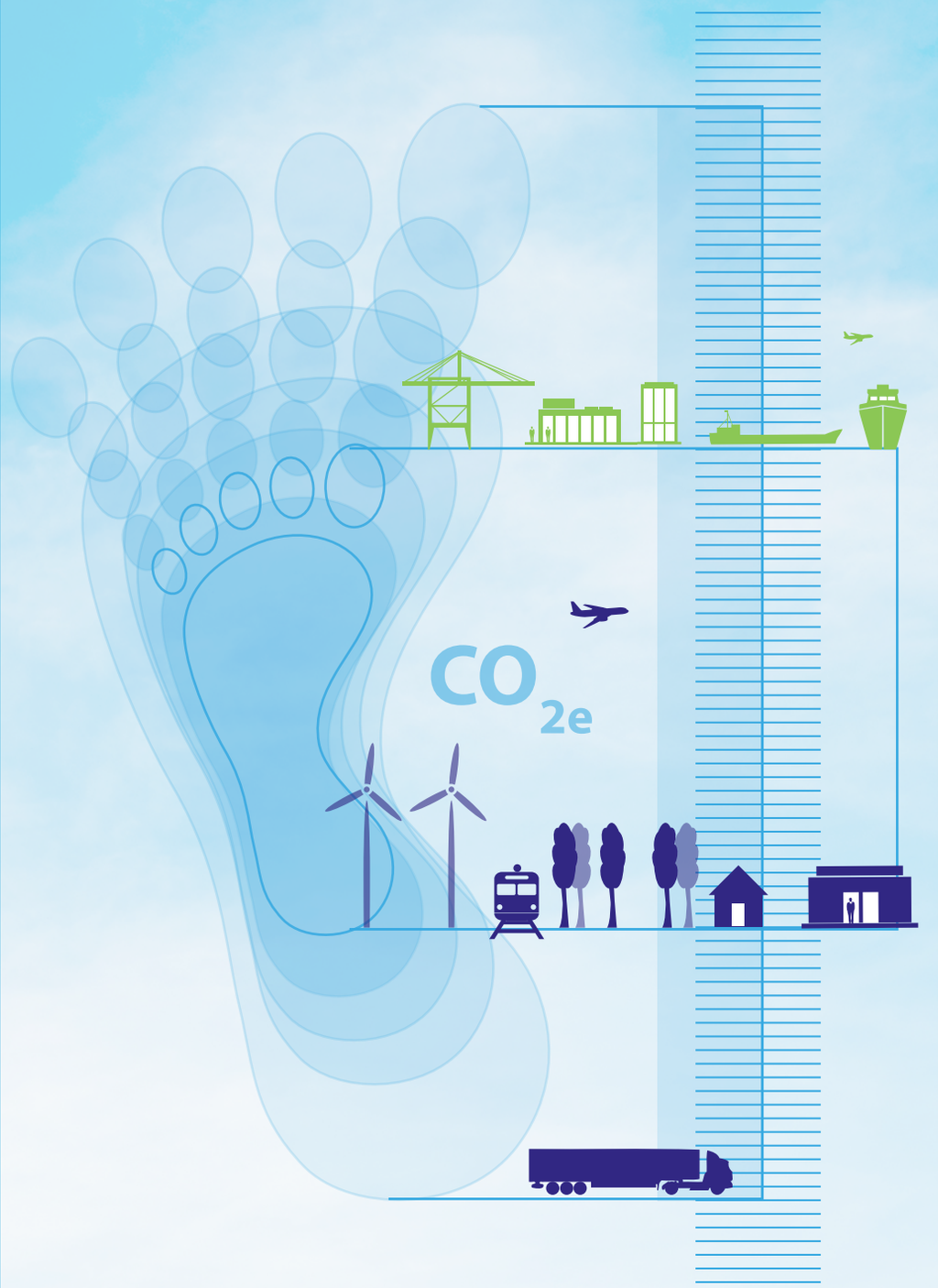
GUIDELINE 12 - CARBON FOOTPRINT IN LOGISTICS



Parcel transport and post

Combined flows

Connekt

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Topsector Logistiek

Colophon

Guideline 12 - Parcel transport and post
Combined flows

Carbon Footprint in logistics

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Parcel transport and post

Combined flows

At a glance there appears to be some similarity between the logistics of consumer mail, commercial mail (including express mail) and parcel deliveries (including B2C and B2B e-commerce): senders may be located anywhere in a country, and the same applies to delivery addresses. The volume per sender can range from very small (1 letter or parcel) to extremely large. In practice, the networks are separated, with anything that can fit into a mailbox being delivered through the postal network and anything larger being handled via the parcel network.

To allow combined volumes to be processed efficiently, specific network structures are created, often with central (sorting) hubs and local distribution centers. Sometimes the networks overlap (as in the case of letter sorting or last-mile delivery to homes).

The 'two-man' home delivery of white and brown goods, for example, is a special variant. In this case the appliances purchased are carried into the home and installed (if required), with old appliances being taken away.

In the case of bulk mail the letters are presented in bags or roll cages, etc., and the transporter does not yet know the destination of each item.

When it comes to delivering parcels or registered post the recipient may not be at home and it may not be possible to deliver the parcel or postal item first time. Then there is the question of returns: in some cases customers will want to send orders back.

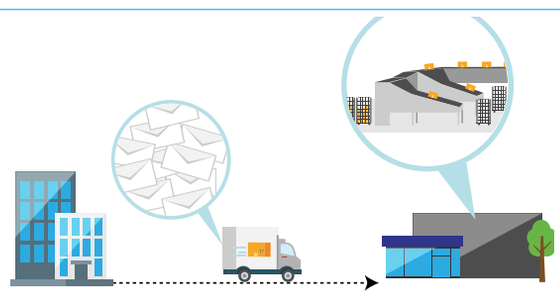
This guideline deals with the specific points that need to be borne in mind when allocating CO_{2e} to cargo in this sector.

Post

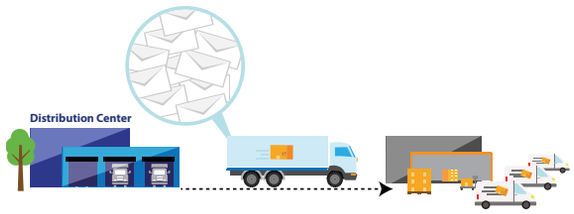
In this example we present a simple network for commercial bulk mail in which all the specific issues are encountered. The situation may be more complex than this in reality.

Consumer mail has many similarities to this, although collection is organized differently (in the form of collection runs to mailboxes and locations). The same also applies to express mail, as this involves collection runs to pick up express items.

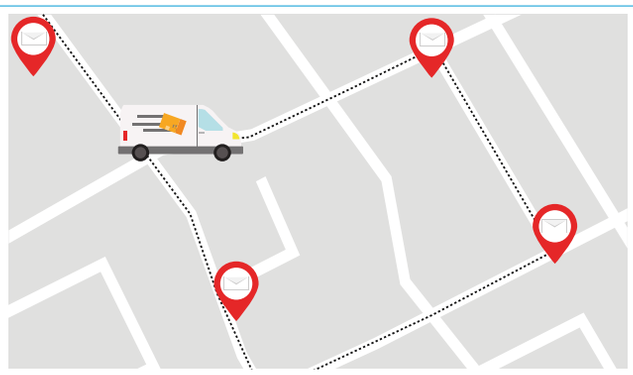
For post the logistical structure consists of a number of different stages



Collection from large customers or a local collection point and transfer to a sorting center.

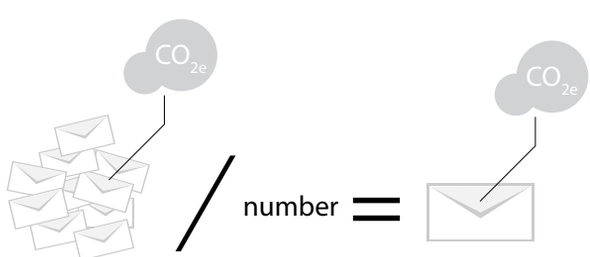


Transport to a regional distribution center and then to a local delivery point.



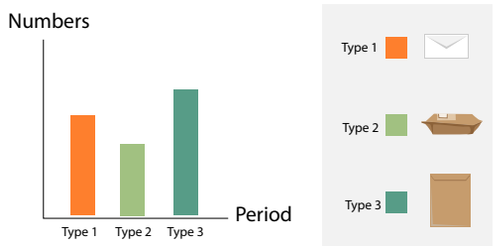
Delivery to addresses.

In the case of bulk mail it is practical to work with letter types: there will be a limited number of types, linked to the franking. Working with types only makes sense if there are significant differences between them in terms of their volume or the amount of capacity they take up.

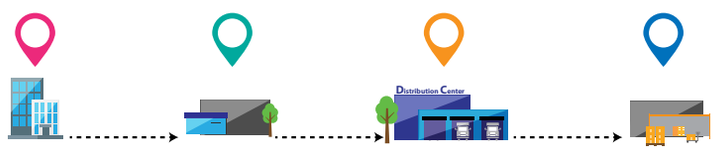


Measuring the emissions per type and then dividing this by the number to obtain the emissions per unit is a sufficiently accurate approach. This means that transporters need to collect the emissions and volume data for each letter type per leg.

There may be a number of legs and the first legs up to delivery are simple

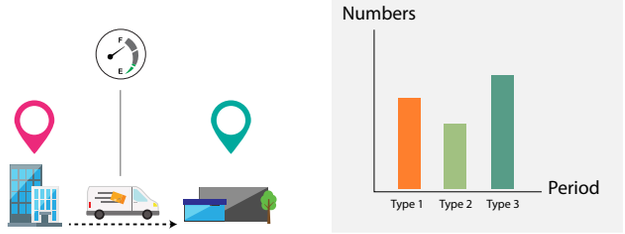


The number of letters of each type is known per day or period and per customer.
Alternative: average per mailbag or roll cage.

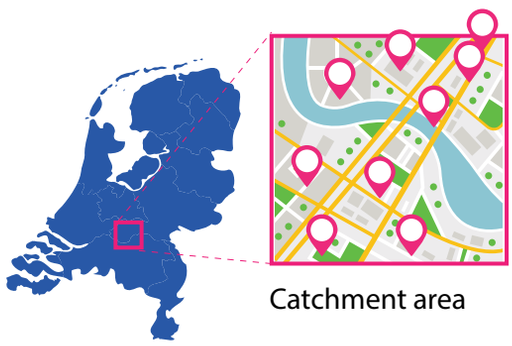


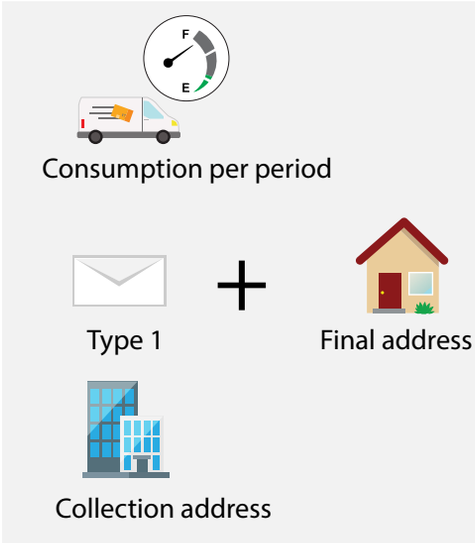
Origin and destination are fixed addresses. These are the locations from which the truck collects the post and to which it transports it (customer to sorting center, sorting center to regional distribution center, regional distribution center to local delivery point).

The total emissions per leg/period can be worked out by determining the fuel consumed by each truck for the leg concerned.
Please note: this relates to the amount of fuel for the entire round trip, until the truck has returned to its starting point.



For each leg determining the emissions per type/unit (in the case of post) or the emissions per type/unit per km_{gcd} is then a simple task. However, this is only simple if a vehicle is constantly traveling back and forth between location A and B.
In practice, such vehicles may also make small round trips: from the regional distribution center they may make a round trip taking in 3 different local delivery points, for example. In this case the COFRET allocation has to be applied again, as one delivery point may be much closer to the DC than another.





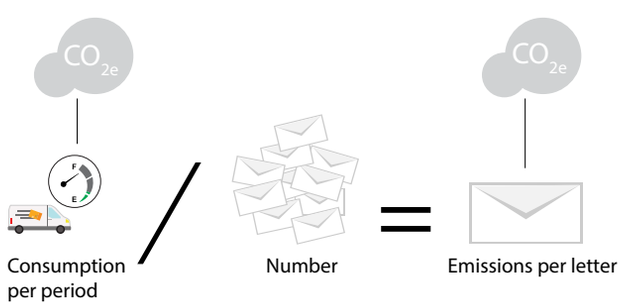
In the case of post the final leg will involve transport from a local delivery point to the final address. The postal address of the recipient now comes into the equation.

The transporter measures the total emissions per period in that particular catchment area of the local delivery point (e.g. the total fuel consumed by the van(s)).

Ideally, these emissions should be allocated to letters on the basis of the combination of:

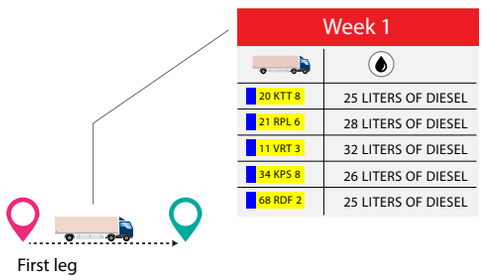
- Type of letter + final address within that catchment area;
- Location of delivery point.

The number/type for each final address is known following sorting.

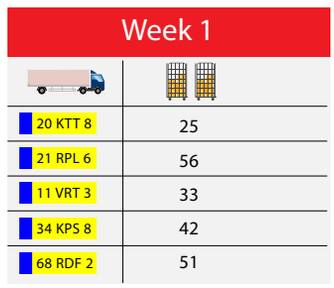


Another way is to divide the emissions by the total number of letters. This provides less management information, but is still correct in terms of total emissions.

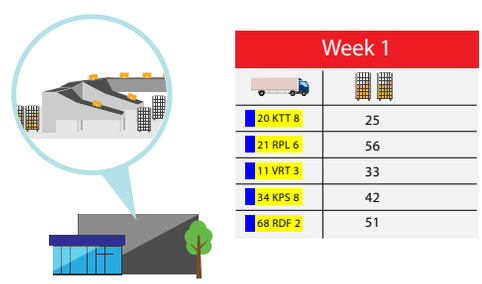
In practice, this means that transporters have to collect the following data



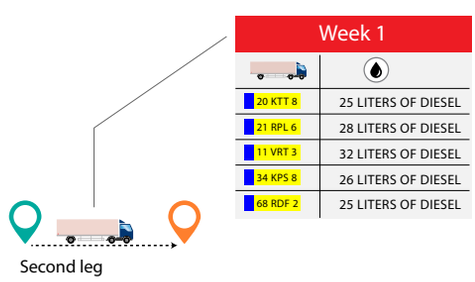
First-leg trips *(collection to first stop).*
License plates and consumption, per week or day.



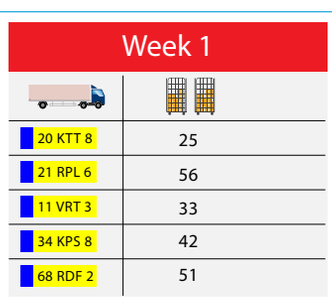
Numbers of mailbags or roll cages.
Per week, or per vehicle.



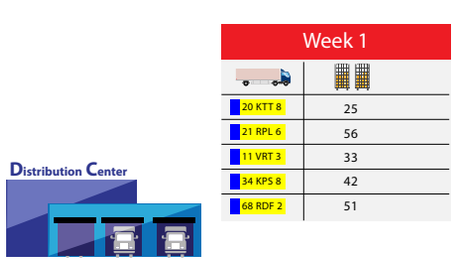
Internal destination *(sorting).*
Per vehicle, or total numbers per destination over a week.



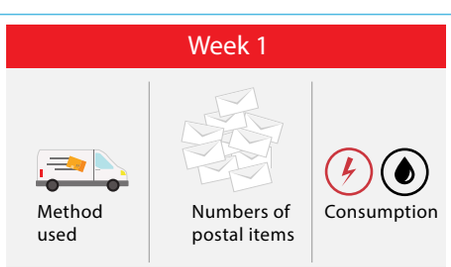
Second-leg trips *(sorting to DC).*
License plates and consumption, per week or day.



Numbers of mailbags or roll cages.
Per week, or per vehicle.



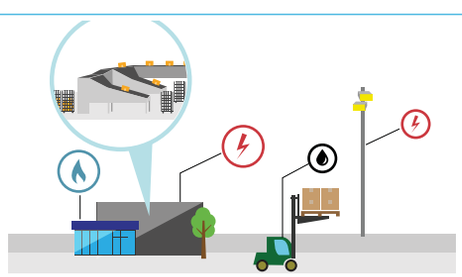
Distribution Center *(DC).*
Per vehicle, or total numbers per destination over a week.



Delivery
Method used: vehicle or postal delivery worker
- *Per item, or total in area per week per type.*

Numbers of postal items
- *Per vehicle or postal delivery worker, or as a total across items of the same type per week.*

Energy consumption/fuel consumption (type/quantity per day/week)
- *Per vehicle or as a total per type per week*



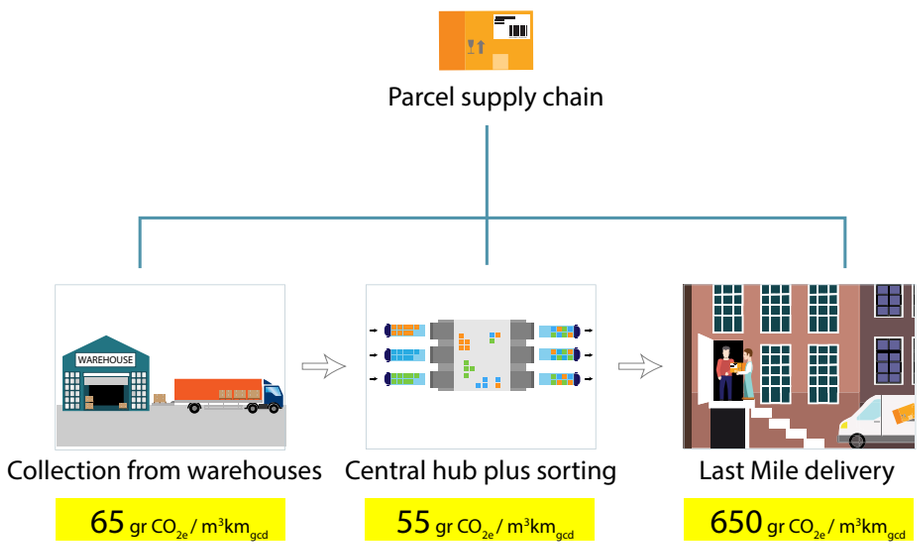
Energy consumption of sorting locations and DC.
Allocated based on numbers of processed items for customer. (see Guideline 10. Transshipment)

These data are sufficient to calculate the allocation.

Please note: all of the above is intended for post (letters) with a weight or volume that is not known in advance. If the weight and volume are known, the approach falls under the "parcels" section, which is dealt with below.

Parcels (non-food)

The logistical networks for parcels are similar to those for processing post: first the orders for delivery are collected from warehouses and are then transported as a combined flow to the end customer via specific network structures with central (sorting) hubs and local distribution centers.



To get a better feel for the indicators, we will take the following example. The indicators are fictitious.

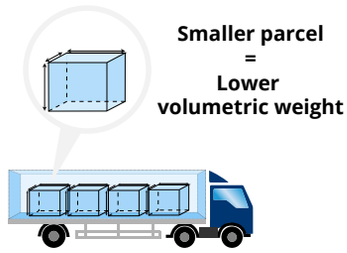
In the first leg a 25-liter (0.025 m^3) parcel is transported a great-circle distance of 40 kilometers and in the second leg a greatcircle distance of 60 kilometers, e.g. to a transshipment point on the outskirts of Leiden. In the case of a city such as Leiden the great-circle distance from the outskirts to the center is approximately 5 kilometers.

The emissions for this delivery are therefore:
0.025 m^3 x 65 gr CO_{2e}/m^3km_{gcd} x 40 km = 65 grams CO_{2e}
0.025 m^3 x 55 gr CO_{2e}/m^3km_{gcd} x 60 km = 82.5 grams CO_{2e}
0.025 m^3 x 650 gr CO_{2e}/m^3km_{gcd} x 4 km = 65 grams CO_{2e}

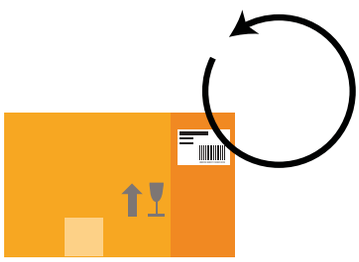
Total = 212.5 grams CO_{2e}

The higher indicator for the last-mile delivery can be explained by the much smaller volume that can be carried in a van, compared with a truck with semi-trailer. A van has to criss-cross the city to make deliveries.

If parcels are smaller (fit more snugly around the product), this is immediately reflected in the emissions, as you would intuitively expect. You can fit more of them into one vehicle if parcels are smaller in size.



In the case of parcels it is the volume of the parcel that determines the transport capacity utilized: the smaller the parcel, the more of them can fit into a vehicle.



Returns.

The final address may be either a home or office (private or commercial) or a collection point. In the case of parcel deliveries all kinds of other aspects also come into the picture, such as the recipient not being at home and returns.

Clothes in particular have a relatively high return rate and orders (or parts of orders) may be sent back again.

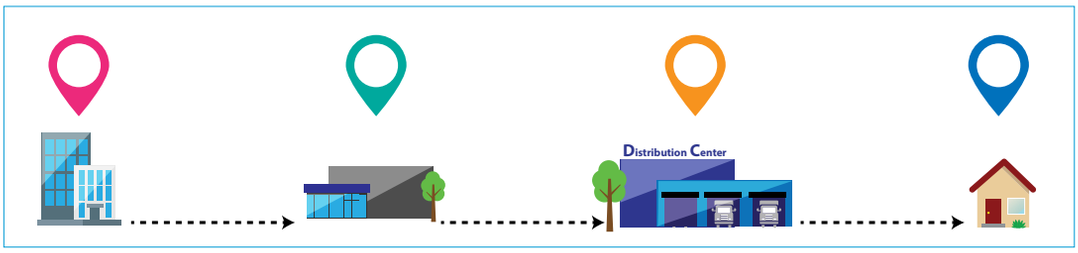
The 'two-man' home delivery of white and brown goods, for example, is a special variant. In this case the appliances purchased are carried into the home and installed (if required), with old appliances being taken away. Weight (rather than volume) may be the limiting factor here: 'full' is when the 'maximum weight has been reached'. The principles remain the same.

Allocation with details

The basis for allocation is relatively simple, as the origin and destination, as well as the volume of the parcel, are known for all parcels.

For each leg the fuel (or energy/electricity) consumed, and therefore the CO_{2e} emissions of a vehicle or vehicles, can be allocated to the parcels, on the basis of the volume per parcel and the (great-circle) distance between the origin and destination. (See the Guideline: 'Allocation'.)

The basis involves calculating the emissions per parcel: if several parcels are delivered to a single address at the same time, the emissions per parcel are added together to determine the emissions of the combined order.



For each leg the origin and destination are, for example:

- Collection location (warehouse) to sorting location;
- Sorting location to regional distribution center;
- Regional distribution center to delivery address.

In the case of parcel deliveries, however, it is useful to take advantage of all the details already in the data and in this way bypass the average.

Service categories

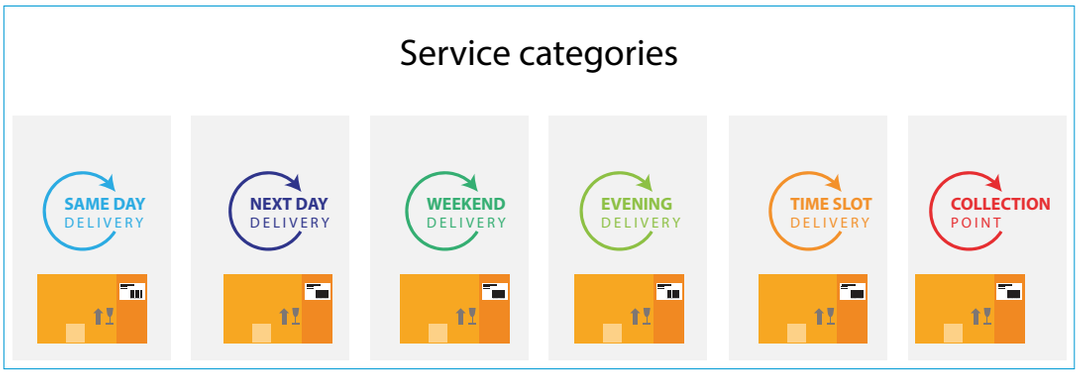
In the case of parcels there are usually a number of options for the speed of delivery or the delivery window. This may be important when it comes to calculating and allocating emissions: if a choice clearly results in less efficient ('less thick') flows, the emissions per unit are higher. For example: having to make an express delivery will probably mean a vehicle is less full, or having a specific delivery window may mean that fewer items can be combined on a single trip. In the past weekend deliveries were fairly rare (and therefore combined less efficiently), but the increase in weekend volumes will reduce this discrepancy.

Same-day delivery with vehicles that are less full.

This means that the differences between service categories can change over time if the 'thickness' of the flows changes.

The same applies to special logistics solutions: if a large e-tailer presorts parcels at the warehouse, e.g. into roll cages per region, the sorting step can be skipped.

It is advisable to distinguish between these service categories in the data so the difference can be monitored.

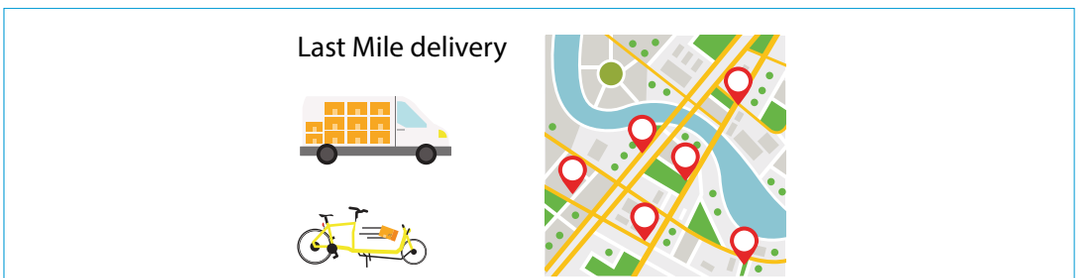


Regional differences

In the case of parcel deliveries the 'last mile' is known to be a major factor per unit. There is a significant difference between a large van that can deliver to many different addresses in a district within a major city, and has to cover very few kilometers to do so, and a small van that has to travel long distances in a rural area to deliver to a limited number of addresses.

In cities increasing use is being made of cargo bikes, light electric freight vehicles and zero emission vehicles. This immediately leads to a relatively large reduction in emissions per unit in this region.

It is advisable to record this difference and make it visible in the data, e.g. per postcode area.



The choice of vehicles for the 'last mile' has a significant influence on emissions.

Not at home

In the past a delivery driver often had to visit an address for a second time to deliver a parcel. Nowadays, the parcel is immediately taken to a collection point if the recipient is not at home. The effect of these additional visits on the allocation is that more emissions are allocated to all the deliveries of this delivery driver (per day or period, depending on the accuracy of the fuel measurement). This effect is therefore incorporated into the average for the delivery region in question.

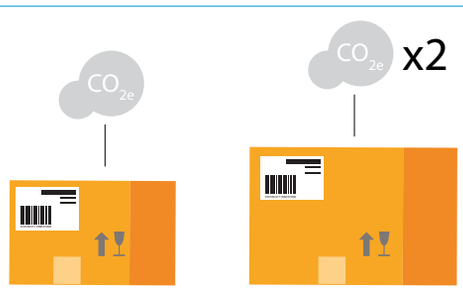
In practice both the not-at-home rate and the indicator (emissions per m^3 per km_{gcd}) are monitored for the region or delivery driver.

First delivery. No one at home.

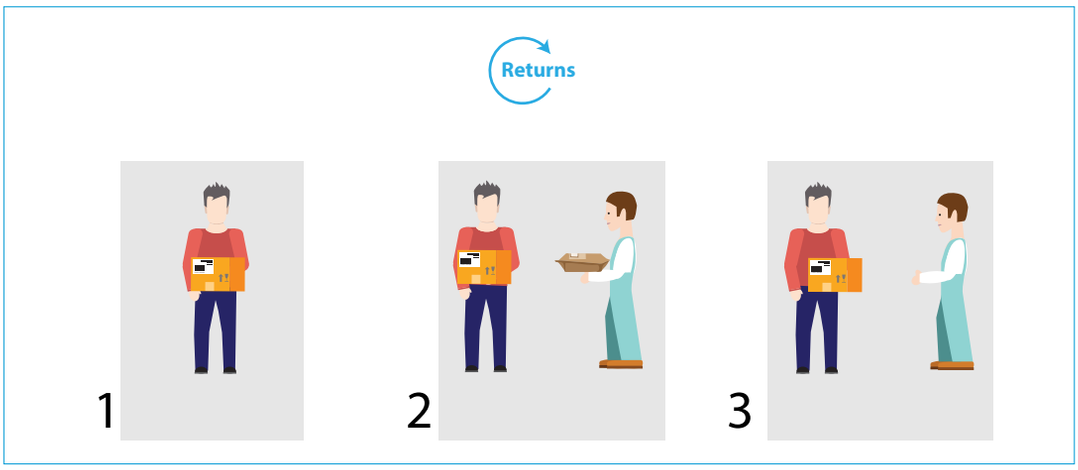
Second delivery. Parcel is delivered.

Returns

If the COFRET methodology is strictly applied, this gives rise to a phenomenon that is perplexing for third parties: returning items is also a transport activity, so the emissions are spread over even more activities. However, a higher number of returns leading to lower calculated emissions per parcel is hard to justify. For this reason an alternative rule is applied in practice: all emissions are allocated to the delivery of the parcel.



If the volume is twice as big, twice the emissions are allocated to the parcel.



If a person orders two pairs of shoes, for example, the parcel is twice as big and the order is allocated twice the emissions for delivery. If one of the two pairs is returned, what happens depends on the return procedure:

1 The recipient brings the return parcel to a collection point him/herself.
2 The return parcel is handed to a delivery driver who was calling at the address anyway.
3 The delivery driver makes a special trip to pick it up. Only in this case does the delivery driver travel additional kilometers.

As a rule, returning the item to the warehouse does not involve any extra trips: the empty trucks traveling to collect orders take the returns back with them. This means that simplifying the process so that everything is allocated to delivery does not result in any substantial deviation from reality.

Warehouse is abroad

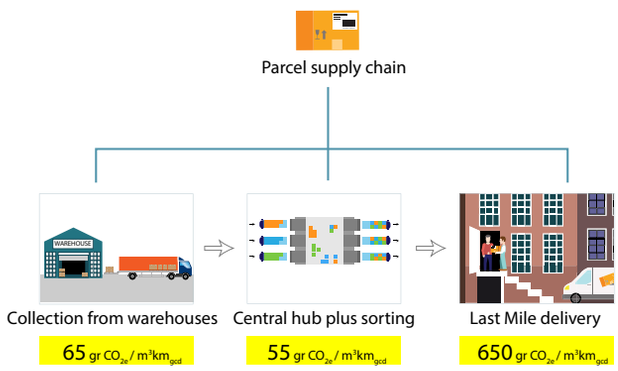
In some cases orders are supplied from a warehouse abroad. This may be in a neighboring country, for example, but in the most extreme case the order may arrive by plane on an intercontinental flight.

For orders transported by land from a neighboring country the agreement is that the emissions will be counted from the border crossing on the route. In the case of goods arriving by plane, they are counted from the airport.

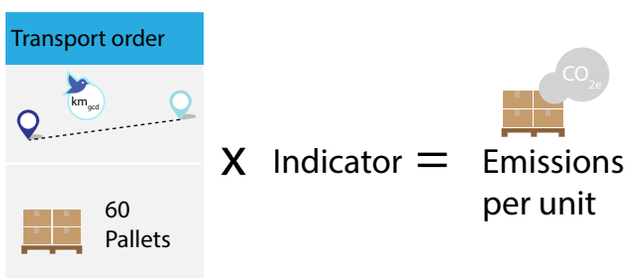
In Europe it is likely that the entire chain will have to be taken into account in the future, i.e. including 'inbound' journeys. For the time being the agreement that emissions will be counted from the border or airport applies.

Predicting

In the Netherlands the sector has analyzed the indicators for each leg of the chain, per region and per service category. This has resulted in indicators for transport, expressed as emissions per m^3 per km_{gcd}.



The transport efficiency of each leg can be measured in the form of an emissions indicator. In this example the factors used are the same as those in the previous example calculation.



By taking the transport orders (quantity, origin and destination), calculating the great-circle distance between the origin and destination, and multiplying this by the indicator received, the emissions per unit are easily obtained. There is no need to know the route. This calculation will usually be performed by software. The more specific the indicator is, the more accurate the result.

These indicators differ from one region and postcode area to another. The emissions that will result from delivering a parcel to a certain address can be predicted very easily for each order with the help of these indicators. All you need are: the address from which the parcel will be collected, the address to which it will be delivered and the size (liters).

If you determine the great-circle distance in kilometers between the locations (warehouse, sorting center, local DC and final address), you can calculate what the emissions will be by means of a simple multiplication.

This type of approach is being employed by the e-commerce sector in the Netherlands under the name 'Bewust Bezorgd' ('Consciously Delivered').

bewust bezorgd

Carbon Footprint guidelines

0. Measuring, calculating, allocating and reducing

1. Allocating

2. Cargo

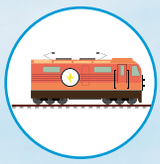
3. Origin and destination

4. Fuel

5. Inland shipping - containers

6. Inland shipping - bulk

7. Freight transport by rail



8. Air freight

9. Maritime and short sea shipping

10. Transshipment

11. Storage

12. Parcel transport and post

13. General road transport

14. Perishable and temperature controlled

15. Outsourced transport

16. Repositioning and empty kilometers

17. (Inter)national supply chains

18. Benchmarking

19. Intermediaries and platforms

20. Auditors and accountants

21. Data quality

22. The relationship between social goals and corporate goals

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