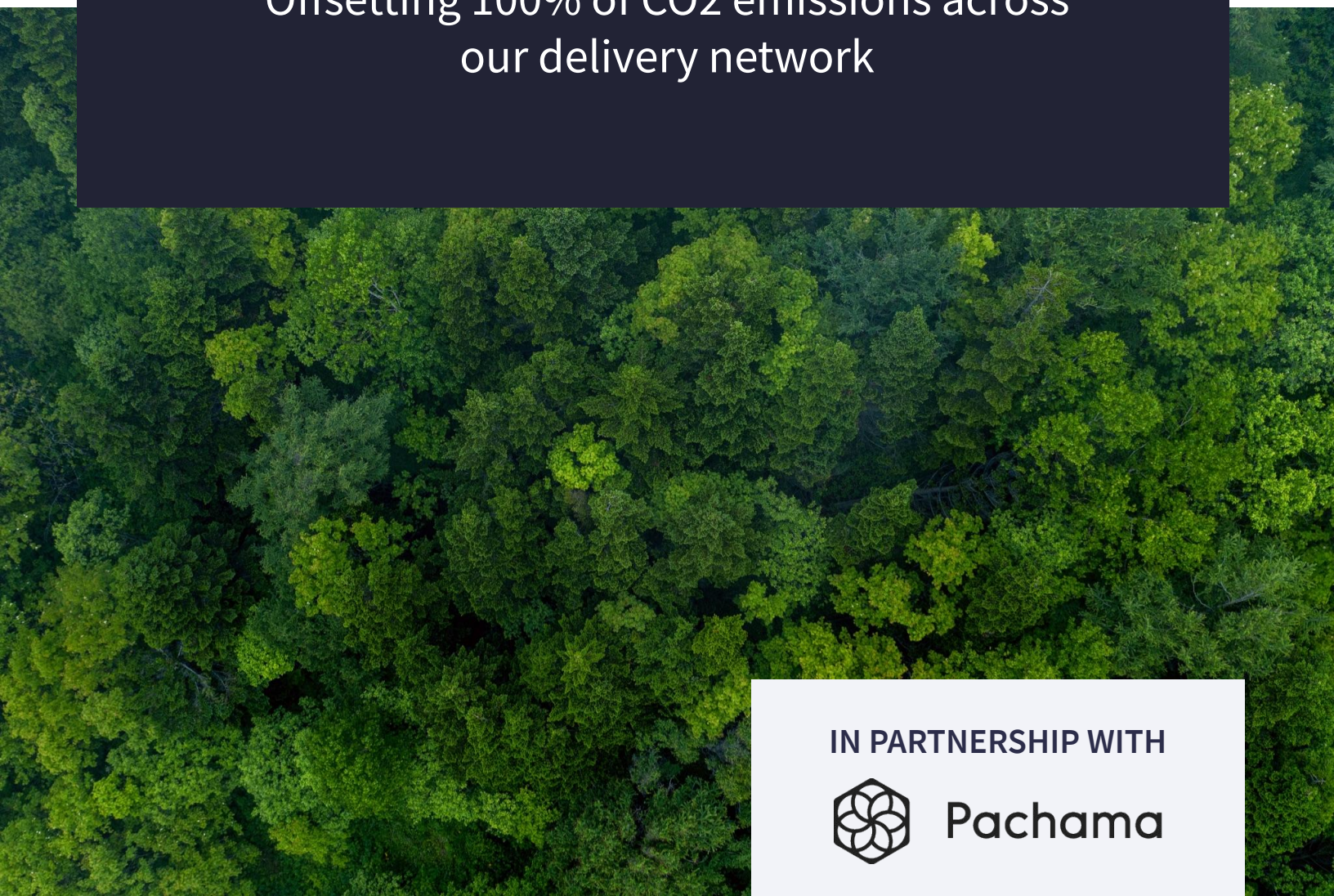
WARE2GO
A UPS Company

CARBON OFFSET SHIPPING NETWORK

CREDIBILITY PROOF

Offsetting 100% of CO2 emissions across our delivery network



IN PARTNERSHIP WITH

Pachama

Credibility Documentation

Ware2Go's calculations for determining the total carbon output within its shipping network.

Contents

Project Summary

Since January 2021, Ware2Go has been offsetting carbon generated from parcel ground, parcel air, less-than-truckload, and full truckload shipments within its network through a partnership with Pachama. Carbon emissions are calculated from Ware2Go's shipment level data coupled with industry standard formulas primarily developed by Pachama and the EPA.

Ware2Go will continue to run this analysis on a quarterly basis to calculate the number of carbon credits to be purchased each quarter to fully offset all carbon emissions within its network. Pachama continually monitors reforestation and preservation efforts to validate carbon credits.

Calculations: Per Shipment Carbon Emissions

Ware2Go leveraged Pachama's proprietary carbon calculation tool in order to calculate its carbon emissions. Pachama's tool is well researched and primarily derives its carbon numbers from the Environmental Protection Agency,

The EPA uses a "Carbon Factor" of 0.207 KG per ton-mile for ground trucks and 1.265 KG per ton-mile for aircraft for weight-distance based calculations (1).

Parcel Ground, Parcel Air, LTL, and FTL Shipments

Ware2Go analyzes its shipping performance by its 4 main transportation methods: small parcel ground, small parcel air, less-than-truckload (LTL) and full truckload (FTL). These breakouts were chosen due to the fundamental differences in the typical shipment profile. Small parcel shipments are relatively light while freight shipments are much heavier. In addition, Ware2Go optimizes its customer's shipping networks, so ground shipments generally travel a much shorter distance compared to air shipments.

These differences in shipping profiles result in dramatically different carbon emissions per shipment. For example, an air shipment is estimated to produce 6x the carbon of a parcel ground shipment while an FTL shipment is estimated to produce over 1,500x the carbon of a single parcel shipment.

Straight line distance was calculated using the haversine distance between the central point of latitude and longitude from origin to destination zip code (4). Average Weight was known for parcel ground, parcel air, LTL, and most FTL shipments. When the weight of an FTL shipment was unknown, a default value of 25,000 pounds was used. This is a heavier estimate of weight than typically expected from Ware2Go's enterprise customers. A breakdown of the 20 most common origin-to-destination combinations can be found in Appendix Figure 2.

Total Carbon Calculations

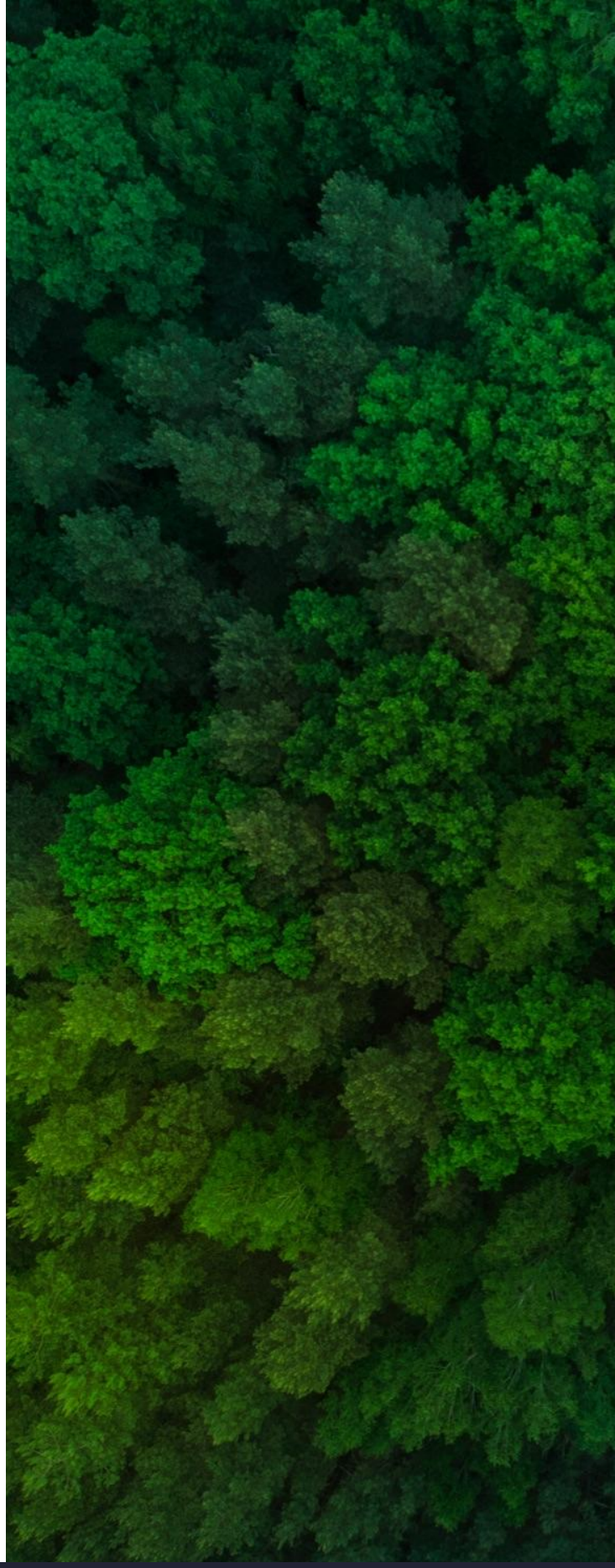
The carbon per shipment in metric tonnes was calculated by combining Ware2Go's business specific calculations and the Pachama's estimate of carbon emissions using the following formula:

CO2 (Metric tonnes) = (Straight Line Distance in miles x 1.5) * (Weight in pounds / 2204.62) * Carbon Factor (converted to lbs per mile)

Straight Line Distance x 1.5 = Estimated distance that the shipment traveled in miles
(accounting for route uncertainty)

Weight in pounds / 2204.62 = Average weight in metric tonnes

Carbon Factor = Assumed carbon emissions based on vehicle type (reference "Carbon Calculations per Shipment")



Assumptions

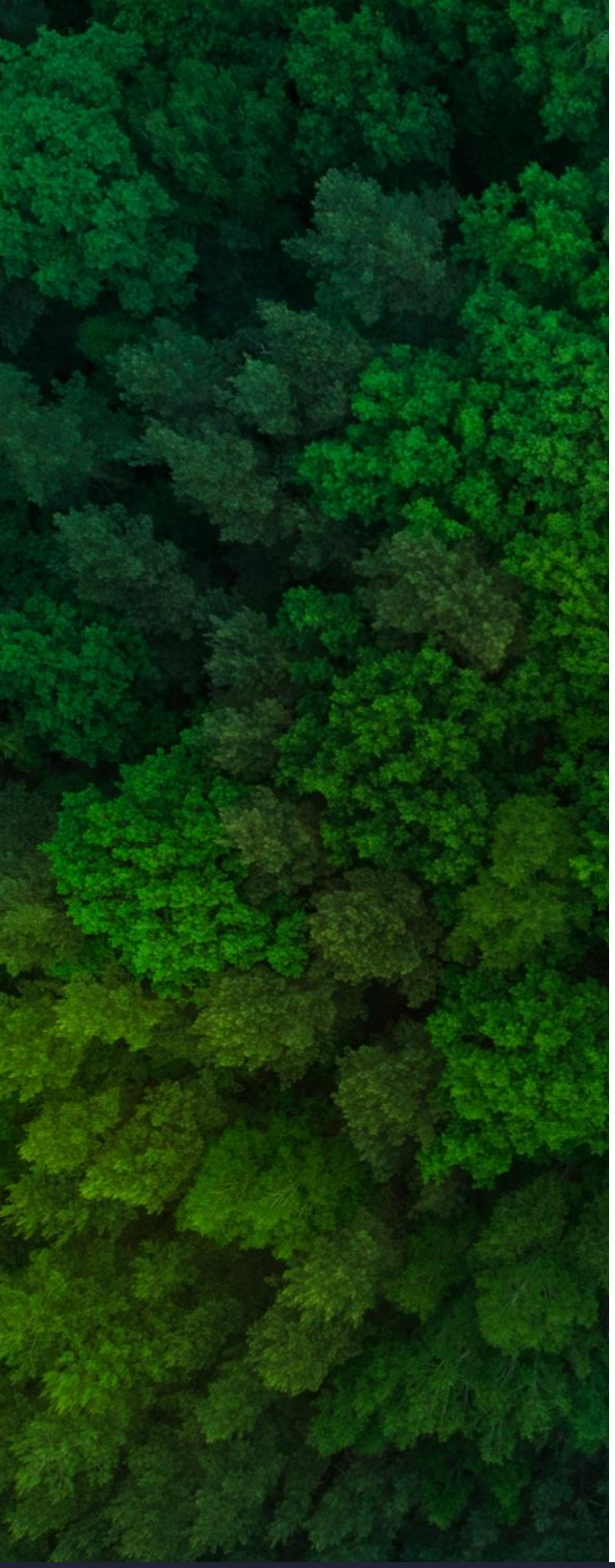
Straight Line Distance Multiplier

Ware2Go needed to calculate the distance that a shipment traveled to accurately estimate carbon emissions using Pachama's calculator. This actual distance a shipment traveled is difficult to accurately measure, so Ware2Go estimated this distance using the straight line distance x 1.5. This multiplier of 1.5 was used to mirror industry standard approaches (3). Ware2Go calculated this multiplier as 1.2, but they chose to use 1.5 as a more aggressive estimate of driving distance.

Validation

Ware2Go leveraged a publicly available calculator from the CarbonFund.org Foundation (4), a non-profit organization that assists with carbon offsetting and greenhouse gas reduction options for individuals, businesses, and organizations, to validate our findings.

Overall, Carbon Fund showed comparable estimates for carbon emissions compared to Ware2Go's calculations using the Pachama formula. For parcel ground shipments in Q1 2021, Carbon Fund estimated that Ware2Go produced 842 tonnes of carbon, whereas Ware2Go estimated 828. Similar estimates were obtained for the other transportation methods. While the source of the discrepancy is unclear, Ware2Go maintains that Pachama provides an accurate estimate of carbon emissions to offset.



Appendix

Figure 1. Average distance and weight by shipment type.

Type	Average Straight Line Distance per Shipment (Miles)	Average Weight per Shipment (pounds)
Parcel Ground	645	15.9
Parcel Air	1,181	9.0
LTL	1,429	249.7
FTL	616	22,166.4

Figure 2: The haversine distance for the most common shipping origin and destinations

Origin Zip	Origin State	Destination Zip	Destination State	Straight Line Distance in Miles
37416	TN	19711	DE	606.8
37416	TN	11368	NY	728.3
37416	TN	11355	NY	729.2
38118	TN	90670	CA	1598.6
37416	TN	11220	NY	716.9
37416	TN	33166	FL	703.6
37416	TN	33178	FL	700.2
37416	TN	10002	NY	720.9
37416	TN	11219	NY	717.4
37416	TN	33755	FL	512.1
37416	TN	14304	NY	644.0
84042	UT	64120	MO	916.3
37416	TN	33172	FL	704.3
64116	MO	76137	TX	461.0
66049	KS	77573	TX	655.2
37416	TN	20906	MD	524.0
37416	TN	22901	VA	418.3
37416	TN	39110	MS	336.0
37416	TN	33126	FL	706.4
97230	OR	98052	WA	148.3

References

1. Table 8. Environmental Protection Agency; “Emission Factors for Greenhouse Gas Inventories”; 2020
2. This was done using the Martins Python Utilities library in Python
3. Shopify uses this as an “uncertanty” factor https://help.shopify.com/en/manual/shipping/setting-up-and-managing-your-shipping/offset
4. https://carbonfund.org/take-action/businesses/business-calculators/