

Compass Carbon Reporting

Carbon Methodology Documentation

Document Version	Date Last Reviewed / Amended <i>(see Master Document Register for notes)</i>
V1	05/10/2026

Blank page

Document Version	Date Last Reviewed / Amended <i>(see Master Document Register for notes)</i>
V1	05/10/2026

Contents

Contents:.....

Error! Bookmark not defined.

i. Table of Acronyms

4

1. Overview

5

2. Methodology

6

a. Road Freight

6

b. Air Freight.....

6

Document Version	Date Last Reviewed / Amended <i>(see Master Document Register for notes)</i>
V1	05/10/2026

i. Table of Acronyms

ACRONYM	MEANING
EASA	European Union Aviation Safety Agency
GCD	Great Circle Distance
LTO	Landing and Take Off
MCC	Mean Cargo Capacity
MCE	Mean Carbon Emissions
MCF	Mean Carbon Factor
MFE	Mean Fuel Expenditure
MPE	Mean Path Emissions
TTW	Tank to Wheel

Document Version	Date Last Reviewed / Amended <i>(see Master Document Register for notes)</i>
V1	05/10/2026

1. Overview

Clover Group International Ltd (Clover, the Company) has, in the course of its environmental assessments, identified carbon emissions throughout the global supply-chain as being a key pillar in its client-facing reporting dialogue.

The quality of commercially available reporting data that is generally produced by those in the global transportation sector is comparatively low considering the significant global CO₂ emissions to which the industry contributes.

The Company therefore sees a very real and significant opportunity by which it can differentiate itself from industry peers, through the formulation of *best-in-class* carbon reporting for the goods in transports.

Compass Carbon Reporting is the tool by which the Company presents its carbon reporting abilities to clients. Compass is a bolt-on to the Company's proprietary software platform (*Portal*), and the means by which the service is delivered.

Through *Compass*, the company sets itself and its client base a series of goals. These are:

- To elevate and include carbon emissions as a metric to be considered as an equal to transit timeframe and cost;
- To allow clients the opportunity to select different transport solutions by including carbon emissions as a consideration;
- To report carbon emissions in the context of historical usage, thereby allowing retrospective analysis and pattern identification by clients.

To achieve these goals, the following *Compass Carbon Emissions Methodology* was developed, designed to divide the problem based on transportation method, solve each segment in the way most fitting to it, and hence produce an accurate approximation for **Tank to Wheel (TTW)** carbon emissions.

The Compass Carbon Emissions Methodology Documentation outlines the wider process of calculating TTW carbon emissions, provides insight into the specific processes that provide results for different modes of transportation, and demonstrates the more technical aspects underlying the Compass carbon tracking algorithms.

Document Version	Date Last Reviewed / Amended (see Master Document Register for notes)
V1	05/10/2026

2. Methodology

Compass calculates the TTW carbon footprint of a unit of cargo based on such factors as:

- Method of Transportation
- Cargo Gross Weight
- Fuel/Engine type
- Regional Observations

These variables are supported by a range of in-house developed heuristics, specially curated technical datasets, industry-supplied observational data and internationally recognised scientific standards to provide a rigorous approach to approximating relative carbon emissions.

Job Splitting

Individual jobs are split into segments based on method of transportation. For road freight jobs, the entire carbon footprint is calculated at once using the Compass Road Freight Methodology. For air freight jobs, the job is separated into a single air freight calculation, with two road freight calculations to account for carriage between ports and origin/destination.

a. Road Freight

The Compass Road Freight TTW Emissions calculations begin with finding the distance between an origin and destination point using a road map routing API. Routes are only computed once, as to prevent customer delivery frequency information from being exposed. The total carbon emissions are calculated as the distance between points multiplied by the average carbon emissions per kilogram of fuel per kilometre driven:

$$E_{CO_2} = \text{Distance (km)} \times \text{Gross Weight (tonnes)} \times 0.00015$$

b. Air Freight

Air Freight TTW carbon calculations are performed using the Compass **Mean Path Emissions (MPE)** method. This method assigns a carbon factor to air paths between airports by averaging the emissions of all the aircraft that use it. For the purposes of

Document Version	Date Last Reviewed / Amended (see Master Document Register for notes)
V1	05/10/2026

freight carbon calculations, aircraft deemed unsuitable for courioring are excluded from this process. Using the MPE method allows for accurate emissions approximations even without knowledge of the exact aircraft used to transport the cargo.

The **Mean Carbon Factor (MCF)** of an air path is measured in kilograms per kilometre per tonne. As such, the approximate carbon footprint of a piece of cargo travelling along the air path is simply:

$$E_{co_2} = MCF \times \text{Gross Weight (tonnes)} \times \text{Distance (km)}$$

Compass calculates distances between airports using the **Great Circle Distance (GCD)** formula and applies a correction distribution to account for path variations.

Calculating MCF

Calculating the MCF of an air path begins with identifying the full extent of valid aircraft that operate along the path. For each aircraft, Compass calculates a close approximation for the total fuel burnt during flight, which is dependent on the aircraft type and engine model, the specifications of which are sourced directly from the manufacturer technical documentation and official EASA published environmental and emissions reports. Compass carefully accounts for variance in fuel expenditure, using standardised thrust configurations for the **Landing and Take Off (LTO)** cycle and interpolation algorithms for predicting cruising fuel usage. The final **Mean Fuel Expenditure (MFE)** is simply the weighted average of the individual fuel consumption for each aircraft model, and the **Mean Carbon Emissions (MCE)** is the MFE multiplied by the carbon emissions per kilogram for jet fuel.

$$MCE = MFE \times 3.16$$

To extract MCF from the MCE, Compass must first calculate the **Mean Cargo Capacity (MCC)**, which is just the average cargo capacity of the operating aircraft multiplied by a load factor to account for packing efficiency. The final equation becomes:

$$MCF = \frac{MCE}{MCC \text{ (tonnes)} \times \text{Distance (km)}}$$

The MCF can be used to directly compute carbon emissions as previously described, or it can be used to describe the relative carbon efficiencies of different air paths and hence inform logistics decision making.

Document Version	Date Last Reviewed / Amended (see Master Document Register for notes)
V1	05/10/2026