Chain analysis Return Logistics

Renewi Nederland b.v.

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renewi waste no more

CO_2-PRESTATIELADDER©

1 Introduction

For the audit of 2024, Renewi wants to analyse the 'Return Logistics' in the context of the CO_2 Performance Ladder. Renewi expects that the GHG (Greenhouse Gas) generated by the current way of logistics is less, compared to the previous way.

This document describes the chain analysis of the process of this project. The report has been produced by Spaak Circular Solutions BV (hereafter: Spaak) on behalf of Renewi.

1.1 What is a chain analysis?

A chain analysis (NL: ketenanalyse) provides information about the CO_2 emissions of a certain product or service for the entire supply chain. This includes the life cycle of a product from the extraction of raw materials to the impact of the product's end of life, including options of recycling.

1.2 Activities Renewi Netherlands Holding b.v.

Renewi strives to be the leading waste-to-product company by contributing to a sustainable society for their key stakeholders: customers, employees, local communities and their shareholders. Renewi focuses on obtaining value from waste instead of incinerating or landfilling waste. Of the 60 million tonnes of waste processed annually in the Netherlands, 90% is recycled or used for energy recovery[1]. Renewi believes that this unique approach to waste-to-product is in line with social and regulatory developments. This approach also offers the most capital-efficient solution for effective recycling and waste management.

1.3 Goal of the research

The main objective for carrying out this chain analysis is to identify CO_2 reduction opportunities, define reduction targets and monitor progress. Based on the insight into Scope 3 emissions and this chain analysis, a reduction target is formulated. Within the CO_2 management system, that has been introduced, active efforts are made to reduce Scope 3 emissions.

Providing information to partners within Renewi's chain and sector – who are part of a similar chain of activities – is explicitly part of this chain analysis. Based on the results, Renewi will take steps to involve these partners in achieving the reduction targets.

1.4 Scope 3 emissions and selection of chain analysis

Renewi's business activities are part of a chain of activities. For example, raw materials, which are collected or acquired, first have to be produced – these are the 'upstream' emissions. Second, transportation, use and processing of delivered products or services use energy and emit GHGs – these are the 'downstream' emissions.
Renewi has chosen to do the chain analyses within the Product-Market Combination of 'Commercial Waste – Company'[2].
This report describes the chain analysis of the collection of the waste from Jumbo supermarkets.

[1] www.afvalcirculair.nl; www.ned.nl

[2] The underlying calculations can be found in Appendix 4.A.1. Scope 3 analyse – PMC – Renewi Netherlands Holding b.v. 2017

The analysis compares the previous situation with the ‘Return Logistics’ process. The two chains will be explained in the next chapter.

2 Identification of the chain

2.1 Background Return Logistics

Jumbo has more than 700 stores across the Netherlands and is one of the largest food retailers in the country. Renewi plays an important role in their operations by managing 1.521 tonnes of their waste every year. Renewi collects and then processes this waste to create value from it in a circular way.

2.1 Pre-centralisation chain

Previously, Renewi was collecting waste from all Jumbo's supermarkets and transported it to their processing plant located in Amsterdam (green flows in Figure 1). The waste consisted of out of date products generated in each supermarket.

From the other side, Jumbo receives goods from its suppliers in its 4 distribution centres (pink lines in Figure 1) and then distributes them to all stores with its own fleet of suppliers by truck (blue lines in Figure 1). The goods are transported in 2 kg trays and stored on the trays. Once the trays were empty, they were transported back to the distribution centres for the next supply (yellow lines in Figure 1).

2.2 Post-centralisation chain

The optimised logistics makes use of the empty trucks of Jumbo going with empty trays to the distribution centres. Instead of Renewi passing by all Jumbo supermarkets, Jumbo itself, fills their return trucks with waste (yellow lines in Figure 2). The waste is collected at the distribution centres. Renewi transports the waste from the distribution centre to their processing facility (green lines in Figure 2). By doing this, there is less transport needed. Jumbo has four distribution centres.

On the suppliers side of Jumbo, no changes are made in post-centralisation (pink and blue lines in Figure 2).

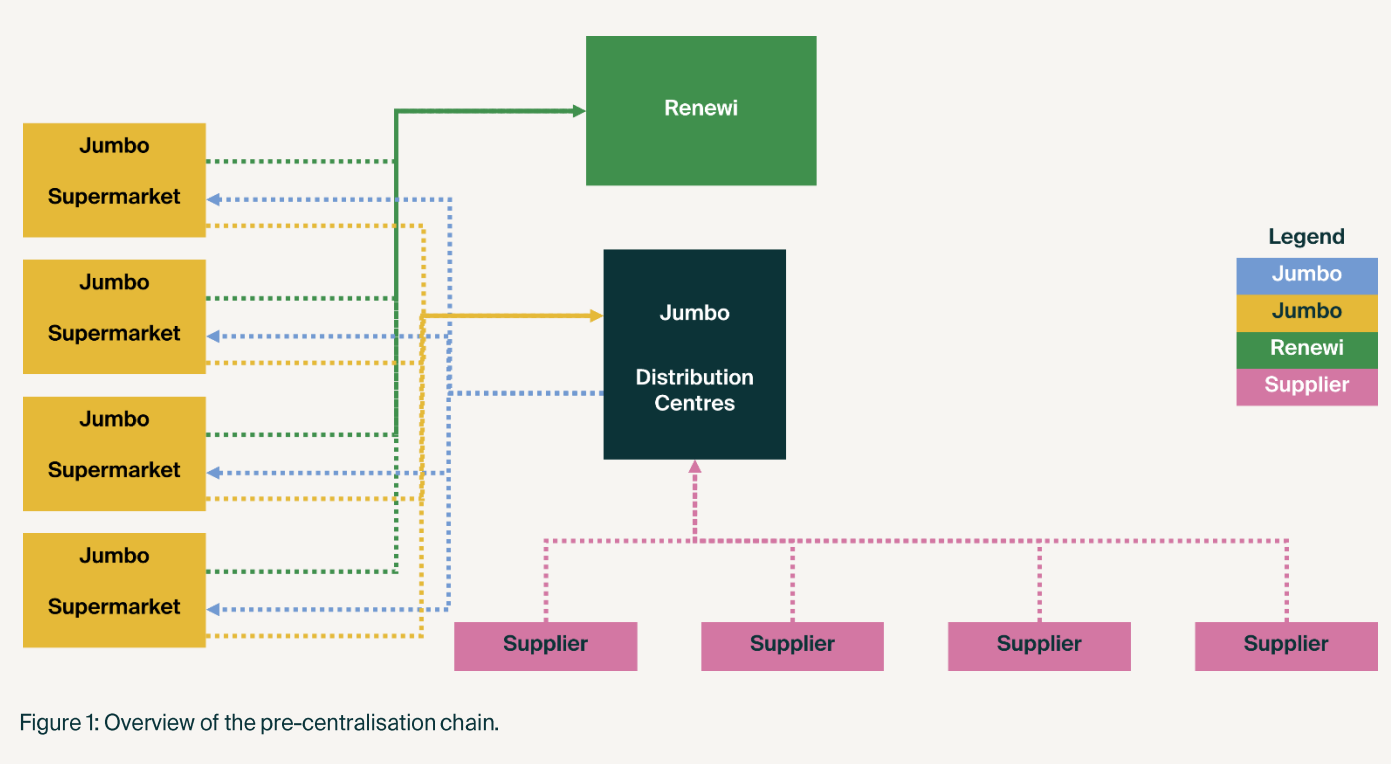

Figure 1: Overview of the pre-centralisation chain.

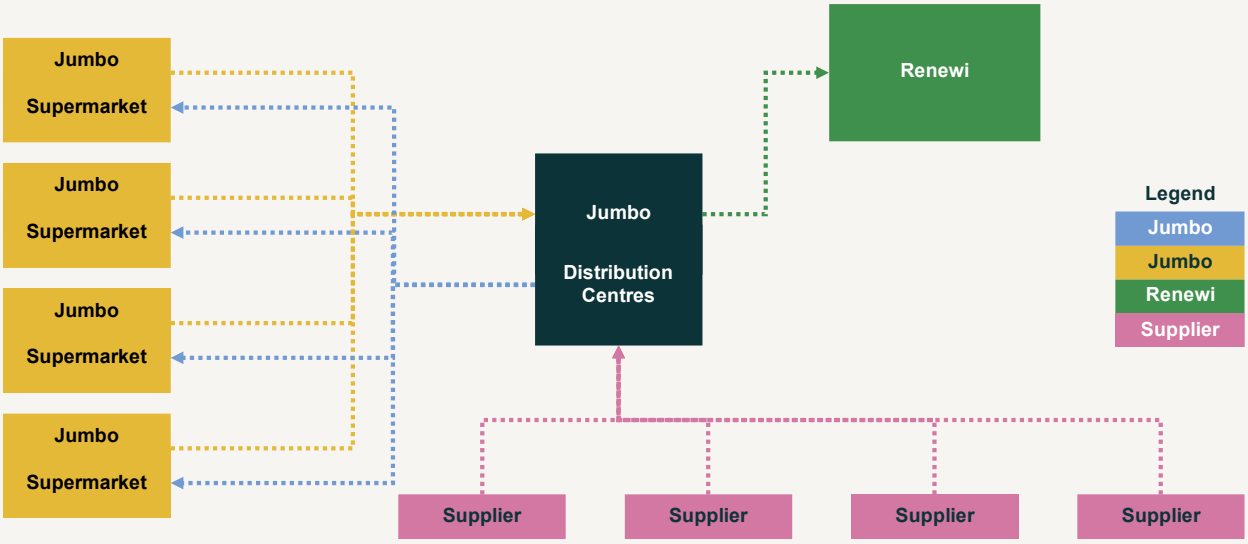

Figure 2: Schematic overview of post-centralisation chain.

3 Environmental impact analysis

The total CO_2 footprint of the process of Return Logistics is analysed by comparing the pre- and post-centralisation scenarios.

3.1 Methodology

The methodology used, is related to that of a lifecycle assessment (LCA) defined by the ISO standards but is adapted to meet the needs of Renewi. The impact analysis goes through the following steps:

1. Defining the scope of the analysis;
2. Defining the steps of the processes that will be compared into the Input-Tech-Output model;
3. Making an inventory of all material flows and their quantity within the processes;
4. Calculating the emissions that are impacting the environment in CO_2 equivalents.
5. Interpreting the results and defining reduction possibilities for Renewi and the chain they are acting in.

3.2 Scope

Within the scope of this project is only the impact of transport by Renewi in both scenarios. In the case of pre-centralisation, the emissions from the transport of waste from each of the supermarkets to Renewi's facilities are counted, while in the case of post-centralisation, the emissions from the transport from Jumbo's distribution centres to Renewi's facilities are counted.

Not within the scope are:

- Material or energy flows within the supply chain.
- Transportation from suppliers to Jumbo's distribution centres.
- Transportation from Jumbo's distribution centres to supermarkets.
- Other processes related to trucks maintenance such as cleaning, oil change, tires, etc.

These fall outside the scope, since they are the same in both the chains compared during this analysis.

3.3 Input-Tech-Output model

The Input-Tech-Output model builds the basis for the impact assessment. Inputs include all the (raw) materials needed for the processes within the scope of the project. The Tech part of the model covers the necessary technology to keep the processes running, such as electricity, fuel, and transport. Finally, Output considers material flows that get out of the process. In this project there are no flows of materials in and out of the system boundaries, therefore, there is only transport which is included in the Tech part of the model.

4 Quantification of emissions

This chapter illustrates the total CO_2-eq. footprint of the process of Return Logistics.

4.1 Renewi's emissions

Emissions were compared between the pre-centralisation scenario and the post-centralisation scenario. In both scenarios, 11.388 tonnes of waste are transported from Jumbo's facilities to Renewi's processing plant annually. Table 1 shows the comparison of emissions per scenario.

Table 1: Summary of emissions by scenario.

	Pre-centralisation	Post-centralisation
Distance (km/year)	931.480	90.458
Total CO_2 emissions (ton)	325,50	127,34
Per ton of waste (kg CO_2-eq/ton)	28,58	11,18

As can be see, the distance in the post-centralisation is just 10% of the distance before (see Figure 3).

4.1.1 Pre-centralisation scenario

The annual emission of the pre-centralisation scenario was 325,5 tonnes CO_2-eq. This corresponds to 28,58 kg CO_2-eq per tonne of waste. In this scenario, 931.480 km were driven by Renewi trucks each year.

4.1.2 Post-centralisation scenario

The current logistics scenario of Return Logistics emits 127,34 CO_2-eq per year. This corresponds to 11,18 kg CO_2-eq per tonne of waste. In the post-centralisation scenario, Renewi's trucks travel 90.458 km. This represents a 61% reduction in the CO_2-eq emissions per year (see Figure 3) and a 90% reduction in the distance travelled per year (see Figure 4).

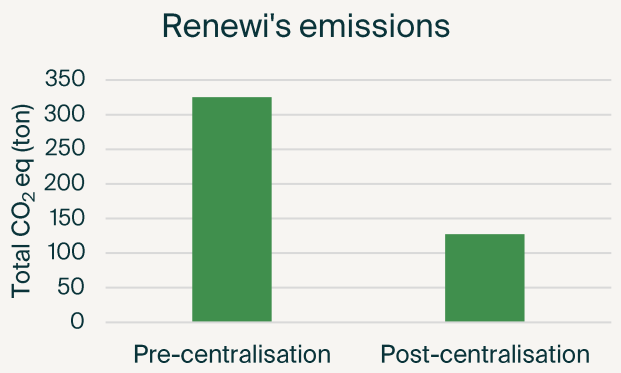

Figure 3: Renewi's carbon footprint in pre- and post-centralisation.

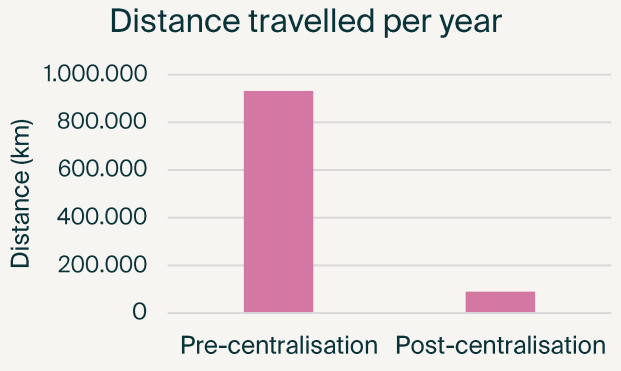

Figure 4: Annual distance travelled per year in pre- and post-centralisation.

In this scenario, emissions are lower not only because of the shorter distance travelled, but also because of the change in trucks. In the pre-centralisation scenario, all trucks were Euro 5, while in the post-centralisation scenario 60% are Euro 6 and 40% are Bio LNG.

Transport from suppliers to Jumbo's distribution centres and from there to the supermarkets is not included in the calculations as the emissions in these processes do not change within the scenarios.

4.2 Jumbo's emissions

While the specific routes and distances travelled by Jumbo trucks are not quantified, the overall carbon emissions for Jumbo trucks are expected to slightly increase. By using their capacity more efficiently on return trips to the DC, there is an increase in the weight of trucks (due to the waste transported back) and so do the emissions for these trips.

However, this optimisation results in a significant overall benefit to the supply chain. The post-centralisation scenario results in a significant reduction in total emissions due to optimised routing, the use of lower emission trucks and efficient use of Jumbo truck capacity on return journeys.

5 Reduction possibilities

Based on the emissions calculated, reduction possibilities have emerged within the process of the Return Logistics, but also within the influence field of the whole chain, where Renewi is a main player.

5.1 Reduction possibilities within the process

Within the process, the main opportunities for reduction are to maximise collection volumes and reduce truck emissions. The first is already achieved by Renewi's logistics model, while the second can be improved.

Renewi has targets to transition to electric trucks by 2030 which will reduce its transport emissions. The level of impact reduction depends on the energy source used for the electric trucks. For example, using grid energy will have a higher impact than using entirely solar energy produced by Renewi. For this reason the carbon footprint reduction of this change was not calculated exactly, but it will certainly have a high impact for Renewi as they have a high renewable energy production.

Considering the post-centralisation scenario, if all their trucks are switched to Bio LNG, then carbon emissions decrease by 96%, as shown in Table 2.

Table 2: Carbon footprint with 100% bio LNG trucks.

	Post-centralisation	100% BIO LNG
Total CO_2 emissions (ton)	127,34	12,24
Per ton of waste (kg CO_2-eq/ton)	11,18	1,08

5.2 Reduction possibilities up- and downstream of the process

Reductions upstream and downstream are about waste prevention. This can be achieved in the following ways:

Each supplier has its own packaging to protect its products. But when it comes to waste management, this creates a problem for the rest of the value chain. Reducing the amount of different materials makes it easier to Renewi to separate them for different purposes, such as composting, recycling, incineration and landfill. Given that it is not easy to change the way Jumbo's suppliers operate, one possible option is to separate packaging at store level.

Another option is to reduce the amount of waste from out of date products. This can be achieved by optimising the amount of product supplied to each supermarket and at the same time promoting the sale of products that are close to expiry. In this way, the amount of waste to be treated is reduced throughout the value chain.

5.3 Reduction possibilities within chain

There are also options to reduce emissions within the chain, such as the use of renewable energy by all actors in the chain.

Renewi is already reducing its carbon footprint by using renewable energy and selling green energy produced on site, such as biogas from the anaerobic digesters. However, Jumbo and its suppliers could also use renewable energy to reduce their impact throughout their operations (if they are not already doing so), as well as using low-emission trucks.

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