whether changes in emissions can be meaningfully traced from year to year depends on the underlying accounting method and the type of data available.

Activity-based emissions calculations

Activity-based emissions are calculated using physical units (e.g. kilograms of material, kilowatt-hours of energy) multiplied by an emission factor per physical unit (e.g. kg CO_2e per kg). When consistent physical activity data is available, changes in consumption are directly reflected in reported emissions. Reducing the quantity of a product or service therefore leads to a proportional reduction in calculated emissions.

This makes activity-based accounting well suited for tracking changes over time at product or process level, provided that sufficiently detailed and stable data exists.

Spend-based emissions calculations

Spend-based emissions calculations, including input-output life cycle assessment (IO-LCA), express emissions per monetary unit (e.g. kg CO_2e per DKK). When applied professionally, monetary data is normalized for inflation and currency effects to ensure comparability across years.

Even with such normalization, spend-based accounting has structural limitations for tracing emission reductions. IO emission factors represent average emissions of economic sectors, not the emissions of specific suppliers, products, or contracts. As a result, real-world changes at supplier level — such as improvements in energy efficiency, fuel switching, or process optimization — are typically not visible in year-to-year results.

In addition, IO databases are based on historic economic and production data and are updated infrequently. This creates a time lag between real changes in global supply chains and their reflection in emission factors.

Illustrative example: tracing changes using spend-based accounting

Consider a simple procurement example: the purchase of pens.

In year 1, a company purchases pens for a total of 500 DKK. The invoice contains no information on the quantity purchased, and no product-specific carbon footprint (e.g. EPD) is available for the brand or model. Using an IO-LCA database, an average emission factor for *office supplies* is applied, expressed as kg CO_2e per DKK spent. Based on this factor, the purchase is estimated to result in approximately X kg CO_2e.

In year 2, three underlying parameters of the purchase may change independently: quantity, price, and product carbon footprint. The implications for reported emissions differ significantly depending on which parameter changes.

Change in quantity

Assume that in year 2 the company purchases twice as many pens, of the same type and at the same unit price. The total invoice amount doubles to 1,000 DKK. Because spend-based emissions are proportional to monetary value, the calculated emissions also double. In this case, the reported change correctly reflects the real-world increase in emissions, as physical consumption has increased proportionally.

Change in price

Assume instead that the company purchases the same quantity and type of pens, but the supplier doubles the price. The invoice amount again doubles to 1,000 DKK, leading to a doubling of calculated emissions in a spend-based model. In reality, however, physical consumption and actual emissions remain unchanged. The reported increase in emissions therefore does not reflect a real increase, but only a change in price.

Change in product carbon footprint

Finally, assume the company purchases the same quantity of pens at the same total price, but switches to a lower-carbon alternative (e.g. recycled or eco-labeled pens). In reality, emissions decrease. However, because the spend and category remain unchanged, the spend-based calculation reports the same emissions as in year 1. The real reduction is therefore not visible in the results.

This example illustrates a fundamental characteristic of spend-based IO carbon accounting: only changes in physical consumption that affect total spend are reliably reflected in reported emissions. Changes in price or product-specific carbon intensity are not captured

Implications for interpretation

The limitations illustrated above are inherent to all spend-based input-output (IO) carbon accounting approaches and are not specific to Konsido's methodology. Accurate year-to-year tracking of emission reductions requires access to physical quantities and/or verified product-specific emission factors. In their absence, spend-based results should be interpreted as indicators of exposure to average supply-chain emissions rather than precise measurements of realized emission reductions. At present, no comprehensive and frequently updated databases exist that allow precise attribution of year-to-year emission changes to specific organizational actions across all purchased goods and services.

Spend-based accounting is therefore best suited for:

- establishing a complete and consistent emissions baseline,
- identifying emission-intensive procurement categories ("hotspots"),
- supporting prioritization and strategic engagement with suppliers.

Interpreting spend-based results as precise measurements of realized emission reductions is not appropriate without additional data. Tracking the direct effects of specific reduction measures requires access to physical quantities, supplier-specific emission factors, or verified product life cycle assessments (LCAs), which can be applied selectively in material categories where such data is available.

4.3 Databases used

Konsido's emissions calculations are based on a combination of internationally recognized, European, and nationally specific emission factor databases. This multi-source approach ensures high coverage across all procurement categories while maintaining regional relevance and scientific credibility.

No single database can provide both full coverage and high precision across all goods and services. Konsido therefore applies a structured database hierarchy, combining global input-output models with more specific European and Danish data where available, and supplementing these with product-level life cycle assessments when appropriate.

4.3.1 Input-output (spend-based) databases

For spend-based emissions calculations, Konsido primarily relies on multi-regional input-output (MRIO) databases. These databases allocate global greenhouse gas emissions to economic sectors based on monetary flows between industries and regions.

EXIOBASE AND KLIMAKOMPASSET

EXIOBASE is a scientifically peer-reviewed, multi-regional input-output (MRIO) database developed by a consortium of European research institutions. It provides environmentally extended economic accounts that link monetary transactions to greenhouse gas emissions across many industries and countries. EXIOBASE is widely recognized as a reference database for spend-based Scope 3 accounting.

In Konsido's current production methodology, spend-based emission factors are primarily sourced from Klimakompasset, the Danish climate database. Klimakompasset is based on EXIOBASE, but adapted and curated to reflect Danish and European conditions, including national energy systems, consumption patterns, and sector structures. This makes it more regionally relevant than direct use of global average EXIOBASE data in a Nordic and European procurement context.

Klimakompasset is therefore used to:

- Ensure complete coverage of purchased goods and services,
- Calculate Scope 3 Category 1 emissions where activity-based data is unavailable,
- Reflect regional production and energy mixes more accurately than global averages,
- Maintain alignment with Danish public-sector and regulatory reporting practices.

Because Klimakompasset builds on EXIOBASE, the underlying methodological foundation remains a globally recognized MRIO framework, while benefiting from national adaptation and quality control. This combination improves both completeness and regional relevance of spend-based emission estimates.

Konsido continuously monitors updates to EXIOBASE and related MRIO datasets. As newer versions of EXIOBASE become available and auditor expectations increasingly favour direct use of primary databases, Konsido plans a gradual transition toward direct integration of EXIOBASE emission factors where this improves transparency, comparability, and methodological robustness. Any such transition will be documented and managed to preserve year-on-year comparability of reported emissions.

The EU27 and DK input-output (IO) database

The EU27 and Denmark (DK) input-output (IO) database describes economic transactions between industries at European and national level and is extended with environmental data to support greenhouse gas accounting. The database is based on official European and national economic statistics and reflects production structures and energy systems relevant to the EU and Denmark.

The EU27 and DK IO database is applied in categories related to:

- Purchased goods and services with predominantly European supply chains
- Activities where regional production structures significantly influence upstream emissions
- Categories where European or Danish averages provide higher accuracy than global IO data

Using EU27 and DK input-output data improves alignment with European and Danish economic conditions compared to global averages, resulting in more regionally representative emission estimates.

4.3.2 National and regional databases

Where nationally specific emission factors are available, Konsido prioritizes these over European or global averages to improve accuracy and relevance.

Klimadatabase

The Danish Klimadatabase provides emission factors tailored to Danish conditions, including energy systems, transport, waste, and selected goods and services. The database is maintained by Danish public authorities and research institutions and is widely used in national climate reporting.

Konsido applies Danish emission factors when:

- The activity clearly takes place within Denmark

• National data provides higher precision than international averages

• Alignment with Danish reporting practices is required

DCA – Nationalt Center for Fødevarer og Jordbrug

For food and agricultural products, Konsido integrates emission factors developed by DCA at Aarhus University. These datasets are based on detailed life cycle assessments of agricultural production and food systems and reflect Danish and Northern European production conditions.

These factors are primarily applied to:

- Food products and catering
- Agricultural raw materials
- Selected bio-based products

4.3.3 Activity-based and proprietary LCA data

Where sufficient information is available (e.g. physical quantities and product specifications), Konsido applies activity-based emission factors derived from product life cycle assessments.

This includes:

- Environmental Product Declarations (EPDs) from recognized programs
- Supplier-specific LCA data where verified and comparable
- Konsido's own LCA calculations developed in collaboration with external experts, including Green Survey

Proprietary LCAs are developed following recognized LCA standards (ISO 14040/44) and are used selectively for high-impact products where increased precision materially improves decision-making.

4.3.4 Database hierarchy and consistency

To ensure consistency, comparability, and auditability, Konsido applies a clear hierarchy when selecting emission factors:

1. Verified activity-based product data (EPDs or equivalent)
2. National emission factor databases
3. European IO databases
4. Global IO databases

Each invoice line is mapped to a single emission factor according to this hierarchy, ensuring that emissions are neither double-counted nor inconsistently calculated across reporting periods.

Databases are reviewed and updated regularly as new versions become available. Historical results are preserved to maintain year-on-year comparability, while methodological changes are transparently documented.
