



Freight / Logistics Calculator

Freight & Logistics Carbon Calculator

Methodology, Assumptions & Data Sources

Overview

This calculator quantifies the greenhouse gas emissions (CO₂e) associated with the transportation of goods; intended for use in research, carbon audits, supply chain assessments, and reporting.

It follows recognised carbon accounting principles and uses emissions conversion factors from the UK Government (DESNZ/DEFRA) greenhouse gas reporting dataset.

All emission factors are based on average laden (loaded vehicle) conditions and include upstream (well-to-tank, WTT) emissions, ensuring consistency with standard UK methodology and alignment with the GHG Protocol and ISO 14064.

The model is designed to provide:

- **Credible, activity-based emissions estimates**
- **Consistency across transport modes**
- **Practical usability for businesses and individuals**

Scope & Boundaries

This calculator captures emissions associated with the movement of goods across key transport modes.

Included:

- Road freight
- Sea freight
- Air freight
- Rail freight (where applicable)

Excluded:

- Warehousing and storage emissions
- Packaging and product manufacturing
- Last-mile delivery variations (unless specifically included)

Methodological Approach

All emissions are calculated using:

Freight Weight × Distance × Emission Factor = Emissions (kgCO₂e)

This reflects standard logistics carbon accounting practices based on **tonne-kilometre (t.km)** modelling.

Emission factors are sourced directly from:

- Department for Environment, Food & Rural Affairs
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These factors incorporate:

- Vehicle efficiency
- Fuel type
- Typical load factors
- Upstream (well-to-tank) emissions where applicable

Transport Modes

Road Freight

- Based on vehicle class and load assumptions
- Uses DEFRA freight-specific factors (not passenger data)

Sea Freight

- Based on typical containerised or bulk shipping
- Reflects high efficiency per tonne-km

Air Freight

- Significantly higher emissions per tonne-km
- Used for time-sensitive or perishable goods

Rail Freight

- Lower emissions than road freight where available
- Reflects electrification and fuel mix

Data Inputs

Users are required to input:

- Weight of goods (kg or tonnes)
- Distance travelled (km)
- Transport mode

Assumptions

- Average load factors and utilisation rates are applied
- Default emission factors represent typical UK and international conditions
- Transport routes are assumed to be direct unless otherwise specified

Data Quality & Accuracy

This model is based on **activity-based data**, which represents a higher level of accuracy compared to spend-based estimation methods.

Results are:

- **Directly linked to physical transport activity**
- **Consistent with recognised freight emissions methodologies**
- **Suitable for use in carbon reporting and offsetting when supported by appropriate input data**

Appropriate Use

The calculator is suitable for:

- Estimating emissions from freight and logistics activities
- Supporting Scope 3 emissions reporting (transport and distribution)
- Comparing transport modes and identifying reduction opportunities
- Informing carbon reduction strategies within supply chains
- Quantify emissions for voluntary carbon offsetting

Limitations

- Results depend on the accuracy of input data (weight, distance, mode)
- Does not account for:
 - specific vehicle efficiencies
 - route optimisation
 - empty return legs (unless included in assumptions)
- Emission factors represent averages and may not reflect individual logistics providers

Use in Carbon Audits

This calculator can be used as:

- A primary tool for estimating freight-related Scope 3 emissions
- A supporting dataset within an ISO-aligned carbon audit
- A method for quantifying transport-related emissions across supply chains

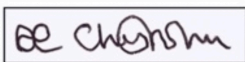
When supported by appropriate documentation, outputs align with reporting expectations under ISO 14064.

Final Note

This methodology provides a **robust, activity-based approach to freight emissions estimation**, offering a high level of credibility while remaining practical for real-world application.

It enables businesses to:

- understand transport-related emissions
- make informed logistics decisions
- and integrate freight into wider carbon management strategies



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